

RURAL WORKS DEPARTMENT

GOVERNMENT OF UTTARAKHAND

Office of Superitendant Engineer, Rural works Department.

Tapovan Marg, (Near Doordardhan Building) Raipur Road. Dehradun, PIN 248001

Phone: 0135-2780538

NATIONAL COMPETITIVE BIDDING (NCB)



Invitation of Bids for Construction of Calf & Cow Sheds and other miscellaneous works at dairy farm, kalsi, Distt. Dehradun.

Project ID No. P107648

IFB No NCB:CIVIL:01/15-16

The Government of india has received a credit from the International Development Association (IDA) toward the cost of National Dairy Plan I (National Dairy Support Project) and intends to apply part of the proceeds of this credit to payments for the works under the National Competitive Bidding (NCB) for which this IFB is issued.

Rural works Department, Dehradun, Uttarakhand on behalf of Uttarakhand Livestock Development Board invites eligible contractors to submit their bids for Construction of Calf & Cow Sheds and others miscellaneous works at dairy farm, kalsi, Distt. Dehradun.as specified in the bid. Bidding documents are available from the above office or may be downloaded from <http://rwd.uk.gov.in> or www.uldb.org. Eligible bidders may submit their bid on or before 1400 hrs on **16 Mar 2016** For any details, visit <http://rwd.uk.gov.in> or www.uldb.org or contact at the above address.


Superitendant Engineer
Rural Works Department
Circle Dehradun 



NATIONAL DAIRY SUPPORT PROJECT

NCB-Bid Document No : RWD:NCB:CIVIL:01/15-16

NATIONAL COMPETITIVE BIDDING

NAME OF WORK	Construction of Calf & Cow Sheds and others miscellaneous works at dairy farm, kalsi, Distt. Dehradun.
PERIOD OF SALE OF BIDDING	From 15-Feb-2016 to 15-March-2016
TIME AND DATE OF PRE-BID CONFERENCE	Not Applicable
LAST DATE AND TIME FOR RECEIPT OF BIDS	16-March-2016 upto 1400Hrs
TIME AND DATE OF OPENING OF BIDS	16-March-2016 At 14.30Hrs
PLACE OF OPENING OF BIDS	Office of Superintendent Engineer, Rural Work Department, Tapovan Marg, (Near Doordarshan Building) Raipur Road, Dehradun PIN 248001
OFFICER INVITING BIDS	Superintendent Engineer, Rural Works Department Circle Dehradun

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INVITATION FOR BID

(IFB)

NATIONAL DAIRY SUPPORT PROJECT

INVITATIONS FOR BIDS (IFB)

NATIONAL COMPETITIVE BIDDING

Date :15.Feb.2016

Bid No.::NCB:CIVIL:01/15-16

1. The Government of India has received financing from the World Bank towards the cost of National Dairy Support Project and intends to apply a part of the funds to cover eligible payments under the contracts for construction of works as detailed below. Bidding will be conducted through National Competitive Bidding procedures agreed with the World Bank. Bidding is open to all eligible bidders as defined in the *IBRD Guidelines for Procurement*. Bidders from India should, however, be registered with the Government of India or other State Governments/Government of India, or State/Central Government Undertakings. Bidders from India, who are not registered as above, on the date of bidding, can also participate provided they get themselves registered by the time of contract signing, if they become successful bidders. **Bidders are advised to note the clauses on eligibility (Section I Clause 4 and minimum qualification criteria (Section I Clause 5) of the Instructions to Bidders to qualify for the award of the contract.**
2. The office of Superintending Engineer Rural works Department circle dehradun invites bids for Construction of Calf & Cow Sheds and others miscellaneous works at dairy farm, kalsi Distt. Dehradun. The bidders are required to submit bids for all the works indicated in the table below.
3. Bidding documents (and additional copies) may be purchased from the office of Superintending Engineer Rural works Department circle dehradun from 15-Feb-2016 to 15.March.2016 for a non-refundable fee of Rs.2270/- (including VAT) as indicated, in the form of cash or Demand Draft on any Scheduled bank payable at Dehradun in favour of Superintending Engineer Rural Works Department circle Dehradun. Bidding documents requested by mail will be dispatched by registered/speed post on payment of an extra amount of Rs.500/-. This office will not be held responsible for the postal delay if any, in the delivery of the documents or non-receipt of the same. Bidders can also download the bid document from the website (www.rwd.uk.gov.in). The bidders who have downloaded the bid document shall be solely responsible for checking this website for any addendum/ amendment issued subsequent to the bid document, and take into consideration the same while preparing and submitting the bids. Bidders who have downloaded the bidding document is required to submit a demand draft on any scheduled bank payable at Dehradun for Rs. 2270/- towards the cost of bidding document with their quotation, when submitted.
4. Bids must be accompanied by security of the amount specified for the work in the table below, drawn in favour of Superintending Engineer Rural Works Department circle Dehradun. Bid security will have to be in any one of the forms as specified in

the bidding document and shall have to be valid for 45 days beyond the validity of the bid.

5. Bids must be delivered to Superintendent Engineer Rural Works Department circle Dehradun on or before 1400 hours on 16-March-2016 and will be opened on the same day at 1430 hours, in the presence of the bidders who wish to attend. If the office happens to be closed on the date of receipt of the bids as specified, the bids will be received and opened on the next working day at the same time and venue. Late Bids will be rejected.
6. A pre-bid meeting is not required for this bid.
7. Other details can be seen in the bidding documents.
8. The address for communication is as under:
Superintendent Engineer Rural Works Department circle Dehradun

1	Name & Designation of	Er. P.S Brijwal, Superintending Engineer Officer
2	Official Address	Tapovan Marg, (Near Doordarshan Building) Raipur Road, Dehradun PIN 248001
3	Email	exnres.10dun@gmail.com
4	Web	www.rwd.uk.gov.in
5	Telephone	+91-135-2780538 (Tel.) +91-135-2780538 (Fax.)

TABLE

Pack age No.	Name of work	Approx. value of Work (IN. RS)	Bid security (Rs.)	Cost of document (Rs.)	Period of completion
1	2		3	4	5
1	Construction of Calf & Cow Sheds and others miscellaneous works at dairy farm, kalsi Distt. Dehradun.	133.56 Lac	Rs.2.68 Lakhs	Rs. 2000/- + 13.5% VAT	12 Months

Seal of office

Section I. Instructions to Bidders

This Section of the Bidding Documents should provide the information necessary for bidders to prepare responsive bids, in accordance with the requirements of the Employer. It should also give information on bid submission, opening and evaluation, and on the award of Contract.

Matters governing the performance of the Contractor, payments under the Contract, or matters affecting the risks, rights, and obligations of the parties under the Contract are not normally included in this Section, but rather under Section VI, General Conditions of Contract (GCC), and/or Section VII, Particular Conditions of Contract (PCC). If duplication of a subject is inevitable in the different sections of the documents, care must be exercised to avoid contradictions between clauses dealing with the same matter.

These Instructions to Bidders shall not be part of the Contract and shall cease to have effect once the Contract Agreement is signed.

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Instructions to Bidders (ITB)

A. General

1. **Scope of Bid**
 - 1.1 The Employer **as defined¹ in Section II “Bidding Data Sheet” (BDS)**, invites bids for the construction of Works, as described in the **BDS** and Section VII, “Particular Conditions of Contract” (PCC). The name and identification number of the Contract are provided in the **BDS** and the PCC.
 - 1.2 The successful Bidder shall be expected to complete the Works by the Intended Completion Date specified in the **BDS** and PCC 1.1 (v).
 - 1.3 Throughout these Bidding Documents:
 - (a) the term “in writing” means communicated in written form (e.g. by mail, e-mail, fax, telex,) with proof of receipt;
 - (b) if the context so requires, “singular” means “plural” and vice versa; and
 - (c) “day” means calendar day.
2. **Source of Funds**
 - 2.1 The Government of India or the Recipient (hereinafter called “Borrower”) specified **in the BDS** has received/applied for financing (hereinafter called “funds”) from the International Bank for Reconstruction and Development or the International Development Association (hereinafter called “the Bank”) in an amount **specified in the BDS**, towards the cost of the project specified **in the BDS**. The Borrower intends to apply a portion of the funds to eligible payments under the contract(s) for which this Bidding Document is issued.
 - 2.2 Payment by the Bank will be made only at the request of the Borrower and upon approval by the Bank, and will be subject, in all respects, to the terms and conditions of the Loan (or other financing) Agreement. The Loan (or other financing) Agreement prohibits a withdrawal from the Loan (or other financing) account for the purpose of any payment to persons or entities, or for any import of goods, if such payment or import, to the knowledge of the Bank, is prohibited by a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations. No party other than the Borrower shall derive any rights from the Loan (or other financing) Agreement or have any claim to the proceeds of the Loan (or other financing).

¹ See Section VI, “General Conditions of Contract,” Clause 1. Definitions.

3. Fraud and Corruption

- 3.1 The Bank requires compliance with its policy in regard to corrupt and fraudulent practices as set forth in Section V.
- 3.2 In further pursuance of this policy, Bidders shall permit and shall cause its agents (whether declared or not), sub-contractors, sub-consultants, service providers, or suppliers and any personnel thereof, to permit the Bank to inspect all accounts, records and other documents relating to any prequalification process, bid submission, and contract performance (in the case of award), and to have them audited by auditors appointed by the Bank.

4. Eligible Bidders

- 4.1 A Bidder, and all parties constituting the Bidder, may have the nationality of any country, subject to the provisions of Section III, Eligible Countries. A Bidder shall be deemed to have the nationality of a country if the Bidder is a citizen or is constituted, incorporated, or registered and operates in conformity with the provisions of the laws of that country. This criterion shall also apply to the determination of the nationality of proposed subcontractors.
- 4.2 A Bidder shall not have a conflict of interest. All Bidders found to have a conflict of interest shall be disqualified. A Bidder may be considered to have a conflict of interest for the purpose of this bidding process, if the Bidder:
- i. directly or indirectly controls, is controlled by or is under common control with another Bidder; or
 - ii. receives or has received any direct or indirect subsidy from another Bidder; or
 - iii. has the same legal representative as another Bidder; or
 - iv. has a relationship with another Bidder, directly or through common third parties, that puts it in a position to influence the bid of another Bidder, or influence the decisions of the Employer regarding this bidding process; or
 - v. participates in more than one bid in this bidding process. Participation by a Bidder in more than one Bid will result in the disqualification of all Bids in which such Bidder is involved. However, this does not limit the inclusion of the same subcontractor in more than one bid; or
 - vi. or any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the works that are the subject of the bid; or
 - vii. or any of its affiliates has been hired (or is proposed to be hired) by the Employer or Borrower as Engineer for the Contract implementation;

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- viii. would be providing goods, works, or non-consulting services resulting from or directly related to consulting services for the preparation or implementation of the project specified in the BDS ITB 2.1 that it provided or were provided by any affiliate that directly or indirectly controls, is controlled by, or is under common control with that firm;
 - ix. has a close business or family relationship with a professional staff of the Borrower (or of the project implementing agency, or of a recipient of a part of the loan) who: (i) are directly or indirectly involved in the preparation of the bidding documents or specifications of the contract, and/or the bid evaluation process of such contract; or (ii) would be involved in the implementation or supervision of such contract unless the conflict stemming from such relationship has been resolved in a manner acceptable to the Bank throughout the procurement process and execution of the contract..
- 4.3 A Bidder may have the nationality of any country, subject to the restrictions pursuant to ITB 4.7. A Bidder shall be deemed to have the nationality of a country if the Bidder is constituted, incorporated or registered in and operates in conformity with the provisions of the laws of that country, as evidenced by its articles of incorporation (or equivalent documents of constitution or association) and its registration documents, as the case may be. This criterion also shall apply to the determination of the nationality of proposed sub-contractors or sub-consultants for any part of the Contract including related Services.
- 4.4 A Bidder that has been sanctioned by the Bank in accordance with the above ITB 3.1, including in accordance with the Bank's Guidelines on Preventing and Combating Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants ("Anti-Corruption Guidelines"), shall be ineligible to be prequalified for, bid for, or be awarded a Bank-financed contract or benefit from a Bank-financed contract, financially or otherwise, during such period of time as the Bank shall have determined. The list of debarred firms and individuals is available at the electronic address **specified in the BDS**.
- 4.5 Bidders that are Government-owned enterprises or institutions in the Employer's Country may participate only if they can establish that they (i) are legally and financially autonomous (ii) operate under commercial law, and (iii) are not dependent agencies of the Employer. To be eligible, a government-owned enterprise or institution shall establish to the Bank's satisfaction, through all relevant documents, including its Charter and other information the

Bank may request, that it: (i) is a legal entity separate from the government (ii) does not currently receive substantial subsidies or budget support; (iii) operates like any commercial enterprise, and, inter alia, is not obliged to pass on its surplus to the government, can acquire rights and liabilities, borrow funds and be liable for repayment of its debts, and can be declared bankrupt; and (iv) is not bidding for a contract to be awarded by the department or agency of the government which under their applicable laws or regulations is the reporting or supervisory authority of the enterprise or has the ability to exercise influence or control over the enterprise or institution..

4.6 Not Used.

4.7 Firms and individuals may be ineligible if so indicated in Section III and (a) as a matter of law or official regulations, the Borrower's country prohibits commercial relations with that country, provided that the Bank is satisfied that such exclusion does not preclude effective competition for the supply of goods or the contracting of works or services required; or (b) by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, the Borrower's country prohibits any import of goods or contracting of works or services from that country, or any payments to any country, person, or entity in that country.

4.8 Bidder shall provide such evidence of eligibility satisfactory to the Employer, as the Employer shall reasonably request

5. Qualifications of the Bidder

5.1 All bidders shall provide in Section IV, "Form of Bid, Qualification Information, Letter of Acceptance, and Agreement," a preliminary description of the proposed work method and schedule, including drawings and charts, as necessary, as further elaborated in ITB Clause 5.3(k).

5.2 In the event that prequalification of potential bidders has been undertaken, only bids from prequalified bidders shall be considered for award of Contract. These qualified bidders should submit with their bids any information updating their original prequalification applications. The update or confirmation should be provided in Section IV.

With the updated information the bidder must continue to be qualified in accordance with the criteria laid down in the prequalification document. All bidder shall also furnish the information for the following in Section IV irrespective of the bidders being pre-qualified:

(i) Power of Attorney.

(ii) Evidence of access to or availability of credit facilities certified by bankers.

(iii) Details as stipulated in clause 5.3 (g) to (k)

- 5.3 If the Employer has not undertaken prequalification of potential bidders, all bidders shall include the following information and documents with their bids in Section IV, unless otherwise **stated in the BDS**:
- (a) copies of original documents defining the constitution or legal status, place of registration, and principal place of business of the Bidder; written power of attorney of the signatory of the Bid to commit the Bidder;
 - (b) total monetary value of construction works performed for each of the last five years;
 - (c) experience in works of a similar nature and size for each of the last five years, and details of work under way or contractually committed; and clients who may be contacted for further information on those contracts;
 - (d) list of major items of construction equipment proposed to carry out the Contract;
 - (e) qualifications and experience of key site management and technical personnel proposed for the Contract;
 - (f) reports on the financial standing of the Bidder, such as profit and loss statements and auditor's reports for the past five years;
 - (g) evidence of adequacy of working capital for this Contract (access to line(s) of credit and availability of other financial resources);
 - (h) authority to seek references from the Bidder's bankers;
 - (i) information regarding any litigation, current or during the last five years, in which the Bidder was/is involved, the parties concerned, and the disputed amounts; and awards;
 - (j) proposals for subcontracting components of the Works amounting to more than 10 percent of the Contract Price. The ceiling for sub contractor's participation is **stated in the BDS [for each the qualification and experience of the identified sub-contractor in the relevant field should be annexed. No vertical splitting of work for subcontracting is acceptable]**
 - (k) the proposed methodology and program of construction including Environment Management Plan, backed with equipment, materials and manpower planning and deployment, duly supported with broad calculations and quality control procedures proposed to be adopted, justifying their capability of execution and completion of

the work as per technical specifications within the stipulated period of completion as per milestones.

- 5.4 Bids from Joint ventures are not acceptable.
- 5.5 To qualify for award of the Contract, the bidder in its name should have, in the last five years, as specified in the BDS, the following experience and licenses:
- 5.5 A(a)** achieved in at least two financial years, a minimum annual financial turnover (in all cases of civil engineering construction works of similar nature only) as specified in BDS;
- (b) satisfactorily completed as prime Contractor (or as a sub-contractor duly certified by the employer / main contractor) at least one similar work or more works of value not less than the amount specified in BDS
- (c) executed in any one year, the minimum quantities of work specified in BDS
- (d) The contractor or his identified sub-contractor should possess required valid electrical license for executing the building electrification works and should have executed similar electrical works for a minimum amount as indicated in BDS in any one year.
- (e) The contractor or his identified sub-contractor should possess required valid license for executing the water supply/sanitary engineering works and should have executed similar water supply/sanitary engineering works for a minimum amount as stated in BDS in any one year.

5.5 B :Each bidder should further demonstrate & confirm:

- (a) availability for construction work, either owned, or on lease or on hire, of the key and critical equipment stated in the BDS including equipment required for establishing field laboratory to perform mandatory tests, as stated in the BDS
- (b) availability for construction work a Contractor's Representative and other key technical personnel with adequate experience as stated in the BDS. The bidder must not have in his employment.
- (i) the near relations (defined as first blood relations, and their spouses, of the bidder or the bidder's spouse) of persons listed in the BDS;

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- (ii) without Government permission, any person who retired as gazette officer within the last two years;
 - (c) availability of liquid assets and/or credit facilities, net of other contractual commitments and exclusive of any advance payments which may be made under the Contract, of not less than the amount specified in the BDS.

5.5 C: To qualify for a package of contract made of this and other contracts for which bids are invited in the IFB, the bidder must demonstrate having experience and resources sufficient to meet the aggregate of the qualifying criteria for the individual contracts.

5.6 Sub-Contractors' experience and resources shall not be taken into account in determining the bidder's compliance with the qualifying criteria except to the extent stated in 5.5 A above.

5.7 Bidders who meet the minimum qualification criteria will be qualified only if their available bid capacity for construction work is equal to or more than the total bid value. The available bid capacity will be calculated as under:

$$\text{Assessed Available bid capacity} = (A * N * 1.5 - B)$$

Where,

A= Maximum value of civil engineering works executed in any one year during the last five years (updated to the price level of the financial year and the percentage escalation as stated in the BDS, taking into account the completed as well as works in progress).

N = Number of years prescribed for completion of the works for which bids are invited (period up to 6 months to be taken as half-year and more than 6 months as one year) as specified in **BDS**.

B= Value, at the current price level, of existing commitments and on-going works to be completed during the period of completion of the works for which bids are invited.

Note :The statements in Section II showing the value of existing commitments and on-going works as well as the stipulated period of completion remaining for each of the works listed should be countersigned by the Engineer in charge, not below the rank of an Executive Engineer or equivalent.

5.8 Even though the bidders meet the above qualifying criteria, they are subject to be disqualified if they have:-

- made misleading or false representations in the forms, statements, affidavits and attachments submitted in proof of the qualification requirement;
- record of poor performance such as abandoning the works, not properly completion or financial failures etc.;

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- consistent history of litigation or arbitration awards against the bidder or any partner of the joint venture.
 - participated in the previous bidding(*if this is a re-bidding*) for the same work and had quoted unreasonably high bid price and could not furnish rational justification to the employer.
- 6. One Bid per Bidder** 6.1 Each Bidder shall submit only one Bid. A Bidder who submits or participates in more than one Bid (other than as a subcontractor or in cases of alternatives that have been permitted or requested) shall cause all the proposals with the Bidder's participation to be disqualified.
- 7. Cost of Bidding** 7.1 The Bidder shall bear all costs associated with the preparation and submission of his Bid, and the Employer shall in no case be responsible or liable for those costs.
- 8. Site Visit** 8.1 The Bidder, at the Bidder's own responsibility and risk, is encouraged to visit and examine the Site of Works and its surroundings and obtain all information that may be necessary for preparing the Bid and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the Bidder's own expense.

B. Bidding Documents

- 9. Contents of Bidding Documents**
- 9.1 The set of Bidding Documents comprises the documents listed in the table below and addenda issued in accordance with ITB Clause 11:
- | | |
|---------------------|--------------------------------------------------------------------------|
| Invitation for Bids | |
| Section I | Instructions to Bidders |
| Section II | Bidding Data Sheet |
| Section III | Eligible Countries |
| Section IV | Forms of Bid, Qualification Information, Letter of acceptance, Agreement |
| Section V | Bank Policy-Corrupt and Fraudulent Practices |
| Section VI | General Conditions of Contract |
| Section VII | Particular Conditions of Contract |
| Section VIII | Specifications |
| Section IX | Drawings |
| Section X | Bill of Quantities |
| Section XI | Forms of Securities |
- 9.2 Unless obtained directly from the Employer, the Employer is not responsible for the completeness of the Bidding Documents, responses to requests for clarification, the minutes of the pre-Bid meeting (if any), or Addenda to the Bidding Documents in accordance with ITB 11. In case of any contradiction, documents obtained directly from the Employer shall prevail.
- 9.3 The Bidder is expected to examine all instructions, forms, terms, and specifications in the Bidding Document. Failure to furnish all information or documentation required by the Bidding Document may result in the rejection of the bid.
- 10. Clarification of Bidding Documents**
- 10.1 A prospective Bidder requiring any clarification of the Bidding Documents may notify the Employer in writing at the Employer's address **indicated in the BDS**. The Employer shall respond to any request for clarification received earlier than 14 days prior to the deadline for submission of bids. Copies of the Employer's response shall be forwarded to all purchasers of the Bidding Documents, including a description of the inquiry, but without identifying its source. **If so specified in the BDS**, the Employer shall also promptly publish its response at the web page identified in the BDS. *(where electronic downloading of bid document is permitted, the employer will upload the addenda on the website and it will be the responsibility of the bidders [who downloaded the bid document] to search the website for any addenda)*. Should the clarification result in

changes to the essential elements of the Bidding Documents, the Employer shall amend the Bidding Documents following the procedure under ITB 11 and ITB 21.2.

10.2 Pre-bid Meeting

10.2.1 The bidder or his official representative is invited to attend a per-bid meeting, which will take place at the place and time stated in BDS.

10.2.2 The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.

10.2.3 The bidder is requested to submit any questions in writing or by facsimile or email to reach the Employer not later than one week before the meeting.

10.2.4 Minutes of the meeting, including the text of the questions raised (without identifying the source of inquiry) and the responses given will be transmitted without delay to all purchasers of the bidding documents. Any modification of the bidding documents listed in Sub-Clause 9.1 which may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an Addendum pursuant to Clause 11 and not through the minutes of the pre-bid meeting. *.(where electronic downloading of bid document is permitted, the employer will upload the addenda on the website and it will be the responsibility of the bidders [who downloaded the bid document] to search the website for any addenda).*

10.2.5. Non-attendance of the pre-bid meeting will not be a cause for disqualification of a bidder.

11. Amendment of Bidding Documents

11.1 Before the deadline for submission of bids, the Employer may modify the Bidding Documents by issuing addenda.

11.2 Any addendum thus issued shall be part of the Bidding Documents and shall be communicated in writing to all purchasers of the Bidding Documents. Prospective bidders shall acknowledge receipt of each addendum in writing to the Employer. The Employer shall also promptly publish the addendum on the Employer's web page in accordance with ITB 10.1.

11.3 To give prospective bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer shall extend, as necessary, the deadline for submission of bids, in accordance with ITB Sub-Clause 21.2 below.

C. Preparation of Bids

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- 12. Language of Bid** 12.1 All documents relating to the Bid shall be in the English.
- 13. Documents Comprising the Bid** 13.1 The Bid submitted by the Bidder shall comprise the following:
- (a) The Letter of Bid (in the format indicated in Section IV);
 - (b) Bid Security, in accordance with ITB Clause 17, if required;
 - (c) Priced Bill of Quantities;
 - (d) written confirmation authorizing the signatory of the Bid to commit the Bidder, in accordance with ITB 19.2;
 - (e) Qualification Information Form and Documents;
 - (f) Alternative offers where invited;
- and any other materials required to be completed and submitted by bidders, as **specified in the BDS**.
- The documents listed in Section IV, VII, and X of sub-clause 9.1 shall be filled in without exception.
- 13.2 Bidders bidding for this contract together with other contracts stated in the IFB to form a package will so indicate in the bid together with any discounts offered for the award of more than one contract.
- 14. Bid Prices** 14.1 The Contract shall be for the whole Works, as described in ITB Sub-Clause 1.1, based on the priced Bill of Quantities submitted by the Bidder.
- 14.2 The Bidder shall fill in rates and prices and line item total (both in figures & words) for all items of the Works described in the Bill of Quantities along with total bid price (both in figures and words). Items for which no rate or price is entered by the Bidder shall not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities. Corrections, if any, shall be made by crossing out, initialing, dating and rewriting.
- 14.3 All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause, shall be included in the rates, prices, and total Bid price submitted by the Bidder.
- 14.4 Bidders may like to ascertain availability of excise/custom duty exemption benefits available in India to the contracts financed under World Bank loan/credits. They are solely responsible for obtaining such benefits which they have considered in their bid and in case of failure to receive such benefits for reasons whatsoever, the employer will not compensate the bidder (contractor). Where the bidder has quoted taking into account

such benefits, he must give all information required for issue of certificates in terms of such notifications as per form attached to the Qualification Information in the bid. To the extent the employer determines the quantity indicated therein are reasonable keeping in view the bill of quantities, construction program and methodology, the certificates will be issued within 60 [sixty] days of signing of contract and no subsequent changes will be permitted. No certificate will be issued for items where no quantity/capacity of equipment is indicated in the statement. The bids which do not conform to the above provisions will be treated as non-responsive and rejected. Any delay in procurement of the construction equipment/machinery/goods as a result of the above shall not be a cause for granting any extension of time.”

14.5 The rates and prices quoted by the Bidder shall be subject to adjustment during the performance of the Contract if **provided for in the BDS** and SCC and the provisions of Clause 47 of the General Conditions of Contract.

15. Currencies of Bid and Payment

15.1 The unit rates and prices shall be quoted by the Bidder entirely in Indian Rupees.

16. Bid Validity

16.1 Bids shall remain valid for the period **specified in the BDS**. A bid valid for a shorter period shall be rejected by the employer as non-responsive.

16.2 In exceptional circumstances, prior to the expiry of the original bid validity, the Employer may request that the bidders extend the period of validity for a specified additional period. The request and the bidders' responses shall be made in writing. If a Bid Security is requested in accordance with ITB Clause 17, it shall be extended up to 45 days after the extended deadline of the extended bid validity period. A Bidder may refuse the request without forfeiting the Bid Security. A Bidder agreeing to the request shall not be required or permitted to modify its Bid, except as provided in ITB Clause 16.3.

16.3 In the case of contracts in which the Contract Price is fixed (not subject to price adjustment), in the event that the Employer requests and the bidder agrees to the extension of the validity period, the contract price, if the bidder is selected for award, shall be the bid price adjusted as follows: The price shall be increased by the factor (value of factor B specified in BDS) for each week or part of a week that has elapsed between the expiration of the initial bid validity and the date of issue of letter of acceptance to the successful bidder. Bid evaluation shall be based on the Bid Price without taking the above correction into

consideration.

17. Bid Security

- 17.1 If required in the BDS the Bidder shall furnish, as part of its Bid, a Bid security, in original form for the amount shown in BDS for this particular work.
- 17.2 This bid security shall be in favour of, as specified in BDS, in one of the following forms:
- A bank guarantee issued by a nationalized/scheduled bank located in India or a reputed bank located abroad in the form given in Section XI; or
 - Certified cheque or Bank draft payable to the employer as specified in BDS.
 - If the institution issuing the guarantee is located outside India, it shall be counter signed by a Nationalized/Scheduled bank located in India, to make it enforceable.
 - Fixed Deposit/Time Deposit certificates issued by a Nationalized or Scheduled Bank located in India for equivalent or higher values are acceptable provided it is pledged in favour of the agency named in BDS and such pledging has been noted and suitably endorsed by the bank issuing the deposit certificate.
 - Any other security **specified in BDS**
- 17.3 Bank guarantee issued as Bid security for the bid shall be valid for 45 days beyond the validity of the bid.
- 17.4 Any bid not accompanied by an acceptable Bid Security and not secured as indicated in Sub-Clause 17.1 to 17.3 above will be rejected by the Employer as non-responsive, pursuant to ITB Clause 27.1.
- 17.5 The Bid security of unsuccessful bidders will be returned within 42 days of the end of the bid validity period specified in Sub-Clause 16.1& 16.2..
- The Bid Security of successful bidders will be discharged and returned when the bidder has signed the Agreement and furnished the required Performance Security.
- 17.6 The Bid Security may be forfeited:
- (a) if a Bidder withdraws/modifies/substitutes its bid during the period of bid validity specified by the Bidder on the Letter of Bid , except as provided in ITB Sub-Clause 16.2; or
 - (b) if the Bidder does not accept the correction of its Bid Price

pursuant to ITB Sub-Clause 28.

- (c) if the successful Bidder fails within the specified time to:
 - (i) sign the Contract Agreement; or
 - (ii) furnish the required performance security .

17.7 If a bid security is **not required in the BDS**, and

- (a) if a Bidder withdraws its bid during the period of bid validity specified by the Bidder on the Letter of Bid, or
- (b) if the successful Bidder fails to: sign the Contract in accordance with ITB 34; or furnish a performance security in accordance with ITB 35;

the Borrower may, **if provided for in the BDS**, declare the Bidder ineligible to be awarded a contract by the Employer for a period of three years.

18. Alternative Proposals by Bidders

18.1 Bidders shall submit offers that comply with the requirements of the bidding documents, including the basic technical design as indicated in the drawing and specifications. Alternatives will not be considered.

19. Format and Signing of Bid

19.1 The Bidder shall prepare one original of the documents comprising the Bid as described in ITB Clause 13, bound with the volume containing the Form of Bid, and clearly marked "ORIGINAL." In addition, the Bidder shall submit copies of the Bid, in the number **specified in the BDS**, and clearly marked as "COPIES." In the event of discrepancy between them, the original shall prevail.

19.2 The original and all copies of the Bid shall be typed or written in indelible ink and shall be signed by a person or persons duly authorized to sign on behalf of the Bidder, pursuant to ITB Sub-Clause 5.3 (a). A copy of the legally valid authorization as specified in **BDS** should be attached along with the bid. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the Bid where entries or amendments such as interlineations, erasures or over writing have been made, shall be valid only if they are signed or initialed by the authorized person or persons signing the Bid..

19.3 The Bid shall contain no alterations or additions, except those to comply with instructions issued by the Employer, or as necessary to correct errors made by the Bidder, in which case such corrections shall be signed or initialed by the person or persons signing the Bid.

19.4 The Bidder shall furnish information as described in the Form of

Bid on commissions or gratuities, if any, paid or to be paid to agents relating to this Bid, and to contract execution if the Bidder is awarded the contract.

D. Submission of Bids

20. Submission, Sealing and Marking of Bids

- 20.1 Bidders may always submit their bids by mail or by hand. When so **specified in the BDS**, bidders shall have the option of submitting their bids electronically. Bidders submitting bids electronically shall follow the procedures **specified in the BDS under ITB 20.1**. The Bidder shall seal the original and all copies of the Bid in two inner envelopes and one outer envelope, duly marking the inner envelopes as “ORIGINAL” and “COPIES.”
- 20.2 The inner and outer envelopes shall
- (a) be addressed to the Employer at the address **provided in the BDS**;
 - (b) bear the name and identification number of the Contract as **defined in the BDS** and PCC; and
 - (c) provide a warning not to open before the specified time and date for Bid opening as **defined in the BDS**.
- 20.3 In addition to the identification required in ITB Sub-Clause 20.2, the inner envelopes shall indicate the name and address of the Bidder to enable the Bid to be returned unopened in case it is declared late, pursuant to ITB Clause 22.
- 20.4 If the outer envelope is not sealed and marked as above, the Employer shall assume no responsibility for the misplacement or premature opening of the Bid.

21. Deadline for Sub-mission of Bids

- 21.1 Bids must be received by the *Employer* at the address and no later than the date and time **indicated in the BDS**. Bidders submitting bids electronically (when permitted) shall follow the electronic bid submission procedures **specified in the BDS**.
- 21.2 The Employer may, at its discretion, extend the deadline for submission of bids by issuing an amendment in accordance with ITB Clause 11, in which case all rights and obligations of the Employer and the bidders previously subject to the original deadline shall then be subject to the new deadline.

22. Late Bids

- 22.1 The *Employer* shall not consider any bid that arrives after the deadline for submission of bids, in accordance with ITB 21. Any bid received by the *Employer* after the deadline for submission of bids shall be declared late, rejected, and returned unopened to the Bidder.

23. Withdrawal, Substitution and Modification of Bids

- 23.1 A Bidder may withdraw, substitute, or modify its bid after it has been submitted by sending a written notice, duly signed by an authorized representative, and shall include a copy of the authorization in accordance with ITB 19.2, (except that withdrawal notices do not require copies). The corresponding substitution or modification of the bid must accompany the respective written notice. All notices must be:
- (a) prepared and submitted in accordance with ITB 19 and ITB 20 (except that withdrawal notices do not require copies), and in addition, the respective envelopes shall be clearly marked “WITHDRAWAL,” “SUBSTITUTION,” “MODIFICATION;” and
 - (b) received by the Employer prior to the deadline prescribed for submission of bids, in accordance with ITB 21. Bidders may withdraw, substitute or modify their Bids by giving notice in writing before the deadline prescribed in ITB Clause 21.
- 23.2 Bids requested to be withdrawn in accordance with ITB 23.1 shall be returned unopened to the Bidders.
- 23.3 No bid may be withdrawn, substituted, or modified in the interval between the deadline for submission of bids and the expiration of the period of bid validity specified by the Bidder on the Letter of Bid or any extension thereof. This will result in the forfeiture of the Bid Security pursuant to ITB 17.6..
- 23.4 Bidders may only offer discounts to, or otherwise modify the prices of their bids, by submitting Bid modifications in accordance with this clause ITB 23.1 or included in the initial Bid

E. Bid Opening and Evaluation

24. Bid Opening

- 24.1 Except in the cases specified in ITB 22 and 23, the Employer shall publicly open and read out in accordance with ITB 24.2 & 24.3 all bids received by the deadline, at the date, time and place **specified in the BDS** in the presence of Bidders` designated representatives and anyone who choose to attend. Any specific electronic bid opening procedures required, if electronic bidding is permitted in accordance with ITB 20.1, shall be as **specified in the BDS**.
- 24.2 First, envelopes marked “WITHDRAWAL” shall be opened and read out and the envelope with the corresponding bid shall not be opened, but returned to the Bidder. No bid withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and is read out at bid opening. Next, envelopes marked “SUBSTITUTION” shall be opened and read out and exchanged with the corresponding bid being substituted, and the substituted bid shall not be opened, but

returned to the Bidder. No bid substitution shall be permitted unless the corresponding substitution notice contains a valid authorization to request the substitution and is read out at bid opening. Envelopes marked "MODIFICATION" shall be opened and read out with the corresponding bid. No bid modification shall be permitted unless the corresponding modification notice contains a valid authorization to request the modification and is read out at bid opening. Only envelopes that are opened and read out at bid opening shall be considered further.

24.3 All other envelopes shall be opened one at a time, reading out: the name of the Bidder and whether there is a modification, the total Bid Price, per lot (contract) if applicable, including any discounts and alternative bids (if permitted), the presence or absence of a bid security; and any other details as the *Employer* may consider appropriate. Only discounts and alternatives & modifications read out at bid opening shall be considered for evaluation. The Letter of Bid and the Bill of Quantities are to be initialed by representatives of the Employer attending bid opening in the manner **specified in the BDS**. The Employer shall neither discuss the merits of any bid nor reject any bid at bid opening (except for late bids, in accordance with ITB 22.1).

24.4 The *Employer* shall prepare a record of the bid opening that shall include, as a minimum: the name of the Bidder and whether there is a withdrawal, substitution, or modification; the Bid Price, per contract if applicable, including any discounts and alternative bids; and the presence or absence of a bid security, if one was required. The Bidders' representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record. A copy of the record shall be distributed to all Bidders.

25. Confidentiality 25.1 Information relating to the Examination, Clarification, Evaluation, and Comparison of Bids and Recommendations for the Award of a contract shall not be disclosed to bidders or any other persons not officially concerned with such process until publication of the award to the successful Bidder has been announced pursuant to ITB Sub-Clause 34.4. Any effort by a Bidder to influence the Employer's processing of bids or award decisions may result in the rejection of its Bid. Notwithstanding the above, from the time of bid opening to the time of Contract award, if any Bidder wishes to contact the Employer on any matter related to the bidding process, it should do so in writing.

26. Clarification of Bids 26.1 To assist in the examination, evaluation, and comparison of Bids, the Employer may, at the Employer's discretion, ask any Bidder for clarification of the Bidder's Bid, including breakdown of unit rates. The request for clarification and the response shall be in

writing, but no change including any voluntary increase or decrease, in the price or substance of the Bid shall be sought, offered, or permitted except as required to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the Bids in accordance with ITB Clause 28.

- 27. Examination of Bids and Determination of Responsiveness**
- 27.1 Prior to the detailed evaluation of Bids, the Employer shall determine whether each Bid (a) meets the eligibility criteria defined in ITB Clause 4; (b) has been properly signed; (c) is accompanied by the required Bid Security in accordance with ITB Clause 17, if specified; and (d) is substantially responsive to the requirements of the Bidding Documents.
- 27.2 A substantially responsive Bid is one which conforms to all the terms, conditions, and specifications of the Bidding Documents, without material deviation or reservation. A material deviation or reservation is one (a) which affects in any substantial way the scope, quality, or performance of the Works; (b) which limits in any substantial way, inconsistent with the Bidding Documents, the Employer's rights or the Bidder's obligations under the Contract; or (c) whose rectification would affect unfairly the competitive position of other bidders presenting substantially responsive bids.
- 27.3 If a Bid is not substantially responsive, it shall be rejected by the Employer, and may not subsequently be made responsive by correction or withdrawal of the nonconforming deviation or reservation.
- 28. Correction of Errors**
- 28.1 Bids determined to be substantially responsive shall be checked by the Employer for any arithmetic errors. Errors shall be corrected by the Employer as follows:
- (a) where there is a discrepancy between the amounts in figures and in words, the amount in words shall govern; and
 - (b) where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by the quantity, the unit rate as quoted shall govern.
- 28.2 The amount stated in the Bid shall be adjusted by the Employer in accordance with the above procedure for the correction of errors and, with the concurrence of the Bidder, shall be considered as binding upon the Bidder. If the Bidder does not accept the corrected amount, the Bid shall be rejected, and the Bid Security may be forfeited in accordance with ITB Sub-Clause 17.6 (b).
- 29. Currency for Bid Evaluation**
- The currency for bid evaluation shall be Indian Rupees only.

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- 30. Evaluation and Comparison of Bids**
- 30.1 The Employer shall evaluate and compare only the bids determined to be substantially responsive in accordance with ITB Clause 27.
- 30.2 In evaluating the bids, the Employer shall determine for each Bid the evaluated Bid price by adjusting the Bid price as follows:
- (a) making any correction for errors pursuant to ITB Clause 28;
 - (b) making an appropriate adjustment for any other acceptable variations, deviations, and
 - (c) making appropriate adjustments to reflect discounts or other price modifications offered in accordance with ITB Sub-Clause 23.4.
- 30.3 The Employer reserves the right to accept or reject any variation, deviation, or alternative offer. Variations, deviations, and alternative offers and other factors which are in excess of the requirements of the Bidding Documents or otherwise result in unsolicited benefits for the Employer shall not be taken into account in Bid evaluation.
- 30.4 The estimated effect of any price adjustment conditions under GCC Clause 45, during the period of implementation of the Contract, shall not be taken into account in Bid evaluation.
- 30.5 Where bids are invited for several lots, the Employer shall determine the application of discounts so as to minimize the combined cost of all the lots, pursuant to ITB Sub-Clause 30.2 (c).
- 30.6 If the bid of the successful bidder, which results in the lowest Evaluated Bid Price, is seriously unbalanced, front loaded or substantially below updated estimates in the opinion of the Employer, the Employer may require the Bidder to produce detailed price analyses (with breakdown of unit rates) for any or all items of the Bill of Quantities, to demonstrate the internal consistency and justification of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, taking into consideration the schedule of estimated contract payments, the Employer may require that the amount of the performance security be increased at the expense of the Bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful Bidder under the Contract
- 31. Preference for Domestic Bidders** Not used

F. Award of Contract

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|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 32. Award Criteria | 32.1 Subject to ITB Clause 33, the Employer shall award the Contract to the Bidder whose Bid has been determined to be substantially responsive to the Bidding Documents and who has offered the lowest evaluated Bid price, provided that such Bidder has been determined to be (a) eligible in accordance with the provisions of ITB Clause 4, and (b) qualified in accordance with the provisions of ITB Clause 5. |
| 33. Employer's Right to Accept any Bid and to Reject any or all Bids | 33.1 Notwithstanding ITB Clause 32, the Employer reserves the right to accept or reject any Bid, and to cancel the bidding process and reject all bids, at any time prior to the award of Contract, without thereby incurring any liability to the affected Bidder or bidders or any obligation to inform the affected Bidder or bidders of the grounds for the Employer's action. |
| 34. Notification of Award and Signing of Agreement | 34.1 The Bidder whose Bid has been accepted shall be notified of the award by the Employer prior to expiration of the Bid validity period in writing. This letter (hereinafter and in the GCC called the "Letter of Acceptance") shall state the sum that the Employer shall pay the Contractor in consideration of the execution, completion, and maintenance of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Contract called the "Contract Price"). |
| Publication of Award & Recourse to unsuccessful Bidders | 34.2 The Letter of Acceptance shall constitute the formation of the Contract, subject to the Bidder furnishing the Performance Security in accordance with ITB Clause 35 and signing the Agreement in accordance with ITB Sub-Clause 34.3. |
| | 34.3 The Agreement shall incorporate all agreements between the Employer and the successful Bidder. It shall be kept ready in the office of the Employer for the signature of the Employer and the successful Bidder, within 21 days following the Letter of Acceptance's date. Within 21 days of receipt of letter of acceptance, the successful Bidder shall sign the Agreement and deliver it to the Employer along with performance security in accordance with ITB Clause 35.1 and revised construction methodology. |
| | 34.4 The Employer shall publish in a national website(http://tenders.gov.in) the results identifying the bid and lot numbers and the following information: (i) name of each bidder who submitted a bid; (ii) bid prices as read out at bid opening; (iii) name and evaluated prices of each bid that was evaluated; (iv) name of bidders whose bids were rejected and the reasons for their rejection; and (v) name of the winning |

bidder, and the price it offered, as well as the duration and summary scope of the contract awarded. After publication of the award, unsuccessful bidders may request in writing to the Employer for a debriefing seeking explanations for the failure of their bids. The Employer shall promptly respond in writing to any unsuccessful Bidder who, after publication of contract award requests the Employer in writing to explain on which grounds its bid was not selected.

35. Performance Security

35.1 Within 21 days after receipt of the Letter of Acceptance, the successful Bidder shall sign the contract agreement and deliver to the Employer a Performance Security in the amount stipulated in the GCC and in the form (Bank Guarantee) **stipulated in the BDS**, in Indian Rupees.

35.2 If the Performance Security is provided by the successful Bidder in the form of a Bank Guarantee or cashier's cheque/certified cheque/Bank Demand Draft, it shall be issued at the Bidder's option, by a nationalized/ scheduled bank located in India, or by a foreign bank acceptable to the Employer, through a correspondent bank located in India.

35.3 Failure of the successful Bidder to comply with the requirements of ITB Sub-Clauses 35.1 and 34.3 shall constitute sufficient grounds for cancellation of the award and forfeiture of the Bid Security and employers may resort to awarding the contract to the next lowest evaluated responsive bidder. Upon the successful Bidder's, signing of the Agreement and furnishing of the Performance Security pursuant to ITB Clause 35.1, the Employer shall promptly notify the name of the winning bidder to each unsuccessful bidder and shall discharge the Bid Securities of the unsuccessful bidders pursuant to ITB Clause 17.5.

36. Advance Payment and Security

36.1 The Employer shall provide an Advance Payment on the Contract Price as stipulated in the GCC, subject to a maximum amount, as **stated in the BDS**. The Advance Payment shall be guaranteed by a Security. Section X "Security Forms" provides a Bank Guarantee for Advance Payment form.

37. Adjudicator /Disputes Review Expert

37.1 The Employer proposes the person **named in the BDS** to be appointed as Adjudicator (or Dispute Review Expert) under the Contract, at the daily rate specified **in the BDS**, plus reimbursable expenses (actual boarding, lodging, travel and other incidental expenses). If the Bidder disagrees with this proposal, the Bidder should so state in Letter of Bid. If, in the Letter of Acceptance, the Employer does not agree on the appointment of the Adjudicator [or Disputes Review Expert] proposed by the Bidder, the Employer will request the Appointing Authority designated in the BDS & Particular

Conditions of Contract (PCC) pursuant to Clause 23.1 of the General Conditions of Contract (GCC), to appoint the Adjudicator [or Disputes Review Expert].

Section II. Bidding Data Sheet

A. General	
ITB 1.1	The Employer is: Superintendent Engineer, Rural Works Department Circle Dehradun
ITB 1.1	The name of the work is: Construction of Calf & Cow Sheds and others miscellaneous works at dairy farm, kalsi Distt. Dehradun. The identification number of the work is: _____ <i>(To be Filled at the time of Award of Contract)</i> The number and identification of lots comprising this bidding process is: Not Applicable
ITB 1.2	The Intended Completion Date is Completion date: 12 (Twelve) Months from the date of award of the contract.
ITB 2.1	The Borrower is Government of India: The Government of India has received a credit from the International Development Association (IDA) towards the cost of the National Dairy Plan I (National dairy support project-NDSP). SAG, Bidaj, an End implementing agency of the project.
ITB 2.1	The Project is National dairy support project (NDSP). The loan or Financing Agreement Amount and number is US \$ 352 million and 5074-IN.
ITB 4.4	The list of firms debarred from participating in World Bank projects is available at: http://www.worldbank.org/debarr/ .
ITB 5.3	The information required from bidders in ITB Sub-Clause 5.3 is modified as follows: none
ITB 5.3 (j)	The ceiling for sub contractor's participation is: 25%
ITB 5.5	The previous financial years are: 2010-11, 2011-12, 2012-13, 2013-14, 2014-2015,
ITB 5.5 (A)	(a) Financial turnover: not less than Rs. 1.50 Crore (b) (1) Satisfactorily completed as prime Contractor (or as a sub-contractor duly certified by the employer / main contractor) at least one similar work of value of Rs 100.00 lakhs each. OR (2) Satisfactorily completed as prime contractor (or as a sub-contractor duly certified by the employer / main contractor) at least two similar works of value of Rs. 70.00 Lakhs. Each. OR

	<p>(3) Satisfactorily completed as prime contractor (or as a sub-contractor duly certified by the employer / main contractor) at least three similar works of value not less than Rs. 50.00 Lakhs each.</p> <p>The following work will be considered as similar...</p> <p>Civil, structural & internal electrification works for RCC Structures and Industrial/Animal Sheds.</p> <p>(c) Execution of minimum quantities of major components of work in any one year.</p> <p style="padding-left: 40px;">Cement concrete RCC : 500 CuM, PCC : 500 CuM, Earthwork in excavation : 1000 CuM, Filling 2500 CuM, Brick Masonry work : 500 CuM</p> <p>(d) The minimum amount of work executed for executing similar Electrical Works in any one year shall be Rs. 2.0 lakhs</p> <p>(e) The minimum amount of work executed for executing similar Water Supply / Sanitary Works in any one year shall be – Rs.1.0 Lakhs.</p>
ITB 5.5 B	<p>(a) The minimum essential equipments to be made available in ideal working 'condition for the Contract by the successful Bidder at all the time of contract period shall be as under:</p> <ol style="list-style-type: none"> 1. Concrete mixture machine for RCC works with mechanized material hopper intake system and mechanical weigh batcher having minimum batch of 1.0 cement bags. (for weigh metric batching of RCC works) – 1 nos. 2. Concrete mixture machine with mechanized hopper for volumetric batching (for PCC works) 3. Concrete vibrator needles <ol style="list-style-type: none"> a. Needle: - 25mm dia – 3 nos. b. Needle: - 40mm dia - 3 nos. c. Needle: - 60mm dia- 2 nos. 4. Concrete vibrator machines: 2 nos electric power supply driven only and 1 as standby with liquid fuel (Petrol/Diesel) driven. 5. Excavator: 1 nos. 6. Total station instruments for building lineout as & when required. 7. Auto level – 1 nos. 8. Sets of Shuttering and supporting/staging materials has to be for minimum 400 SqM. 9. Water pumps (minimum 1.0 HP) :- 2.0 nos. 10. Welding Equipments : 2 Nos.

11. VD Equipments : based on requirement..
12. Power trowel & floater, surface vibrator : based on requirement.

Testing Equipments :

1. One concrete cube testing machine machine calibrated and certification of calibration shall be produced by the contractor.
2. Twelve cast iron cube moulds of 15 cm size
3. One Lab. balance to weigh up to 20 kg with sensitivity of 10gm
4. One set of sieves for coarse and fine aggregates & power driven Sieve shaker.
5. One set of slump cone complete with tamping rod.
6. A set of measures from 5 litre to 0.1 litre.
7. One flakiness gauge.
8. One elongation index gauge.
9. One sedimentation pipette.
10. One Pyconometer.
11. Two calibrated glass jar of 1 litre capacity.

For Internal Electrification Works

1. Multimeters
2. Crimping tools
3. Insulation Testers
4. Conduit bending machine
5. Wireman's tools
6. Switch Board manufacturing facilities.

[Based on the studies carried out by the Employer, the minimum suggested major key and critical equipment required to attain the completion of work in accordance with the prescribed construction schedule are shown in the above list. The bidders should, however undertake their own studies and furnish with their bid, a detailed construction planning and methodology supported with layout and necessary drawings and detailed calculations as stated in clause 5.3 (k) above to allow the Employer to review their proposals. The numbers, types and capacities of each plant/equipment shall be shown in the proposals along with the cycle time for each operation for the given production capacity to match the requirements.]

(b) The Key Personnel required for the project implementation are:

S.No	Designation of Personnel	No.	Minimum Qualification	Minimum years of experience	Minimum experience in similar works
1	Execution Manager	1	BE (Civil)	8 Yrs	6 Yrs
2	Supervision cum billing Engineer	1	Diploma (Civil)	3 Yrs	2 Yrs
3	Shuttering and Bar-binder supervisor	1	Site Execution	5 Yrs	5 Yrs
4	Concreting Foreman	1	Site Execution	5 Yrs	5 Yrs
5	Mechanic/ Electrician	1	ITI (Mechanical /Electrical)	5 Yrs	5 Yrs
<p><i>[Bidders to Indicate designation, qualification & Experience for each person and furnish their Curriculum Vitae]</i></p> <p>The persons of following department(s) are not permitted to be in the employment of the Bidder.</p> <p>(i) Rural Works Department (ii) Public Works Department (iii) State Electricity Board</p> <p>(c) the minimum amount of liquid assets and/or credit facilities net of other contractual commitments of the successful Bidder [<i>availability to be certified by a Scheduled Bank in the specified format</i>]shall be: Rs. 25 Lakhs.</p>					
ITB 5.7	Annual increase factor to be considered for bringing the prices to level of current financial year is 6% per annum				
B. Bidding Documents					
ITB 10.1	For clarification purposes only, the Employer's address is:				

	<p>Superintendent Engineer, Rural Work Department Circle Dehradun Tapovan Marg, (Near Doordarshan Kendra), Raipur Road, Dehradun Phone : +91-135-2780538 Fax : +91-135-2780538 e-mail : exnres.10dun@gmail.com Country: INDIA Web Page www.rwd.gov.in</p> <p>Requests for clarification should be received by the Employer no later than 14 days prior to deadline for submission of bids.</p>
ITB 10.2	Pre-bid Meeting is not applicable.
C. Preparation of Bids	
ITB 13.1	Any additional documents required to be completed and submitted by the Bidders are <i>none</i> .
ITB 14.5	The Contract is subject to price adjustment in accordance with PCC Clause 45.1.
ITB 16.1	The Bid shall be valid for 90 days.
ITB 16.3	The factor 'B' is 6%
ITB 17.1	The Bid Security amount is Rs. 2.68 lakh (Rupees Two lakh sixty eight thousand only)
ITB 17.2	<p>Bid Security should be in favour of Superintending engineer Rural Works Department circle Dehradun.</p> <p>Other types of acceptable securities are as under;</p> <p>Bid Security as Bank Guarantee issued by a Nationalised/Scheduled Bank included in Section XI, Security forms or a Demand Draft payable at "Dehradun" favoring "Superintendent Engineer, Rural Work Department Circle Dehradun" issued by a Nationalised/Scheduled Bank.</p> <p>Fixed/Time deposit certificates should be pledged in favour of Superintendent Engineer, Rural Work Department Circle Dehradun.</p>
ITB 17.7	<i>Deleted</i>
ITB 19.1	The number of copies of the Bid to be completed and returned shall be two.
ITB 19.2	<p>The written confirmation of authorization to sign on behalf of the Bidder shall indicate:</p> <p><i>a) Legally valid Power of Attorney is required to demonstrate the authority</i></p>

	<p><i>of the signatory to sign the Bid ; and</i></p> <p><i>b) In the case of Bids submitted by an existing or intended JV, if permitted as per ITB 5.4, the authorization shall be evidenced by a Power of Attorney signed by legally authorized signatories of all the partners.</i></p>
D. Submission of Bids	
ITB 20.1	Bidders may submit their bids electronically: No.
ITB 20.2 (a)	<p>The Employer's address for the purpose of Bid submission is</p> <p>Superintendent Engineer, Rural Work Department Circle Dehradun <i>Tapovan Marg, (Near Doordarshan Kendra), Raipur Road, Dehradun</i></p> <p>Phone : +91-135-2780538 Fax : +91-135-2780538 e-mail : exnres.10dun@gmail.com Country: <i>INDIA</i> Web Page www.rwd.gov.in</p>
ITB 20.2 (b)	Name and Identification number of the contract as given in ITB 1.1 above in this sheet.
ITB 20.2 (c)	The warning should read "DO NOT OPEN BEFORE 16-March-2016 1430 hours
ITB 21.1	The deadline for submission of bids shall be 1400 hours on 16.03.2016; In the event the specified date is declared as a holiday for the employer, the bids will be received upto the appointed time on the next working day.
E. Bid Opening and Evaluation	
ITB 24.1	<p>The bid opening shall take place at: Superintendent Engineer, Rural Work Department Circle Dehradun <i>Tapovan Marg, (Near Doordarshan Kendra), Raipur Road, Dehradun</i></p> <p>Animal Breeding Farm Kalsi</p> <p>Date:16.03.2016; Time: 1430 hours</p> <p>In the event specified date is declared as a holiday for the employer, the bids will be received up to the appointed time on the next working day.</p>
ITB 24.3	The Letter of Bid and Priced Bill of Quantities shall be initialed by Manager

	of the Employer conducting Bid opening.
ITB 30.3	Evaluation of bids will be done on the basis of lowest bid for total cost of all the works.
F. Award of Contract	
ITB 35.1	<p>The Standard Form of Performance Security acceptable to the Employer shall be a Bank Guarantee.</p> <p>A Bank Guarantee shall be unconditional (on demand) (see Section X: Security Forms). An amount of 5 percent of the Contract Price is specified for Performance Bank Guarantees. (see Section X: Security Forms. If the performance security is given as a cashier's cheque or demand draft, the same shall be drawn from a nationalized/scheduled bank in India in favour of Superintendent Engineer Rural Work Department payable at Bidaj / Ahmedabad.</p>
ITB 36.1	The Advance Payment shall be limited to 15 percent of the Contract Price.- Please see PCC Clause 49.1 for conditions.
ITB 37.1	Deleted

Section III. Eligible Countries

Eligibility for the Provision of Goods, Works and Services in Bank-Financed Procurement

1. In reference to ITB 4.7, for the information of the Bidders, at the present time firms, goods and services from the following countries are excluded from this bidding process:

Under ITB 4.7 (a) *none*

Under ITB 4.7 (b) *none*

Section IV. Forms of Letter of Bid, Qualification Information, Letter of Acceptance, and Agreement

1. Letter of Bid

The Bidder must prepare the Letter of Bid on stationery with its letterhead clearly showing the Bidder's complete name and address. . If the Bidder objects to the Adjudicator/Dispute Review expert proposed by the Employer in the Bidding Documents, it should so state in its Bid, and present an alternative candidate, together with the candidate's daily fees and biographical data, in accordance with ITB Clause 37. Bidder should also confirm requirement of advance if provided in ITB36.1.

Date: _____

Invitation for Bid No.: _____

To:

Supertendent Engineer
Rural Work Department
Circle Dehradun
(Near Doordarshan Building) Raipur Road,
Dehradun PIN 248001

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the Bidding Documents, including Addenda issued in accordance with Instructions to Bidders (ITB 11) ;
- (b) We meet the eligibility requirements and have no conflict of interest in accordance with ITB 4;
- (c) We have not been suspended nor declared ineligible by the Employer in accordance with ITB 4.7&ITB 5.8
- (d) We offer to execute in conformity with the Bidding Documents the following Works:
_____;
- (e) The total price of our Bid, excluding any discounts offered in item (d) below is:
_____ ***[both in words and figures];***

-In case of only one lot, total price of the Bid [insert the total price of the bid in words and figures];

-In case of multiple lots, total price of each lot [insert the total price of each lot in words and figures,];

-In case of multiple lots, total price of all lots (sum of all lots)[insert the total price of all lots in words and figures,];

- (f) The discounts offered and the methodology for their application are:
- (i) The discounts offered are: *[Specify in detail each discount offered.]*
- (ii) The exact method of calculations to determine the net price after application of discounts is shown below:*[Specify in detail the method that shall be used to apply the discounts];*
_____;
- (g) Our bid shall be valid for a period of _____ *[insert validity period as specified in ITB 16.1.]* days from the date fixed for the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
- (h) We require advance payment equal to.....as provided in ITB clause 36.1.
- (i) If our bid is accepted, we commit to obtain a performance security in accordance with the Bidding Document;
- (j) We are not participating, as a Bidder , in more than one bid in this bidding process in accordance with ITB 6.1,
- (k) Our firm, its affiliates or subsidiaries, including any Subcontractors or Suppliers for any part of the contract, has not been declared ineligible by the Bank, under the Employer’s country laws or official regulations or by an act of compliance with a decision of the United Nations Security Council;
- (l) We are not a government owned entity / We are a government owned entity but meet the requirements of ITB 4.5;²
- (m) We have paid, or will pay the following commissions, gratuities, or fees with respect to the bidding process or execution of the Contract:³

Name of Recipient	Address	Reason	Amount
-----	-----	-----	-----
-----	-----	-----	-----

- (n) We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf will engage in bribery or any collusive arrangements with competitors.
- (o) We also undertake that, in competing for (and, if the award is made to us, in executing) the above contract, we will strictly observe the laws against fraud and corruption in force in India on date namely “Prevention of Corruption Act 1988.”

²Use one of the two options as appropriate.

³If none has been paid or is to be paid, indicate “none”.

- (p) We understand that this bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed;
- (q) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive; and
- (r) If awarded the contract, the person named below shall act as Contractor's Representative: _____

Name of the Bidder* *[insert complete name of person signing the Bid]*

Name of the person duly authorized to sign the Bid on behalf of the Bidder** *[insert complete name of person duly authorized to sign the Bid]*

Title of the person signing the Bid *[insert complete title of the person signing the Bid]*

Signature of the person named above *[insert signature of person whose name and capacity are shown above]*

Date signed *[insert date of signing]* day of *[insert month]*, *[insert year]*

*: In the case of the Bid submitted by joint venture specify the name of the Joint Venture as Bidder

** : Person signing the Bid shall have the power of attorney given by the Bidder to be attached with the Bid Schedules.

2. Qualification Information

Notes on Form of Qualification Information

The information is to be filled in by individual bidders and by each member of Joint Venture in case of JV participating in the Bid. The following pages will be used for purposes of post-qualification as provided for in Clause 5 of the Instructions to Bidders. This information will not be incorporated in the Contract. Attach additional pages as necessary.

Individual Bidders Qualification																																																						
1	(i) Constitution or legal status of Bidder					[attach copy]																																																
	(ii) Place of registration:																																																				
	(iii) Principal place of business:																																																				
	(iv) Power of attorney of signatory of Bid					[attach]																																																
	Total annual volume of civil engineering construction work executed and payments received in the last five years preceding the year in which bids are invited. (<i>Attach certificate from Chartered Accountant</i>)					Year	(Rs. In millions)																																															
						20 -20																																																
						20 -20																																																
						20 -20																																																
						20 -20																																																
<p>(A) Work performed as prime Contractor (<i>in the same name and style</i>) on construction works of a similar nature and volume over the last five years⁴. [<i>Attach certificate from the Engineer-in-charge.</i>]</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Project Name</th> <th style="width: 15%;">Name of Employer</th> <th style="width: 15%;">Description of work</th> <th style="width: 10%;">Contract No.</th> <th style="width: 10%;">Value of contract</th> <th style="width: 10%;">Date of Issue of Work Order</th> <th style="width: 10%;">Stipulated Date of Completion</th> <th style="width: 10%;">Actual Date of Completion</th> <th style="width: 10%;">Remarks</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>										Project Name	Name of Employer	Description of work	Contract No.	Value of contract	Date of Issue of Work Order	Stipulated Date of Completion	Actual Date of Completion	Remarks																																				
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<p>(B) Quantities of work executed as prime contractor (in the same name and style) in the last five years:⁵</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2" style="width: 10%;">Year</th> <th rowspan="2" style="width: 10%;">Name of the Work</th> <th rowspan="2" style="width: 10%;">Name of Employer*</th> <th colspan="3" style="width: 50%;">Quantity of work performed(cum) @</th> <th rowspan="2" style="width: 10%;">Remarks (indicate contract</th> </tr> <tr> <th style="width: 20%;">Cement concrete (including RCC&PCC)</th> <th style="width: 15%;">Masonry</th> <th style="width: 15%;">E/works</th> </tr> </thead> <tbody> <tr> <td>2009 -2010</td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>2010 -2011</td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>2011 -2012</td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>2012 -2013</td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>2014 -2015</td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>										Year	Name of the Work	Name of Employer*	Quantity of work performed(cum) @			Remarks (indicate contract	Cement concrete (including RCC&PCC)	Masonry	E/works	2009 -2010							2010 -2011							2011 -2012							2012 -2013							2014 -2015						
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⁴ Immediately preceding the financial year in which bids are received.

⁵ Immediately preceding the financial year in which bids are received.

[@ The items or work for which date is requested should tally with that specified in ITB 5.5A(c)* Attach certificates from Engineer in-charge]

(c) Value of Electrical & Sanitary/ Water supply works executed (ITB Clause 5.5 (A) (d) & (e)

Name of Contractor	Year	Contract No.	Name of Work	Name of Employer & Address	Value of Electrical works executed	Value of Sanitary water supply works executed

2.1.	Information on Bid Capacity (works for which bids have been submitted and works which are yet to be completed) as on the date of bid submission.							
	(A) Existing commitments and on-going construction works:							
	Description of Works	Place & State	Contract No & Date	Name & Address of Employer	Value of Contract (Rs. in million)	Stipulated period of completion	Value of works remaining to be completed (Rs. millions)*	Anticipated Date of completion
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	* Enclose certificate(s) from Engineers(s)-in-charge for value of work remaining to be completed.							
	(B) Works for which bids already submitted & likely to be awarded – expected additional commitment.							
	Description of Work	Place & State	Name & Address of Employer	Estimated Value of Works (Rs. millions)	Stipulated period of completion	Date when decision is expected	Remarks, if any	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	

2.2	Availability of Major items of Contractor's Equipment: List all information requested below. Refer also to Clause 5.3 (d) and Clause 5.5B (a) of the Instructions to Bidders.									
Item of Equipment	Description	Make	capacity	age (Years)	Condition	Number available	Owned	Leased	Purchased	
2.3	Qualifications of technical personnel proposed: Refer also to Clause 5.3 (e) and Clause 5.5 B (b) of the Instructions to Bidders and Clause 9.1 of Part-1 General Conditions of Contract.									
Position	Name	Qualification	Years of experience	Years of experience in proposed position <i>(modify the items to suit the work)</i>						
				Road Works	Building Works	Others	Total			
2.4	Proposed sub-contractors and firms: Refer to ITB Clause 5.3(j) and GCC Clause 7.									
Sections of the Works	Value of subcontract	% of Bid price	Sub-contractor (name and address)	Experience in similar work						
<i>Note : The capability of the sub-Contractor will also be assessed (on the same lines as for the main Contractor) before according approval to him.</i>										
2.5	Financial reports or the last five years: Balance sheets, profit and loss statements, auditors' reports, etc. List below and attach copies.									
2.6	Financial Resources: Evidence of access to financial resources to meet the qualification requirements[<i>cash in hand, lines of credit, etc.</i>] List below and attach copies of support documents. [<i>Attach a certificate from Bank in the format at the end of this section. Other Certificate, will not be accepted</i>]									
2.7	Banker's References: Name, address, and telephone, telex, and facsimile numbers of banks that may provide references if contacted by the Employer.									
2.8	Information on current litigation in which the Bidder is involved.									
Name of Other	Cause of dispute	Litigation where	Amount	Remarks						

	party(s)		(Court or Arbitration)	involved	regarding present status		
	1	2	3	4	5		
2.9	Proposed work method and schedule: The bidder should attach descriptions, drawings, and charts as necessary, to comply with the requirements of the bidding documents. [<i>Refer Clause 5.1 and 5.3(k)</i>]						
2.10	Statement of Compliance under the requirements of Sub-Clause 4.2 of ITB.						
2.11	Financial Statements Summary: To be submitted by each bidder including each members of JV.						
SUMMARY OF FINANCIAL STATEMENTS							
Name of bidder/JV Member:							
(Equivalent Rs. Million)							
S.No.	Financial Information in Rupee equivalent with exchange rate at the end of concerned year	Actual for Previous five years excluding the current financial year					Ref. of Page Nos. of Balance Sheets
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1.	Total Assets						
2.	Total Turnover						
3.	Current Assets						
4.	Current Assets + Loan & Advances						
5.	Total Liabilities						
6.	Current Liabilities						
7.	Current liabilities & provision						
8.	Profit before Interest and Tax						
9.	Profit before Tax						
10.	Profit after Tax						
11.	Shareholder's Funds (Net Worth)=(Paid up equity +Reserves)-(revaluation reserves + Miscellaneous expenditure not written off)						
12.	Depreciation						
13.	Current Ration (2)/(5)						
14.	Net cash accruals= Profit after Tax + depreciation						

2.12	<p>This information should be extracted from the Annual Financial Statements/ Balance sheets, which should be enclosed. Year 1 will be the latest year for which audited financial statements are available. Year 2 shall be the year immediately preceding year 1 and year 3 shall be the year immediately preceding Year 2.</p> <p>Additional Requirements : Bidders should provide any additional information required to fulfill the requirement of Clause 5 of ITB.</p>
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**2.13 SAMPLE FORMAT(no substitute is acceptable) FOR EVIDENCE OF ACCESS
TO OR AVAILABILITY OF CREDIT FACILITIES-***
CLAUSE 5.5 [B] [c] OF ITB

BANK CERTIFICATE

This is to certify that M/s.....is a reputed company with a good financial standing.

If the contract for the work, namely.....[funded by the World Bank] is awarded to the above firm, we shall be able to provide overdraft/credit facilities to the extent of Rs. to meet their working capital requirements for executing the above contract.

---Sd.---

Name of Bank

Senior Bank Manager

Address of the Bank

*** Change the text as follows for Joint Venture:**

This is to certify that M/s. Who has formed a JV with M/s. and M/s. for participating in this bid, is a reputed company with a good financial standing.

If the contract for the work, namely [funded by the World Bank] is awarded to the above Joint Venture, we shall be able to provide overdraft/credit facilities to the extent of Rs. to M/s. to meet the working capital requirements for executing the above contract.

[This should be given by the JV members in proportion to their financial participation.]

(To be given from a nationalized or scheduled bank in India. No other substitute will be acceptable)

Form.....

(Name of the Project) : Construction of Calf & Cow Sheds and others miscellaneous works at dairy farm, kalsi Distt. Dehradun.

(Declaration regarding customs/ excise duty exemption for materials/ construction equipment bought for the work)

(Bidder's Name and Address)

To:

Superintendent Engineer
Rural Work Department
Circle Dehradun
(Near Doordarshan Building) Raipur Road,
Dehradun PIN 248001

Dear Sir:

Re: Construction of Calf & Cow Sheds and others miscellaneous works at dairy farm, kalsi Distt. Dehradun. Certificate for Import/Procurement of Goods/Construction Equipment

1. We confirm that we are solely responsible for obtaining customs/excise duty waivers which we have considered in our bid and in case of failure to receive such waivers for reasons whatsoever, the employer will not compensate us.
2. We are furnishing below the information required by the Employer for issue of the necessary certificates in terms of the Government of India Central Excise Notification No.108/95 and Customs Notification No. 85/99.
3. The goods/construction equipment for which certificates are required are as under:

Items <i>(modify the list as required for the work)</i>	Make/ Brand Name	Capacity [where applicable]	Quantity	Value	State whether it will be procured locally or imported [if so from which country]	Remarks regarding justification for the quantity and their usage in works.
Goods						
[a] Bitumen						
[b] Cement						
[c] Steel						
[d] Others						
Construction Equipment						

4. We agree that no modification to the above list is permitted after bids are opened.
5. We agree that the certificate will be issued only to the extent considered reasonable by the Employer for the work, based on the Bill of Quantities and the construction programme and methodology as furnished by us along with the bid.
6. We confirm that the above goods and construction equipment will be exclusively used for the construction of the above work and the construction equipment will not be sold or otherwise disposed of in any manner for a period of five years from the date of acquisition.

Date: _____

(Signature) _____

Place: _____

(Printed Name) _____

(Designation) _____

(Common Seal) _____

[This certificate will be issued within 60 days of signing of contract and no subsequent changes will be permitted.]

3. Letter of Acceptance

[letterhead paper of the Employer]

[The Letter of Acceptance shall be the basis for formation of the Contract as described in ITB Clauses 34 and 35. This Standard Form of Letter of Acceptance shall be filled in and sent to the successful Bidder only after evaluation of bids has been completed, subject to any review by the World Bank required under the Loan Agreement.]

[insert date]

Identification No and Title of Contract: *[insert identification number and title of the Contract]*

To: *[insert name and address of the Contractor]*

This is to notify you that your Bid dated *[insert date]* for execution of the *[insert name of the Contract and identification number, as given in the SCC]* for the Contract Price *[insert amount in numbers and words]* as corrected and modified⁶ in accordance with the Instructions to Bidders is hereby accepted by our Agency.

[insert one of the following (a) or (b) options]

- (a) We accept that *[insert name proposed by bidder]* be appointed as the Adjudicator/Dispute review expert.⁷
- (b) We do not accept that *[insert name proposed by bidder]* be appointed as Adjudicator/Dispute Review expert, and by sending a copy of this Letter of Acceptance to *[insert name of the Appointing Authority]*, we are hereby requesting *[insert name]*, the Appointing Authority, to appoint the Adjudicator/dispute Review Expert in accordance with ITB Clause 37.1.⁸

We note that as per your bid, you do not intend to subcontract any component of work.

[OR]

We note that as per your bid, you propose to employ M/s. as sub-contractor for executing

⁶ Delete "corrected and" or "and modified" if not applicable. See Notes on Standard Form of Agreement, next page.

⁷ To be used only if the Contractor disagrees in the Bid with the Adjudicator proposed by the Employer in the Instructions to Bidders, and has accordingly offered another candidate.

⁸ To be used only if the Contractor disagrees in the Bid with the Adjudicator proposed by the Employer in the ITB, has accordingly offered another candidate, and the Employer does not accept the counterproposal.

[Delete whatever is inapplicable]

You are hereby requested to furnish Performance Security, plus additional security for unbalanced bids in terms of ITB clause 30.6, in the form detailed in ITB Clause 35.1 for an amount of Rs. ____ within 21 days of the receipt of this letter of acceptance, valid upto 28 days from the date of expiry of Defects Liability Period i.e. upto and sign the contract, failing which action as stated in ITB Clause 35.3 will be taken.

We have reviewed the construction methodology submitted by you along with the bid in response to ITB Clause 5.3[k] and our comments are given in the attachment. You are requested to submit a revised Program including environmental management plan as per Clause 26 of General Conditions of Contract within 14 days of receipt of this letter of acceptance.

Yours faithfully,

Authorized Signature.....

Name and Title of Signatory.....

Name of Agency.....

Issue of Notice to proceed with the work

(letterhead of the Employer)

_____ (date)

To

_____ (name and address of the Contractor)

Dear Sirs:

Pursuant to your furnishing the requisite security as stipulated in ITB clause 35.1, insurance policy as per GCC , construction methodology as stated in letter of acceptance and signing of the contract agreement for the construction of _____ @ a Bid Price of Rs. _____, you are hereby instructed to proceed with the execution of the said works in accordance with the contract documents.

Yours faithfully,

(Signature, name and title of
signatory authorized to sign on
behalf of Employer)

4. Agreement

[The Agreement shall incorporate any corrections or modifications to the Bid resulting from corrections of errors (ITB Clause 28), price adjustment during the evaluation process (ITB Sub-Clause 16.3, selection of an alternative offer (ITB Clause 18), acceptable deviations (ITB Clause 27), or any other mutually-agreeable changes allowed for in the Conditions of Contract, such as changes in key personnel, subcontractors, scheduling, and the like.]

This Agreement, made the *[insert day]* day of *[insert month]*, *[insert year]* between *[insert name and address of Employer]* (hereinafter called “the Employer”) and *[insert name and address of Contractor]* (hereinafter called “the Contractor”) of the other part.

Whereas the Employer is desirous that the Contractor execute *[insert name and identification number of Contract]* (hereinafter called “the Works”) and the Employer has accepted the Bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein at a contract price of Rs.

Now this Agreement witnesseth as follows:

1. In this Agreement, words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to, and they shall be deemed to form and be read and construed as part of this Agreement.
2. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein in conformity in all respects with the provisions of the Contract.
3. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects wherein the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

In Witness whereof the parties thereto have caused this Agreement to be executed the day and year first before written.

The Common Seal of *[Witness entity]* _____
was hereunto affixed in the presence of: _____

Signed, Sealed, and Delivered by the said _____
in the presence of: _____

Binding Signature of Employer *[signature of an authorized representative of the Employer]*

Binding Signature of Contractor *[signature of an authorized representative of the Contractor]*

Section V. Bank Policy - Corrupt and Fraudulent Practices

(Section V shall not be modified)

Guidelines for Procurement of Goods, Works, and Non-Consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers, dated January 2011:

“Fraud and Corruption:

1.16 It is the Bank’s policy to require that Borrowers (including beneficiaries of Bank loans), bidders, suppliers, contractors and their agents (whether declared or not), sub-contractors, sub-consultants, service providers or suppliers, and any personnel thereof, observe the highest standard of ethics during the procurement and execution of Bank-financed contracts.⁹ In pursuance of this policy, the Bank:

- (a) Defines, for the purposes of this provision, the terms set forth below as follows:
 - (i) “Corrupt practice” is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;¹⁰
 - (ii) “fraudulent practice” is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;¹¹
 - (iii) “collusive practice” is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;¹²
 - (iv) “coercive practice” is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;¹³

⁹In this context, any action to influence the procurement process or contract execution for undue advantage is improper.

¹⁰ For the purpose of this sub-paragraph, “*another party*” refers to a public official acting in relation to the procurement process or contract execution. In this context, “*public official*” includes World Bank staff and employees of other organizations taking or reviewing procurement decisions.

¹¹ For the purpose of this sub-paragraph, “*party*” refers to a public official; the terms “benefit” and “obligation” relate to the procurement process or contract execution; and the “act or omission” is intended to influence the procurement process or contract execution.

¹² For the purpose of this sub-paragraph, “*parties*” refers to participants in the procurement process (including public officials) attempting either themselves, or through another person or entity not participating in the procurement or selection process, to simulate competition or to establish bid prices at artificial, non-competitive levels, or are privy to each other’s bid prices or other conditions.

- (v) “obstructive practice” is
- (aa) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or
 - (bb) acts intended to materially impede the exercise of the Bank’s inspection and audit rights provided for under paragraph 1.16(e) below.
- (b) will reject a proposal for award if it determines that the bidder recommended for award, or any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;
- (c) will declare misprocurement and cancel the portion of the loan allocated to a contract if it determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of the loan engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the procurement or the implementation of the contract in question, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner at the time they knew of the practices;
- (d) will sanction a firm or individual, at any time, in accordance with the prevailing Bank’s sanctions procedures,¹⁴ including by publicly declaring such firm or individual ineligible, either indefinitely or for a stated period of time: (i) to be awarded a Bank-financed contract; and (ii) to be a nominated¹⁵;

¹³ For the purpose of this sub-paragraph, “party” refers to a participant in the procurement process or contract execution.

¹⁴ A firm or individual may be declared ineligible to be awarded a Bank financed contract upon: (i) completion of the Bank’s sanctions proceedings as per its sanctions procedures, including, inter alia, cross-debarment as agreed with other International Financial Institutions, including Multilateral Development Banks, and through the application the World Bank Group corporate administrative procurement sanctions procedures for fraud and corruption; and (ii) as a result of temporary suspension or early temporary suspension in connection with an ongoing sanctions proceeding. See footnote 14 and paragraph 8 of Appendix 1 of these Guidelines.

¹⁵ A nominated sub-contractor, consultant, manufacturer or supplier, or service provider (different names are used depending on the particular bidding document) is one which has either been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that allow the bidder to meet the qualification requirements for the particular bid; or (ii) appointed by the Borrower.

- (e) will require that a clause be included in bidding documents and in contracts financed by a Bank loan, requiring bidders, suppliers and contractors, and their sub-contractors, agents, personnel, consultants, service providers, or suppliers, to permit the Bank to inspect all accounts, records, and other documents relating to the submission of bids and contract performance, and to have them audited by auditors appointed by the Bank.”

Section VI: Conditions of Contract

These General Conditions of Contract (GCC), read in conjunction with the Particular Conditions of Contract (PCC) and other documents listed therein, should be a complete document expressing fairly the rights and obligations of both parties.

These General Conditions of Contract have been developed on the basis of considerable experience in the drafting and management of contracts, bearing in mind a trend in the construction industry towards simpler, more straightforward language.

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General Conditions of Contract

A. General

1. Definitions

- 1.1 Boldface type is used to identify defined terms.
- (a) The Accepted Contract Amount means the amount accepted in the Letter of Acceptance for the execution and completion of the Works and the remedying of any defects.
 - (b) Not used.
 - (c) The Adjudicator or Dispute Review Expert is the person appointed jointly by the Employer and the Contractor to resolve disputes in the first instance, as provided for in GCC 23.
 - (d) Bank means the financing institution **named in the PCC**.
 - (e) Bill of Quantities means the priced and completed Bill of Quantities forming part of the Bid.
 - (f) Compensation Events are those defined in GCC Clause 42 hereunder.
 - (g) The Completion Date is the date of completion of the Works as certified by the Project Manager, in accordance with GCC Sub-Clause 53.1.
 - (h) The Contract is the Contract between the Employer and the Contractor to execute, complete, and maintain the Works. It consists of the documents listed in GCC Sub-Clause 2.3 below.
 - (i) The Contractor is the party whose Bid to carry out the Works has been accepted by the Employer.
 - (j) The Contractor's Bid is the completed bidding document submitted by the Contractor to the Employer.
 - (k) The Contract Price is the Accepted Contract Amount stated in the Letter of Acceptance and thereafter as adjusted in accordance with the Contract.
 - (l) Days are calendar days; months are calendar months.
 - (m) Not used.
 - (n) A Defect is any part of the Works not completed in accordance with the Contract.
 - (o) The Defects Liability Certificate is the certificate issued by Project Manager upon correction of defects by the Contractor.
 - (p) The Defects Liability Period is the period **named in the PCC** pursuant to Sub-Clause 34.3 and calculated from the Completion Date.
 - (q) Drawings means the drawings of the Works, as included in the Contract, and any additional and modified drawings issued by (or on behalf of) the Employer in

accordance with the Contract, include calculations and other information provided or approved by the Project Manager for the execution of the Contract.

- (r) The Employer is the party who employs the Contractor to carry out the Works, **as specified in the PCC.**
- (s) Equipment is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works.
- (t) "In writing" or "written" means hand-written, type-written, printed or electronically made, and resulting in a permanent record;
- (u) The Initial Contract Price is the Contract Price listed in the Employer's Letter of Acceptance.
- (v) The Intended Completion Date is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is **specified in the PCC.** The Intended Completion Date may be revised only by the Project Manager by issuing an extension of time or an acceleration order.
- (w) Materials are all supplies, including consumables, used by the Contractor for incorporation in the Works.
- (x) Plant is any integral part of the Works that shall have a mechanical, electrical, chemical, or biological function.
- (y) The Project Manager is the person **named in the PCC** (or any other competent person appointed by the Employer and notified to the Contractor, to act in replacement of the Project Manager) who is responsible for supervising the execution of the Works and administering the Contract.
- (z) PCC means Particular Conditions of Contract
- (aa) The Site is the area **defined as such in the PCC.**
- (bb) Site Investigation Reports are those that were included in the bidding documents and are factual and interpretative reports about the surface and subsurface conditions at the Site.
- (cc) Specification means the Specification of the Works included in the Contract and any modification or addition made or approved by the Project Manager.
- (dd) The Start Date is **given in the PCC.** It is the latest date when the Contractor shall commence execution of the Works. It does not necessarily coincide with any of the Site Possession Dates.
- (ee) A Subcontractor is a person or corporate body who has a Contract with the Contractor to carry out a part of the work in the Contract, which includes work on the Site.
- (ff) Temporary Works are works designed, constructed, installed, and removed by the Contractor that are needed

for construction or installation of the Works.

- (gg) A Variation is an instruction given by the Project Manager which varies the Works.
- (hh) The Works are what the Contract requires the Contractor to construct, install, and turn over to the Employer, **as defined in the PCC.**

2. Interpretation

- 2.1 In interpreting these GCC, words indicating one gender include all genders. Words indicating the singular also include the plural and words indicating the plural also include the singular. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Project Manager shall provide instructions clarifying queries about these GCC.
- 2.2 If sectional completion is **specified in the PCC**, references in the GCC to the Works, the Completion Date, and the Intended Completion Date apply to any Section of the Works (other than references to the Completion Date and Intended Completion Date for the whole of the Works).
- 2.3 The documents forming the Contract shall be interpreted in the following order of priority:
 - (a) Agreement,
 - (b) Letter of Acceptance,
 - (c) Contractor's Bid & Priced Bill of Quantities,
 - (d) Particular Conditions of Contract,
 - (e) General Conditions of Contract,
 - (f) Specifications,
 - (g) Drawings, and
 - (h) Joint Venture Agreement [where applicable]
 - (i) any other document **listed in the PCC** as forming part of the Contract.

3. Language and Law

- 3.1 The language of the Contract and the law governing the Contract are **stated in the PCC.**

Salient features of major labour and other laws that are applicable to construction industry in India are given as Appendix 1 to these General Conditions of Contract.
- 3.2 Throughout the execution of the Contract, the Contractor shall comply with the import of goods and services prohibitions in the India when

- (a) as a matter of law or official regulations, India prohibits commercial relations with that country; or
- (b) by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, India prohibits any import of goods from that country or any payments to any country, person, or entity in that country.

4. Project Manager's Decisions

- 4.1 Except where otherwise specifically stated, the Project Manager shall decide contractual matters between the Employer and the Contractor in the role representing the Employer.

However, if the Project Manager is required, under the rules and regulations and orders of the Employer, to obtain approval of some other authorities for specific actions, he will so obtain the approval. Provided further that any requisite approval shall be deemed to have been given by the Employer for any such authority exercised by the Project Manager.

5. Delegation

- 5.1 Unless otherwise specified in the PCC, the Project Manager may delegate any of his duties and responsibilities to other people, except to the Adjudicator, after notifying the Contractor, and may revoke any delegation after notifying the Contractor.

6. Communications

- 6.1 Communications between parties that are referred to in the Conditions shall be effective only when in writing. A notice shall be effective only when it is delivered. All oral instructions shall be confirmed in writing in seven working days.

7. Subcontracting

- 7.1 The Contractor may subcontract with the approval of the Project Manager up to a ceiling specified in PCC, but may not assign the Contract without the approval of the Employer in writing. Subcontracting shall not alter the Contractor's obligations.
- 7.2 The Project Manager should satisfy himself before recommending to the Employer whether:
- a) the circumstances warrant such sub-contracting; and,
 - b) the sub-Contractor so proposed for the Work possesses the experience, qualifications and equipment necessary for the job proposed to be entrusted to him in proportion to the quantum of Works to be sub-contracted.
- 7.3 If payments are proposed to be made directly to that sub-contractor, this should be subject to specific authorization by the prime contractor so that his arrangement does not alter the contractor's liability or obligations under the contract.

7.4 The Contractor shall not be required to obtain any consent from the Employer for:

- (a) the sub-contracting of any part of the Works for which the Sub-Contractor is already named in the contract;
- (b) the provision for labour, or labour component, and,
- (c) the purchase of materials which are in accordance with the standards specified in the contract.

(Note: 1. All bidders are expected to indicate clearly in the bid, if they proposed sub-contracting elements of the works amounting to more than 10 percent of the Bid Price. For each such proposal the qualification and the experience of the identified sub-contractor in the relevant field should be furnished along with the bid to enable the employer to satisfy himself about their qualifications before agreeing for such sub-contracting and include it in the contract. In view of the above, normally no additional sub-contracting should arise during execution of the contract.

2. However, [a] sub-contracting for certain specialized elements of the work is not unusual and acceptable for carrying out the works more effectively; but vertical splitting of the works for sub-contracting is not acceptable. [b] In any case, proposal for sub-contracting in addition to what was specified in bid and stated in contract agreement will not be acceptable if the value of such additional sub-contracting exceeds 25% of value of work which was to be executed by Contractor without sub-contracting.

3. Assignment of the contract may be acceptable only under exceptional circumstances such as insolvencies/liquidation or merger of companies etc.)

8. Other Contractors

8.1 The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities, and the Employer between the dates given in the Schedule of Other Contractors, as **referred to in the PCC**. The Contractor shall also provide facilities and services for them as described in the Schedule. The Employer may modify the Schedule of Other Contractors, and shall notify the Contractor of any such modification.

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- 9. Personnel and Equipment**
- 9.1 The Contractor shall employ the key personnel and use the equipment identified in its Bid and referred to in the PCC, to carry out the Works or other personnel and equipment approved by the Project Manager. The Project Manager shall approve any proposed replacement of key personnel and equipment only if their 'relevant qualifications or characteristics are substantially equal to or better than those proposed in the Bid.
- 9.2 The Project Manager may require the Contractor to remove from the Site of Works, a member of the Contractor's staff or his work force, who:
- (a) persists in any misconduct or lack of care,
 - (b) carries out duties incompetently or negligently,
 - (c) fails to conform with any provisions of the Contract, or
 - (d) persists in any conduct which is prejudicial to safety, health, or the protection of the environment.
- 9.3 If the Employer, Project Manager or Contractor determines, that any employee of the Contractor be determined to have engaged in corrupt, fraudulent, collusive, coercive, or obstructive practice during the execution of the Works, then that employee shall be removed in accordance with Clause 9.2 above
- 9.4 In all the above cases, the contractor shall ensure that the person leaves the site within seven days and has no further connection with the work in the contract. The Contractor shall appoint a suitable replacement within 28 days or earlier as may be agreed to between the Project manager and the Contractor.
- 9.5 The Contractor shall not employ any retired Gazetted officer who has either not completed two years after the date of retirement or has not obtained permission from the Government authorities for employment with the Contractor¹⁶.

¹⁶ Based on Government Directives.

**Compliance with
Labour
Regulations**

- 9.5 The Contractor shall, unless otherwise provided in the Contract, make his own arrangements for the engagement of all staff and labour, local or other, and for their payment, housing, feeding and transport. The Contractor shall, if required by the Project Manager, deliver to the Project Manager a return in detail, in such form and at such intervals as the Project Manager may prescribe, showing the staff and the numbers of the several classes of labour from time to time employed by the Contractor on the Site and such other information as the Project Manager may require.
- 9.6 During continuance of the Contract, the Contractor and his Sub-Contractors shall abide at all times by all existing labour enactments and rules made there under, regulations, notifications and bye laws of the State or Central Government or local authority and any other labour laws (including rules), regulations, bye laws that may be passed or notification that may be issued under any labour law prevailing on the Base Date either by the State or the Central Government or the local authority. The Contractor shall keep the Employer indemnified in case any action is taken against the Employer by the competent authority on account of contraventions including amendments. If the Employer is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/bye laws/Acts/Rules/regulations including amendments, if any, on the part of the Contractor, the Project Manager/ Employer shall have the right to deduct any money due to the Contractor including his amount of performance security. The Employer/ Project Manager shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Employer.
- 9.7 The employees of the Contractor and the Sub-Contractor in no case shall be treated as the employees of the Employer at any point of time.
- 9.8 The Contractor shall duly comply with the provisions of the Apprentices Act 1961 (III of 1961) and the rules made there under, and comply, failure or neglect to shall be subject to all liabilities and penalties provided in the said Act and Rules.

**10. Employer's
and
Contractor's
Risks**

- 10.1 The Employer carries the risks which this Contract states are Employer's risks, and the Contractor carries the risks which this Contract states are Contractor's risks.

11. Employer's Risks

11.1 From the Start Date until the Defects Liability Certificate has been issued, the following are Employer's risks:

- (a) The risk of personal injury, death, or loss of or damage to property (excluding the Works, Plant, Materials, and Equipment), which are due to
 - (i) use or occupation of the Site by the Works or for the purpose of the Works, which is the unavoidable result of the Works or
 - (ii) negligence, breach of statutory duty, or interference with any legal right by the Employer or by any person employed by or contracted to him except the Contractor.
- (b) The risk of damage to the Works, Plant, Materials, and Equipment to the extent that it is due to a fault of the Employer or in the Employer's design, or due to war or radioactive contamination directly affecting the country where the Works are to be executed.

11.2 From the Completion Date until the Defects Liability Certificate has been issued, the risk of loss of or damage to the Works, Plant, and Materials is an Employer's risk except loss or damage due to

- (a) a Defect which existed on the Completion Date,
- (b) an event occurring before the Completion Date, which was not itself an Employer's risk, or
- (c) the activities of the Contractor on the Site after the Completion Date.

12. Contractor's Risks

12.1 From the Starting Date until the Defects Liability Certificate has been issued, the risks of personal injury, death, and loss of or damage to property (including, without limitation, the Works, Plant, Materials, and Equipment) which are not Employer's risks are Contractor's risks.

13. Insurance

13.1 The Contractor shall provide, in the joint names of the Employer and the Contractor, insurance cover from the Start Date to the end of the Defects Liability Period, in the amounts and deductibles **stated in the PCC** for the following events which are due to the Contractor's risks:

- (a) loss of or damage to the Works, Plant, and Materials [which are incorporated in works];

- (b) loss of or damage to Construction Equipment;
- (c) loss of or damage to property (except the Works, Plant, Materials, and Equipment) in connection with the Contract; and
- (d) personal injury or death.

13.2 Policies and certificates for insurance shall be delivered by the Contractor to the Project Manager for the Project Manager's approval before the Start Date. All such insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred.

13.3 If the Contractor does not provide any of the policies and certificates required, the Employer may effect the insurance which the Contractor should have provided and recover the premiums the Employer has paid from payments otherwise due to the Contractor or, if no payment is due, the payment of the premiums shall be a debt due.

13.4 Alterations to the terms of insurance shall not be made without the approval of the Project Manager.

13.5 Both parties shall comply with any conditions of the insurance policies.

14. Site Data

14.1 The Contractor shall be deemed to have examined any Site Data **referred to in the PCC**, supplemented by any information available to the Contractor.

15. Contractor to Construct the Works

15.1 The Contractor shall construct and install the Works in accordance with the Specifications and Drawings and as per instructions of Project Manager.

Protection of Environment

15.2.1 The Contractor shall take all reasonable steps to protect the environment on and off the Site and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other cause arising as a consequence of his methods of operation..

15.2.2 During continuance of the contract, the contractor and his sub-contractors shall abide at all times by all existing enactments on environmental protection and rules made there under, regulations, notifications and by-laws of the Sate or Central Government, or local authorities and other law, bye-law, regulations that may be passed or notification that may be issued in this respect in future by the State or Central

Government or the local authority. Salient features of the major laws are given in Appendix 1 to the General conditions of contract.

- 16 The Works to Be Completed by the Intended Completion Date**
- 16.1 The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the Program submitted by the Contractor, as updated with the approval of the Project Manager, and complete them by the Intended Completion Date.
- 17 Approval by the Project Manager**
- 17.1 The Contractor shall submit Specifications and Drawings showing the proposed Temporary Works to the Project Manager, for his approval.
- 17.2 The Contractor shall be responsible for design of Temporary Works.
- 17.3 The Project Manager's approval shall not alter the Contractor's responsibility for design of the Temporary Works.
- 17.4 The Contractor shall obtain approval of third parties to the design of the Temporary Works, where required.
- 17.5 All Drawings prepared by the Contractor for the execution of the temporary or permanent Works, are subject to prior approval by the Project Manager before this use.
- 18 Safety**
- 18.1 The Contractor shall be responsible for the safety of all activities on the Site.
- 19 Discoveries**
- 19.1 Anything of historical or other interest or of significant value unexpectedly discovered on the Site shall be the property of the Employer. The Contractor shall notify the Project Manager of such discoveries and carry out the Project Manager's instructions for dealing with them.
- 20 Possession of the Site**
- 20.1 The Employer shall give possession of all parts of the Site to the Contractor. If possession of a part is not given by the date **stated in the PCC**, the Employer shall be deemed to have delayed the start of the relevant activities, and this shall be a Compensation Event.
- 21 Access to the Site**
- 21.1 The Contractor shall allow the Project Manager and any person authorized by the Project Manager access to the Site and to any place where work in connection with the Contract is being carried out or is intended to be carried out.

22 Instructions, Inspections and Audits

- 22.1 The Contractor shall carry out all instructions of the Project Manager which comply with the applicable laws where the Site is located.
- 22.2 The Contractor shall keep, and shall make all reasonable efforts to cause its Subcontractors and sub-consultants to keep, accurate and systematic accounts and records in respect of the Works in such form and details as will clearly identify relevant time changes and costs.
- 22.3 The Contractor shall permit and shall cause its Subcontractors and sub-consultants to permit, the Bank and/or persons appointed by the Bank to inspect the Site and/or the accounts and records relating to the performance of the Contract and the submission of the bid, and to have such accounts and records audited by auditors appointed by the Bank if requested by the Bank. The Contractor's and its Subcontractors' and sub-consultants' attention is drawn to Sub-Clause 25.1 which provides, inter alia, that acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under Sub-Clause 22.2 constitute a prohibited practice subject to contract termination (as well as to a determination of ineligibility pursuant to the Bank's prevailing sanctions procedures).

23 Appointment of the Adjudicator or Dispute Review Expert

- 23.1 The Adjudicator/Dispute Review Expert [DRE] named in PCC shall be appointed jointly by the Employer and the Contractor, at the time of the Employer's issuance of the Letter of Acceptance. If, in the Letter of Acceptance, the Employer does not agree on the appointment of the Adjudicator/DRE, the Employer will request the Appointing Authority **designated in the PCC**, to appoint the Adjudicator/DRE within 14 days of receipt of such request.
- 23.1.1 the Adjudicator/DRE should be in a position before "notice to proceed with work" is issued to the contractor and an agreement should be signed with the Adjudicator/DRE jointly by Employer/Contractor in the form attached – Appendix 3.
- 23.2 Should the Adjudicator/DRE resign or die, or should the Employer and the Contractor agree that the Adjudicator/DRE is not functioning in accordance with the provisions of the Contract, a new Adjudicator/DRE shall be jointly appointed by the Employer and the Contractor. In case of disagreement between the Employer and the Contractor, within 30 days, the Adjudicator/DRE shall be designated by the Appointing

Authority **designated in the PCC** at the request of either party, within 14 days of receipt of such request.

24 Procedure for Disputes

24.1 If the Contractor believes that a decision taken by the Project Manager was either outside the authority given to the Project Manager by the Contract or that the decision was wrongly taken, the decision shall be referred to the Adjudicator/DRE within 14 days of the notification of the Project Manager's decision.

24.2 The Adjudicator/DRE shall give a decision in writing within 28 days of receipt of a notification of a dispute.

24.3 The Adjudicator/DRE shall be paid daily at the **rate specified in the PCC**, together with reimbursable expenses of the types **specified in the PCC**, and the cost shall be divided equally between the Employer and the Contractor. Whatever decision is reached by the Adjudicator/DRE, either party may refer that to an Arbitrator within 28 days of the Adjudicator's/DRE's written decision. If neither party refers the dispute to arbitration within the above 28 days, the Adjudicator's /DRE's decision shall be final and binding.

24.4 The arbitration shall be conducted in accordance with the arbitration procedures published by the institution named and in the place specified **in the PCC**.

24.5 The Arbitrator shall give a decision in writing within 120 days of start of the proceedings except otherwise agreed to by the Parties. The Arbitrators shall entertain only those issues which have been earlier referred to the Adjudicator/DRE and either party is dissatisfied with the decision given by the Adjudicator/DRE.

25. Corrupt And Fraudulent Practices

25.1 The Bank requires compliance with its policy in regard to corrupt and fraudulent practices as set forth in Appendix to the GCC.

25.2 The Employer requires the Contractor to disclose any commissions or fees that may have been paid or are to be paid to agents or any other party with respect to the bidding process or execution of the Contract. The information disclosed must include at least the name and address of the agent or other party, the amount and currency, and the purpose of the commission, gratuity or fee.

B. Time Control

- | | |
|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 26. Program | <p>26.1 Within the time stated in the PCC, after the date of the Letter of Acceptance, the Contractor shall submit to the Project Manager for approval a revised Program (revising the program given along with the bid) including Environmental Management Plan showing the general methods, arrangements, order, and timing for all the activities in the Works along with monthly cash flow forecasts.</p> <p>26.2 An update of the Program shall be a program showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work, including any changes to the sequence of the activities.</p> <p>26.3 The Contractor shall submit to the Project Manager for approval an updated Program at intervals no longer than the period stated in the PCC. If the Contractor does not submit an updated Program within this period, the Project Manager may withhold the amount stated in the PCC from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Program has been submitted.</p> <p>26.4 The Project Manager's approval of the Program shall not alter the Contractor's obligations. The Contractor may revise the Program and submit it to the Project Manager again at any time. A revised Program shall show the effect of Variations and Compensation Events.</p> <p>26.5 The Contractor shall furnish monthly progress reports as directed by the Project Engineer by 7th of the succeeding month. The report shall include charts and detailed descriptions of the progress of identified activities, photographs showing status of progress at site, records of Contractor's personnel and equipment, Quality Assurance documents, comparison of actual and planned progress as per program.</p> |
| 27 Extension of the Intended Completion Date | <p>27.1 The Project Manager shall extend the Intended Completion Date including milestones if a Compensation Event occurs or a Variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date as per agreed milestones without the Contractor taking steps to accelerate the remaining work, which would cause the Contractor to incur additional cost.</p> |

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- 27.2 The Project Manager shall decide whether and by how much to extend the Intended Completion Date/milestones within 21 days of the Contractor asking the Project Manager for a decision upon the effect of a Compensation Event or Variation and submitting full supporting information. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date/milestones.
- 28 Acceleration**
- 28.1 When the Employer wants the Contractor to finish before the Intended Completion Date, the Project Manager shall obtain priced proposals for achieving the necessary acceleration from the Contractor. If the Employer accepts these proposals, the Intended Completion Date shall be adjusted accordingly and confirmed by both the Employer and the Contractor.
- 28.2 If the Contractor's priced proposals for acceleration are accepted by the Employer, they are incorporated in the Contract Price and treated as a Variation.
- 29 Delays Ordered by the Project Manager**
- 29.1 The Project Manager may instruct the Contractor to delay the start or progress of any activity within the Works.
- 30 Management Meetings**
- 30.1 Either the Project Manager or the Contractor may require the other to attend a management meeting. (Which will be held at the place specified in PCC. The periodicity to be fixed by Project Manager / Contractor jointly). The business of a management meeting shall be to review the progress of construction with reference to the construction program given in accordance with GCC 26.1, the plans for remaining work and to deal with matters raised in accordance with the early warning procedure.
- 30.2 The Project Manager shall record the business of management meetings and provide copies of the record to those attending the meeting and to the Employer. The responsibility of the parties for actions to be taken shall be decided by the Project Manager either at the management meeting or after the management meeting and stated in writing to all who attended the meeting.
- 31 Early Warning**
- 31.1 The Contractor shall warn the Project Manager at the earliest opportunity of specific likely future events or circumstances that may adversely affect the quality of the work, increase the Contract Price, or delay the execution of the Works. The

Project Manager may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the Contract Price and Completion Date. The estimate shall be provided by the Contractor as soon as reasonably possible.

- 31.2 The Contractor shall cooperate with the Project Manager in making and considering proposals for how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the work and in carrying out any resulting instruction of the Project Manager.

C. Quality Control

32 Quality Assurance

- 32.1 The Contractor shall institute Quality Assurance (QA) and Quality Control (QC) systems in accordance with Quality Assurance Plan to demonstrate compliance with the requirements of the Contract as approved by the Project Manager.
- 32.2 Compliance with the QA/QC systems shall not relieve the Contractor of any of his duties obligations or responsibilities under the Contract.

33 Tests

- 33.1 The Contractor shall provide all apparatus, assistance, documents and other information, electricity, equipment, fuel, consumables, instruments, labour, materials, and suitably qualified and experienced staff, as are necessary to carry out the specified tests efficiently.
- 33.2 If the Project Manager instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a Defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no Defect, the test shall be a Compensation Event.

34 Identifying and Correction of Defects

- 34.1. The Project Manager shall check the Contractor's work and notify the Contractor of any defects that are found specifying a time by which it should be corrected. Such checking shall not affect the Contractor's responsibilities. The Project Manager may instruct the Contractor to search for a Defect and to uncover and test any work that the Project Manager considers may have a Defect.
- 34.2 The contractor shall permit the Employer's Technical auditor to check the contractor's work and notify the Project Manager and Contractor of any defects that are found. Such a check

shall not affect the Contractor's or the Project Manager's responsibility as defined in the Contract Agreement

34.3 The Project Manager shall give notice to the Contractor of any Defects [specifying a time limit by which it should be corrected] before the end of the Defects Liability Period, which begins at Completion, and is **defined in the PCC**. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.

34.4 Every time notice of a Defect is given, the Contractor shall correct the notified Defect within the length of time specified by the Project Manager's notice.

35 Uncorrected Defects

35.1 If the Contractor has not corrected a Defect within the time specified in the Project Manager's notice, the Project Manager shall assess the cost of having the Defect corrected and the Contractor shall pay this amount.

Note: 1. Where in certain cases, the technical specifications provide for acceptance of works within specified tolerance limits at reduced rates, Engineer will certify payments to Contractor accordingly.

2. Where the failure to correct a particular defect within the specified time is considered as a fundamental breach of contract a notice should be given to the contractor as stated in GCC 57.2(e).

D. Cost Control

36 Contract Price

36.1 The Bill of Quantities shall contain priced items for the Works to be performed by the Contractor. The Bill of Quantities is used to calculate the Contract Price. The Contractor will be paid for the quantity of the work accomplished at the rate in the Bill of Quantities for each item.

37 Changes in the Contract Price

37.1 If the final quantity of the work done differs from the quantity in the Bill of Quantities for the particular item by more than 25 percent, provided the change exceeds 1 percent of the Initial Contract Price, the Project Manager shall adjust the rate to allow for the change.

(a) If the quantity of work executed exceeds the quantity of the item in BOQ beyond the higher specified limit the Project Manager shall fix the rate to be applied for the additional quantity of the work executed.

(b) If the quantity of work executed less than the quantity of the item in BOQ lesser than the lower specified limit, the Project Manager shall fix the rate to be applied for whole of the quantity of the work so executed.

37.2. The Project Manager shall not adjust rates from changes in quantities if thereby the Initial Contract Price is exceeded by more than 15 percent, except with the prior approval of the Employer.

37.3 If requested by the Project Manager, the Contractor shall provide the Project Manager with a detailed cost breakdown of any rate in the Bill of Quantities.

38 Variations

38.1 All Variations shall be included in updated Programs, produced by the Contractor.

38.2 The Contractor shall provide the Project Manager with a quotation (with breakdown of unit rates) for carrying out the Variation when requested to do so by the Project Manager. The Project Manager shall assess the quotation, which shall be given within seven (7) days of the request or within any longer period stated by the Project Manager and before the Variation is ordered.

38.3 If the work in the Variation corresponds to an item description in the Bill of Quantities and if, in the opinion of the Project Manager, the quantity of work above the limit stated in Sub-Clause 37.1 or the timing of its execution do not cause the cost per unit of quantity to change, the rate in the Bill of Quantities shall be used to calculate the value of the Variation. If the cost per unit of quantity changes, or if the nature or timing of the work in the Variation does not correspond with items in the Bill of Quantities, the quotation by the Contractor shall be in the form of new rates for the relevant items of work.

38.4 If the Contractor's quotation is unreasonable, [*or if contractor fails to provide the Project Manager with a quotation within a reasonable time specified by Project Manager in accordance with GCC38.2*] the Project Manager may order the Variation and make a change to the Contract Price, which shall be based on the Project Manager's own forecast of the effects of the Variation on the Contractor's costs

38.5 If the Project Manager decides that the urgency of varying the work would prevent a quotation being given and considered

without delaying the work, no quotation shall be given and the Variation shall be treated as a Compensation Event.

38.6 The Contractor shall not be entitled to additional payment for costs that could have been avoided by giving early warning.

39 Cash Flow Forecasts

39.1 When the Program, is updated, the Contractor shall provide the Project Manager with an updated cash flow forecast. The cash flow forecast shall be in Indian Rupees.

40 Payment Certificates

40.1 The Contractor shall submit to the Project Manager monthly statements of the estimated value of the work executed less the cumulative amount certified previously along with details of measurement of the quantity of works executed in a tabular form approved by the Project Manager.

40.2 The Project Manager shall check the details given in the Contractor's monthly statement and within 14 days certify the amounts to be paid to the Contractor after taking into account any credit or debit for the month in question in respect of materials for the works in the relevant amount and under conditions set forth in GCC Sub-Clause 49.4 [*Secured Advance*]

40.3 The value of work executed shall be determined by the Project Manager after due check measurement of the quantities claimed as executed by the contractor

40.4 The value of work executed shall comprise of the value of the quantities of work in the Bill of Quantities that have been completed;

40.5 The value of work executed shall include the valuation of Variations and Compensation Events.

40.6 The Project Manager may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.

41 Payments

41.1. Payments shall be adjusted for deductions for advance payments, retention, other recoveries in terms of contract & taxes to be deducted at source [TDS] as per applicable law. The Employer shall pay the Contractor the amounts certified by the Project Manager within 28 days of the date of each certificate. If the Employer makes a late payment, the

Contractor shall be paid interest on the late payment in the next payment. Interest shall be calculated from the date by which the payment should have been made up to the date when the late payment is made at 8% per annum

- 41.2. If an amount certified is increased in a later certificate or as a result of an award by the Adjudicator/DRE or an Arbitrator, the Contractor shall be paid interest upon the delayed payment as set out in this clause. Interest shall be calculated at the rate stated in GCC 41.1 above, from the date upon which the increased amount would have been certified in the absence of dispute.
- 41.3 Items of the Works for which no rate or price has been entered in shall not be paid for by the Employer and shall be deemed covered by other rates and prices in the Contract.

42 Compensation Events

- 42.1 The following shall be Compensation Events:
- (a) The Employer does not give access to a part of the Site by the Site Possession Date pursuant to GCC Sub-Clause 20.1.
 - (b) The Employer modifies the Schedule of Other Contractors in a way that affects the work of the Contractor under the Contract.
 - (c) The Project Manager orders a delay or does not issue Drawings, Specifications, or instructions required for execution of the Works on time.
 - (d) The Project Manager instructs the Contractor to uncover or to carry out additional tests upon work, which is then found to have no Defects.
 - (e) The Project Manager unreasonably does not approve a subcontract to be let.
 - (f) Ground conditions are substantially more adverse than could reasonably have been assumed before issuance of the Letter of Acceptance from the information issued to bidders (including the Site Investigation Reports), from information available publicly and from a visual inspection of the Site.
 - (g) The Project Manager gives an instruction for dealing with an unforeseen condition, caused by the Employer, or additional work required for safety or other reasons.
 - (h) Other contractors, public authorities, utilities, or the Employer does not work within the dates and other constraints stated in the Contract, and they cause delay or extra cost to the Contractor.
 - (i) The advance payment is delayed.

- (j) The effects on the Contractor of any of the Employer's Risks.
- (k) The Project Manager unreasonably delays issuing a Certificate of Completion.

42.2 If a Compensation Event would cause additional cost or would prevent the work being completed before the Intended Completion Date, the Contract Price shall be increased and/or the Intended Completion Date shall be extended. The Project Manager shall decide whether and by how much the Contract Price shall be increased and whether and by how much the Intended Completion Date shall be extended.

42.3 As soon as information demonstrating the effect of each Compensation Event upon the Contractor's forecast cost has been provided by the Contractor, it shall be assessed by the Project Manager, and the Contract Price shall be adjusted accordingly. If the Contractor's forecast is deemed unreasonable, the Project Manager shall adjust the Contract Price based on the Project Manager's own forecast. The Project Manager shall assume that the Contractor shall react competently and promptly to the event.

42.4 The Contractor shall not be entitled to compensation to the extent that the Employer's interests are adversely affected by the Contractor's not having given early warning or not having cooperated with the Project Manager.

43 Tax

43.1 The rates quoted by the Contractor shall be deemed to be inclusive of the Vat, Sales and other taxes that the Contractor will have to pay for the performance of this Contract. The Employer will perform such duties in regard to the deduction of such taxes at source [TDS] as per applicable law.

44 Currencies

44.1 All payments shall be made in Indian Rupees.

45 Price Adjustment

45.1 Contract price shall be adjusted for increase or decrease in rates and price of labour, materials, fuels and lubricants and other inputs to the works in accordance with the principles and procedures outlined below. A table of adjustment data is included in the PCC which indicates the coefficients of various inputs and the sources of indices for various schedules of BOQ. If the PCC does not include a table of adjustment data this sub clause shall not apply and there shall be no price adjustment.

- (a) The price adjustment according to sub para (d) below,

shall apply for the work done from the start date given in the PCC up to the end of the Intended Completion Date. If there is delay in completion beyond such date for reasons attributable to the contractor, the Price Adjustment for the work carried out during such period, for reasons attributable to the Contractor, shall be regulated by sub-para (g) below.

(b) The Contract Price shall be adjusted to take account of any increase or decrease in cost after the base date, which affect the Contractor in performance of obligations under the Contract.

(c) The total value (R) of the work done during the specified period[GCC 40.1]shall be as under:

$$R = \text{SUM} (R_{S1} + R_{S2} + R_{S3} + \dots R_{Sn}),$$

Where,

‘R_{sn}’ is the value of work done during the specified period to which the price adjustment shall be applied for the relevant schedule of Bill of Quantities (BOQ) specified in P.C.C during the specified period, and represented as under:

$R_{sn} = (V_{sn} + S_{sn})$ minus (amount of secured advance recovered in the same period + value of works executed under variations for which price adjustments will be worked separately based on terms mutually agreed between the Project Engineer and the Contractor)

where,

V_{sn} is the total value of work done during the specified period for the respective schedule of BOQ, and

S_{sn} is the secured advance paid during the specified period for the respective schedule of BOQ,

(d) The adjustment to be applied to the amount otherwise payable to the Contractor, as valued in accordance with the appropriate schedule of BOQ and certified in Payment Certificates, shall be determined from formulae which shall be of the following general type:

$$P_n = a + b L_n/L_o + c E_n/E_o + d M_n/M_o + \dots$$

where,

“P_n” is the adjustment multiplier to be applied to the value of the work done during the period “n”, this period being a month unless otherwise stated in the PCC.

“a” is a fixed coefficient, stated in the relevant table of adjustment data, representing the non-adjustable portion in contractual payments;

“b”, “c”, “d”,... are coefficients representing the estimated proportion of each cost element related to the execution of the Works, as stated in the relevant table of

adjustment data; such tabulated cost elements may be indicative of resources such as labour, equipment and materials;

“L_n” [*Labour*], “E_n” [*Equipment*], “M_n” [*Material*], are the current cost indices or reference prices for period “n”, each of which is applicable to the relevant tabulated cost element [*Labour, Equipment, Steel, Cement, Fuel/Lubricants, Bitumen, others*] on the date, specified in the Table-2 of Adjustment Data, prior to the last day of the period (to which the particular Payment Certificate relates); and

“L_o”, “E_o”, “M_o”,are the base cost indices or reference prices, expressed in the relevant currency of payment, each of which is applicable to the relevant tabulated cost element on the Base Date.

- (e) The cost indices or reference prices stated in the tables of adjustment data given in PCC shall be used. The base date shall be date of opening of bids.
- (f) If the Contractor fails to complete the Works within the Intended Completion date, adjustment of prices thereafter shall be made using either:
 - (i) index or price applicable for each cost element tabulated in the tables of adjustment data on the specified date prior to the expiry of the Intended Completion Date, or
 - (ii) the current index or price applicable for the period in question whichever is more favourable to the Employer.
- (g) The weightings (coefficients) for each of the factors of cost stated in the table(s) of adjustment data shall only be varied by the Project Manager if they have been rendered unreasonable, unbalanced or inapplicable, as a result of Variations.
- (h) Unless otherwise stated in the P.C.C., the Price adjustment shall be done in each monthly Interim Payment Certificate [IPC]. The coefficients and indices are given in the Tables of Adjustment Data in Contract data.

To the extent that full compensation for any rise or fall in costs to the contractor is not covered by the provisions of this or other clauses in the contract, the unit rates and prices included in the

contract shall be deemed to include amounts to cover the contingency of such other rise or fall in costs

- 46 Retention**
- 46.1 The Employer shall retain from each payment due to the Contractor the proportion **stated in the PCC** until Completion of the whole of the Works
- 46.2 Upon the issue of a Certificate of Completion of the Works by the Project Manager, in accordance with GCC 53.1, half the total amount retained shall be repaid to the Contractor and half when the Defects Liability Period has passed and the Project Manager has certified that all Defects notified by the Project Manager to the Contractor before the end of this period have been corrected. On completion of the whole works the Contractor may substitute the balance retention money with an “on demand” Bank guarantee.
- 47 Liquidated Damages**
- 47.1 The Contractor shall pay liquidated damages to the Employer at the rate per day **stated in the PCC** for each day that the Completion Date is later than the Intended Completion Date (for the whole of the works or the milestones as stated in the PCC).. The total amount of liquidated damages shall not exceed the amount **defined in the PCC**. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not affect the Contractor’s liabilities.
- 47.1.1 Time is the essence of the contract and payment or deduction of liquidated damages shall not relieve the contractor from his obligation to complete the work as per agreed construction program and milestones, or from any of the other contractor’s obligations and liabilities under the contract.
- 47.2 If the Intended Completion Date including milestones is extended after liquidated damages have been paid, the Project Manager shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate. The Contractor shall be paid interest on the overpayment, calculated from the date of payment to the date of repayment, at the rates specified in GCC Sub-Clause 41.1.
- 48 Bonus**
- 48.1 Not used.
- 49 Advance Payment**
- 49.1 The Employer shall make advance payment to the Contractor of the amounts **stated in the PCC** by the date **stated in the PCC**, against provision by the Contractor of an Unconditional Bank

Guarantee in a form and by a bank acceptable to the Employer in amounts in Indian Rupees equal to the advance payment. The Guarantee shall remain effective until the advance payment has been repaid, but the amount of the Guarantee shall be progressively (*each installment not less than Rs. 500,000*) reduced by the amounts repaid by the Contractor. Interest shall not be charged on the advance payment.

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| Secured Advances | <p>49.2 The Contractor is to use the advance payment only to pay for Equipment, Plant, Materials, and mobilization expenses required specifically for execution of the Contract. The Contractor shall demonstrate that advance payment has been used in this way by supplying copies of invoices or other documents to the Project Manager.</p> <p>49.3 The advance payment shall be repaid by deducting proportionate amounts from payments otherwise due to the Contractor, following the schedule of completed percentages of the Works on a payment basis. No account shall be taken of the advance payment or its repayment in assessing valuations of work done, Variations, price adjustments, Compensation Events, Liquidated Damages.</p> <p>49.4 The Engineer shall make advance payment in respect of materials intended for but not yet incorporated in the Works in accordance with conditions stipulated in the PCC.</p> |
| 50 Securities | <p>50.1 The Performance Security shall be provided to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in an amount specified in the PCC, by a Nationalized or Schedule bank in India, and denominated. The Bank Guarantee for Performance Security and additional security for unbalanced bids shall be valid until a date 28 days from the date of issue of the Certificate of Completion.</p> |
| 51 Day works | <p>51.1 Not used.</p> |
| 52 Cost of Repairs | <p>52.1 Loss or damage to the Works or Materials to be incorporated in the Works between the Start Date and the end of the Defects Correction periods shall be remedied by the Contractor at the Contractor's cost if the loss or damage arises from the Contractor's acts or omissions.</p> |

E. Finishing the Contract

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| 53 Completion | 53.1 The Contractor shall request the Project Manager to issue a Certificate of Completion of the Works, and the Project Manager shall do so upon deciding that the whole of the Works is completed. |
| 54 Taking Over | 54.1 The Employer shall take over the Site and the Works within seven days of the Project Manager's issuing a certificate of Completion. |
| 55 Final Account | 55.1 The Contractor shall supply the Project Manager with a detailed account of the total amount that the Contractor considers payable under the Contract at the end of the Defects Liability Period. The Project Manager shall issue a Defects Liability Certificate and certify any final payment that is due to the Contractor within 56 days of receiving the Contractor's account if it is correct and complete. If it is not, the Project Manager shall issue within 56 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Project Manager shall decide on the amount payable to the Contractor and issue a payment certificate within 56 days of receiving the contractor's revised account. |
| 56 Operating and Maintenance Manuals | <p>56.1 If "as built" Drawings [including a compact disk containing digitized drawings] and/or operating and maintenance manuals are required, the Contractor shall supply them by the dates stated in the PCC.</p> <p>56.2 If the Contractor does not supply the Drawings [including a compact disk containing digitized drawings] and/or manuals by the dates stated in the PCC pursuant to GCC Sub-Clause 56.1, or they do not receive the Project Manager's approval, the Project Manager shall withhold the amount stated in the PCC from payments due to the Contractor.</p> |
| 57 Termination | <p>57.1 The Employer or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract after giving fourteen (14) days written notice.</p> <p>57.2 Fundamental breaches of Contract shall include, but shall not be limited to, the following:</p> <ul style="list-style-type: none"> (a) the Contractor stops work for 28 days when no stoppage of work is shown on the current Program and the stoppage has |

not been authorized by the Project Manager;

- (b) the Project Manager instructs the Contractor to delay the progress of the Works, and the instruction is not withdrawn within 28 days;
- (c) the Employer or the Contractor is made bankrupt or goes into liquidation other than for a reconstruction or amalgamation;
- (d) a payment certified by the Project Manager is not paid by the Employer to the Contractor within 84 days of the date of the Project Manager's certificate;
- (e) the Project Manager gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Project Manager;
- (f) the Contractor does not maintain a Security, which is required;
- (g) the Contractor has delayed the completion of the Works by the number of days for which the maximum amount of liquidated damages can be paid, as **defined in the PCC**; or
- (h) if the Contractor, in the judgment of the Employer, has engaged in corrupt or fraudulent practices in competing for or in executing the Contract, pursuant to GCC Clause 25.1, then the Employer may, after giving fourteen (14) days written notice to the Contractor, terminate the Contract and expel him from the Site..
- (i) The contractor has contravened Clauses 7 and 9 of GCC.
- (j) The contractor does not adhere to the agreed construction program and agreed environmental management plan [Clause 26 of GCC] and also fails to take satisfactory remedial action as per agreements reached in the management meetings [Clause 30] for a period of 60 days.
- (k) The contractor fails to carry out of the instructions of Engineer within a reasonable time determined by the Engineer in accordance with GCC Clause 15.1 and 22.
- (l) The contractor (in case of Joint Venture) has modified the composition of the joint venture and/or the responsibility of

each member of the joint venture from what is stated in joint venture agreement without the prior approval of the Employer.

- 57.3 When either party to the Contract gives notice of a breach of Contract to the Project Manager for a cause other than those listed under GCC Sub-Clause 57.2 above, the Project Manager shall decide whether the breach is fundamental or not.
- 57.4 Notwithstanding the above, the Employer may terminate the Contract for convenience.
- 57.5 If the Contract is terminated, the Contractor shall stop work immediately, make the Site safe and secure, and leave the Site as soon as reasonably possible.

58 Payment upon Termination

- 58.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Project Manager shall issue a certificate for the value of the work done and Materials ordered less advance payments received up to the date of the issue of the certificate less other recoveries due in terms of contract, less taxes to be deducted at source [TDS] as per applicable law, and less the percentage to apply to the value of the work not completed, as **indicated in the PCC**. Additional Liquidated Damages shall not apply. If the total amount due to the Employer exceeds any payment due to the Contractor, the difference shall be a debt payable to the Employer.
- 58.2 If the Contract is terminated for the Employer's convenience or because of a fundamental breach of Contract by the Employer, the Project Manager shall issue a certificate for the value of the work done, Materials ordered, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works, and less advance payments received up to the date of the certificate less other recoveries due in terms of the contract and less taxes due to be deducted at source [TDS] as per applicable law.

59 Property

- 59.1 All Materials on the Site, Plant, Equipment, Temporary Works, and Works shall be deemed to be the property of the Employer if the Contract is terminated because of the Contractor's default.

60 Release from Performance

- 60.1 If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Employer or the Contractor, the Project Manager shall certify that the

Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which a commitment was made.

**61 Suspension of
Bank Loan or
Credit**

61.1 In the event that the Bank suspends the Loan or Credit to the Employer, from which part of the payments to the Contractor are being made:

- (a) The Employer is obligated to notify the Contractor of such suspension within 7 days of having received the Bank's suspension notice.
- (b) If the Contractor has not received sums due it within the 28 days for payment provided for in Sub-Clause 40.1, the Contractor may immediately issue a 14-day termination notice.

APPENDIX TO GENERAL CONDITIONS

Bank's Policy- Corrupt and Fraudulent Practices

(Text in this Appendix shall not be modified)

Guidelines for Procurement of Goods, Works, and Non-Consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers, dated January 2011:

“Fraud and Corruption:

1.16 It is the Bank's policy to require that Borrowers (including beneficiaries of Bank loans), bidders, suppliers, contractors and their agents (whether declared or not), sub-contractors, sub-consultants, service providers or suppliers, and any personnel thereof, observe the highest standard of ethics during the procurement and execution of Bank-financed contracts.¹⁷ In pursuance of this policy, the Bank:

- (a) defines, for the purposes of this provision, the terms set forth below as follows:
 - (i) “corrupt practice” is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;¹⁸
 - (ii) “fraudulent practice” is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;¹⁹
 - (iii) “collusive practice” is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;²⁰
 - (iv) “coercive practice” is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;²¹
 - (v) “obstructive practice” is

¹⁷In this context, any action to influence the procurement process or contract execution for undue advantage is improper.

¹⁸ For the purpose of this sub-paragraph, “*another party*” refers to a public official acting in relation to the procurement process or contract execution. In this context, “*public official*” includes World Bank staff and employees of other organizations taking or reviewing procurement decisions.

¹⁹ For the purpose of this sub-paragraph, “*party*” refers to a public official; the terms “benefit” and “obligation” relate to the procurement process or contract execution; and the “act or omission” is intended to influence the procurement process or contract execution.

²⁰ For the purpose of this sub-paragraph, “*parties*” refers to participants in the procurement process (including public officials) attempting either themselves, or through another person or entity not participating in the procurement or selection process, to simulate competition or to establish bid prices at artificial, non-competitive levels, or are privy to each other's bid prices or other conditions.

²¹ For the purpose of this sub-paragraph, “*party*” refers to a participant in the procurement process or contract execution.

- (aa) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or
 - (bb) acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under paragraph 1.16(e) below.
- (b) will reject a proposal for award if it determines that the bidder recommended for award, or any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;
- (c) will declare mis -procurement and cancel the portion of the loan allocated to a contract if it determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of the loan engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the procurement or the implementation of the contract in question, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner at the time they knew of the practices;
- (d) will sanction a firm or individual, at any time, in accordance with the prevailing Bank's sanctions procedures,²² including by publicly declaring such firm or individual ineligible, either indefinitely or for a stated period of time: (i) to be awarded a Bank-financed contract; and (ii) to be a nominated²³;
- (e) will require that a clause be included in bidding documents and in contracts financed by a Bank loan, requiring bidders, suppliers and contractors, and their sub-contractors, agents, personnel, consultants, service providers, or suppliers, to permit the Bank to inspect all accounts, records, and other documents relating to the submission of bids and contract performance, and to have them audited by auditors appointed by the Bank.”

²² A firm or individual may be declared ineligible to be awarded a Bank financed contract upon: (i) completion of the Bank's sanctions proceedings as per its sanctions procedures, including, inter alia, cross-debarment as agreed with other International Financial Institutions, including Multilateral Development Banks, and through the application the World Bank Group corporate administrative procurement sanctions procedures for fraud and corruption; and (ii) as a result of temporary suspension or early temporary suspension in connection with an ongoing sanctions proceeding. See footnote 14 and paragraph 8 of Appendix 1 of these Guidelines.

²³ A nominated sub-contractor, consultant, manufacturer or supplier, or service provider (different names are used depending on the particular bidding document) is one which has either been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that allow the bidder to meet the qualification requirements for the particular bid; or (ii) appointed by the Borrower.

Section VII. Particular Conditions of Contract

A. General	
GCC 1.1 (d)	The financing institution is: International Development Association
GCC 1.1 (r)	The Employer is <i>Superintendent Engineer, Rural Works Department, Dehradun</i>
GCC 1.1 (v)	The Intended Completion Date for the whole of the Works shall be Completion date : 12 (Twelve) Months from the date of award of the contract.
GCC 1.1 (y)	The Project Manager is: Executive Engineer, Rural Works Department, Dehradun
GCC 1.1 (aa)	The Sites are located at as below. Construction of Calf & Cow Sheds and others miscellaneous works at dairy farm, kalsi Distt. Dehradun. (a) Project site: Dairy Farm, Kalsi, Distt. Dehradun.
GCC 1.1 (dd)	The Start Date shall be one week after the date of issue of notice to proceed with works to the contractor.
GCC 1.1 (hh)	The Works consist of <ol style="list-style-type: none"> 1. <i>Cow Shed:</i> 2. <i>Calves Shed</i> 3. <i>Changing Block</i> 4. Other supporting structures like changing room, various stores, passing room, Loading Unloading platform, toilets, Weigh Bridge etc. 5. Site protection and development works: <ol style="list-style-type: none"> a. Boundary wall b. Foot Dip c. Vehicle Dip d. G.I Chain link fencing 6. Electrical Works: External and Internal Electrical Works

	a. Identification number of the contract is..... (to be filled at the time of award of contract)
GCC 2.2	Sectional Completions are: Not Applicable
GCC 2.3(j)	The following documents also form part of the Contract: None. The Construction methodology: <ol style="list-style-type: none"> 1. Construction methodology will be followed in accordance to the technical specifications, agreed schedule and completion period. 2. Schedule of construction would strictly be the priority works to be given due importance for early completion. 3. Normally the finished floor and finishing activities are to be taken up after completion of all structural, steel and roofing activities are completed. 4. As decided by Project Manager while execution based on merit of case. 5.
GCC 3.1	The language of the contract is <i>English</i> . The law that applies to the Contract is <i>the</i> laws of Union of India.
GCC 5.1	The Project manager may delegate any of his duties and responsibilities.
GCC 7.1	The ceiling for sub-contractor is 25%
GCC 8.1	Schedule of other contractors: Not Applicable
GCC 9.1	Key Personnel and equipment: As mentioned in Clause ITB 5.5 (B) under BDS.

GCC 13.1	<p>The minimum insurance amounts and deductibles shall be:</p> <table border="1"> <thead> <tr> <th>S.No.</th> <th>Description</th> <th>Minimum cover for Insurance</th> <th>Maximum deductible for Insurance</th> </tr> </thead> <tbody> <tr> <td>(i)</td> <td>Works and Plant and Materials</td> <td>5.00 Crore</td> <td>Rs. 0.50 lakh</td> </tr> <tr> <td>(ii)</td> <td>Loss or damage to Equipment</td> <td>1.50 Crore</td> <td>Rs. 0.10 lakh</td> </tr> <tr> <td>(iii)</td> <td>Other Property</td> <td>1.0 Crore</td> <td>Rs. 0.10 lakh</td> </tr> <tr> <td>(iv)</td> <td>Personal injury or death insurance: a)for other people;</td> <td>20.0 Lakhs</td> <td>Rs. 0.01 lakh</td> </tr> <tr> <td></td> <td>b)for contractor's Employees</td> <td colspan="2">In accordance with the statutory requirements applicable in India</td> </tr> </tbody> </table>	S.No.	Description	Minimum cover for Insurance	Maximum deductible for Insurance	(i)	Works and Plant and Materials	5.00 Crore	Rs. 0.50 lakh	(ii)	Loss or damage to Equipment	1.50 Crore	Rs. 0.10 lakh	(iii)	Other Property	1.0 Crore	Rs. 0.10 lakh	(iv)	Personal injury or death insurance: a)for other people;	20.0 Lakhs	Rs. 0.01 lakh		b)for contractor's Employees	In accordance with the statutory requirements applicable in India	
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GCC 14.1	<p>Site data are : Soil Investigation Reports are attached with tender at Annexure E.</p> <p>Inspection of Sites:</p> <p>The Contractor/Bidder shall be deemed to have inspected and examined the sites and its surroundings and information available in connection therewith and to have satisfied himself, before submitting his Tender, as to the form and nature thereof, including the sub-surface conditions, the hydrological and climatic conditions, the extent and nature of work and materials necessary for the completion of the Works, the means of access to the Site and accommodation he may require and, in general, shall be deemed to have obtained all necessary information, subject as above mentioned, as to risks, contingencies and all other circumstances which may influence or affect his Tender.</p> <p>Sufficiency of Tender:</p> <p>The Contractor/Bidder shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his Tender for the Works and of the rates and prices stated in the priced Schedule of Quantities and the Schedule of Rates and Prices, if any, which Tender rates and prices shall, except insofar, as it is otherwise provided in the Contract, cover all his obligations under the Contract and all matters and things necessary for the</p>																								

	proper execution and maintenance of the Works.	
GCC 15.1	Plant, etc., Exclusive Use for the Works:	
	All Constructional Plant, Temporary Works and materials provided by the Contractor shall, when brought on to the of the Works and the Contractor shall not remove the same or any part thereof, except for the purpose of moving it from one part of the site to another, without the consent, in writing, of the Project Manager, which shall not be unreasonably withheld.	
	Upon completion of the Works the Contractor shall remove from the Site all the said Constructional Plant and Temporary Works remaining thereon and any unused materials provided by the Contractor.	
	The Project Authority/ Rural Work Department shall not at any time be liable for the loss of or damage to any of the said Constructional Plant, Temporary Works or materials.	
GCC 15.2.3	Interference with Traffic and adjoining properties	The Contractor shall use every reasonable means to prevent any of the highways or bridges communicating with or on the routes to the Site from being damaged or injured by any traffic of the Contractor or any of his sub-contractors and, in particular, shall select routes, choose and use vehicles and restrict and distribute loads so that any such extraordinary traffic as will inevitably arise from the moving of plant and material from and to the Site shall be limited, as far as reasonably possible, and so that no unnecessary damage or injury may be occasioned to such highways and bridges.
	Extra ordinary traffic	Should it be found necessary for the Contractor to move one or more loads of Constructional Plant, machinery or pre- constructed units or parts of units of work over a part of a highway or bridge, the moving whereof is likely to damage any highway or bridge unless special protection or strengthening is

		<p>carried out, then the Contractor shall before moving the load on to such highway or bridge give notice to the concerned authority of the weight and other particulars of the load to be moved and his proposals for protecting or strengthening the said highway or bridge and obtain approval from that concerned authority at his own cost . He shall keep the Engineer informed of the action taken.</p> <p>If during the execution of the Works or at any time thereafter the Contractor shall receive any claim arising out of the execution of the Works in respect of damage or injury to highways or bridges he shall immediately report the same to the Engineer and thereafter shall negotiate the settlement of and pay all sums due in respect of such claim and shall indemnify the Rural Work Depart in respect thereof and in respect of all claims, proceedings, damages, costs, charges and expenses in relation thereto.</p> <p>Where the nature of the Works is such as to require the use by the Contractor of water-borne transport the foregoing provisions of this Clause shall be construed as though "highway" included a lock, dock, sea wall or other structure related to a waterway and "vehicle" included craft, and shall have effect accordingly.</p>
GCC 16.2	Patent Rights & Royalties	The Contractor shall save harmless and indemnify the Implementation of Bull Production Through Imported Embryos of HF & New Jersey

	<p>Under NDP-1 Vikas Khand – Kalsi. Distt. Dehradun/Project Authority from and against all claims and proceedings for or on account of infringement of any patent rights, design trademark or name or other protected rights in respect of any Constructional Plant, machine work, or material and for in connection with the Works or any of them and from and against all claims, proceedings, damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto. Except where otherwise specified, the Contractor shall pay all tonnage and other royalties, rent and other payments or compensation, if any, for getting stone, sand, gravel, clay or other materials required for the Works or any of them.</p>
<p>GCC 20.1</p>	<p>The Site Possession Dates shall be the date of award of contract for the works (A) to (D):</p> <p>a. Project Manager’s Office Accommodation & Project’s Name Board:</p> <p>i. The Contractor shall at his own cost provide a temporary office accommodations at each site of approx. size 4M X 6M for the Project Manager along with toilet facility and shall provide electrical connection, light & fan fittings to the same. The structure shall be removed after the completion of work, by the Contractor, at his own cost. However, this requirement shall be applicable only if the contract cost is more than Rs. 100 lakh.</p> <p>ii. The contractor at his own cost shall also provide near the entrance of the project site, a suitable name board fabricated from MS sheet with support structure, duly painted and lettering, indicating the name of project, owner, turnkey consultant, architect, civil contractor and mechanical contractor etc., as per drawing and</p>

details approved by purchaser's Project Manager. However, this requirement shall be applicable only if the estimated contract amount is more than **Rs. 100 lakh**.

b. Water for Construction and Other Use:

- i. Unless otherwise specified the Contractor shall make his own arrangement for water for the work and nothing extra shall be paid for the same.
- ii. The water used by the Contractor shall be fit for drinking as well as construction purposes to the satisfaction of the Project Manager/Project Authority and Indian Standard Codes.
- iii. The Contractor may be allowed to construct temporary tube well /wells in the Project site for getting water after he has got written consent of the Owner/Project Authority/Project Manager. The Contractor shall be required to provide necessary arrangements to avoid any accident or damage to the buildings, roads, and service lines adjacent to the tube wells/wells sunk. The Contractor shall dismantle the tube well/well on completion of work and restore the ground to its original condition at his own cost.
- iv. In case the Owner/Project Authority/purchaser supplies water, it shall be on the following conditions:
 1. Water charges shall be recovered from each RA bill @ **0.5%** of net amount of work done of such bill excluding the cost of electrical works.
 2. The water shall be provided at one point in the site at the discretion of the Project Manager. The Contractor shall make its own arrangement for water connection and distribution pipe lines in the construction area.

c. Power (Electricity) Supply:

	<p>i. Unless otherwise specified the Contractor shall have to make his own arrangements for the power supply at his cost. All the electrical works shall be done as per INDIAN ELECTRICITY RULES . The temporary lines shall be removed by the Contractor at his cost after the completion of the work or if there is any hindrance , to the other works due to the alignment of these lines, during the Contract period.</p> <p>ii. In case the ELECTRIC power supply is provided by the Purchaser/Owner/project Authority, it shall be on the following conditions:-</p> <ol style="list-style-type: none">1. Electricity charges shall be recovered from each RA bill @ 0.5% of net amount of work done of such bill. Alternatively, electricity charges shall be recovered on the basis of actual power consumed. It shall be responsibility of contractor, at his own cost, to provide electrical energy meter to assess the electrical power consumed.2. The supply shall be made at one point in the site at the direction of the Project Manager. The Contractor shall make his own arrangement to receive, carry and distribute the power wherever it is required within the site as per INDIAN ELECTRICITY RULES.3. The temporary supply lines shall be removed and the site shall be cleared by the Contractor after the completion of the work at his own cost. <p>d. Works in Existing Plant :</p> <p>i. In cases where the works against this contract have to be carried out by successful bidder in a existing plant/building, the contractor has to follow all the related rules & regulations of the plant & to plan his activities in consultation with owner/purchaser/Project authority's site in-charge so that regular operation/activities of the plant are not effected. There can be restrictions on the movement of workers, stacking of materials & to ensure cleanliness of the area. If</p>
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	<p>any shut down is required by the contractor to work in a operating plant, the same shall be taken through General Manager, Rural Work Department or site in-charge from Project authorities after providing details & it has to be ensured that work is completed within the agreed shutdown period.</p> <p>e. Cement/steel Consumption, Reconciliation and Variation for Cement/ Steel Arranged & Supplied by Contractor:</p> <p>i. Cement: On completion of work, the theoretical cement consumption shall be worked out. Over the theoretical consumption, a variation up to – 1.5% (minus one point five percent) is permissible. The difference in quantity of cement bags actually consumed less than the permissible variation shall be recovered at the rate twice the weighted average (for the contract duration worked out on the basis of RBI indices for Cement) rate of one bag (50 Kg) of cement. Nothing extra will be paid for over consumption of cement above the theoretical cement consumption.</p> <p>ii. Reinforcement & Structural Steel : Material supplied shall confirm for weight per meter as per relevant I S Code. Variation for under weight shall be allowed as per IS Codes. However no compensation shall be admissible for overweight of material, rolling margin, wastage etc.Reconciliation of steel shall be done at the final bill stage for quantity received, consumed in works and billed, wastage etc. After reconciliation of steel, it is to be ensured that total quantity of steel paid is not more than the total quantity received at site. For this purpose, from each consignment / truck load of steel received at site and for each diameter/category, samples (3 samples for 10 MT of steel) shall be taken jointly & weighed to establish actual unit weight for reconciliation. All this information shall be entered in steel register maintained jointly by contractor & project manager</p>		
GCC 21.2	<table border="1"> <tr> <td>Contractor to keep site clear</td> <td>During the progress of the Works</td> </tr> </table>	Contractor to keep site clear	During the progress of the Works
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	<p>the Contractor shall keep the site reasonably free from all unnecessary obstructions and shall store or dispose of any Constructional Plant and surplus materials and clear away and remove from the site any wreckage, rubbish or Temporary Works no longer required.</p>
<p>GCC 22.4</p>	<p>Drawings : their Purpose and the Custody:</p> <p>The Contract drawings read together with the Contract specifications are intended to show and explain the manner of executing the work and to indicate the type and the class of materials to be used.</p> <p>In case any feature of the work is not set forth in the drawings and specifications, the Contractor shall forthwith apply to the Project Manager for further instructions, drawings or specifications.</p> <p>The drawings shall remain in the sole custody of the Project Manager, but two copies shall be issued to the Contractor free of charge. One copy of the drawings, furnished to the Contractor as aforesaid, shall be kept by the Contractor on the site and the same shall at all reasonable times be available for inspection and use by the Project Manager or the Project Manager's Representative and by any other person authorized by the Project Manager in writing. At the completion of the Contract the Contractor shall return to the Project Manager all drawings issued under the Contract. The drawings and specifications issued are sole property of the Purchaser/ Consultants and these can not be reproduced/ copied or used for any other works without a written consent of the Purchaser/ Consultant.</p> <p>The Contractor/Bidder shall give written notice to the Project Manager whenever planning or progress of the works is likely to be delayed unless any further drawing or instruction is issued by the Project Manager within a reasonable time. The notice shall include the detail of the drawing or instruction required and of why and by when it is required and of any delay or disruption likely to be suffered if it is late.</p> <p>The contractor/Bidder shall submit the following information, in triplicate, to the Project Manager for approval within the time stipulated against each item below :</p> <p>a) a general layout plan of construction plant and equipment for the execution of work within fourteen days from the date of notice to proceed with the work; and</p>

	<p>b) drawings or prints showing the location of major plants and other facilities which he proposes to put up at the site, including any changes in the general layout, at least fourteen days prior to the commencement of the respective work.</p> <p>23.4 Further Drawings and Instructions:</p> <p>The Project Manager may also authorize his representatives /Engineer to perform his duties and functions. The Contractor/Bidder shall carry out and be bound by the same. The Engineer shall have full powers and authority to supply to the Contractor from time to time, during the progress of the works, such further drawings and instructions as shall be necessary for the proper execution of the project.</p>
GCC 24.4	<p>The procedure for arbitration will be as follows:</p> <p>(a) In case of Dispute or difference arising between the Employer and a domestic contractor relating to any matter arising out of or connected with this agreement, such disputes or difference shall be settled in accordance with the Arbitration and Conciliation Act, 1996. The arbitral tribunal shall consist of 3 Arbitrators one each to be appointed by the Employer and the Contractor. The third Arbitrator shall be chosen by the two Arbitrators so appointed by the Parties and shall act as Presiding Arbitrator. In case of failure of the two Arbitrators appointed by the parties to reach upon a consensus within a period of 30 days from the appointment of the Arbitrator appointed subsequently, the Presiding Arbitrator shall be appointed by the President of the Institution of Engineers (India).</p> <p>(b) If one of the parties fails to appoint its Arbitrator in pursuance of sub-clause (a) above within 30 days after receipt of the notice of the appointment of its Arbitrator by the other party, then the President of the Institution of Engineers (India), both in cases of Foreign Contractor as well as Indian Contractor, shall appoint the Arbitrator. A certified copy of the order of the President of the Institution of Engineers (India)</p> <p>(c) Arbitration proceedings shall be held at RWD Dehraun, India, and the language of the arbitration proceedings and that of all documents and communications between the parties shall be English.</p> <p>(d) The decision of the majority of Arbitrators shall be final and binding upon both parties. The cost and expenses of Arbitration</p>

	<p>proceedings will be paid as determined by the arbitral tribunal. However, the expenses incurred by each party in connection with the preparation, presentation, etc. of its proceedings as also the fees and expenses paid to the Arbitrator appointed by such party or on its behalf shall be borne by each party itself.</p> <p>(e) Where the value of the contract is Rs.50 million and below, the disputes or differences arising shall be referred to the Sole Arbitrator. The Sole Arbitrator should be appointed by agreement between the parties; failing such agreement, by the appointing authority, namely the President of the Institution of Engineers; (India).</p> <p>(f) Performance under the contract shall continue during the arbitration proceedings and payments due to the contractor by the Employer shall not be withheld, unless they are the subject matter of the arbitration proceedings.</p>
<p>B. Time Control</p>	
<p>GCC 26.1</p>	<p>The Contractor shall submit a revised Program including Environmental Management Plan for the Works (in such form and detail as the engineer shall reasonably prescribe) within 14 days of delivery of the Letter of Acceptance.</p> <p><i>[This program should be in adequate detail and generally conform to the program submitted along with bid. Deviations if any from that should be clearly explained and should be satisfactory to the Engineer]</i></p>
<p>GCC 26.3</p>	<p>The period between Program updates is 30 days.</p> <p>The amount to be withheld for late submission of an updated Program is Rs.5,00,000/- (Rupees Five Lakh only).</p> <p>No Night Work: Subject to any provision to the contrary contained in the Contract, none of the Permanent Works shall, save as hereinafter provided, be carried on during the night without the permission in writing of the Project Manager except when the work is unavoidable or absolutely necessary for the saving of life or property or for the safety of the Works, in which case the Contractor shall immediately advise the Project Manager. Provided always that the provisions of this Clause shall not be applicable in the case of any work which it is customary to carry out by rotary or double shifts.</p>
<p>GCC 30.1</p>	<p>The venue of the management meeting will Superintending Engineer Rural works Department circle Dehradun.</p>

GCC 32.2	<p>Contractor's Superintendence: The Contractor shall give or provide all necessary superintendence during the execution of the Works and as long thereafter as the Project Manager may consider necessary for the proper fulfilling of the Contractor's obligations under the Contract. The Contractor, or a competent and authorized agent or representative approved of in writing by the Project Manager, which approval may at any time be withdrawn, is to be constantly on the Works and shall give his whole time to the superintendence of the same. If such approval shall be withdrawn by the Project Manager, the Contractor shall, as soon as is practicable, having regard to the requirement of replacing him as hereinafter mentioned, after receiving written notice of such withdrawal, remove the agent from the Works and shall not thereafter employ him on the Works in any capacity and shall replace him by another agent approved by the Project Manager. Such authorized agent or representative shall receive, on behalf of the Contractor, directions and instructions from the Project Manager.</p> <p>Contractor's Employees: The Contractor shall provide and employ on the Site in connection with the execution and maintenance of the Works:</p> <p>a) Only such technical assistants as are skilled and experienced in their respective fields and sub-agents, foremen and leading hands as are competent to give proper supervision to the work they are required to supervise, and</p> <p>b) Such skilled, semi-skilled and unskilled labour as is necessary for the proper and timely execution and maintenance of the Works.</p> <p>Setting-out: The Contractor shall be responsible for the true and proper setting-out of the Works in relation to original points, lines and levels of reference given by the Project Manager in writing and for the correctness, subject as above mentioned of the position, levels, dimensions and alignment of all parts of the Works and for the provision of all necessary instruments, appliances and labour in connection therewith. If at any time, during the progress of the Works, any error shall appear or arise in the position, levels dimensions or alignment of any part of the Works, the Contractor, on being required so to do by the Project Manager shall, at his own cost, rectify such error to the satisfaction of the Project Manager, unless such error is based on incorrect data supplied in writing by the Project Manager in which case the expense of rectifying the same shall be borne by the contractor. The checking of any setting-out or of any line or level by the Project Manager shall not in any way relieve the Contractor of his responsibility for the correctness thereof and the Contractor shall carefully protect and preserve all bench- marks,</p>
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sight-rails, pegs and other things used in setting- out the Works.

Watching and Lighting:

The Contractor shall in connection with the Works provide and maintain at his own cost all lights, guards, fencing and watching when and where necessary or required by the Project Manager, for the protection of the Works, or for the safety and convenience of the public or others.

Care of Works:

From the commencement of the Works until the date stated in the Certificate of Completion for the whole of the Works the Contractor shall take full responsibility for the care thereof. Provided that if the Project Manager shall issue a Certificate of Completion in respect of any part of the Permanent Works the Contractor shall cease to be liable for the care of that part of the Permanent Works from the date stated in the Certificate of Completion in respect of that part and the responsibility for the care of that part shall pass to the Owner. Provided further that the Contractor shall take the full responsibility for the care of any outstanding work which he shall have undertaken to finish during the Period of maintenance until such outstanding work is completed. In case any damage, loss or injury shall happen to the Works, or to any part thereof, from any cause whatsoever. While the Contractor shall be responsible for the care thereof the Contractor shall, at his own cost, repair and make good the same, so that at completion the Permanent Works shall be in good order and condition and in conformity in every respect with the requirements of the Contract and the Project Manager's instructions. The Contractor shall also be liable for any damage to ;the Works occasioned by him in the course of any operations carried out by him for the purpose of completing any outstanding work or complying with his obligations.

The Contractor shall not demolish, remove or alter the structures, trees or other facilities on the site without the prior approval of the Project Manager.

Materials and Workmanship:

All materials and workmanship shall be of the respective kinds described in the Contract and in accordance with the Project Manager's instructions and shall be subjected from time to time to such tests as the Project Manager may direct at the place of manufacture or fabrication, or on the Site or at such other place or places as may be specified in the Contract, or at all or any of such places. The Contractor shall provide such assistance, instruments, machines, labour and materials as are normally required for examining, measuring and testing any work and the quality, weight or quantity of any material used and shall supply samples of materials before incorporation in the Works for testing as may be selected and required by the Engineer.

All samples shall be supplied by the Contractor at his own cost if the supply thereof is clearly intended by or provided for in the Contract.

The cost of conducting any test ordered by the Project Manager to ascertain the quality of the materials and the workmanship shall be borne by the Contractor.

Inspection of Operations:

The Project Manager and any person authorised by him shall at all times have access to the Works and to all workshops and places where work is being prepared or from where materials, manufactured articles or machinery are being obtained for the Works and the Contractor shall afford every facility for and every assistance in or in obtaining the right to such access.

Examination of Work before Covering up:

No work shall be covered up or put out of view without the approval of the Project Manager and the Contractor shall afford full opportunity for the Project Manager to examine and measure any work which is about to be covered up or put out of view and to examine foundations before permanent work is placed thereon. The Contractor shall give due notice to the Project Manager whenever such work or foundations is or are ready or about to be ready for examination and the Project Manager shall, unless he considers it unnecessary and advises the Contractor accordingly, attend for the purpose of examining and measuring such work or of examining such foundations.

The Contractor shall uncover any part or parts of the Works or make openings in or through the same as the Project Manager may from time to time direct and shall reinstate and make good such part or parts to the satisfaction of the Project Manager. If any such part or parts have been put out of view after compliance with the requirements and are found to be executed in accordance with the Contract, the expenses of uncovering, making openings in or through, reinstating and making good the same shall be borne by the employer, but in any other case all costs shall be borne by the Contractor.

The Project Manager shall during the progress of the Works have power to order in writing from time to time.

- a) The removal from the Site, within such time or times as may be specified in the order, of any materials which, in the opinion of the Project Manager, are not in accordance with the Contract.
- b) The substitution of proper and suitable materials and

	<p>c) The removal and proper re-execution, notwithstanding any previous test thereof or interim payment therefore, of any work which in respect of materials or workmanship is not, in the opinion of the Project Manager, in accordance with the Contract.</p> <p>In case of default on the part of the Contractor in carrying out such order, the work shall be entitled to employ and pay other persons to carry out the same and all expenses consequent thereon or incidental there to shall be recoverable from the Contractor by the Department or may be deducted by the employer from any payment due or which may become due to the Contractor.</p>
C. Quality Control	
GCC 34.3	The Defects Liability Period is: 12 months.
D. Cost Control	
GCC 41.1	<p>The quantities set out in the Schedule of Quantities are the estimated quantities of the work, but they are not to be taken as the actual and exact quantities of the Works to be executed by the Contractor in fulfillment of his obligations under the Contract.</p> <p>The Works shall be measured net, as prescribed in the specification of works, notwithstanding any general or local custom, except where otherwise specifically described or prescribed in the Contract. Wherever not specifically mentioned in the Contract, the mode of measurement as prescribed in the relevant IS codes shall be applicable and binding to the Contract. A list of ISS code of practices, which shall be referred to in that event, is attached as annex to Technical Specifications. Only the latest editions of all the codes of practices including all latest official amendments and revisions shall be applicable.</p> <p>For measurement of items of work in foundation and plinth & in super structure the criteria shall be the plinth level of the individual buildings covered under this Contract.</p>
GCC 45.1	Not Applicable
GCC 46.1	The proportion of payments retained (Retention Money) shall be 6% from each bill subject to the maximum of 5% of final contract price.
GCC 47.1	The liquidated damages for the whole of the Works are 0.07 <i>percentage of the final Contract Price</i> per day. The maximum amount of liquidated damages for the whole of the Works is 10% of the final Contract Price.
GCC 49.1	The amount of the advance payment are: <u>Nature of Advance</u> <u>Amount (Rs.)</u> <u>Conditions to be</u>

	<p>1. Mobilization</p> <p>2. Equipment <i>(This advance is not applicable for equipment already owned or hired/leased by the contractor.)</i></p> <p>3. Secured advance for non-perishable materials brought to site <i>[All materials to be used and set in construction as per SOQ/BOQ except for perishable materials like glass, wood etc]</i></p>	<p>15% of the Contract price</p> <p>90% for new and 50% of depreciated value for old equipment. Total amount will be subject to a maximum of 5% of the Contract price.</p> <p>75% of Invoice value or Market value –lower of the two.</p>	<p><u>fulfilled</u></p> <p>On submission of un-conditional Bank Guarantee. <i>(to be drawn before end of 20% of Contract period)</i> After equipment is brought to site as per agreed construction program <i>(provided the Project Manager is satisfied that the equipment is required for performance of the contract)</i> and on submission of unconditional Bank Guarantee for amount of advance.</p> <p>a) The materials are in accordance with the specification for Works;</p> <p>b) Such materials have been delivered to site, and are properly stored and protected against damage or deterioration to the satisfaction of the ProjectManger.</p> <p>c) the Contractor's records of the requirements, orders, receipt and use of materials are kept in a form approved by the Project Manager and</p>
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	<p>such records shall be available for inspection by the Project Manager;</p> <p>d) The contractor has submitted with his monthly statement the estimated value of the materials on site together with such documents as may be required by the Project Manager for the purpose of valuation for material and providing evidence of ownership and payment thereof;</p> <p>e) Ownership of such materials shall be deemed to vest in the Employer for which the Contractor has submitted an Indemnity Bond (in the format provided as Annexure – D); and</p> <p>f)The quantity of materials are not excessive and shall be used within a reasonable time as determined by the Project Manager.</p> <p>(The advance payment will be paid to the Contractor no later than 15 days after fulfillment of the above conditions).</p> <p>Repayment of advance payment for mobilization and equipment: The advance shall be repaid with percentage deductions from the interim payments certified by the Engineer under the Contract. Deductions shall commence in the next Interim Payment Certificate following that in which the total of all such payments to the contractor has reached not less than 15</p>
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	<p>percent of the Contract Price or 12 months from the date of payment of first installment of advance, whichever period concludes earlier, and shall be made at the rate of 25 percent of the amounts of all Interim Payment Certificates until such time as the advance has been repaid, always provided that the advance shall be completely repaid prior to the expiry of the original time for completion.</p> <p>Repayment of secured advance: The advance shall be repaid from each succeeding monthly payments to the extent materials [for which advance was previously paid pursuant to Clause 49 of GCC and 49.1(3) of PCC.] have been incorporated into the Works.</p>
GCC 50.1	<p>The Performance Security for 5 percent of contract price plus Rs. 1,00,000/- as additional security for unbalanced bids [<i>in terms of ITB Clause 30.6</i>]</p> <p>The standard form of Performance Security acceptable to the Employer shall be an <u>unconditional</u> Bank Guarantee from a Scheduled or Nationalized bank in India of the type as presented in Section X of the Bidding Documents.</p>
E. Finishing the Contract	
GCC 53.1	<p>On the completion of the Works the Contractor, at his own cost, shall clear away and remove from the Site all Constructional Plant, surplus materials, rubbish and Temporary Works of every kind, and leave the whole of the Site and Works clean and in a workmanlike condition to the satisfaction of the Engineer. However for removal of surplus excavated earth & existing material, payment shall be made separately as per relevant tender item.</p>
GCC 56.1	<p>* The date by which operating and maintenance manuals are required is within 28 days of issue of certificate of completion of whole or section of work, as the case may be.</p> <p>* The date by which “as-built” drawings (in scale...) including a compact disc containing digitized drawings in 2 sets are required is within 28 days of issue of certificate of completion of whole or section of the work, as the case may be.</p>
GCC 56.2	<p>The amount to be withheld for failing to produce “as built” drawings and/or operating and maintenance manuals *by the date required in G.C.C. 56.1 is Rs. 50000/-</p>
GCC 57.2 (g)	<p>The maximum number of days is: 28 days of issue of certificate of completion of whole or section of work, as the case may be</p>
GCC 58.1	<p>The percentage to apply to the value of the work not completed, representing the Employer’s additional cost for completing the Works, is 20%.</p>

Appendices

Salient Features of Labour Laws

SALIENT FEATURES OF SOME MAJOR LABOUR LAWS APPLICABLE TO ESTABLISHMENTS ENGAGED IN BUILDING AND OTHER CONSTRUCTION WORK

(The law as current on the date of bid opening will apply)

Labour Laws	<p>(a) <u>Workman Compensation Act 1923</u> : The Act provides for compensation in case of injury by accident arising out of and during the course of employment.</p> <p>(b) <u>Payment of Gratuity Act 1972</u>: gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years' service or more or on death the rate of 15 days wages for every completed year of service. The Act is applicable to all establishments employing 10 or more employees.</p> <p>(c) <u>Employees P.F. and Miscellaneous Provision Act 1952 (since amended)</u>: The act Provides for monthly contribution by the employer plus workers @ 10% or 8.33%. The benefits payable under the Act are:</p> <p style="margin-left: 20px;">(i) Pension or family pension on retirement or death, as the case may be. (ii) Deposit linked insurance on the death in harness of the worker. (iii) Payment of P.F. accumulation on retirement/death etc.</p> <p>(d) <u>Maternity Benefit Act 1951</u>: The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.</p> <p>(e) <u>Contract Labour (Regulation & Abolition) Act 1970</u>: The Act provides for certain welfare measures to be provided by the Contractor to contract labour and in case the Contractor fails to provide, the same are required to be provided, by the Principal Employer by Law. The Principal Employer is required to take Certificate of Registration and the Contractor is required to take license from the designated Officer. The Act is applicable to the establishments or Contractor of Principal Employer if they employ 20 or more contract labour.</p>
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	<p>(f) <u>Minimum Wage Act 1948</u>: The Employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a schedule employment. Construction of Buildings, Roads, Runways are schedule employments.</p> <p>(g) <u>Payment of Wages Act 1936</u>: It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.</p> <p>(h) <u>Equal Remuneration Act 1979</u>: The Act provides for payment of equal wages for work of equal nature to Male and Female workers and for not making discrimination against Female employees in the matters of transfers, training and promotions etc.</p> <p>(i) <u>Payment of Bonus Act 1965</u>: The Act is applicable to all establishments employing 20 or more employees. The Act provides for payments of annual bonus subject to a minimum of 8.33% of wages and maximum of 20% of wages to employees drawing Rs.3500/- per month or less. The bonus to be paid to employees getting Rs.2500/- per month or above upto Rs.3500/- per month shall be worked out by taking wages as Rs.2500/- per month only. The Act does not apply to certain establishments. The newly set-up establishments are exempted for five years in certain circumstances. Some of the State Governments have reduced the employment size from 20 to 10 for the purpose of applicability of this Act.</p> <p>(j) <u>Industrial Disputes act 1947</u>: the Act lays down the machinery and procedure for resolution of Industrial disputes, in what situations, a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.</p> <p>(k) <u>Industrial Employment (Standing Order) Act 1946</u>: It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the States and Central Government to 50). The Act provides for laying down rules governing the conditions of employment by the Employer on matters provided in the Act and get the same certified by the designated Authority.</p> <p>(l) <u>Trade Unions Act 1926</u>: The Act lays down the procedure</p>
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	<p>for registration of trade unions of workmen and employers. The Trade Unions registered under the Act have been given certain immunities from civil and criminal liabilities.</p> <p>(m) <u>Child Labour (Prohibition & Regulation) Act 1986</u>: The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes. Employment of Child Labour is prohibited in Building and Construction Industry.</p> <p>(n) <u>Inter-State Migrant workmen's (Regulation of Employment & Conditions of Service) Act 1979</u>: The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The Inter-State migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, traveling expenses from home upto the establishment and bank etc.</p> <p>(o) <u>The Building and Other Construction works (Regulation of Employment and Conditions of Service) Act 1996 and the Cess Act of 1996</u>: All the establishments who carry on any building or other construction work and employs 10 or more workers and covered under this Act. All such establishments are required to pay cess at the rate not exceeding 2% of the cost of construction as may be modified by the Government. The Employer of the establishment is required to provide safety measures at the Building or construction work and other welfare measures, such as Canteens, First –Aid facilities, Ambulance, Housing accommodations for workers near the work place etc. The Employer to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government.</p> <p>(p) <u>Factories Act 1948</u>: the Act lays down the procedure for approval at plans before setting up a factory, health and safety provisions, welfare provisions, working hours, annual earned leave and rendering information regarding accidents or dangerous occurrences to designated authorities. It is applicable to premises employing 10 persons or more with aid of power or 20 or more persons without the aid of power engaged in manufacturing process</p>
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	(q) Weekly Holidays Act -1942
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SALIENT FEATURES OF SOME OF THE MAJOR LAWS THAT ARE APPLICABLE FOR PROTECTION OF ENVIRONMENT.

Laws on protection of Environment	<ol style="list-style-type: none"> 1. The Water(Prevention and Control of Pollution) Act, 1974, This provides for the prevention and control of water pollution and the maintaining and restoring of wholesomeness of water. 'Pollution' means such contamination of water or such alteration of the physical, chemical or biological properties of water or such discharge of any sewage or trade effluent or of any other liquid, gaseous or solid substance into water(whether directly or indirectly) as may, or is likely to, create a nuisance or render such water harmful or injurious to public health or safety, or to domestic, commercial, industrial, agricultural or other legitimate uses, or to the life and health of animals or plants or of aquatic organisms. 2. The Air (Prevention and Control of Pollution) Act, 1981, This provides for prevention, control and abatement of air pollution. 'Air Pollution' means the presence in the atmosphere of any 'air pollutant', which means any solid, liquid or gaseous substance (including noise) present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment. 3. The Environment(Protection) Act, 1986, This provides for the protection and improvement of environment and for matters connected therewith, and the prevention of hazards to human beings, other living creatures, plants and property. 'Environment' includes water, air and land and the inter-relationship which exists among and between water, air and land, and human beings, other living creatures, plants, micro-organism and property. 4. The Public Liability Insurance Act, 1991, This provides for public liability insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling hazardous substances and for matters connected herewith or incidental thereto. Hazardous substance means any substance or preparation which is defined as hazardous substance under the Environment (Protection) Act 1986, and exceeding such quantity as may be specified by notification by
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	the Central Government.
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Appendix 2

Tables of Adjustment Data

(Cl. 45 of GCC)

Calculation to be done as GCC Clause 45.1 mentioned in PCC

Section VIII. Specifications & Works Performance Requirements

A set of precise and clear Specifications is a prerequisite for bidders to respond realistically and competitively to the requirements of the Employer without qualifying or conditioning their bids. The Specifications must be drafted to permit the widest possible competition and, at the same time, present a clear statement of the required standards of workmanship, materials, and performance of the goods and services to be procured. Only if this is done shall the objectives of economy, efficiency, and fairness in procurement be realized, responsiveness of bids be ensured, and the subsequent task of Bid evaluation facilitated. The Specifications should require that all goods and materials to be incorporated in the Works be new, unused, of the most recent or current models, and incorporate all recent improvements in design and materials unless provided otherwise in the Contract.

Samples of Specifications from previous similar projects in India are useful in to prepare Specifications. The use of metric units is encouraged by the World Bank. Most Specifications are normally written specially by the Employer or Project Manager to suit the Contract Works in hand. There is no standard set of Specifications for universal application in all sectors, but there are established principles and practices, which are reflected in these documents.

There are considerable advantages in standardizing General Specifications for repetitive Works in recognized public sectors, such as highways, ports, railways, urban housing, irrigation, and water supply, in the same country or region where similar conditions prevail. The General Specifications should cover all classes of workmanship, materials, and equipment commonly involved in construction, although not necessarily to be used in a particular Works Contract. Deletions or addendums should then adapt the General Specifications to apply them to the particular Works.

Care must be taken in drafting Specifications to ensure that they are not restrictive. In the Specifications of standards for goods, materials, and workmanship, recognized international standards should be used as much as possible. Where other particular standards are used, whether national standards of India or other standards, the Specifications should state that goods, materials, and workmanship that meet other authoritative standards, and which ensure substantially equal or higher quality than the standards mentioned, shall also be acceptable. To that effect, the following sample clause may be inserted in the Special Conditions or Specifications.

“Equivalency of Standards and Codes

Wherever reference is made in the Contract to specific standards and codes to be met by the goods and materials to be furnished, and work performed or tested, the provisions of the latest current edition or revision of the relevant standards and codes in effect shall apply, unless otherwise expressly stated in the Contract. Where such standards and codes are national, or relate to a particular country or region, other authoritative standards that

ensure a substantially equal or higher quality than the standards and codes specified shall be accepted subject to the Project Manager's prior review and written consent. Differences between the standards specified and the proposed alternative standards shall be fully described in writing by the Contractor and submitted to the Project Manager at least 28 days prior to the date when the Contractor desires the Project Manager's consent. In the event the Project Manager determines that such proposed deviations do not ensure substantially equal or higher quality, the Contractor shall comply with the standards specified in the documents."

The method of measurement of completed work for payment shall be in accordance with U.K. Institution of Civil Engineers.

These Notes for Preparing Specifications are intended only as information for the Employer or the person drafting the bidding documents. They should not be included in the final documents.

Specifications & Performance Requirements

TECHNICAL SPECIFICATIONS TRADE INDEX

TRADE	DESCRIPTION
01	Earth Work
02	Concrete Work
03	Masonry Work
04	Wood Work
05	Finishing Work
06	Flooring Work
07	Steel Work
08	Roofing
09	Miscellaneous Works
10	Road Work
11	Water Supply
12	Sanitary Work
	Internal Electrification work

TECHNICAL SPECIFICATION

(Detailed technical specifications)

1.00 - EARTH WORK

Scope:

This section covers the works specification of earthwork in excavation in all kinds of soils including murrum, hard murrum, soft rock (without blasting, hard rock (without blasting), rock (with blasting), earth and sand filling in plinth, rubble soling, and brick on edge soling , Anti-termite treatment.

Applicable Codes:

The following Bureau of Indian Standard Codes, unless otherwise specified herein, shall be applicable. In all cases, the latest revision of the codes shall be referred to.

IS - 4081 Safety code for blasting and related drilling operations

IS - 1200 Method of measurement of building works.

IS - 3764 Safety code for excavation work.

IS - 3385 Code of practice for measurement of Civil Engineering works.

IS - 2720 Part II Determination of moisture content.

Part VIII Determination of moisture content dry density relation using light compaction.

Part XXVIII Determination of dry density of soils, in-place by the sand replacement method.

Part XXIX Determination of dry density of soils, in-place, by the core cutter method.

Drawings:

Engineer will furnish all necessary drawings showing the areas to be excavated, filled, sequence of priorities etc. Contractor shall follow strictly such drawings.

General:

Contractor shall provide all tools, plants, instruments, qualified supervisory personnel, labour, materials, and temporary works, consumables, any and everything necessary, whether or not such items are specifically stated herein, for completion of the Work.

Contractor shall carry out the survey of the site before excavation and set properly lines and establish levels for various works such as earthwork in excavation for levelling, basement, foundations, plinth filling, roads, drains, cable trenches, pipelines etc. Such survey shall be carried out by taking accurate cross sections of the area perpendicular to establish reference/grid lines at 5 m intervals or nearer as determined by Engineer based on ground profile. These shall be checked by Engineer and thereafter properly recorded.

The area to be excavated/ filled shall be cleared of fences, trees, plants, logs, slumps, bush, vegetation's, rubbish slush etc. and other objectionable matter. If any roots or stumps of trees are found during excavation, they shall also be removed. The material so removed shall be burnt or disposed off as directed by Engineer. Where earth fill is intended, the area shall be stripped of all loose/soft patches, top soil containing deleterious matter/materials before fill commences.

Relics, Objects of Antiquity, etc.:

All gold, silver, oil minerals archaeological and other findings of importance, all precious stones, coins, treasures, relics, antiquities and other similar things which may be found in or upon the site shall be the property of owner and Contractor shall dully preserve the same to the satisfaction of Owner and from time to time deliver the same to such person or persons as Owner may from time to time authorise or appoint to receive the same.

1.01 Earth Work in Excavation up to 1.50 M from Existing GL:

a) **Classification:**

Any earthwork will be classified under any of the following categories.

i) **All kinds of soils:**

These shall include all kinds containing kankar, sand, silt, murum and / or shingle, gravel, clay, loam peat, ash, shale etc. which can generally be excavated by spade, pick-axe and shovel and which is not classified under soft and decomposed rock, and hard rock defined below. This shall also include embedded rock boulders not bigger than 1metre in any dimension and not more than 200 mm in any one of the other two dimensions.

ii) **Soft Rock:**

This shall include rock, boulders, slag, chalk, slate, hard mica schist, laterite etc. which are to be excavated with or without blasting or could be excavated with picks, hammer, crow bars, wedges. This shall also include excavation in macadam and tarred roads and pavements. This shall also include rock boulders not bigger than 1 metre in any dimension and not more than 500 mm in any one of the other two dimensions Rubble masonry to be dismantled will also be measured under this item.

iii) **Hard Rock:**

This shall include rock which cannot be easily excavated with pick-axes, hammer, crow bars and wedges but has to be either heated where blasting is prohibited or has to be blasted. They shall be stacked separately for measurement.

This shall comprise any rock or cement concrete or RCC, the excavation of which cannot be carried out by using mechanical/hydraulic excavators and where blasting is resorted. Architects opinion as to the particular rock requires blasting or not shall be final and binding. Any secondary blasting / breaking of blasted boulders is required will have to be carried out at site before stacking. After blasting, blasted rock capable of being lifted by hand together with spalls should be stacked at site for recording measurements. These stacks shall then be transported to various locations at site for reuse in masonry as directed by Engineer-in charge.

- b) The materials which are not usable for masonry shall be disposed off within the site as decided by Employer/Architect. Nothing extra shall be payable on this account.

Rock tolerance of about (-6") minus six inches is permitted while blasting the hard rock. However no measurement will be payable for this tolerance depth excavated. For any rock excavation beyond (-6") minus six inches of rock tolerance, suitable deductions will be made to makeup the same with P. C. C. 1:5:10 (one part cement:5 part coarse sand:10 part stone aggregate). It should be understood that the measurement shall be payable up to the formation level only.

- c) The earth work In excavation shall be done as per the Architect and structural consultant's drawings up to required depths and levels and alignments in all sorts of soils. The depth of the foundation will be as per the Engineer's instructions. The lining work should be done by the Contractor. Roots or trees met with during the excavation shall be cut and smeared with coal tar. Excavated earth shall be stacked at least 3 m away from the trenches or as per the Engineer's instructions, so that it may not damage the sides of the excavated trenches. The sides of the excavated trenches shall be vertical and in straight line and bottom uniformly levelled watered, consolidated and ready for termite treatment. The maximum lead for stacking the earth shall be as specified in the item description.
- d) In firm soil if the excavation is deeper than 2 m the sides of the trenches shall be made bigger by allowing steps of 50 cm on either side so as to keep the slope 0.25 to 1. In loose soft or slushy soil the width of the step shall be suitably increased or the sides sloped or shoring and strutting may be done as per the Engineer's instructions.

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- e) For excavation for drain and all road works, the sides and the bottoms should be to the required slope, shape and gradient. The cutting shall be done from top to bottom. Under no circumstances shall undermining or under cutting be allowed. The final surface shall be neatly levelled and well compacted. The earth from the cutting shall be directly used for filling either in plinth or on grounds.
 - f) For excavation in trenches for pipes nothing extra shall be payable for the lift irrespective of the depth unless specifically mentioned otherwise in the Schedule of Quantities.
 - g) If the trenches are made deeper than specified level due to oversight or negligence of the Contractor the extra depth shall be filled up by lean concrete of mix 1:5:10(1 part cement; 5 part coarse sand and 10 part coarse aggregate of nominal size 40mm) and if the trench is made wider than shown in the drawings the Contractor has to make good at his own cost. The foundation trenches shall be free from water and muck, while the foundation work is in progress.
 - h) The trenches which are ready for concreting shall be got approved by the Engineer.
 - i) The excavated stacked earth shall be refilled in the trenches and sides of foundation in 150 mm layers and the balance surplus shall be first filled in layers in plinth and the remaining surplus shall be disposed off by uniform spreading within the site/outside the site as directed by the Engineer.
 - j) Adequate protective measures shall be taken by the Contractor to see that the excavation for the building foundation does not affect the adjoining structure's stability and safety. Contractor will be responsible if he has not taken precaution for the safety of the people, property or neighbour's property caused by his negligence during the constructional operations.
 - k) To the extent available, selected surplus spoils from excavated materials shall be used as backfill. Fill material shall be free from clods, salts, sulphates, organic & other foreign material. All clods of earth shall be broken or removed. Where excavated material is mostly rock, the boulders shall be broken into pieces not larger than 150 mm size, mixed with properly graded fine material consisting of murum or earth to fill up the voids and the mixture used for filling.
 - l) As soon as the work in foundations has been accepted and measured, the spaces around the foundations, structures, pits, trenches etc. shall be cleared of all debris and filled with earth in layers 15 cm to 20 cm, each layer being watered, rammed and properly consolidated before the succeeding one is laid. Each layer shall be consolidated to the satisfaction of Engineer.

- m) **Mode of Measurement for Earth Work in Excavation Including Back Filling:**
- i) **Lead:** for deposition/disposal of excavated material, shall be as specified in the respective item of work. If the lead is not specified in the respective item, a basic lead of 600 Metres shall be considered for quoting rates. Only leads beyond 600 Metres shall be considered as extra lead and the Contractor shall be compensated for the same. For the purpose of measurement of lead the area to be excavated or filled or area on which excavated material is to be deposited / disposed off shall be divided into suitable blocks and for each of the blocks, the distance between centre lines shall be taken as the lead which shall be measured, as far as practically possible, by the shortest straight line route on the plan and not the actual route taken by Contractor. No extra compensation is admissible on the grounds that the lead including that for borrowed materials had to be transported over marshy or katcha land/route.
- ii) All excavation shall be measured net. Dimensions for purpose of payment of the excavation shall be reckoned on the horizontal area of the base of foundations of the walls, columns, footings, tanks, rafts or other foundations structure to be built, multiplied by the mean depth from the surface of the ground in accordance with the drawings. Working spaces and excavation inside slopes shall not be paid for. Contractor may make such allowances in his rates to provide for excavation in side slopes and working spaces keeping in mind the nature of the soil and safety of excavation. In soft / slushy soil or in firm soil if the excavation is deeper than 2m the sides of the trenches shall be made bigger by allowing steps of 50cm on either side so as to keep slope 0.25: 1. This shall be paid as per original tender rate. However, if concreting is proposed against the additional/ extra excavation made by the Contractor shall be made good by the Contractor with concrete of the same class as in the foundations at his own cost.
- iii) **Backfilling:** As per specification the side of foundations of columns, footings, structures, basement plinth, walls, tanks rafts, trenches etc. with excavated materials will not be paid for separately. It shall be clearly understood that the rate quoted for excavation including backfilling shall include stacking of excavated material as directed, excavation / and shifting the selected stacked material (earth), conveying it to the place of final backfill, consolidation compaction using plate compactor etc. as specified. As a rule material to be back filled shall be stacked temporarily within the basic lead of 200 metres unless otherwise specified in the item.
- iv) The rates quoted shall also include for dumping of excavated materials in regular heaps, bunds, riprap with regular slopes as directed by Engineer

within the lead specified and levelling the same so as to provide natural drainage. Rock / soil excavated shall be stacked properly as directed by Engineer. As a rule, all softer material shall be laid along the centre of the heaps, the harder and more weather resisting materials forming the casing on the sides and the top. Excavated soft rock or hard rock shall be stacked separately.

- (v) The **bailing out of water** shall also be executed by the Contractor at his own cost.
- (vi) The cost of shoring and strutting as demanded by the site conditions and as instructed by the Engineer is deemed to be included in quoted rate.

1.02 Earth Work in Excavation for Depth Exceeding 1.50 M but not Exceeding 3.0 M:

The general specification shall be same as for the item 1.01 given above.

Mode of Measurement: Same as Item spec. no. 1.01

1.03 Earth Work in Excavation for Depth Exceeding 3.0 M but not Exceeding 4.5 M:

The general specification shall be same as for the item 1.01 given above.

Mode of Measurement: Same as Item spec. no. 1.01

1.04 Earth Work in Excavation in Rocks up to 1.50 M from Existing Ground Level (EGL):

- a) Unless otherwise stated herein, IS 4081, **safety code for blasting and related drilling operations** shall be followed. After removal of over burden, if any, excavation shall be continued in rock to such widths, lengths, depths and profiles as are shown on the drawings or such other lines and grades as may be specified by Engineer. As far as possible all blasting shall be completed prior to commencement of construction. At all stages of excavation, precautions, shall be taken to preserve the rock below and beyond the lines specified for the excavating, in the soundest possible condition. The quantity and strength of explosive used shall be such as will neither damage nor crack the rock outside the limits of excavation. All precautions, as directed by Engineer shall be taken during the blasting operations and care shall be taken that no damage is caused to adjoining buildings or structure as a result of blasting operations. In case of damage to permanent or temporary structures, Contractor shall repair the same to the satisfaction of Engineer at his cost. As excavation approaches its final lines and levels, the depth of the charge holes and amount of explosives used shall be progressively and suitably reduced.

- b) Specific **permission** of Engineer will have to be taken by Contractor **for blasting rock** and he shall also obtain a valid blasting license from the authorities concerned. If permission for blasting is refused by Engineer, the rock shall be removed by wedging, pick barring, heating and quenching or other approved means. All loose/loosened rock in the sides shall be removed by barring wedging, etc. The unit rates for excavation in hard rock shall include the cost of all these operations.
- c) Contractor shall obtain **necessary license for storage of explosives** fuses and detonators issued to him from Owner's stores or from a supplier arranged by the Contractor, from the authorities dealing with explosives. The fees, if any, required for obtaining such license, shall be borne by Contractor. Contractor shall have to make necessary storage facilities, for the explosives etc. as per rules and regulations of local, State and Central Govt. authorities and statutory bodies. Explosives shall be kept dry and shall not be exposed to direct rays of sun or be stored in the vicinity of fire, stoves, steam pipes or heated metal, etc. No explosive shall be brought near the work in excess of quantity required for a particular amount of firing to be done and surplus left after filling the holes shall be removed to the magazine. The magazine shall be built as far as possible from the area to be blasted. Engineer's prior approval shall be taken for the location proposed for the magazine.
- d) In no case shall blasting be allowed closer than 30 meters to any structure or to locations where concrete has just been placed. In the latter case the concrete must be at least 7 days old.
- e) For blasting operations, the following points shall be observed:-
- i) Contractor shall employ a competent and experienced supervisor and licensed blaster In-charge for each set of operation, who shall be held personally responsible to ensure that all safety regulations are carried out.
 - ii) Before any blasting is carried out, Contractor shall intimate Engineer and obtain his approval in writing for resorting to such operations. He shall intimate the hours of firing charges, the nature of explosive to be used and the precautions taken for ensuring safety.
 - iii) Contractor shall ensure that all workmen and the personnel at site are excluded from an area within 200M radius from the firing point, at least 15 minutes before firing time by sounding warning siren. The areas shall be encircled by red flags. Clearance signal shall also be given sounding a distinguishing siren.
 - iv) The blasting of rock near any existing buildings, equipment or any other property shall be done under cover and Contractor has to make all such necessary muffling arrangements. Covering may preferably be done by MS plates with adequate dead weight over them. Blasting shall be done

with small charges only and where directed by Engineer, a trench shall have to be cut by chiselling prior to the blasting operation separating the area under blasting from the existing structures.

- v) The firing shall be supervised by a Supervisor and not more than six (6) holes at a time shall be set off successively. If the blasts do not tally with the number fired, the misfired holes shall be carefully located after half an hour and when located, shall be exploded by drilling a fresh hole along with Omisfired hole (but not nearer than 600 mm from it) and by exploding a new charge.
- vi) A wooden tamping rod with a flat end shall be used to push cartridges home and metal rod or hammer shall not be permitted. The charges shall be placed firmly into place and not rammed or pounded. After a hole is filled to the required depth the balance of the hole shall be filed with stemming which may consist of sand or stone dust or similar inert material.
- vii) Contractor shall preferably detonate the explosives electrically.
- viii) The explosive shall be exploded by means of a primer which shall be fired by detonating a fuse instantaneous detonator (FID) or other approved cables. The detonators with FID shall be connected by special nippers.
- ix) In dry weather and normal dry excavation, ordinary low explosive gunpowder may be used. In damp rock, high explosive like gelatine with detonator and fuse wire may be used. Under water or for excavation in rock with substantial accumulated seepage electric detonation shall be used.
- x) Holes for charging explosive shall be drilled with pneumatic drills, the drilling pattern being so planned that rock pieces after blasting will be suitable for handling without secondary blasting.
- xi) When excavation has almost reached the desired level, hand trimming shall have to be done for dressing the surface to the desired level. Any rock excavation beyond an over break limit of 75mm shall be filled up as instructed by Engineer, with concrete of strength not less than M10. The cost of filling such excess depth shall be borne by Contractor and the excavation carried out beyond the limit specified above will not be paid for. Stepping in rock excavation shall be done by hand trimming.
- xii) Contractor shall be responsible for any accident to workmen, public or owners property due to blasting operations. Contractor shall also be responsible for strict observance of rules, laid by Inspector of explosives, or any other Authority duly constituted under the State and/or Union Government.
- xiii) **Mode of Measurement:** It shall be measured in CuM.

Volume of rock excavated shall be calculated on the basis of length, breadth and depth of excavation indicated on the drawings. No payment will be made for excavations/over break beyond payment line specified, wherever such measurement is not possible, as in case of strata intermixed with soil, excavated rock shall be properly stacked as directed by Engineer and the volume of rock shall be calculated on the basis of stack measurements after making 40% allowance for voids. The measurement of the earth work shall be paid as per the drawing or the requirements of the site as approved by the Engineer.

xiv) The rate quoted for excavation shall include the following jobs:

- a) Refilling of the trenches and consolidating and spreading as per the Engineer's directions.
- b) Shoring and strutting as demanded by the site conditions and as instructed by the Engineer.

1.05 Earth Work in Excavation in Rocks Depth Exceeding 1.50 M but not Exceeding 3.0 M:

The general specification is same as Item spec. no. 1.04

Mode of Measurement: Same as Item spec. no. 1.04

1.06 Filling in Plinth with Selected Excavated Earth:

- a) Filling in plinth above existing grade, in layers of 15-30 cm, watered and compacted with mechanical compaction machines and by hand. The base surface shall be cleared of vegetation by up-rooting or any organic matter, prior to commencement of filling operation. When filling reaches the required finished level, the surface shall be flooded with water, if directed by the Engineer, for 24 hours, allowed to dry and then the surface is again compacted as specified above to avoid settlements at a later stage. The finished level of the filling shall be dressed, trimmed to the required level/slopes specified.
- b) Where specified in the item description given in the Schedule of Quantities that the compaction of the plinth fill shall be carried out by means of 10/12 tonnes rollers smooth wheeled or mechanical vibro-roller, as rolling proceeds water sprinkling shall be done to assist consolidation.

Payment for filling in plinth with selected excavated material will be made as specified/directed. Payment for this work will be made based on measurement of plinth/dimensions filled. The plinth/ ground levels shall be surveyed beforehand for this purpose. The lead shall be as specified.

- c) **Mode of Measurement:** It shall be measured in Cu.M.

1.07 Filling Excavated Earth in Ground for Land Development:

- a) No earth fill shall commence until surface water discharges and streams have been properly intercepted or otherwise dealt with as directed by Engineer.
- b) Filling shall be carried out at the required level/slopes, as indicated in the drawings and as directed by Engineer. If no compaction is called for, the fill may be deposited to the full height in one operation and levelled to required level/slopes. If the fill has to be compacted, it shall be placed in layers not exceeding 600 mm and levelled uniformly and compacted before the next layer is deposited.
- c) Field compaction is called for; test shall be carried out at different stages of filling and also after the fill to the entire height has been completed. This shall hold good for embankments as well.
- d) Contractor shall protect the earth fill from being washed away by rain or damaged in any other way. Should any slip occur, Contractor shall remove the affected material and make good the slip at his own cost.
- e) The fill shall be carried out to such dimension and levels as indicated on the drawings after the stipulated compaction. The fill shall be considered as incomplete if the desired compaction has not been obtained. The rates shall include all operations such as lead and transport, filling, watering and consolidating as directed.

Mode of Measurement: It shall be measured in CuM.

1.08 Filling in Plinth and Ground with Earth Brought from Outside:

- a) Filling shall be carried out with approved material as described in 1.01 (j). The material and source shall be subject to prior approval of Engineer. The approved area, from where the fill material is to be dug, shall be cleared of all bushes, roots plants, rubbish etc. top soil containing salts, sulphate and other foreign material shall be removed. The materials so removed shall be burnt or disposed off as directed by Engineer. The Contractor shall make necessary access roads to those areas and maintain the same, if the road does not exist, at his cost.
- b) If any material is rejected by Engineer, Contractor shall remove the same forthwith from the site at no extra cost to the owner. Surplus fill material shall be disposed off by uniform spreading within the site as instructed by the Engineer.
- c) The filling and compaction shall be carried out as specified in the Item spec. no. 1.06 for filling in plinth and as per Item spec. no. 1.08 for filling in

ground for land development. Backfilling, plinth filling etc. with borrowed earth will be paid for under specified items.

The quoted rate shall include all operations such as clearing, excavation, lead and transport, fill, compaction etc. as specified. Actual quantity of consolidated filling or actual quantity of excavation in the borrow pits (less such top soil which has been excavated and not used for filling) whichever is less shall be measured and paid **for in cubic metre**. The lead, lift etc. shall be as indicated in the schedule of quantities.

d) **Mode of Measurement:** It shall be measured in CuM.

1.09 Providing and Filling Local Sand in Trenches, Plinth and Surrounding Areas:

a) At places backfilling shall be carried out with local sand if directed by Engineer. The sand used shall be kept flooded with water for 24 hours to ensure maximum consolidation. Any temporary work required to contain sand under flooded condition shall be to Contractor's account. The surface of the consolidated sand shall be dressed to require level or slope. Construction of floors or other structures on sand fill shall not be started until Engineer has inspected and approved the fill.

Mode of measurement: Actual quantity of consolidated sand filling shall be measured and paid in **CuM**.

1.10 Providing and Laying Rubble/Metal Soling:

a) Rubble/metal used for packing under floors, foundations etc. shall be hard, durable rock, free from veins, flaws and other defects. The size of the rubble/metal shall be 60 to 80 mm or 100 mm to 150mm unless otherwise specified in the item description in the Schedule of Quantities and the quality shall be got approved by the Engineer.

b) Rubble/metal shall be laid closely in position on the sub-grade. All interstices between the stones shall be wedged in with smaller stones of suitable size well driven to ensure tight packing and complete filling of interstices. Such filling shall be carried out simultaneously with the placing in position of rubble/metal stone and shall not lag behind.

c) Small interstices shall be filled with murrum, well watered and rammed.

Mode of Measurement: The unit of measurement shall be **SqM/ CuM** of the work done as per the drawings and/or as specified in the Schedule of Quantities. No deductions for voids.

1.11 Providing & Laying Brick Soling:

- a) Bricks shall be laid on edge or flat as per the item specification. The bricks shall be placed as close as possible over a well compacted bed with a layer of sand. Broken bricks shall not be used except for closing the line. Bricks should not show any efflorescence on drying.
- b) The under layer be dressed/levelled in required slope/grade and compacted with mechanical compactor roller with a layer of sand as per detail. Sand fill of specified thickness as per the details shall be measured and paid under relevant item separately.
- c) The soling pattern shall be as specified in the item specification; it can be plain, diagonal or herring-bone. Suitable slope shall be maintained as specified by the Engineer.
- d) The joints shall be filled with selected non expensive granular earth or sand or with cement mortar of requisite proportion as specified in the item specification.

Mode of Measurement: This item shall be measured **in SqM.** of work done as per the drawings/ directed by the Engineer. No deduction shall be made for any opening up to 0.1 Sq. M.

1.12 Providing and Laying Dry Stone Pitching:

- a) Stone subject to marked deterioration by water or weather will not be accepted. The stone shall be hard, durable and fairly regular in shape and its thickness in any one direction shall not be less than the thickness of the pitching as specified in the Schedule of Quantities.
- b) Before laying the pitching the sides of the sloped surface shall be trimmed to the required slope and profiles The depressions shall be thoroughly filled and compacted. It shall commence from the bottom. The stones shall be placed normal to the slope and the largest dimension is perpendicular to the face of the slope unless such dimension is more than the thickness of the pitching. The largest stones shall be placed at the bottom. The joints between the stones shall be filled with good earth. The earth shall be got approved by the Engineer before filling.

The **rate** shall include preparation of base, providing and laying of stones and filling up of joints with approved good earth.

Mode of Measurement It shall be measured in Cu.M. No deductions shall be made for voids.

1.13 Providing and Laying Dry Stone Pitching with Cement Pointing:

- a) The general specification shall be same as the Item spec. no. 1.12 but for the joints between the stones shall be filled with cement mortar of proportion as specified in the item description in the Schedule of Quantities.

b) **Mode of Measurement:** Same as per item No1.12

1.14 Providing and Filling Dry Brickbats at all Levels:

The brickbats shall be well burnt, sound either half brick or of 40-65mm (average) thickness in size. The brickbats shall be clean and mortar free or any organic or loose matter. They should be washed off dust, segregated before it is filled. They shall be filled in places as directed by the Engineer. The brick bats for filling in soak pits or trenches shall be uniform in size without dust.

Mode of Measurement: The bulk volume of the filling shall be measured in Cu. m. No deduction shall be made for voids.

1.15 Providing & Laying Single Layer Flat Brick Soling:

Providing & laying single layer flat brick soling with approved quality well burnt (having crushing strength of 50 Kg per Sq.Cm) or over burnt bricks including laying bricks in plain/ diagonal/ herring bone pattern filling the joints with local sand as per general specifications of Item spec. no. 1.12 etc lcomplete.

Mode of Measurement: This item shall be measured in SqM. No deduction shall be made for any opening up to 0.1 SqM.

1.16 Carting Away Earth out side the Site:

Carting away the excavated surplus earth/ debris generated out of dismantling of brick work/ concrete as specified in the schedule of the quantities out side of the site including loading at site, transportation, unloading, spreading etc complete as directed.

Contractor shall maintain full record of measurement and the quantities in respect of total quantity of earth work in excavation, quantity back filled in trenches/ pits after laying concrete/ masonry foundations etc and quantity of surplus earth carted away and the same to reconciled intermittently during execution.

Mode of measurement: Quantity carted away shall be measured in CuM. Length, breadth and depth of the pit shall be measured where full quantity of excavated earth is carted away.

OR

80% fill measurement of earth/debris in truck shall be measured and paid for.

1.17 Supplying the Chemicals and Carrying out Pre-Construction Anti-Termite Treatment:.

Supplying the chemicals and carrying out pre-construction Anti- termite treatment at the various stages of construction as per IS / and as recommended by the chemical manufacturer to safeguard the building against termite including execution and submission of guarantee for a period of 10 years against any subterranean pest infestation **Pest Control (India) Ltd** or equivalent as per their specifications.

For anti termite treatment chemicals used– CHLORO-PYRIPHOS 20 EC @ 1 % concentration in aqueous emulsion. At DPC level (if DPC is done) or over masonry course, 5 litre per SqM emulsion to be applied. The junction of wall and plinth (after completion of each filling) to be done @ 1 litre per RM including Roding for better spreading. 5 litre per SqM emulsion to be applied over filling after compaction. Finally the earth around the external perimeter of building up to depth of 30 cm shall be treated @ 5 litres per RM including making holes and forcing liquid. Critical areas such as openings around pipes, cable trench etc to be soaked with chemical emulsion.

Mode of measurement: Building area in plan shall be measured in SqM based on the treatment provided. (No co-efficient shall be applied).

2.00 - CONCRETE AND ALLIED WORKS

Applicable Codes:

The following codes and standards are made a part of the Specifications. All standards, codes of practices referred to herein shall be the latest edition including all applicable official amendments and revisions.

In case of discrepancy between this specification and those referred to herein, this specification shall prevail.

(a) Materials

IS 269	Specification for ordinary, rapid hardening and low heat Portland cement.	Portland cement.
IS 455	Specification for Portland blast furnace slag.	
IS 1489	Specification for Portland-Pozollana cement.	
IS 4031	Methods of physical tests for hydraulic cement.	
IS 650	Specification for standard sand for testing of cement.	

IS 383	Specification for coarse and fine aggregates from natural sources for concrete.
IS 2386	Methods of test for aggregates for concrete. (Parts I to VIII)
IS 516	Methods of test for strength of concrete.
IS 1199	Methods of sampling and analysis of concrete.
IS 2396(I) IS 5640	Flakiness Index of aggregates
IS 3025	Methods of sampling and test (physical and chemical water used in industry).
IS 432 (Part I & II)	Specification for mild steel and medium tensile steel bars and hard drawn steel wire for concrete reinforcement.
IS 1139	Specification for hot rolled mild steel and medium tensile steel deformed bars for concrete reinforcement
IS 1566	Specification for plain hard drawn steel wire fabric for concrete reinforcement.
IS 1785 (Part I)	Specification for plain hard drawn steel wire for pre-stressed concrete.
IS 1786	Specification for cold twisted steel bars for concrete reinforcement.
IS 2090	Specification for high tensile steel bars used in pre stressed concrete
IS 4990	Specification for plywood for concrete shuttering work.
IS 2645	Specification for integral cement water-proofing compounds.

(b) Equipment

IS 1791	Specification for batch type concrete mixers
IS 2438	Specification for roller pan mixer
IS 2505	Specification for concrete vibrators immersion type
IS 2506	Specification for screed board concrete vibrators
IS 2514	Specification for concrete vibrating tables.

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- IS 3366 Specification for pan vibrators
- IS 4656 Specification for form vibrators for concrete.
- IS 2722 Specification for portable swing weigh-batchers for concrete (single and double bucket type)
- IS 2750 Specification for steel scaffoldings

Codes of Practice

IS 456:2000 Code of practice for plain and reinforced concrete.

- IS 1343 Code of practice for pre-stressed concrete
- IS 457 Code of practice for general Construction of plain and reinforced concrete for dams and other massive structures
- IS 3370 Code of practice for concrete structures for storage of liquids.
(Part I to V)
- IS 3935 Code of practice for composite construction
- IS 3201 Criteria for design and construction of pre cast concrete trusses.
- IS 2204 Code of practice for construction of reinforced concrete shell roof
- IS 2210 Criteria for the design of RC shell structures and folded plates.
- IS 2751 Code of practice for welding of mild steel bars used for reinforced concrete construction.
- IS 2502 Code of practice for bending and fixing of bars for concrete reinforcement.
- IS 3558 Code of practice for use of immersion vibrators for consolidating concrete.
- IS 3414 Code of practice for design and installation of joints in buildings
- IS 4014 Code of practice for steel tubular, (Part I&II) scaffolding.
- IS 2571 Code of practice for laying insitu cement concrete flooring.

(c) Construction Safety

IS 3696 Safety code for scaffoldings and ladders

(d) Measurement

IS 1200 Method of measurement of building works.

IS 3385 Code of practice for measurement of civil engineering works.

The above mode of measurements shall be applicable only if it is not given specifically in the tender document.

General

The quality of materials, method and control of manufacture and transportation of all concrete work irrespective of mix, whether reinforced or otherwise shall conform to the applicable portions of this specification.

Engineer shall have the right to inspect the source/s of material/s, the layout and operation of procurement and storage of materials, the concrete batching and mixing equipment, and the quality control system. Such an inspection shall be arranged and engineer's approval obtained, prior to starting of concrete work.

Materials

The ingredients to be used in the manufacture of standard concrete shall consist solely of standard type Portland cement, clean sand, natural coarse aggregate, clean water and admixtures.

1) Cement

- a) If the Contractor is instructed to supply cement, then the following points shall be applicable:
 - i) Unless otherwise specified the cement shall be ordinary Portland cement in 50 kg bags. The use of bulk cement will be permitted only with the approval of Engineer.
 - ii) A certified report attesting to the conformance of the cement to IS specifications by the cement manufacturer's chemist shall be furnished to engineer if demanded.
 - iii) Cement held in storage for a period of Ninety (90) days or longer shall be tested. Should at any time Engineer have reasons to consider that any cement is defective, then irrespective of its origin, and/or manufacturers test certificate, such cement shall be tested immediately at contractor's cost at a National Test Laboratory / approved laboratory and until the results of such tests are found satisfactory, it shall not be used in any work. Contractor shall not be entitled to any claim of any nature on this account.

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- iv) A cement stores shall be constructed and maintained as detailed under (b) (i) here under for storing specified quantity of cement for the project.
 - b) i) Contractor will have to make his own arrangements for the storage of minimum 50MT of cement or the capacity as directed by Engineer-in-charge. If supplies are arranged by department, cement will be issued in quantities to cover work requirements of one month or more, as deemed fit by Engineer and it will be the responsibility of contractor to ensure adequate and proper storage. Cement in bulk may be stored in bins or silos, which will provide complete protection from dampness contamination and minimize taking and false set. Cement bags shall be stored in a dry enclosed shed (storage under tarpaulins will not be permitted), well away from the outer walls and insulated from the floor to avoid contact with moisture from ground and so arranged as to provide ready access damaged or reclaimed or partly set cement will not be permitted to be used and shall be removed from the site. The storage bins and storage arrangements shall be such that there is no dead storage. Not more than 12 bags shall be stacked in any tier. The storage arrangement shall be approved by Engineer. Consignments of cement shall be stored as received and shall be consumed in the order of their delivery.

2) Aggregates

- a) Aggregate in general designates both fine and coarse inert materials used in the manufacture of concrete. Fine aggregate is aggregate all of which passes through 4.75 mm IS sieve. Coarse aggregate is aggregate most of which is retained on 4.75 mm sieve
- b) All fine and coarse aggregates proposed for use in the work shall be subject to Engineer's approval and after specific materials have been accepted, the source of supply of such materials should not be changed without prior approval of Engineer.
- c) Aggregates shall, except as noted above, consist of natural sands, crushed stone and gravel from a source known to produce satisfactory aggregate for concrete and shall be chemically inert, strong, hard, durable against weathering, of limited porosity and free from deleterious materials that may cause corrosion of the reinforcement or may impair the strength and/or durability of concrete. The grading of aggregates shall be such as to produce dense concrete of specified strength and consistency that will work readily into position without segregation and shall be based on the mix design and preliminary tests on concrete specified later.
- d) **Sampling and testing**

Samples of the aggregates for mix design and determination of suitability shall be taken under the supervision of Engineer and delivered to the laboratory, well in advance of the scheduled placing of concrete. Records of

tests, which have been made on proposed aggregates and on concrete made from this source of aggregates, shall be furnished to Engineer in advance of the work for use in determining aggregate suitability. The costs of all such tests, sampling etc. shall be borne by contractor.

e) **Storage of Aggregates**

All coarse and fine aggregates shall be stacked in stock separately in stock piles in the material yard near the work site in bins properly constructed to avoid inter mixing of different aggregates. Contamination with foreign materials and with earth during storage and while heaping the materials shall be avoided. The aggregate must be of specified quality not only at the time of receiving at site but more so at the time of loading into mixer. Rackers shall be used for lifting the coarse aggregates from bins or stockpiles. Coarse aggregate shall be piled in layers not exceeding 1.20 meters in height to prevent coning or segregation. Each layer shall cover the entire area of the stockpile before succeeding layers are started. Aggregates that have become segregated shall be rejected.

f) **Specific Gravity**

Aggregate except as noted above and for other than lightweight concrete shall consist of natural or crushed sand shall conform to IS 383. The sand shall be clean sharp, hard, strong and durable and shall be free from dust, vegetable substances, adherent coating, clay, alkali, organic matter, mica, salt or other deleterious substances, which can be injurious to the setting qualities/strength/ durability of concrete.

3) **Machine made Sand**

Machine made sand will be acceptable, provided the constituent rock / gravel composition shall be sound, hard dense, non-organic uncoated and durable against weathering.

a) **Screening and Washing**

Sand shall be prepared for use for such screening or washing, or both, as necessary, to remove all objectionable foreign matter while separating the sand grains to the required size fractions.

b) **Foreign Material Limitations**

The percentages of deleterious substances in sand delivered to the mixer shall not exceed the following:

	Uncrushed	Crushed	
i)	Material finer than 75Micron IS sieve	3.00	15.0

ii)	Shale	1.00	-
iii)	Coal and lignite	1.00	1.00
iv)	Clay lumps	1.00	1.00
v)	Total of all above substances including items (i) to (iv) for uncrushed sand and items iii) and (iv) for crushed sand	5.00	2.00

c) **Gradation**

Unless otherwise directed or approved, the grading of sand shall be within the limits indicated hereunder:

IS Sieve Designation	Percentage passing for			
	Grading Zone I	Grading Zone II	Grading Zone III	Grading Zone IV
10 mm	100	100	100	100
4.75 mm	90-100	90-100	90-100	95-100
2.36 mm	60-95	75-100	85-100	95-100
1.18 mm	30-70	55-90	75-100	90-100
600 micron	15-34	35-59	60-79	80-100
300 micron	5-20	8-30	12-40	15-50
150 micron	0-10	0-10	0-10	0-15

Where the grading falls outside the limits of any particular grading zone of sieves other than 600 micron IS sieve, by total amount not exceeding 5 percent, it shall be regarded as falling within that grading zone. This tolerance shall not be applied to percentage passing the 600 micron IS sieve or to percentage passing any other sieve on the coarser limit of grading zone I or the finer limit of grading zone IV.

d) **Fineness Modulus**

The sand shall have a fineness modulus of not less than 2.2 or more than 3.2. The fineness modulus is determined by adding the Cumulative percentages retained on the following IS sieves sizes 4.75mm, 2.36 mm, 1.18 mm 600 micron, 300 micron and 150 micron and dividing the sum by 100.

4) Coarse Aggregate

a) Coarse aggregate for concrete, except as noted above and for other than lightweight concrete shall conform to IS 383. This shall consist of natural or crushed stone and gravel and shall be clean and free from elongated, flaky or laminated pieces adhering coatings, clay lumps, coal residue, clinkers slag, alkali, mica, organic matter or other deleterious matter.

b) **Screening and Washing**

Natural gravel and crushed rock shall be screened and/or washed for the removal of dirt or dust coating, if so demanded by Engineer.

c) **Grading**

Coarse aggregate shall be graded in both cases the grading shall be within the following limits.

IS Sieve Designation	% passing for single sized aggregate of nominal size (mm)					% passing for graded aggregate of nominal size (mm)			
	40	20	16	12.5	10	40	20	16	12.5
63mm	100	-	-	-	-	100	-	-	-
40mm	85 - 100	100	-	-	-	95 - 100	100	-	-
20mm	0-20	85-100	100	-	-	30-70	95-100	100	-
16mm	-	-	85-100	100	-	-	-	90-100	-
12.5mm	-	-	-	85-100	100	-	-	-	90-100
10mm	0.5	0-20	0-30	0-45	85-100	10-35	25-55	30-70	40-85
4.75mm	-	0-5	0-5	0-10	0-20	0-5	0-10	0-10	0-10
2.36mm	-	-	-	-	0-5	-	-	-	-

The pieces shall be angular in shape and shall have granular or crystalline surfaces, Friable, flaky and laminated pieces, mica and shale, if present, shall be only in such quantities that will not, in the opinion of Engineer affect adversely the strength and/or durability of concrete. The maximum size of coarse aggregate shall be 75 mm for class concrete 40-mm for class B concrete and 20mm for class C concrete. The maximum size of coarse aggregate shall be the maximum size

specified above, but in no case greater than 1/4 of the minimum thickness of the member, provided that the concrete can be placed without difficulty so as to surround all reinforcement thoroughly and fill the corners of the form. Plums above 150 mm and up to any reasonable size can be used in plain very concrete work of large dimensions up to a maximum limit of 20% of volume of concrete when specifically approved by Engineer. For heavily reinforced concrete members the nominal maximum size of the aggregate shall be 5 mm less than the minimum clear distance between the reinforcing main bars or 5mm less than the minimum cover to the reinforcement whichever is smaller. The amount of fine particles occurring in the free state or as loose adherent shall not exceed 1% when determined by laboratory sedimentation tests as per IS 2386. After 24 hours immersion in water, a previously dried sample shall not have gained more than 10% of its oven dry weight in air, as determined by IS 2386.

d) **Foreign Materials Limitations**

The percentages of deleterious substance in the coarse aggregate delivered to the mixer shall not exceed the following:

		Percent by weight	
	Uncrushed	Crushed	
i)	Material finer than 75 micron IS sieve	3.00	3.00
ii)	Coal and lignite	1.00	1.00
iii)	Clay lumps	1.00	1.00
iv)	Soft fragments	3.00	-
v)	Total of all the above substances	5.00	5.00

5) Water

- a) Water used for both mixing and curing shall be free from injurious amounts of deleterious materials. Potable waters are generally satisfactory for mixing and curing concrete.
- b) In case of doubt, the suitability of water for making concrete shall be ascertained by the compressive strength and initial setting time test specified in IS-456 -2000. The sample of water taken for testing shall be typical of the water proposed to be used for concreting, due account being paid to seasonal variation. The sample shall not receive any treatment before testing other than that envisaged in the regular supply of water proposed for use in concrete. The sample shall be stored in a clean container previously rinsed out with similar water.
- c) Average 28 days compressive strength of at least three 15 cm concrete cubes prepared with water proposed to be used shall not be less than 90% of the average strength of three similar concrete cubes prepared with distilled water.
- d) The initial setting time or test block made with the appropriate set cement and the water proposed to be used shall not be less than 30 minutes and

shall not differ by more than plus minus 30 seconds from the initial setting time of control test block prepared with the appropriate test cement and distilled water. The test blocks shall be prepared and tested in accordance with the requirements of IS 4031.

- e) Where water can be shown to contain an excess of acid, alkali sugar or salt, engineer may refuse to permit its use. As a guide, the following concentrations represent the maximum permissible values:
- i) To neutralize 100 ml sample of water, using phenolphthalein as indicator, it should not require more than 5 ml of 0.2 normal NaOH. The details of test shall be as given in IS 3025 (part 22).
- ii) To neutralise 100 ml sample of water using Mix Indicator as an indicator, it should not require more than 25 ml of 0.02 normal H₂SO₄. The details of test shall be given in IS 3025 (part 23).
- iii) Percentage of solids when tested in accordance with the method indicated below shall not exceed the following:

	Percent	Test as per
Organic	200 mg/L	IS 3025-1964 (part 18)
Inorganic	3000mg/L	- Do --
Sulphate (as SO ₄ Alkali)	400 mg/L	IS 3025-1964 (part 24)
Chlorides (as Cl)	2000 mg/L	IS 3025-1964 (part 32)
Suspended matter	2000 mg/L	IS 3025-1964 (part 17)

6) Brick aggregates

The brickbats shall be of new bricks well burnt, hard, durable and broken to sizes, well graded. It shall be free from dust; the size shall be of 37mm and down. It shall be free from earth and other impurities.

7) Reinforcement Steel

- a) Reinforcement bars, if supplies are arranged by contractor, shall be either plain round mild steel bars grade I as per IS 432 (part I) or medium tensile steel bar as per IS 432 (Part I) or hot rolled mild steel and medium tensile steel deformed bars as per IS 1139 or cold twisted steel bars as per IS 1786, as shown and specified on the drawings. Wire mesh or fabric shall be in accordance with IS 1566. Substitution of reinforcement will not be permitted except upon written approval from Engineer.

- b) Plain round mild steel bars grade II as per IS:432(part I) may be used with prior approval of Engineer in writing and with 10% increase in the reinforcement area but its use shall not be permitted in structures located in earthquake zones subjected to severe damage (as per IS:1895) and for structures subject to dynamic loading (other than wind loading), such as frames supporting rotary or reciprocating machinery etc.
- c) All reinforcement shall be clean, free from grease, oil, paint, loose mill scale, loose rust, dust, bituminous material or any other substances that will destroy or reduce the bond. All rods shall be thoroughly cleaned before being fabricated. Pitted and defective rods shall not be used.

2.01 Providing and laying Brickbat Cement Concrete 1:4:8 (1part cement: 4 part coarse sand: 8 part brickbats of size 37mm and down).

The brickbats, sand and cement shall be of quality as described in the materials section above. The materials shall be mixed in volumetric proportions in concrete mixer only. The concrete shall be laid in layers of 150mm thick or as specified and well consolidated with rammer of weight 4.5 to 5.5 kg steel rammers of base area 300 Sq. cm till slurry comes on top before the next layer is laid. Curing shall be done for 7 days. For joints the edge of the concrete shall be finished off with a slope not steeper than 2:1 and well roughened. The **rate** shall include cost the shuttering to be provided

Mode of Measurement: This shall be measured in CuM. The bed concrete provided for flooring / below foundation or as specified shall be paid for under this item.

2.02 Providing and laying Brickbat Cement Concrete 1:5:10 (1part cement: 5 part coarse sand: 10 part brickbats of size 37mm and down).

The general specification is same as for Item spec. no. 2.01 but for the volumetric proportion of the sand and brickbats is 5 and 10 instead of 4 and 8 respectively.

Mode of measurement: Same as per Item spec. no. 2.01

2.03 Providing and laying plain cement concrete 1:4:8 (1 part cement: 4 part coarse sand: 8 part graded stone aggregate of nominal size 37 mm and down).

The coarse aggregate, cement and coarse sand shall be of quality as specified in the materials section 2.01 and the other procedures are same as that specified in Item spec. no. 2.01.

Mode of measurement: Same as per Item spec. no. 2.01

2.04 Providing and laying plain cement concrete 1:3:6(1 part cement: 3 part coarse sand: 6 parts graded stone aggregate of nominal size 37 mm and down.

The general specifications shall be same as per Item spec. no. 2.03 but for the volumetric proportions of the coarse sand and the stone aggregate which shall be 3:6 instead of 4:8 and stone aggregate size 20mm & down.

Mode of measurement: Same as per Item spec. no. 2.01

2.05 Providing and laying RCC of mix M20 for structures at all levels below and up to highest plinth level.

Mix Design

- a) All concrete in the works shall be of design mix as defined in IS 456: 2000, unless it is a nominal mix concrete. Whether reinforced or otherwise, all design mix concrete works to be carried out under this specification shall be divided into the following classifications:

b) MINIMUM COMPRESSIVE STRENGTH OF 15 CM CUBES AT 7 AND 28 DAYS AFTER MIXING, CONDUCTED IN ACCORDANCE WITH IS 516

Class	Preliminary test (N/SqMM)		Work Test N/SqMM		Max. size of aggregate mm	Minimum Cement Content per CuM
	At 7 days	At 28 days	At 7 days	At 28 days		
M 40	35.0	54.0	27.0	46.0	20	550 Kg
M 35	31.0	45.0	23.5	39.0	20	470 Kg
M 30	28.0	42.0	20.0	33.0	40 or 20	420 Kg
M 25	23.5	35.0	17.0	28.0	40 or 20	370 Kg
M 20	19.4	29.0	13.5	22.0	40 or 20	320 Kg
M 15	14.0	17.0	10.0	16.0	40 or 20	300 Kg

- c) It shall be very clearly understood that whenever the class of concrete such as M20 is specified it shall be the Contractor's responsibility to ensure that minimum crushing strength stipulated for the respective class of concrete is obtained at works. The maximum total quantity of aggregate per 50 Kg of cement shall not exceed 450 Kg except when otherwise specifically approved by Engineer.
- d) To fix the grading of aggregates, water cement ratio, workability and the quantity of cement required to give preliminary and works cubes of the

minimum strength specified, the proportions of the mix shall be determined by weight/volume. Adjustment of aggregate proportions due to moisture present in the aggregate shall be made. Mix proportioning shall be carried out according to Indian Standard Specifications.

- e) Whenever there is a change either in required strength of concrete or water cement ratio or workability or the source of Aggregates and/or cement, preliminary tests shall be repeated to determine the revised proportions, of the mix to suit the altered conditions.
- f) While fixing the value for water cement ratio for preliminary mixes, assistance may be derived from the graph (appendix IS 456 showing the relationship between the 28 day compressive strengths of concrete mixes with different water cement ratios and the 7 days compressive strength of cement tested in accordance with IS 269.
- g) If the contractor is intending to use Ready Mixed Concrete (RMC), he should get approval of the Engineer/Owner/Architect before placing RMC into the structure/ permanent work. Ready Mixed Concrete (RMC) shall be allowed from the sources and RMC manufacturing plants belonged to/owned by the main approved cement manufacturers stipulated as per the Section V, Appendix – IV, Form of Bid. Stages of approval start from the particular grade of concrete, source of concrete and its constituents with necessary mentioned tests, No. of trial mixes, Cube test results (the test results of concrete for 7 days and 28 days strength should be reported by the supplying firm independently apart from field tests at site) etc, as per the relevant IS Codes and as per the Engineer's requirements at any stage, without any extra cost implication to the Contract in any manner either for supply, testing, placing concrete in to place with all necessary material, labour, plant and equipments, safety measures and any statutory duties, taxes, other liabilities in this regard. Contractor must ensure that the RMC should be placed in position within 2 ½ hours from loading of concrete into transit mixer. Relevant documents like trip sheet should be sent along with each mix. Contractor must ensure that the minimum cement content for particular grade shall follow as specified in technical specification. Testing of RMC (fresh/hardened) shall comply relevant IS Codes (IS 4926:1976 reaffirm 1990).

Preliminary tests

- a) Test specimens shall be prepared with at least two different water/cement ratios for each class of concrete, consistent with workability required for the nature of the work. The materials and proportions used in making preliminary tests shall be similar in all respects to those to be actually employed in the works as the object of these tests is to determine the proportions of cement, aggregates and water necessary to produce concrete of required consistency and to give the specified strength. It will be the Contractor's sole responsibility to carry out these tests and he shall

therefore furnish to Engineer a statement of proportions proposed to be used for the various concrete mixes.

- b) Materials shall be brought to the room temperature and all materials shall be in a dry condition. The quantities of water, cement and aggregates for each mix shall be determined by weight/volume to an accuracy of 1 part in 1000 parts.
- c) Mixing shall be done by a mixer machine as per IS 516 in such a manner as to avoid loss of water. The cement and fine aggregate shall first be mixed dry until the mixture is uniform in colour. The coarse aggregate shall then be added, mixed and water added and mixed thoroughly for a period of not less than 3 minutes until the resulting concrete is uniform in appearance. Each mix of concrete shall be of such a quantity as to leave about 10% excess concrete after moulding the desired number of test specimens.
- d) The consistency of each mix of concrete shall be measured immediately after mixing, by the slump test in accordance with IS 1199. If in the slump test, care is taken to ensure that no water or other materials is lost, the materials used for the slump test may be remixed with the remainder of the concrete for making the specimen test cubes. The period of re-mixing shall be as short as possible yet sufficient to produce a homogeneous mass.
- e) Compression tests of concrete cubes shall be made as per IS 516 on 15 cm cubes. Each mould shall be provided with a metal base having a plane surface to support the mould during filling without leakage. The base plate shall be preferably attached to the mould by springs or screws. The parts of the mould when assembled shall be positively and rigidly held together. Before placing, concrete the mould and base plate shall be cleaned and oiled. The dimensions and internal faces of the mould shall be accurate within the following limits:

Height and distance between the opposite faces of the mould shall be of specified size plus minus 0.2mm. The angle between the adjacent internal faces and between internal faces and top and bottom planes of mould shall be 90 Deg. plus/minus 5 Deg. The interior faces of the mould shall be plane surfaces with a permissible variation 0.03mm.
- f) Concrete test cubes shall be moulded by placing fresh concrete in the mould and compacted as specified in IS 516.
- g) Curing shall be as specified in IS 516. The cubes shall be kept in moist air of at least 90% relative humidity at a temperature of 27 Deg. Cent. plus minus two Deg. Cent. for 24 hours plus minus half hour from the time of adding water to the dry ingredients. Thereafter they shall be removed from the moulds, kept immersed in clean fresh water, and kept at 27 Deg. Cent. plus minus 2 Deg. Cent. Temp. Until required for test. Curing water shall be renewed every seven days. A record of maximum and minimum

temperatures at the place of storage of the cubes shall be maintained during the period they remain in storage.

h) **Testing of specimens**

The strength shall be determined based on not less than five cubes test specimens for each age and each water cement ratio. All these laboratory test results shall be tabulated and furnished to Engineer. The test result shall be accepted by Engineer if the average compressive strengths of the specimens are tested subject to the condition that only one out of the five consecutive test may give a value less than the specified strength for that age. The Engineer may direct the Contractor to repeat the tests if the results are not satisfactory and to make such changes, as he considers necessary to meet the requirements specified. All these preliminary tests shall be conducted by the Contractor at his own cost in an approved laboratory.

Proportioning consistency, batching and mixing of concrete
Proportioning

a) **Aggregate**

The proportions, which shall be decided by conducting preliminary test, shall be by volume. These proportions of cement, fine and coarse aggregates shall be maintained during subsequent concrete mixing. The supply of properly graded aggregate of uniform quality shall be maintained over the period of work, the grading of aggregates shall be controlled by obtaining the coarse aggregate in different sizes and blending them in the right proportions. The different sizes shall be stocked in separate stockpiles. The grading of coarse and fine aggregate shall be checked as frequently as possible as determined by Engineer, to ensure maintaining of grading in accordance with the samples used in preliminary mix design. The material shall be stock piled well in advance of use.

b) **Cement**

The cement shall be measured by volume / weight

c) **Water**

Only such quantity of water shall be added to the cement and aggregates in the concrete mix as to ensure dense concrete, specified surface finish, satisfactory workability, consistent with the strength stipulated for each class of concrete. The water added to the mix shall be such as not to cause segregation of material or the collection of excessive free water on the surface of the concrete.

The water cement (W/C) ratio is defined as the volume of water in the mix (including the surface moisture of the aggregates) divided by the volume of cement in the mix. The actual water cement ratio to be adopted shall be

determined in each instance by the Contractor and approved by the Engineer.

d) **Proportioning by water/Cement ratio**

The W/C ratio specified for use by Engineer shall be maintained. The Contractor shall determine the water content of the aggregates as frequently as directed by Engineer as the work progress and as specified in IS 2386 (Part-III) and the amount of water added at the mixer shall be adjusted as directed by Engineer so as to maintain the specified W/C ratio. To allow for the variation in volume of aggregates due to variation in their moisture content suitable adjustments in the volume of aggregates shall also be made.

e) **Consistency and slump**

Concrete shall be of a consistency and workability suitable for the conditions of the job. After the amount of water required is determined, the consistency of the mix shall be maintained throughout the progress of the corresponding parts of the work and approved tests e.g. slump tests, compacting factor tests, in accordance with IS 1199 shall be conducted from time to time to ensure the maintenance of such consistency.

The following tabulation gives a range of slumps, which shall generally be used for various types of construction unless otherwise instructed by the Engineer.

SLUMPS FOR VARIOUS TYPES OF CONSTRUCTION:

Only sufficient quantity of water shall be added to concrete during mixing to produce a mix of sufficient workability to enable it to be well consolidated to be worked in to the corners of the shuttering and around the reinforcement, to give the specified surface finish, and to have the specified surface strength. The following slumps shall be adopted for different kinds of works:-

Name of Work	When vibrator used	When vibrator not used
Mass concrete in foundations, footings retaining walls and pavements.	10mm to 25mm	50 mm to 75 mm
Thin sections of floors of less than 75mm thick	25mm to 40mm	75 mm to 100 mm

For Reinforced cement concrete work:

Name of Work	When	When vibrator
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	vibrator used	not used
Mass concreting in foundations, footings retaining walls and pavements	10mm to 25mm	80 mm
Beams, slabs, columns	25mm to 40mm	100 mm to 125 mm
Thin shells, folded plates etc	40mm to 50mm	125 mm to 150 mm

The concrete mix shall be in the proportion as arrived at as per the mix design and all the ingredients to be measured by weight (i.e. by weigh batching). All concrete work shall be carried by weigh batching only. In case if it is approved by the Engineer, the equivalent volume of coarse and fine aggregates based on the bulk density can be adopted. Contractor shall make available weigh scale of appropriate capacity at site for intermittent checking the weight of the ingredients so measured by volume during the concreting operation.

Sampling and testing concrete in the field:

- a) Facilities required for sampling materials and concrete in the field shall be provided by the Contractor at no extra cost. The following equipment with operator shall be made available at Engineer's request (all must be in serviceable condition):
 - i) One concrete cube testing machine machine suitable for 15 cm cubes, of 100 tonnes capacity with proving calibration ring. The machine should be powered driven type, calibrated and certification of calibration shall be produced by the contractor.
 - ii) Twelve cast iron cube moulds of 15 cm size
 - iii) One Lab. balance to weigh up to 20 kg with sensitivity of 10gm
 - iv) One set of sieves for coarse and fine aggregates & power driven Sieve shaker
 - v) One set of slump cone complete with tamping rod
 - vi) A set of measures from 5 litre to 0.1 0 litre
 - vii) One electric oven with thermostat up to 120 Deg. Cent.
 - viii) One flakiness gauge
 - ix) One elongation index gauge
 - x) One sedimentation pipette

- xi) One Pyconometer
- xii) Two calibrated glass jar of 1 litre capacity.
- xiii) One Modified proctor mould
- xiv) Five nos. core cutters

The above list of the facility is an indicative and is not limiting. The contractor shall arrange necessary laboratory equipment / glassware etc as may be required as per relevant IS specification / code of practice or as advised by the Structural Consultants.

Arrangement can be made by the contractor to have the cubes tested in an approved laboratory in lieu of a testing machine at site at his expense, with the prior consent of the Engineer.

- b) At least six test cubes of each class of concrete shall be made for every 15.0 CuM. of concrete or part thereof. Such samples shall be drawn on each day for each type of concrete. Of each set of 6 cubes, three shall be tested at 7 days age and three at 28 days age. The laboratory test results shall be tabulated and furnished to Engineer. Engineer will pass the concrete if average strength of the specimens tested is not less than the strength specified, subject to the condition that only one out of three consecutive tests may give a value less than the specified strength but this shall not be less than 90% of the specified strength. The cubes shall be tested on 7th and 28th day from the day of casting of the cubes.

The requirement of number of samples shall be determined by the Engineer and as such 1 sample for quantity of concrete up to 5 CuM 2 samples for quantity from 6 to 14 CuM to be taken.

An additional set of test cube if asked by the Engineer shall be cast and taken by the contractor which may be kept for record / verification at later date.

Admixtures:

- a) Admixtures may be used in concrete only with the approval of Engineer based upon evidence that, with the passage of time, neither the compressive strength nor its durability reduced. Calcium chloride shall not be used for accelerating setting of the cement for any concrete containing reinforcement, or embedded steel parts. When calcium chloride is permitted to be used, such as in mass concrete works, it shall be dissolved in water and added to the mixing water in an amount not to exceed 1.5% of the volume of the cement in concrete. When admixtures are used, the designed concrete mix shall be corrected accordingly. Admixtures shall be used as per manufacturer's instructions, in the manner, and with the control specified by Engineer.

b) **Air entraining agents:**

Where specified and approved by Engineer, neutralised vinyl resin or any other approved air-entraining agent may be used to produce the specified amount of air in the concrete mix and these agents shall conform to the requirements of ASTM standard 6260, air entraining admixtures for concrete. The recommended total air content of the concrete is 4% plus minus 1%. The method of measuring air content shall be as per IS 1199.

c) **Water reducing admixtures:**

Where specified and approved by Engineer water reducing Lignosulfonate mixture shall be added in quantities specified by Engineer. The admixtures shall be added in the form of a solution.

d) **Retarding admixtures:**

Where specified and approved by Engineer, retarding agents shall be added to the concrete mix in quantities specified by Engineer.

e) **Water proofing agent:**

Where specified and approved by Engineer, water proofing agent conforming to IS: 2645 shall be added in quantities specified by Engineer.

Optional tests:

- a) Engineer may order tests to be carried out on cement, sand, coarse aggregate and water in accordance with the relevant Indian Standards. Tests on cement shall include (i) fineness test (ii) test for normal consistency (iii) test for setting time (iv) test for soundness (v) test for tensile strength (vi) test for compressive strength (vii) test for heat of hydration by experiment and by calculations in accordance with IS: 269. Tests on sand shall include (i) test for organic impurities (ii) specific gravity test (iii) test for unit weight. Tests on coarse aggregate shall include (i) specific gravity and unit weight of dry loose and rodded aggregate (ii) soundness and alkali aggregate reactivity (iv) petrographic examination (v) deleterious materials and organic impurities (vi) test for aggregate crushing value. Any or all these tests would normally be ordered to be carried out only if Engineer feels the materials are not in accordance with the specifications or if the specified concrete strengths are not obtained and shall be performed by contractor at site or at an approved test laboratory. Testing fees and other all incidental charges, the Contractor shall have to pay.
- b) If the works cubes do not give the stipulated strengths Engineer reserves the right to ask contractor to dismantle such portions of the work, which in his opinion are unacceptable and re-do the work to the standard stipulated at contractor's cost.

In such case when the concrete fail to pass the routine tests the Engineer can order the contractor to undertake **non-destructive tests like Rebound Hammer test**. The field test to be carried out in accordance with procedure described in IS 13311 (Part II).When making rebound hammer test each result should be the average of at least 12 readings. The readings shall be taken and as per the procedure in the relevant IS 13311 (Part II) and calibration charts available from manufacturer to be used for interpretation. This non-destructive test shall be carried out through an approved agency at contractors cost.

c) **Load test on members or any other tests**

- i) In case of any work being suspected of faulty material or workmanship or both, Engineer requiring its removal and reconstruction may order the contractor that it should be load tested in accordance with the following provisions.
- ii) The test load shall be 125 % of the maximum superimposed load for which the structure was designed. Such test load shall not be applied before 56 days after the effective hardening of the concrete. During the test, struts strong enough to take the load shall be placed in position leaving a gap under the members. The test load shall be maintained for 24 hours before removal.
- iii) If within 24 hours of the removal of the load, the structure dose not show a recovery of at least 75 percent of the maximum deflection shown during the 24 hours under load the test loading shall be repeated after a lapse of at least 72 hours. The structure shall be considered to have failed to pass the test if the recovery after the second test is not at least 75 percent of the maximum deflection shown during the second test. If the structure is certified as failed by Engineer, the cost of the load test shall be borne by the contractor.
- iv) If the maximum deflection in mm, shown during 24 hours under load is less than $40(L \times L) / D$, where L is the effective span in M ; and D, the overall depth of the section in mm, it is not necessary for recovery to be measure and recovery provisions of (iii) shall not apply.This will be governed by relevant IS.
- v) Any other tests e.g. taking out in approved manner concrete cores examination and tests on such cores removed from such parts of the structure as directed by Engineer, Non destructive testing etc. shall be carried out by contractor if so directed.
- vi) Should the results of any test prove unsatisfactory, or the structure shows signs of weakness, undue deflection or faulty construction the contractor shall remove and rebuild the member or members involved or carry out such other remedial measures as may be required by Owner. the Contractor shall

bear the cost of so doing, unless the failure of the member or members to fulfil the test conditions is proved to be solely due to faulty design.

Concrete in alkali soils and alkaline water

Where concrete is liable to attack from alkali salts or alkaline water, special cements containing low amount of Tricalcium Aluminates shall be used, if so specified in the drawings. Such concrete shall have a minimum 28 days compressive strength of 250 kg per Sq. cm and shall contain not less than 370 kg of cement per cubic metre of concrete in place. If specified, additional protection shall be obtained by the use of a chemically resistant, stone facing or a layer of plaster of Paris covered with suitable fabric, such as jute thoroughly impregnated with tar.

Preparation prior to concrete placement

- a) Before the concrete is actually placed in position, the insides of the formwork shall be inspected to see that they have been cleaned and oiled. Temporary openings shall be provided to facilitate inspection, especially at bottom of columns and walls forms to permit removal of saw dust, wood shavings, binding wire, rubbish dirt etc. Openings shall be placed or holes drilled so that these materials and water can be removed easily. Such openings/holes shall be later suitably plugged.
- b) The various agencies shall be permitted ample time to install drainage and plumbing lines in floor and trench drains, electrical conduits, hangers, anchors, inserts, sleeves, bolts, frames and other miscellaneous embedment to be cast in the concrete as indicated on the drawings or as is necessary for the proper execution of the work Contractor shall cooperate fully with all such agencies and shall permit the use of scaffolding form work etc. by other agencies at no extra cost.
- c) All embedded parts, inserts etc. supplied by Owner or Contractor shall be correctly positioned and securely held in the forms to prevent displacement during depositing and vibrating of concrete.
- d) Anchor bolts shall be positioned and kept in place with the help of proper manufactured templates. The use of all such templates, fixture etc. shall be deemed included in the rates.
- e) Slots, openings, holes, pockets etc. shall be provided in the concrete work in the positions indicated in the drawings or as directed by Engineer.
- f) Prior to concrete placement all work shall be inspected and approved by Engineer and if found unsatisfactory, concrete shall not be poured until after all defects have been corrected at Contractor's cost. Cat ladders shall be provided on the reinforcement to facilitate labour movement.

- g) Approval by Engineer for all materials and work as required herein shall not relieve contractor from his obligation to produce finished concrete in accordance with the drawings and specifications.
- h) No concrete shall be placed in wet weather or on water covered surface. Any concrete that has been washed by heavy rains, the work shall be entirely removed, if there is any sign of cement and sand having been washed from the concrete mixture. To guard against damage, which may be caused by rains, the works shall be covered with tarpaulins immediately after the concrete has been placed and compacted. Any water accumulating on the surface of the newly placed concrete shall be removed by approved means and no further concrete shall be placed thereon until such water is removed. To avoid flow of water over/around freshly placed concrete, suitable drains and sumps shall be provided.
- i) Immediately before concrete placement begins, proposed surfaces except framework, which will come in contact with the concrete to be placed, shall be covered with a bonding mortar.

Transportation:

- a) All buckets, containers or conveyors used for transporting concrete shall be mortar tight. Irrespective of the method of transportation adopted, concrete shall be delivered with the required consistency and plasticity without segregation or loss of slump. However, chutes shall not be used for transport of concrete without the written permission of Engineer and concrete shall not be re handled before placing.
- b) Concrete must be placed in its final position before it becomes too stiff to work. On no account, water shall be added after the initial mixing concrete that has become stiff or has been contaminated with foreign materials shall be rejected and disposed off as directed by Engineer.
- c) All equipment used for mixing, transporting and placing of concrete shall be maintained in clean condition. All pans bucket. Hoppers, chutes, pipelines, transit mixers and other equipment shall be thoroughly cleaned after each period of placement.

Procedure for placing of concrete:

- a) Before any concrete is placed, the entire placing program, consisting of equipment, layout proposed procedures and methods shall be submitted to engineer for approval if so demanded by Engineer and no concrete shall be placed until Engineer's approval has been received. Conveyor for conveying concrete shall be of such size and design as to ensure a practically continuous flow of concrete during depositing without segregation of materials, considering the size of the job and placement location.

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- b) Concrete shall be placed in its final position before the cement shall normally be compacted in its final position within fifteen minutes of leaving the mixer and once compacted it shall not be disturbed.
 - c) Concrete, in all cases, be deposited as nearly as practicable directly in its final position, and shall not be re handled or caused to flow in a manner which will cause segregation, loss of materials, displacement of reinforcement, shuttering or embedded inserts or impair its strength. For locations where direct placement is not possible, and in narrow forms, contractor shall provide suitable drop and elephant trunks to confine the movement of concrete. Special care shall be taken when concrete is dropped from a height especially if reinforcement is in the way, particularly in columns and thin walls.
 - d) Except when otherwise approved by Engineer, concrete shall be placed in shovels or other approved implements and shall not be dropped from a height more than 1 M or handled in a manner, which will cause segregation.
 - e) The following specification shall apply when placing of concrete by use of mechanical equipment is specifically called for while inviting bids or is warranted considering the nature of work involved. The control of placing shall begin at the mixer discharge, concrete shall be discharged by a vertical drop into the middle of the bucket or hopper and this principle of a vertical discharge of concrete shall be adhered to thoroughly all stages of delivery until the concrete comes to rest in its final position.
 - f) Central bottom dump buckets of a type that provides for positive regulation of the amount and rate of deposition of concrete in all dumping position shall be employed.
 - g) In placing concrete in large open areas, the bucket shall be spotted directly over the position designated and then lowered for dumping. The open bucket shall clear the concrete already in place and the height of drop shall not exceed 1 M. The bucket shall be opened slowly to avoid high vertical bounce. Dumping of buckets on the swing or in any manner, which results in separation of ingredients or disturbance of previously placed concrete, will not be permitted.
 - h) Concrete placed in restricted forms by wheel barrows, buggies, cars, short chutes or hand shovelling shall be subject to the requirement for vertical delivery of limited height to avoid segregation and shall be deposited as nearly as practicable in its final position.
 - i) Where it is necessary to use transfer chutes, specific approval of Engineer must be obtained to the type, length, slopes, s baffles, vertical terminals and timing of operations, the discharge and without segregation. To allow for the loss of mortar against the sides of the chutes, the first mix shall have less coarse aggregate. During cleaning of chutes, the wastewater shall be kept clear of the forms. Concrete shall not be permitted to fall from the end of the

chutes by more than 1 M. Chutes when approved for use shall have slopes not flatter than 1: 3 and steeper than 1: 2 chutes shall be of metal or metal lined and of rounded cross section. The slopes of all chutes sections shall be approximately the same. The discharge end of the chutes shall be maintained above the surface of the concrete in the forms.

- j) Concrete may be conveyed and placed by mechanically operated equipment e.g. pumps or pneumatic placers only with the written permission of Engineer. The slump shall be held to the minimum, necessary for conveying concrete by this method.
- k) When pumping is adopted, before pumping of concrete is started, the pipeline shall be lubricated with one or two batches of mortar composed of one part cement and two parts sand. The concrete mix shall be specially designed to suit pumping. Care shall be taken to avoid stoppages in work once pumping has started.
- l) When pneumatic placer is used, the manufacturer's advice on layout of pipeline shall be followed to avoid blockages and excessive wear. Restraint shall be provided at the discharge box to cater for the reaction at this end. Manufacturer's advice shall be followed regarding concrete quality and all other related matters when pumping or pneumatic placing equipment is used.
- m) Concreting, once started, shall be continuous until the pour is completed. Concrete shall be placed in successive horizontal layers of uniform thickness ranging from 15 to 90 mm as directed by Engineer. These shall be placed as rapidly practicable to prevent the formation of cold joints or planes of weakness between each succeeding layer within the pour. The thickness of each layer shall be such that it can be deposited before the previous layer has stiffened. The bucket loads or other units of deposit shall be spotted progressively along the face of the layer with such overlap as well facilitate spreading the layer to uniform depth and texture with a minimum of shovelling. Any tendency to segregation shall be corrected by shovelling stones into mortar rather than mortar on to stones. Such a condition shall be corrected by redesign of mix or other means, as directed by Engineer.
- n) The top surface of each pour and bedding planes shall be approximately horizontal unless otherwise instructed.
- p) **Compaction:**
 - i) Concrete shall be compacted during placing the approved vibrating equipment until the concrete has been consolidated to the maximum practicable density, is free of pockets of coarse aggregate and fits tightly against all form surfaces, reinforcement and embedded fixtures. Particular care shall be taken to ensure that all concrete placed against the forms faces and into corners of forms or against hardened concrete at joints is free from voids or cavities. The use of vibrators shall be consistent with the concrete mix and

caution exercised not to over vibrate the concrete to the point those segregation results.

- ii) Vibrators shall conform to BIS/IS specifications. Type of vibrator to be used shall depend on the structure where concrete is to be placed. Shutter vibrators to be effective, shall be firmly secured to the formwork which must be sufficiently rigid to transmit the vibration and strong enough not to be damaged by it. Immersion vibrators shall have no load frequency, amplitude and acceleration as per IS 2505 depending on the size of vibrator. Immersion vibrators in sufficient numbers and each of adequate size shall be used to properly consolidate all concrete. Tapping or external vibrating of forms by hand tools or immersion vibrators will not be permitted.
- iii) The exact manner of application and the most suitable machines for the purpose must be carefully considered and operated by experienced men. Immersion vibrators shall be inserted vertically at points not more than 450 mm apart and withdrawn when air bubbles cease to come to the surface. Immersion vibrators shall be withdrawn very slowly. In no case shall immersion vibrators be used to transport concrete inside the forms. Particular attention shall be paid to vibration at the top of a lift e.g. in a column or wall.
- iv) When placing concrete in layers, which are advancing horizontally as the work progresses, great care shall be exercised to ensure adequate vibration, blending and mixing of the concrete between the succeeding layers.
- v) The immersion vibrator shall penetrate the layer being placed and also penetrate the layer below with the under layer is still plastic to ensure good bond and homogeneity between the two layers and prevent the formation of cold joints.
- vi) Care shall be taken to prevent contact of immersion vibrators against reinforcement steel. Immersion vibrators shall not be allowed to come in contact with reinforcement steel after start of initial set. They shall also not be allowed to come in contact with forms or finished surfaces.
- vii) Form attached vibrators shall be used only with specific authorisation of Engineer.
- viii) The surface vibrators will not be permitted under normal conditions. However, for thin slabs vibration by specially designed vibrators may be permitted upon approval of Engineer. Where as for cement concrete pavements appropriate surface vibrator shall be used in addition to immersion vibrator approved by the Engineer.
- ix) The formation of stone pockets or mortar bondage's in corner and against faces of forms shall not be permitted. Should these occur, they shall be dug out, reformed and refilled to sufficient depth and shape for through bonding, as directed by Engineer.

q) **Placement interval:**

Except when placing with slip forms each placement of concrete in multiple lift work, shall be allowed to set for at least 24 hours after the final set of concrete and before the start of a subsequent placement.

r) **Special provision in placing:**

When placing concrete in walls with openings and in floors of integral slab and beam construction and other similar conditions, the placing shall stop when the concrete reaches the top of the opening in walls and bottom horizontal surface of the slab, as the case may be placing shall be resumed before the concrete in place takes initial set, but not until it has time to settle as determined by Engineer.

s) **Placing concrete through reinforcement steel:**

While placing concrete through reinforced steel, care shall be taken to prevent segregation of the coarse aggregate. When the congestion of steel makes placing difficult, it may be necessary to temporarily move the top steel aside to get proper placement and restore reinforcing steel to design position.

t) **Bleeding:**

Bleeding of free water, on top of concrete being deposited, in to the forms shall be caused to stop the concrete pour. The conditions causing this defect corrected before any further concreting is resumed.

Curing, protecting, repairing and finishing

a) **Curing:**

- i) All concrete shall be cured by keeping it continuously damp for the period required for complete hydration and hardening to take place shall cure all concrete. Preference shall be given to the use of continuous sprays or ponded water continuously saturated covering of sacks, canvas, Hessian or other absorbent materials, or approved effective curing compounds applied with spraying equipment capable of producing a smooth, even textured coat. Extra precautions shall be exercised in curing concrete during cold and hot water as outlined hereinafter. The quality of curing water shall be the same as that used for mixing concrete.
- ii) Certain types of finish or preparation for overlaying concrete must be done at certain stage of the curing process and special treatment may be required for specific concrete surface finish.

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- iii) Curing of concrete made of high alumina cement and super sulphate cement shall be carried out as directed by Engineer.
 - iv) Fresh concrete shall be kept continuously wet for a minimum period of 10 days from the date of placing of concrete following a lapse of 12 to 14 hours after laying of concrete. The curing of horizontal surfaces exposed to the drying winds shall however begin immediately the concrete has hardened. Water shall be applied uniformly to concrete surfaces within 1 hour after concrete has set. Water shall be applied to formed surfaces immediately upon removal of forms quantity of water applied shall be controlled to prevent erosion of freshly placed concrete.
 - v) Curing shall be assured by use of an ample water supply under pressure in pipes with all necessary appliance of hose, sprinklers and spraying devices. Continuous fine mist spraying or sprinkling shall be used, unless otherwise specified or approved by Engineer.
 - vi) Whenever, by the judgment of Engineer, it may be necessary to omit the continuous spray method, a covering of clean sand or other approved means such as wet gunny bags, which will prevent loss of moisture from the concrete, may be used. No type of covering will be approved which would stain or damage the concrete during or after the curing period. Covering shall be kept continuously wet during the curing period.
 - vii) For curing of concrete in pavements, sidewalks floors, flat roofs or other level surfaces, the ponding method of curing is preferred. The method of containing the ponded water shall be approved by Engineer. Special attention shall be given to edges and corners of the slabs to ensure proper protection to these areas. The ponded area shall be kept continuously filled with water during the curing period.
 - viii) Surface coating type compounds shall be used only by special permission of Engineer; curing compounds shall be liquid type white pigmented. Other curing compounds shall be used on surfaces where future blending with concrete, water or acid proof membrane or painting is specified.
 - ix) All equipment and materials required for curing shall be on hand and ready for use before concrete is placed.

b) **Protecting fresh concrete:**

Fresh concrete shall be protected from defacements and damage due to construction operation by leaving forms in place for an ample period as specified later in this specification. Newly placed concrete shall be protected by approved means such as tarpaulins from rain, sun and winds. Steps as approved by Engineer shall also be taken to protect immature concrete from damage by debris, excessive loading, vibration, abrasion or contact with other materials etc that may impair the strength and/or durability of the concrete. Workmen shall be warned against and prevented

from disturbing green concrete during its setting period. If it is necessary that workmen enter the area of freshly placed concrete, Engineer may require that bridges be placed over the area.

c) **Repair and replacement of unsatisfactory concrete:**

- i) Immediately after the shuttering is removed, the surface of concrete shall be very carefully inspected and all defective areas called to the attention of Engineer who may permit patching of the defective areas or also reject the concrete unit either partially or entirely. Rejected concrete shall be removed and replaced by contractor at no additional expense to owner. Holes left by bolts etc. shall be filled up and made good with mortar composed of one part of cement to one and half parts of sand passing 2.36 mm IS sieve after removing any loose stones adhering to the concrete shall be finished as described under the particular items of work.
- ii) Superficial honey combed surfaces and rough patches shall be similarly made good immediately after removal of shuttering in the presence of Engineer and superficial water and air holes shall be filled in. The mortar shall be well worked into the surface with a wooden float. Excess water shall be avoided. Unless instructed otherwise by Engineer the surface of the exposed concrete placed against shuttering shall be rubbed down immediately on removal of shuttering to remove fine or other irregularities and necessary care being taken to avoid damage to the surface. Surface irregularities shall be removed by grinding.
- iii) If reinforcement is exposed or the honeycombing occurs at vulnerable positions e.g. ends of beams or columns it may be necessary to cut out the member completely or in part and reconstruct. The decision of Engineer shall be final in this regard. If only patching is necessary, the defective concrete shall be cut out till solid concrete is reached (or to a minimum depth of 25mm) the edges being cut perpendicular to the affected surface or with small under cut if possible. Anchors, tees or dovetail slots shall be provided whenever necessary to attach the new concrete securely in place an area extending several centimetres beyond the edges and the surfaces of the prepared voids shall be saturated with water for 24 hours immediately before the patching material is placed.
- iv) The use of epoxy for bonding fresh concrete used for repairs will be permitted upon written approval of Engineer. Epoxy shall be applied in strict accordance with the instructions of the manufacturer.
- v) Small size holes having surface dimensions about equal to the depth of the hole, holes left after removal of form bottom, grout insert holes and slots cut for repair of cracks shall be repaired as follows. The hole to be patched shall be roughened and thoroughly soaked with clean water until absorption stops.

A 5mm thick layer of grout of equal parts of cement and sand shall be well brushed into the surface to be patched, followed immediately by the patching concrete, which shall be well consolidated with a wooden float. The concrete patch shall be built up in 10 mm thick layers. After an hour or more, depending upon weather conditions, it shall be worked off flush with a wooden float and smooth finish obtained by wiping with Hessian; a steel trowel shall be used for this purpose. The mix for patching shall be of same material and in the same proportions as that used in the concrete being repaired, although some reduction in the maximum size of the coarse aggregates may be necessary and the mix shall be kept as dry as possible.

Mortar filling by air pressure (guniting) shall be used for repairing of areas too large and/or too shallow for patching with mortar. Patched surfaces shall be given a final treatment to match the colour and texture of the surrounding concrete. While cement shall be substituted for ordinary cement, if so directed by Engineer, to match the shade of the patch with original concrete.

- vii) The patched area shall be covered immediately with an approved non-staining water saturated material such as gunny bag which shall be kept continuously wet and protected against sun and wind for a period of 24 hours. Thereafter, the patched area shall be kept wet continuously by fine spray of sprinkling for not less than 10 days.
- viii) Any minor cavity in the element or water pass through a joint, the affected area shall be grouted with an approved means as approved by the Engineer. This will not however applicable to any defect which is in case established during testing.
- ix) All materials, procedures and operations used in the repairing of concrete and also the finished repair work shall be subject to the approval of Engineer. All fillings shall be tightly bonded to the concrete and shall be sound, free from shrinkage cracks after the fillings have been cured and finished.
- d) **Finishing:**
 - i) The type of finish for formed concrete surface shall be as follows, unless, other wise specified by the Engineer.

For surfaces against which backfill or concrete is to be placed, no treatment is required except repairing of defective areas.

For surface below grade, which will receive, waterproofing treatment the concrete shall be free of surface irregularities, which would interfere with proper application of the waterproofing material which is specified for use.

Unless specified, surfaces which will be exposed when the structure is in service shall receive no special finish, except repairing of damage or defective

concrete removal of fins and abrupt irregularities, fillings of holes left by form ties and rods and clean up of loose or adhering debris.

- ii) Surfaces which will be exposed to the weather and which would normally be level shall be sloped for drainage. Unless the drawing specifies such as stair treads, walls shall be sloped across the width approximately 1 in 30 broader surface such as walkways, roads, parking areas and platforms shall be sloped about 1 in 50. Surfaces that will be covered by backfill or concrete sub floors to be covered either concrete topping, terrazzo or quarry tile and similar surfaces shall be smoothing screeded and levelled to produce even surfaces. Surface irregularities shall not exceed 6mm. Surfaces which will not be covered by backfill, concrete or tile toppings such as outside decks, floors of galleries and sumps, parapets, gutters, sidewalks floors and slabs shall be consolidated, screeded and floated. Excess water and laitance shall be removed before finishing. Floating may be done with hand or power tools and started as the screeded surface has attained a stiffness to permit finishing operation and these shall be the minimum required to produce a surface uniform in texture and free from screed marks or other imperfections. Joints edge panels and forms linings shall be of uniform size and are as large as practicable and installed with closed joints. Upon removal of forms the joint marks shall be smoothed off and all blemishes, projections etc, removed leaving the surfaces reasonably smooth and unmarred.

iv) **Integral cements concrete finish:**

When specified on the drawings and integral cement concrete finish of specified thickness for floors and slabs shall be applied either monolithic or bonded as specified on the drawing as per IS 2571. The surface shall be compacted and then floated with a wood float or power floating machine. The surface shall be tested with a straight edge and any high and low spots eliminated. Floating or troweling of finish shall be permitted only after all surfaces water has evaporated. Dry cement or a mixture of dry cement and sand shall not be sprinkled directly on the surface of the cement finish to absorb moisture or to stiffen the mix.

v) **Exposed Concrete finish/Rendering:**

A rubbed finish shall be provided only on exposed concrete surfaces as specified on the drawings. Upon removal of forms, all fins and other projections on the surfaces shall be carefully removed, off-sets levelled and voids and damaged sections be immediately saturated with water and repaired by filling with a concrete or mortar of the same composition as was used in the surface. Then surface shall be thoroughly wetted and rubbed with carborundrum or other abrasive. Cement mortar may be used in the rubbing, but the finished surface shall be brush coated with either cement grout after rubbing. The finished surfaces shall present a uniform and smooth appearance matching with exposed concrete surface texture and style.

Mode of Measurement: This shall be paid in Cu. M

- i) The unit rate for concrete work under various categories shall be all inclusive and no claims for extra payment on account of such items as leaving holes, embedding inserts etc. shall be entertained unless separately provided for in the schedule of quantities. No extra claim shall also be entertained due to change in the number, position end/or dimensions of holes soils or openings sleeves, inserts or on account of any increased lift or scaffolding etc. All these factors should be taken into consideration while quoting the unit rates.
- ii) Payments of concrete will be made on the basis of unit of the respective item specified in the Schedule of Quantities. No deduction in the concrete quantity will be made for reinforcements, inserts etc. and opening less than 0.05cu.m. Where no such deduction for concrete is made, payment for shuttering work provided for such holes, pockets etc. will not be made.
- iii) Payment for beams will be made for the quantity based on the depth being reckoned from the underside of the slabs and length measured as the clear distance between supports. Payment for columns shall be made for the quantity based on height reckoned up to the underside of slabs.

2.06 Providing and laying RCC of M 25 mix for structures below & up to highest plinth level.

The general specification is same as per Item spec. no. 2.05 except change in the design mix proportion for M25 grade of concrete.

Mode of Measurement: Same as per Item spec. no. 2.05

2.07 Providing and laying RCC of M 30 mix for structures below & up to highest plinth level.

The general specification is same as per Item spec. no. 2.05 except change in the design mix for M30 grade of concrete.

Mode of Measurement: Same as per Item spec. no. 2.05

2.08 Providing and laying M 20 mix concrete in super structures up to 6m height from highest plinth level

The general specification is same as per Item spec. no. 2.05 except for the height.

Mode of Measurement: Same as per Item spec. no. 2.05

2.09 Making undream pile of 230mm dia. 2.00 mts. Depth with single bulb. Pile to be pouring with M-20

Auger with special blades – to excavate the pile hole and use reaming to form the bulb. Single Under-reamed bulb is 2.5 times the dia. Of pile. Use bottom bucket to collect and remove the excavated soil from the bulb. Cast the pile with M-20.

The general specification for M 20 grade concrete is same as per Item spec. no. 2.05 except for the height.

Mode of Measurement: It shall be measured in Running Meter.

2.10 Providing and laying M 30 mix concrete in super structures up to 6m height from highest plinth level.

The general specification is same as per Item spec. no. 2.05 except for the grade of concrete & height.

Mode of Measurement: Same as per Item spec. no. 2.05

2.11 Providing and laying M 20 mix concrete in super structures above 6 M and up to 12 M height

The general specification is same as per Item spec. no. 2.05 except for the change in height.

Mode of Measurement: Same as per Item spec. no. 2.05

2.12 Providing and laying M 25 mix concrete in super structures above 6M and up to 12 M height

The general specification is same as per Item spec. no. 2.05 except for the change in grade of concrete & height.

Mode of Measurement: Same as per Item spec. no. 2.05

2.13 Providing and laying M 30 mix concrete in super structures above 6 M from plinth level and up to 12 M height

The general specification is same as per Item spec. no. 2.05 except for the change in grade of concrete & height.

Mode of Measurement: same as per Item spec. no. 2.05

2.14 Providing& laying RCC for equipment / machine foundation

The general specification is same as Item spec. no. 2.05 but for the mix of the concrete, which shall be as specified in the item. The rate is exclusive of reinforcement steel but inclusive of centring and shuttering, providing number of holes, pockets (size and shape as shown in the drawings and as

directed) and grouting the same after the machine/ equipment is erected with concrete of specified mix and finishing the same as self finish specified. The rates shall include grouting of base plates, anchor bolts, pipe sleeves including placing, aligning, levelling and maintaining it during the casting of cement concrete, protection of the threaded portion of bolts by acceptable means or protection of any surface from sticking of cement grout etc, welding the insert elements, handling/ placing the template etc complete as per equipment drawing / structural drawing etc complete. The cost of formwork, creating bolt pockets / grouting the bolts is included in the item.

Mode of Measurement Same as per Item spec. no. 2.05.

2.15 Pre-cast Concrete

Pre-cast concrete shall comply with relevant IS and with the following requirements:

- a) All pre-cast units shall be cast on suitable cement or steel platform which shall be adequately oiled to obtain surface finish same standard as obtained in the forms. Contractor shall be responsible for the accuracy of the level or shape of the bed or platform. A suitable serial number and the date of casting shall be impressed or painted on each unit.
- b) Side shutters shall not be struck in less than 24 hours after depositing concrete and no pre-cast unit shall be lifted until the concrete reaches strength of at least twice the stress to which the concrete may be subjected to at the time of lifting.
- c) The lifting and removal of pre-cast units shall be undertaken without causing shock, vibration or undue bending stresses to or in the units. Before lifting and removal takes place Contractor shall satisfy Engineer or his representative that the methods he proposes to adopt for these operations shall not over stress or otherwise affect seriously the strength of the pre-cast units. The reinforced side of the units shall be distinctly marked.
- d) All pre-cast 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 be completely immersed in water if the size of the unit so permits or curing shall be carried out as per standard practice.
- e) Slots, openings or holes, pockets etc. shall be provided in the concrete work in the drawings or as directed by Engineer. Any deviation from the approved drawings shall be made good by Contractor at his own expense, without damaging any other work sleeves, bolts, inserts, etc. shall also be provided in concrete work where so specified.

- f) The pavement slabs / trench covers top shall be appropriately finished i.e. either stripped finished or smooth finished with a smooth border including Chamfering as per details, finishing the exposed edges / corners.
- g) The unit rate for pre-cast concrete members shall include formwork, mouldings, finishing, hoisting and setting in position including mortar, provision of lifting arrangement, exposed concrete finish etc. complete. Reinforcement fixed shall be measured and paid for separately under relevant item.

Mode of Measurement:

It shall be measured in Cu. M.

2.16 Providing & erecting Formwork for structures below ground level and up to highest plinth level

- a) The formwork shall consist of shores, bracings, sides of beams and columns, bottom of slabs etc, including ties anchors, hangers inserts etc, complete which shall be properly designed and planned for the work. False work shall be so constructed that necessary adjustment can be made to compensate for take up and settlements. Wedge may be used at the top or bottom of timber shores but not at both ends to facilitate vertical adjustment or dismantling of the formwork.

- b) **Design of formwork:**

The design of the formwork as well as its construction shall be the responsibility of Contractor. If so instructed, the drawings and/or calculation for the design for the formwork shall be submitted to Engineer for approval before proceeding with work, at no extra cost. Engineer's approval shall not however relieve Contractor of the full responsibility for the design and construction of the formwork. The design shall take into account the entire load vertical and lateral that the forms will be carrying live and vibration loadings.

- c) **Type of formwork:**

Formwork may be of timber, plywood metal, plastic or concrete. For special finishes the formwork may be lined with plywood, steel sheets oil tempered hard board etc. Sliding forms and slip forms may be used with the approval of Engineer.

- d) **Form work requirements:**

- i) Forms shall conform to the shapes, lines, grades and dimensions including camber of the concrete as called for on the drawings. Ample studs, braces, ties, straps, etc. shall be used to hold the forms in proper position without any distortion whatsoever until the concrete is set sufficiently to permit

- removal of forms. Forms shall be strong enough to permit the use of immersion vibrators. In special cases form vibrators may also be used. The shuttering shall be close boarded. Timber shall be well seasoned, free from sap, shakes, loose knots, worm holes, warps or other surface defects in contact with concrete. Faces coming in contact with the concrete shall be free from adhering grout, plaster, and paint, projecting nails, splits or other defects. Joints shall be sufficiently tight to prevent loss of water or any fine material from concrete.
- ii) Plywood shall be used for exposed concrete surfaces; where called for. Sawn and wrought timber may be used for unexposed surfaces. Inside faces of forms for concrete surfaces, these are to be rubbed finished shall be planed to remove irregularities or uneven ness in the face. Formwork with linings shall be permitted.
 - iii) All new and used form timber shall be maintained in a good condition with respect to shape, strength, rigidity, water tightness, smoothness and cleanliness of surfaces. Form timber unsatisfactory in any respect shall not be used and if ejected by Engineer shall be removed from the site.
 - iv) Shores supporting successive members shall be placed directly over those below or be so designed and placed that the load will be transmitted directly to them. Trussed supports shall be provided for shores that cannot be secured on adequate foundations.
 - v) Formwork, during any stage of construction showing signs of distortion or distorted to such a degree that the intended concrete work will not conform to the exact contours indicated on the drawings, shall be repositioned and strengthened. Poured concrete affected by the faulty formwork, shall be removed completely and the formwork be corrected prior to placing of new concrete.
 - v) Excessive construction camber to compensate for shrinkage, settlement may impair the structural strength of members and shall not be permitted.
 - vii) Forms shall be so designed that their removal will not damage the concrete. Face formwork shall provide true vertical and horizontal joints, conform to the architectural features of the structure as to location of joints and be as directed by engineer.
 - viii) Where exposed smooth or rendered concrete finishes are required the forms shall be constructed with special care so that the resulting concrete surfaces require a minimum finish.
- e) **Formwork for Slope Surfaces:**
- i) Forms for sloped surfaces shall be built so that the formwork can be placed board-by-board immediately ahead of concrete placement so as to

enable ready access for placement, vibration inspection and repair of the concrete.

- ii) The formwork shall also be built so that the boards can be removed one by one from the bottom up as soon as the concrete has attained sufficient stiffness to prevent sagging. Surfaces of construction joints and finished surfaces with slopes steeper than 4 horizontal: 1 vertical shall be formed as required herein.

f) **Formwork for Curved Surfaces:**

- i) The contractor shall interpolate intermediate sections as necessary and shall construct the forms so that the curvature will be continuous between sections. Where necessary to meet requirements for curvature, the form timber shall be built up of laminated splens cut to make tight, smooth form surfaces.
- ii) After the forms have been constructed, all surface imperfections shall be corrected and all surface irregularities at matching faces of form material shall be dressed to the specified curvature.

g) **Formwork for Exposed Concrete Surfaces:**

- i) Where it is desired, directed or shown on the drawings to have original fair face finish of concrete surface without any rendering or plastering, formwork shall be carried out by using wood planks, plywood or steel plates of approved quality and as per direction of the Engineer.
- ii) The contractor shall use one type of material for all such exposed concrete faces and the forms shall be constructed so as to produce uniform and consistent texture and pattern on the face of the concrete. Patches or forms for these surfaces will not be permitted. The formwork shall be placed so that all horizontal formworks are continuous across the entire surface.
- iii) To achieve a finish which shall be free of board marks, the formwork shall be faced with plywood or equivalent material in large sheets. The sheets shall be arranged in an approved pattern. Wherever possible, joints between sheets shall be arranged to coincide with architectural features, sills, window heads or change in direction of the surface.

All joints between shuttering plates or panels shall be vertical or horizontal unless otherwise directed. Suitable joints shall be provided between sheets. The joints shall be arranged and fitted so that no blemish or mark is imparted to the finished surfaces.

- iv) To achieve a finish which shall give the rough appearance of concrete cast against sawn boards, formwork boards unless otherwise stated shall be of 150 mm wide, securely jointed with tongue and grooved joints if required to prevent grout loss with tie rod positions and direction of boards carefully

- controlled. Sawn boards shall be set horizontally, vertically or at an inclination shown in the drawings. All bolt holes shall be accurately aligned horizontal and vertically and shall be filled with matching mortar recessed 5mm back from the surrounding concrete face.
- v) Forms for exposed concrete surfaces shall be constructed with grade strips (the underside of which indicated top of pour) at horizontal construction joints, unless the use of groove strips is specified on the drawings. Such forms shall be removed and reset from lift to lift, they shall not be continuous from lift to lift. Sheeting of reset forms shall be tightened against the concrete so that the forms will not be spread and permit abrasion irregularities or loss of mortar. Supplementary form ties shall be used as necessary to hold the reset forms tight against the concrete.
 - vi) For fair faced concrete, the position of through bolts will be restricted and generally indicated on the drawings.
 - vii) Chamfer strips shall be placed in the corners of forms for exposed exterior corners so as to produce 20 mm levelled edges except where otherwise shown in the drawings. Interior corners and edges at formed joints shall not be levelled unless shown on the drawings. Moulding for grooves, drip courses and bands shall be made in the form itself.
 - viii) The wood planks, plywood and steel plates used in formwork for obtaining exposed surfaces shall not be used for more than 3 times in case of wood planks, 6 times for plywood and 10 times for steel plates respectively. However, no forms will be allowed for reuse, if in the opinion of the Engineer it is doubtful to produce desired texture of exposed concrete.
 - ix) In order to obtain exposed concrete work of uniform colour it shall be necessary to ensure that the sand used for all exposed concrete work shall be of approved uniform colour. Moreover the cement used in the concrete for any complete element shall be from single consignment.
 - x) No exposed concrete surface shall be rendered or painted with cement or otherwise. Plastering of defective concrete as a means of achieving the required finish shall not be permitted, except in the case of minor porosity on the surface, the Engineer may allow a surface treatment by rubbing down with cement and sand mortar of the same richness and colour as for the concrete. This treatment shall be made immediately after removing the formwork.
 - xi) The contractor shall also take all precautionary measures to prevent breaking and chipping of corners and edges of completed work until the building is handed over.
 - h) **Bracings struts and props:**

- i) Shuttering shall be braced, strutted, propped and so supported that it shall not deform under weight and pressure of the concrete and also due to the movement of men and other materials. Bamboos shall not be used as props or cross bearers.
- ii) The shuttering for beams and slabs shall be so erected that the shuttering on the sides of the beams and under the soffit of slabs can be removed without disturbing the beam bottoms. Re-propping of beams shall not be done except when props have to be reinstated to take care of construction loads anticipated being in excess of the design load. Vertical props shall be supported on wedges or other measures shall be taken whereby the props can be gently lowered vertically while striking the shuttering. If the shuttering for a column is erected for the full height of the column, one side shall be left open and built up in sections as placing of concrete from the sides to limit the drop of concrete to 3M or as directed by engineer.

j) **Mould Oil:**

Care shall be taken to see that the faces of form work coming in contact with concrete are perfectly cleaned and two coats of mould oil or any other approved material applied before fixing reinforcement and placing concrete. Such coating shall be insoluble in water, non-staining and not injurious to the concrete. It shall not become flaky or be removed by rain or wash water. Reinforcement and/or other items to be cast in the concrete shall not be placed until coating of the forms is complete; adjoining concrete surface shall also be protected against contamination from the coating material.

k) **Chamfers and fillets:**

All corners and angles exposed in the finished structure shall be formed with mouldings to form chamfers or fillets on the finished concrete. The standard dimension of chamfers and fillers, unless otherwise specified shall be 20 mm x 20 mm. Care shall be exercised to ensure accurate mouldings. The diagonal face of the mouldings shall be planned or surfaced to the same texture as the forms to which it is attached.

l) **Wall ties:**

Wire ties passing through the walls shall not be allowed. In their place bolts through sleeves be used.

m) **Reuse of forms:**

Before reuse, all forms shall be thoroughly scraped, cleaned, nails removed, holes that may leak suitably plugged and joints examined and when necessary, repaired and the inside retreated to prevent adhesion to the satisfaction of Engineer. Warped lumber shall be resized. Contractor shall equip himself with enough shuttering material to complete the job in the stipulated time.

n) **Removal of forms:**

- i) Contractor shall record on the drawings and in a special register the date upon which the concrete is placed in each part of the work and the date on which the shuttering is removed there from. The Contractor shall remove the shuttering after obtaining the approval of the Engineer.
- ii) In no circumstances shall forms be struck until the concrete reaches strength of at least twice the stress due to self weight and any construction/erection loading to which the concrete may be subjected at the time of striking formwork.
- ii) In normal circumstances (generally where temperatures are above 20 Deg. Cent.) forms may be removed after expiry of the following periods:-

<u>Structural members</u>	<u>Ordinary Portland cement concrete</u>
a) Walls Columns and Vertical Sides of Beams	24 hrs. or as directed by the Engineer
b) Soffit formwork to Slabs Props to be re-fix immediately after removal of formwork	3 days
c) Beam soffits props left under	7 days
d) Removal of props to slabs	
i) Spanning up to 4.5m	7 days
ii) Spanning over 4.5m	14days
e) Removal of props to beams and arches	
i) Spanning up to 6 m	14 days
ii) Spanning over 6 m	21 days

For other cements and lower temperature, the stripping time recommended above shall be suitably modified by the Engineer in conformity with the relevant code of practice or recommendations by the manufacturer.

- iv) Striking shall be done slowly with utmost care to avoid damage to arises and projections and without shock or vibration, by gently easing the wedges. If

after removing the formwork, it is found that timber has been embedded in the concrete, it shall be removed and made good as specified earlier.

- v) Reinforced temporary openings shall be provided as directed by Engineer to facilitate removal of formwork which otherwise may be inaccessible.
- vi) Tie rods, clamps, form bolts etc. which must be entirely removed from walls or similar structures shall be loosened not sooner than neither 24 hours nor later than 40 hrs. after the concrete has been deposited. Ties, except those required to hold forms in place, may be removed at the same time. Ties, withdrawn from walls and grade beams shall be pulled towards the inside face cutting ties back from the faces of walls and grade beams will not be permitted.
- vii) For liquid retaining structures no sleeves for through bolts shall be used nor shall through bolts be removed as indicated above. The bolts, in this case, shall be cut at 25 mm depth from the surface and then the hole shall be made good by polymer modified cement mortar of the same proportions as the concrete just after striking the formwork.

Necessary approach / staging for ease of the access of workmen, inspection and supervision staff, in accordance with safety requirements and as per the instructions of the Engineer to be provided for all types of framework, for all the elements at all the depth / heights the cost of such arrangements detailed here above shall be deemed to be included in the quoted unit price of the item. The rate shall include providing and erecting formwork in position as per drawings, applying oil, removal of form after the specified period.

Mode of Measurement:

It shall be measured in Sq. M The actually shuttered area shall be measured and paid for

2.17 Providing and erecting Formwork for structures in super structures up to 12 M height from highest plinth level.

The general specification is same as per Item spec. no. 2.16 except for the change in height.

Mode of Measurement: Same as per Item spec. no. 2.16

2.18 Providing and erecting Formwork laying for structures in super structures above 12 M height from highest plinth level.

The general specification is same as per Item spec. no. 2.16 except for the change in height.

Mode of Measurement: Same as per Item spec. no. 2.16

2.19 Providing and erecting false staging for formwork

The additional height for which it is required shall be as specified in the item specification.

Mode of Measurement: This shall be measured and paid for in Sq. m The plan area of the structure shall be measured for all members except RCC walls and gable ends. For RCC walls and gable ends the elevation area shall be measured for payment under this item.

2.20 Extra over and above for the form work for exposed RCC work

Extra over and above Item spec. no. 2.16 or 2.17 or 2.18 for the form work for exposed RCC work The specification for the nature of shuttering shall be as specified in the item 2.16 under the sub-head shuttering for exposed concrete works. The work shall be finished including rendering as detailed under relevant item of concrete and also as stated under Item spec. no. 2.16.

Mode of Measurement: Only the surfaces / face(s) of the element which are given such exposed finish shall be measured in Sq. M

2.21 Providing and laying DPC 50mm thick

This shall be of plain cement concrete of mix M-20 or as specified in the item specification. The top surface of the masonry shall be levelled properly before laying the concrete. The side shuttering shall be vertical and strong. There should not be any honey combing. Curing shall be done for 7 days. After the curing period is over the surface shall be cleaned with brush and kerosene shall be applied over it. Then hot bitumen of grade 80/ 100 shall be applied @ 1.7 kg/Sq. M over the concrete surface. It shall be applied uniformly without any blank space.

Mode of Measurement: It shall be measured in Sq. M

2.22 Providing and laying cement concrete M- 20 at all heights below and up to highest plinth level

Specifications as per Item spec. no. 2.05 except for change for grade of concrete.

Mode of Measurement: Same as per Item spec. no. 2.05

2.23 Providing and laying cement concrete M- 20 at all heights up to 12 M from level above the highest plinth level

Specifications as per Item spec. no. 2.05 however for providing and laying cement concrete at all heights above plinth level and up to 12 M.

Mode of Measurement: Same as per Item spec. no. 2.05

2.24 Supplying and mixing water proofing compound

The waterproofing compound of approved make shall be added to cement concrete or cement mortar as instructed by the Engineer. The proportion of the compound to be added shall be as per the Manufacturer's specifications.

Mode of Measurement: The quantity of compound added shall be measured and paid for. The unit shall be as specified in the item specification.

2.25 Providing, fabricating and placing in position Reinforcement steel

The quality of the steel shall be as mentioned in the materials section. The bars shall be fabricated as per the drawings. Laps and splices for reinforcement shall be as shown on the drawings. Engineer shall approve splices in adjacent bars. The bars shall not be lapped unless the length required exceeds the maximum available lengths of bars at site or should be provided as specified in the drawing.

Bending

- a) Reinforcing bars supplied bent or in coils, shall be straightened before they are cut to size. Straightening of bars shall be done in cold and without damaging the bars. This is considered as a part of reinforcement bending fabricating work.
- b) All bars shall be accurately bent according to the sizes and shapes shown on the detailed working drawings/bar bending schedules. They shall be bent gradually by machine or other approved means. Reinforcing bars shall not be straightened and bend in a manner that will injure the material, bars containing cracks or splits shall be rejected. They shall be bent cold, except bars of over 32mm in diameter that may be bent hot if specifically approved by Engineer. Bars bent hot shall not be heated beyond cherry red colour (not exceeding 845 deg. C.) and after bending shall be allowed to cool slowly without quenching. Bars incorrectly bent shall be used only if the means used for straightening and re-bending shall not injure the material. No reinforcement shall be bent when in position in the work without approval whether or not it is partially embedded in hardened concrete. Bars having kinks or bends other than those required by design shall not be used.

Fixing

- a) Reinforcement shall be accurately fixed by any approved means and maintained in the correct position shown in the drawings by the use of block, spacers and chairs as per IS 2502 to prevent displacement during placing and compaction of concrete. Bars intended to be in contact at crossing points shall be strongly bound together at all such points with two numbers 16 to 18 gauge annealed soft iron wire or GI wire as specified in the tender. The vertical distance required between successive layers of bar in beams or other members shall be maintained by providing of mild steel spacer bars at such intervals that the main bars do not perceptibly sag between adjacent spacer bars.

Cover

- a) Nominal cover is the design depth of concrete cover to all steel reinforcement, including links. Unless indicated otherwise on the drawings, clear concrete cover for reinforcement (exclusive of plaster or other decorative finish) shall be as follows:
- i) At each end of reinforcing bar, not less than 25 mm or not less than twice the diameter of the bar whichever is less.
 - ii) For a longitudinal reinforcing bar in a column, not less than 40mm, or less than the diameter of such bar. In case of columns of minimum dimensions of 20 cm or under, whose reinforcing bars do not exceed 12 mm, a nominal cover of 25 mm may be used.
 - iii) For longitudinal reinforcing bars in a beam 25 mm or not less than the diameter of the bar.
 - iv) For tensile, compressive, shear, or other reinforcement in a slab or wall not less than 20mm or not less than the diameter of such reinforcement.
 - vi) For footings minimum cover of shall be 50 mm. In case concrete is deposited on prepared ground surface other than PCC the cover shall be to the bottom reinforcement shall be 75 mm.
 - vii) For concrete surfaces exposed to the weather or the ground after removal of forms, such as retaining walls, footing sides and top etc. not less than 50 mm for bars larger than 16 mm diameter and not less than 40 mm for bars 16 mm diameter or smaller.
 - viii) Increased cover thickness shall be provided, as indicated on the drawings, for surfaces exposed to the action of harmful chemicals (or exposed to earth contaminated by such chemical, acid, alkali, saline atmosphere, sulphurous smoke, etc.

- ix) For reinforced concrete members, totally or periodically immersed in sea water or subject to sea water spray, the cover of concrete shall be 50mm more than those specified in (i) to (v) above.
- x) For liquid retaining structures the minimum cover to all steel shall be 40mm or the diameter of the main bars, whichever is greater. In the presence of sea water and soils and waters of a corrosive character the cover shall be increased by 10 mm.
- xi) Protection to reinforcement in case of concrete exposed to harmful surroundings may also be given by providing dense impermeable concrete with approved protective coatings, as specified by the Engineer.
- xii) Concrete / Cement mortar cover blocks of same strength with MS wire grouted or PVC cover blocks of approved quality shall be provided to maintain the correct cover. Concrete / PVC cover blocks to be tied / fixed with reinforcement steel bars to ensure the bar remains in position. The use of pebbles or stones shall not be permitted.

Inspection

Erected and secured reinforcement shall be inspected, jointly measured and recorded and approved by Engineer prior to placement of concrete.

Mode of Measurement

Lengths of reinforcement steel including spacers & chairs shall be measured to the nearest centimetre and converted to weight using IS coefficients. The actual quantity of steel embedded in concrete as calculated and approved by Engineer, irrespective of the level or the height at which the work is done shall be taken. The unit rate for reinforcement shall include all rolling margin, wastages, binding wire, cover blocks etc. for which no separate payment shall be made. Laps as shown in drawings or as approved by Engineer and minimum number of chairs and spacer bars required to keep the reinforcement in position shall be paid for.

When steel is supplied by the owner, the cost of this quantity of steel plus wastage as specified in clause 5.0 of Section VI shall be recovered at issue rate from the Contractor. Rolling margin shall be paid as per clause 6.0 of Section VI.

No wastage and rolling margin for over weight shall however be payable when steel is supplied by the contractor whereas for under weight it should be paid at actual if allowed to use.

2.26 Providing, fabricating and placing in position Reinforcement steel- High Strength Deformed Bars-CTD/TMT (Thermo Mechanically Twisted/treated) bars.

High Strength Deformed Bars (HSDB)/TMT- reinforcement steel shall be confirming to latest IS 1786 as per the specifications detailed under Item spec. no. 2.25. The HSDB/TMT shall be of minimum grade Fe 415 for concrete reinforcement. The chemical composition shall when analysed as per relevant parts of IS 228 shall conform to the provisions of IS 1786.

Mode of measurement: Same as per Item spec. no. 2.25

2.27 Providing and placing in position bitumen impregnated fiber board

The bitumen-impregnated fibre board shall be of approved make and thickness as specified. This shall be placed in locations before concreting as per drawing / instructed by the Engineer in the expansion / construction joints. The work shall be done at all levels without any extra cost. The thickness of the board shall be as specified in the item specification.

Mode of Measurement: It shall be measured in Sq. M.

2.28 Providing and laying bituminous mastic

This shall be of approved make and quality. The joint / grooves to be cleaned of all the dust or loose/ organic matter/ any foreign material etc. and dried before application of a primer coat of flow able bitumen painting before filling the gap / groove with bituminous mastic The top of the mastic shall be finished smooth with a camber at the centre as shown in the drawings / directed by the Engineer. The joints shall be of uniform width and care shall be taken for proper bonding of the joints.

Mode of Measurement: This shall be measured in RM for specified width and depth as per the item in the Schedule of Quantities.

2.29 Supply and filling the pockets with free flow ready mix high strength cementitious grout

Providing and Grouting the foundation bolts/pockets, base plates with ACC Shrinkkomp grade-2/ GP2 of FOSROC or FLOWGROUT 60 of FAIRMATE **ready mixed non shrink, free flow, self levelling, cementitious grout** making holes if necessary in concrete as directed and as per the recommendations of the manufacturer. The pocket shall be cleaned off the dust or any foreign matter before grouting The work shall be measured based on the size of pockets actually grouted or size of pockets shown in the approved drawing, whichever is less. Similarly, in case of grouting below the base plate of machine / equipment, measurement shall be based on the area of grout and the thickness as per the drawing or as per actual whichever is less.

Mode of Measurement: The pockets shall be measured and shall paid for in CuM.

2.30 Providing and filling Silicon sealant

Silicon sealant should be of approved make and grade for construction/expansion joints application for the buildings. The work should include cleaning the joints and providing primer etc. as per specifications of the manufacturer and sealing/finishing etc. for size 10 mm wide x 6 to 8mm deep, complete as directed.

Mode of Measurement: This shall be measured in Running Meter.

3.00 MASONRY WORKS

Applicable codes and specifications

The following codes, standards and specifications are made a part of this specification. All standards, tentative specifications, codes of practices referred to herein shall be the latest edition including all applicable official amendments and revisions.

- IS: 1077 Common burnt clay building bricks
- IS: 3102 Classification of burnt clay bricks
- IS: 2180 Burnt clay building bricks, heavy duty.
- IS: 3495 Method of sampling and testing clay building bricks
- IS: 2691 Burnt clay facing bricks
- IS: 2221 Code of practice for brick work
- IS: 2185 Load bearing hollow concrete blocks
- IS: 5498 Lime-cement-cinder hollow concrete blocks
- IS: 3115 Lime-cement cinder solid blocks

IS: 1597 Code of practice for construction of stone masonry (Part I).

3.01 Providing and constructing brick masonry in any shape CM in foundation and up to highest plinth level

- a) Bricks used in works shall be bricks of specified crushing strength as described in the Schedule of Quantities. They shall have the following general properties:

They shall be sound, hard, and homogenous in texture, well burnt in kiln without being vitrified, table moulded, deep red, cherry or copper coloured, of regular shape and size and shall have sharp and square edges and paralleled faces. The bricks shall be free from pores, chips, flaws or humps of any kind. Bricks containing ungrounded particles and which absorb water more than 1/5th of their weight when soaked in water for twenty-four hours shall be rejected. Over burnt or under burnt bricks shall be liable to rejection. The bricks shall give a clear ringing sound when struck.

- b) **Samples of bricks** shall be submitted before starting the brickwork to the Engineer for approval. Bricks supplied shall conform to the approved samples. Brick sample shall be got tested as per IS 3495 by Contractor at

no extra cost. Bricks rejected by Engineer shall be removed from the site of works within 24 hours.

c) **Mortar**

- i) Mix for cement mortar shall be as specified in the respective items of work. Gauge boxes for sand shall be of such dimensions that one complete bag of cement containing 50 kgs. of cement forms one unit. The sand shall be free from clay shale, loam, alkali, and organic matter and of sound, hard, clean and durable particles. Sand shall be approved by the engineer. If so directed by the engineer sand shall be thoroughly washed till it is free of any contamination.
- ii) For preparing cement mortar the ingredients shall first be mixed thoroughly in dry condition. Water shall then be added and mixing continued to give a uniform mix of required consistency. Cement mortar shall preferably be machine **mixed**, through mixing in a thorough manner may be allowed. The mortar so mixed shall be used within 30 minutes of mixing. Mortar left unused in the specified period shall be rejected.
- iii) The Contractor shall arrange for test on mortar samples if so directed by the engineer re-tempering of mortar shall not be permitted.

d) **Workmanship**

- i) All bricks shall be thoroughly soaked in clean water for at least one hour immediately before being laid. The cement mortar for brick masonry work shall be as specified in the respective item of work. Brick work 230 mm thick and over shall be laid in English bond unless otherwise specified. While laying bricks shall be pressed in to the mortar and shoved into final position so as to embed the brick fully in mortar. Bricks shall be laid with frogs uppermost.
- ii) All brickwork shall be plumb, square and true to dimensions. Vertical joints in alternate courses shall come directly one over the other and be in line. Horizontal courses shall be levelled. The thickness of brick courses shall be kept uniform. For walls of thickness greater than 230 mm both faces shall be kept in vertical planes. No broken bricks shall be used except as closures. Care shall be taken that the bricks forming the top corners and ends of the wall shall be properly radiated and keyed into position. Holes kept in masonry for scaffolding shall be closed before plastering. All interconnected brickwork shall be carried out at nearly one level (so that there is uniform distribution of pressure on the supporting structure) and no portion of the work shall be left more than one course lower than the adjacent work where this is not possible, the work shall be raked back accordingly to bond (and not saw toothed) at an angle not exceeding 45 dig.
- iii) Bricks shall be so laid that all joints are well filled with mortar. The thickness of joints shall not be less than 6mm and not more than 10 mm. The face joint shall be raked to a minimum depth of 12mm by raking tools

daily during the progress of work when the mortar is still green so as to provide a proper key for the plaster or pointing to be done. Where plastering or pointing is not required to be done the joints shall be uniform in thickness and be struck flush and finished at the time of laying. The face of brickwork shall be cleaned daily and all mortar droppings removed. The surface of each course shall be thoroughly cleaned of all dirt before another course is laid on top. If the mortar in the lower course has begun to set the joints shall be raked out to a depth of 12 mm before another course is laid.

- iv) All brickwork shall be built tightly against columns, floor slabs or other structural member.
- v) Where drawings. Indicate that structural steel columns are to be fireproofed with brickwork the brick shall be built closely against all flanges and webs with all spaces between the steel and bricks works filled solid with mortar. Steel member's partly embedded in brickwork and not indicated to be fireproofed with concrete shall be covered with not less than 12mm thick mortar unless directed otherwise by engineer.
- vi) The work shall be cured for 15 days.
- (a) Miscellaneous inserts in masonry e.g. sleeves, wall ties, anchors, conduits, structural sheet, steel lintels etc. shall be installed by the Contractor. Furnishing fixing of any of these inserts by the Contractor will be paid for separately under steelwork. Openings, arches, etc. shall be provided as shown on the drawings, chasses, pockets etc, shall be provided as shown on the drawings to receive rain water pipes etc. Wall ties and flashing shall be built into the brickwork in accordance with the drawings and specifications.

The rate includes necessary single or double scaffolding, centring, soaking of bricks, raking out joints and curing the work all complete.

(f) **Mode of Measurement:**

- i) Brick work of thickness one brick i.e. 230 mm and above shall be paid in units of CuM.

In all cases, the quantities measured shall be executed after making necessary deductions for openings etc. as given below: -

No deductions shall be done for openings up to 1000 sq. cm., ends of dissimilar materials, drainage holes, window/door holdfasts, concrete lintel bearings, landing slab bearing, beam bearing, chimney flues, cut-outs, iron fixtures, pipes up to 30cm diameter.

- ii) It shall be clearly understood that the rates quoted by the Contractor shall be valid for brickwork in all shapes including elliptical, irregular shape etc.

and include leaving openings, cutting chases in brickwork as per drawings/ instructions of the Engineer.

3.02 Providing and constructing masonry in any shape in super structure at all levels above highest plinth level.

The general specification is same as per Item spec. no. 3.01. The item includes scaffolding, staging etc as required.

Mode of Measurement: Same as per Item spec. no. 3.01

3.03 Providing and constructing 115 mm brick masonry in partition at all levels

The bricks shall be laid with stretchers. The proportion of the mortar shall be as specified in the item description. The quality of the bricks shall be as specified in the item 3.01. Two nos.of 6mm diameter MS bars or 25mm x 1.2 mm deep iron band kept at every fourth or third course as specified in BOQ . The rate includes necessary single or double scaffolding, centring, soaking of bricks, providing and placing of 2 nos. of 6 mm diameter MS bars or 25mm x 1.2 mm thick iron band ,raking out joints and curing the work all complete.

Mode of Measurement: The brick work shall be measured in sq.m. The deductions shall be as specified in the item 3.01.

3.04 Providing and constructing 75mm partition wall in CM

The general specification shall be same as per item 3.03 except thickness of partition wall..

Mode of measurement: Same as per Item spec. no. 3.03.

3.05 Providing and constructing honey comb brick work

The specification for the material and the workmanship shall be as specified in the items 3.01 or 3.03 depending on the thickness of the brick work. The proportion of the CM shall be as specified in the item description in the Schedule of Quantities.

Mode of Measurement: It shall be measured in Cu.M as a normal brick work. No deductions shall be made for the honeycombing.

3.06 Providing and constructing Facing brickwork

The facing bricks made from suitable soils shall be free from cracks, flaws, nodules of free lime, warpage and organic matter. These shall be thoroughly

burnt and shall have plane rectangular faces with parallel sides and sharp straight right angled edges of specified strength.

- a) Facing bricks of the type specified shall be laid in the positions in specified mortar or in CM 1:4 and in the pattern as indicated on the drawings and all facing brickwork shall be well bonded to the backing bricks. No facing brickwork shall at anytime be more than 600 mm above the backing brickwork.
- b) The joints shall be raked and be pointed as the work proceeds and exposed faces of the brickwork shall be pointed with neat joint to give a fair face.
- c) Faced work shall be kept clean and free from damage, discolouration etc. at all times. The Contractor shall carefully plug all holes with bricks similar to the surrounding .
- d) For facing brickwork double scaffolding shall be used and no holes in brickwork for scaffolding shall be permitted.
- e) The rate shall include pointing, double scaffolding, curing etc. all complete

Mode of Measurement: It shall be measured in Sq.M.

3.07 Providing and constructing Concrete block (solid / hollow) masonry

- a) Concrete blocks (hollow or solid) shall generally conform to IS: 2185. Blocks shall be regular in size and shape and shall be of minimum strength 50 kg / Sq.cm or specified in the item specification. Blocks shall be properly cured before they are brought to site. Half or three quarter size blocks are to be used wherever required to make up length of wall and broken blocks shall not be used. The texture of the blocks shall be such that plaster will adhere to it. The contractor shall supply samples for approval. Blocks supplied shall conform to approved samples.

Mortar: - Mortar shall be similar to mortar in brickwork as given 3.01 herein before.

Workmanship

- a) The blocks need not to be wetted however the surfaces which will be jointed shall be moistened with clean water for at least one hour immediately before being laid. All block work shall be plumb, square and properly bonded. The joints shall be broken. The thickness of courses shall be uniform with courses horizontal. All connected work shall be carried out at nearly one level and no portion of the work shall be left more than one course lower than the adjacent work.
- b) Blocks shall be so laid that all joints are well filled with mortar. The thickness of joints shall be 10 mm. The face joints shall be raked to a

minimum depth of 10 mm by raking tools daily during the progress of work when the mortar is still green, so as to provide a proper key for the plaster or pointing. When plastering or pointing is not required, the joints shall be struck flush. For pointed masonry without plaster, smooth textured concrete block shall be used. The face of block work shall be kept clean at all times. The laid masonry work to be cured and be kept for 15 days

- c) Where block are to be used for load bearing walls, the upper most layer of block masonry supporting slab or other structured members, shall be solid or treated as directed by the engineer. Pre-cast concrete screen blocks or Jali work may be used for decorative purposes. The contractor shall furnish samples for approval.

Mode of Measurement: Block work of specified thickness shall be paid in units of Cu.M. If reinforcing bars are specified in horizontal courses, it shall be measured and paid for separately under relevant tender item; in all cases, the quantities measured and paid for shall be those actually executed after making necessary deductions for openings etc.

3.08 Providing and constructing Random rubble masonry un-coursed in foundation and up to plinth level

- a) Stone: It shall be hard, sound, free from decay, weathering and defects like cavities, cracks, flaws, sand holes, veins, patches of soft or loose materials etc. It shall be obtained from an approved quarry and blasted rock obtained from site. Where required by the engineer the stone shall be got tested for water absorption determined as per IS 1124-1974. Stone with rounded surfaces shall not be used. The quoted rate for Random rubble masonry using blasted rock includes for sizing and dressing of blasted rock to suit the requirements of masonry construction.
- b) Stones for this work shall be hard, durable rock, close or fine grained and uniform in colour free from veins, flaws and other defects and shall conform to IS:1597 (Part I). The stones shall be laid in mortar proportions specified for the particular item of work. Stones shall be got approved.
- c) For all work below ground level the masonry shall be random rubble un-coursed with ordinary quarry dressed stones or hearting and faced with selected quarry dressed stones.
- d) For all work above ground level the masonry shall be random rubble faced with hammer dressed stones with squared quoins at joints and corners.
- e) No stones shall tail in to the wall, either with a point or to length less than 1 1/2 times its height. The thickness of the joints shall not exceed 12 mm.
- f) Spauls and pinnings shall not be allowed to show on the face of the wall. Two bonds stone each of minimum area of 500 Sq.cm for every 1.0 sq.m. Of

each wall face shall be provided. These shall be through stones in wall 600 mm thick and under, in walls thicker than 600 mm the length of bond stones shall be $2/3$ times the thickness of walls. The stones for hearting of the wall shall not be less than 150 mm in any direction. Chips and spalls shall be wedged into avoid thick mortar beds and joints. The wall faces, corners and joints or openings shall be truly vertical the quoins shall be of selected stones, neatly dressed with chisel to form the required angle and laid header and stretcher alternatively.

- g) The exposed face of the work shall be carefully and neatly pointed with mortar in all joints on the other side the joints shall be neatly struck with trowel while the mortar is fresh.

Mortar

The mortar for the work shall be as specified in the respective item of work. Curing of masonry shall continue and be kept continuously moist for a minimum of 14 days.

The item includes providing of bond through stones.

Mode of Measurement: The unit of measurement shall be CuM or part thereof. The actual quantity of masonry shall be calculated from dimensions as per the drawings or actual execution which ever is less deducting the openings shall be paid for.

3.09 Providing and constructing Random rubble masonry un-coursed in superstructure

The specification shall be same item 3.08 except height.

Mode of Measurement: Same as per Item spec. no. 3.08

3.10 Providing and constructing Coursed rubble masonry in foundation and up to plinth level

- a) The stones used shall be hard, durable rock, free from veins, flaws and other defects and shall conform to IS 1597 (Part 1). Height of each course in the masonry shall not be less than 150 mm. The stones in each course shall be of equal height. All courses shall be of the same height unless other wise specified. All stones shall be set in full cement mortar of proportion specified for the respective item of work. The Engineer shall be approved stones.
- b) The face stones shall be squared on all joints and beds. The beds being hammer dressed or chisel dressed type and squares for at least 75mm from the face and the joints for at least 40-mm. The face of the stone shall be hammer dressed so that bushings shall not project more than 40 mm.

- c) No spauls or pinnings shall be allowed on the face. All bed joints shall be horizontal and side joints vertical and no joints shall be more than 10 mm in thickness.
- d) No face stone shall be less in breadth than in height or shall tail into the work to a length less than the height and at least 1/3rd the number of stones shall tail into the work to at least twice their height, or in walls over 600 mm in thickness 3 times their height.
- e) Through stones shall be inserted every 1.5 meters to 1.8 meters apart in every case and shall run right through when the wall is not more than 600 mm thick when the wall is more than 600 mm thick a line of two or more headers shall be laid from the face to face which shall overlap each other by at least 150 mm. A header shall have a length of at least thrice its height.
- f) Stones shall break joint at least half the height of the course. Quoins shall be formed of stones at least 45 cm long laid stretcher and header alternately. They shall be laid square in their beds, which shall be fair dressed to a depth of at least 100-mm. The corner shall be chisel dressed for a width of 25 mm.
- g) The work on the interior face shall be precisely the same as on the exterior face unless the work is to be plastered in which case the side joints need not be truly vertical.
- h) Hearting shall consist of flat bedded stones carefully laid on their proper beds and solidly bedded in mortar chips and spauls of stone being wedged in wherever necessary so as to avoid thick beds or joints of mortar. Care shall be taken so that no dry work or hollow spaces shall be left anywhere in the masonry. The face and backing shall be brought up every bed. The backing should not be levelled up at each course by the use of chips.
- i) The joints shall be evenly raked to a depth of 12 mm using a proper racking tool during the progress of the work for masonry above original or formed ground level. The joints in masonry below ground level shall be flushed. If asked for after racking when mortar is green joints shall be applied with CM 1:3 mortar and neatly pointed simultaneously at no extra cost. The face of the wall to be cleaned of the mortar burrs if any to leave the surface clean and even.

The mortar for the work shall be as specified in the respective item of work. Curing of masonry shall continue for a minimum of ten days.

Mode of Measurement: Same as per Item spec. no. 3.08

3.11 Providing and constructing Coursed rubble masonry in superstructure

Same as in Item spec. no. 3.10 but for course rubble masonry in superstructure at all levels including scaffolding etc complete as directed

Mode of Measurement: Same as per Item spec. no. 3.10

4.00 WOOD AND ALUMINIUM WORK

Applicable Codes

- IS:4021 Timber door, window and ventilator frames
- IS:2202 Wooden flush door shutters (solid core type) part I
- IS:1003 Timber panelled and glazed shutters(part I & II)
- IS:4020 Method of tests for wooden flush doors:

Type tests

- IS:1761 Transparent sheet glass for glazing and framing purposes
- IS:3097 Specification for veneered particle boards (Exterior Grade)

4.01 Providing & Fixing panelled or glazed or partly panelled & partly glazed door shutters of specified thickness with frame of specified size

- a) **Wood** used for all work shall be the best of the respective class specified, and properly seasoned, suitable for joiner work should be of natural growth, uniform in texture, straight grained, free from sapwood, dead knots, open shakes, rot, decay and any other defects and blemishes.
- b) For **joints** following principles to be observed:-
- At the joints the weakness of pieces must be minimum as far as possible. Each abutting surface in a joint shall be placed as neatly as possible, perpendicular to the pressure. To form and fit accurately every pair of surface that comes in contact.
- c) All joining shall be wrought on all faces and finished off by hand with sand paper with slightly rounded arises.
- d) The joints shall be pinned with hard wood pins and put together with white lead. Jointing shall be by means of mortise and tendon or dovetailed joints as approved. For external work the joints shall be coated with white or red lead before the members are put together. For internal joints where there is no chance of moisture the joint shall be glued. Driving of screws with hammer is prohibited. The screws shall be soaked in oil before driving them home. The heads of the screws and nails shall be sunk and puttied.
- e) Any joinery work which shall split, fracture, shrink or show flaws or other defects due to unsoundness, inadequate seasoning or bad workmanship, shall be removed and replaced with sound materials at the contractor's expense.

- f) **Door frames** shall be rebated. All dimensions shall be as per drawings. The verticals of door frames shall project about 50mm below finished floor, surface coming in contact with brick work shall be painted with bitumen or so lignum as directed by the engineer. The door frame shall be provided with 3nos MS 230x30x3mm flat split hold fasts on each side, respectively. These hold fasts shall be embedded in masonry or concrete work with concrete block of mix 1:2:4 and size 230x300x250. The work shall conform to IS:4021.
- g) The door shall be panelled or solid flush doors as described in the item of work. All doors shall be supplied with approved **fittings** such as hinges handles on both sides, oxidised brass tower bolts/Aluminium anodized and latch arrangements, door stops etc, of approved make as shown in drawings or as per item description specified in Schedule of quantities (SOQ) or directed by the Engineer. Wherever required hardware like PVC/ rubber data and other such fixtures shall be provided without any extra cost irrespective of it is expressly specified in the item description. External flush doors shall be made of weatherproof plywood as per item description in the Schedule ofQuantities.
- h) The workmanship of all doors and window shutters shall conform to the requirements of IS:1003 (Parts 1 & II) and IS:2202 (Part 1). Flush door panels shall be got tested as per IS:4020 in standard Laboratories.
- i) **Beading** and **architraves** shall conform to the shapes shown on drawings or as approved and fixed by means of screws (counter sunk or otherwise) or bolts.

j) **Glass**

All glass to be provided shall be Float glass and shall be of Indian make confirming to relevant IS specification as directed. It shall be free from waves and bubbles and all defects. The thickness of the glass shall be as follows:-
4mm thick glass for panes up to 5000 sq.cm area

5 mm thick glass or plate glass for panes above 5001 to 12000 sq.cm

6 mm thick glass or plate glass for panes above 12001 sq. cm

It should be clearly understood that glass which does not have uniform refractive index or which is wavy, will be rejected. The glazing shall be fixed with teak wood beading and putty.

It shall conform to **IS:1761**. The putty shall be made up of one part of white lead, 3 parts of finely powdered chalk and adding boiled linseed oil to make a stiff elastic paste. No voids shall be left in the putty. When Glass is fixed with wooden beading, the contact surface glass with frame/ beading shall be applied with a thin coat of putty for securing the pan (pan should not vibrate or give rattling sound when tapped). Woodwork shall not be painted

oiled or otherwise treated before it has been approved by the engineer. In case glass fixing in metallic frames with metal beading, EPDM gasket be used.

In case glass pan of higher thickness as per specific details is required same shall be paid covered under separate item.

The **rate** for the item shall include the following works:-

- i) Providing and fixing of the frame including the cost of hold fasts and embedding in 1:2:4 concrete blocks.
 - ii) Providing and fixing of the shutter as specified and instructed by the Engineer.
 - iii) Providing and fixing of architrave as per drawing.
 - iv) Painting/polishing of the frame, shutter and the architrave/beading
 - v) Fittings shall be provided as specified in the item / as per the drawings/as directed.
 - vi) Providing and fixing of glass of specified thickness with painted/polished teak wood beading/ putty etc. all around.
- (k) **Mode of Measurement:** The doors shall be **measured in SqM** or part thereof. The outer to outer of the frame shall be measured

4.02 -Do- as per item spec. no. 4.01 but for 19 mm thick NOVA TEAK or MDF board or 19 mm thick marine ply panels as filler material

The specification shall be same as Item Spec. no. 4.01 but to provide NOVA TEAK/ MDF board or marine ply of ISI / approved make in place of TW panels. Other details shall be as per 4.01.

Mode of Measurement: Same as per Item Spec. no.4.01

4.03 -Do- as per Item Spec. no. 4.02 but for providing and fixing TW panelled shutter without frame

The shutters shall be fixed with required number of appropriate hinges to Wooden/MS frames.

The specification of shutter shall be same as Item Spec. no. 4.01 but without frame and architraves.

Mode of Measurement: The area of shutter out to out only shall be measured in SqM.

4.04 Providing and fixing Composite door and window partly open-able, partly fixed partly open able with frame of specified size

The specification for the **door shutter with frame** shall be as per **Item Spec. no. 4.01.**

The specifications for the **windows** shall be as given below:-

The TW window **frame** of specified class & dimensions shall be as per drawing and shall be provided with 2 nos. MS 230x 30 x 3 mm flat split hold fasts on each side, respectively. These hold fasts shall be embedded in masonry or concrete work with concrete block of mix 1:2:4 and size 230x300x250 mm. Frame surface coming in contact with brick work shall be painted with bitumen or so lignum as directed by the engineer

The **windows** shall be partly fixed partly open-able or fully open-able as specified. Each leaf of the **shutter** shall have one pair of SS friction hinge or brass oxidized hinge and stay or as specified. Depending on the width of the shutter adequate no. of hinges shall be provided as directed by the Engineer at no extra cost. The glazed windows shall be provided with glass of thickness as specified in Item Spec. no. 4.01. Architraves shall be provided as per drawing. Painting etc. to be carried out as given in Item Spec. no. 4.01

Mode of Measurement: Same as Item Spec. no. 4.01

4.05 Providing and fixing windows and ventilators Fixed type:

The specification for windows shall be same as given in Item Spec. no. 4.04 Ventilators shall have two MS holdfasts. Ventilators shall be provided with glass of thickness as per area specified in Item spec. no. 4.01. Architraves for the ventilator shall be provided as per the drawing.

Mode of Measurement: Same as per Item Spec. no. 4.01.

4.06 -Do- as Item Spec. no. 4.04 but for fully openable type windows/Ventilators.

The specification shall be same as given in item spec. no. 4.04.

Mode of Measurement: Same as per Item Spec. no. 4.01

4.07 -Do- as Item Spec. no. 4.04 but for partly openable and partly fixed Windows/ Ventilators.

The specification shall be same as given in Item Spec. no. 4.04 but with necessary hinges as per item description/ drawing.

Mode of Measurement: Same as per Item Spec. no. 4.01

4.08 Providing & Fixing mosquito/fly proof door shutter

The fly / mosquito proof **shutter** shall be out of TW styles / rails of size and class as specified in the schedule of quantities. In general frame for the shutter shall match with that of window/ door shutter and general specifications shall be as per Item Spec. no.4.01 and 4.03 respectively and for the fly wire mesh the following specification shall be applicable:-

Fly/Mosquito proof netting of 100G or 140G (22 to 23 SWG), rust proof, galvanized or SS as specified in the item description shall be used. Mosquito proof of 100 G (23 SWG), 0.60mm wire diameter and 1mm average distance between the wire or Fly proof of 140 G (22SWG), 0.71mm wire diameter and 1.40mm average distance between the wire shall be used. The wire mesh shall be tightly secured and to be fixed with TW beading as per design including providing and fixing Brass oxidized or as specified hinges, handles, tower bolt, sliding door bolts etc including stopper if required; painting /polishing as per Item Spec. no. 4.01 .

The **rate** shall include painting/ polishing of both sides of the shutter and the beading provided all around the wire net as specified.

Mode of Measurement: The wire mesh shutter shall be measured in SqM. The wire mesh bent up or turned back shall not be paid, only shutter out to out shall be paid.

4.09- Do – as per Item Spec. no. 4.08 but for fly proof shutter for the windows.

The specification shall be same as given in Item Spec. no. 4.08

Mode of Measurement: Same as per Item Spec. no. 4.08

4.10 Providing & Fixing fixed glass louvers in TW frame of specified size

The **frame** shall be fixed to the masonry or RCC elements with 2 nos. hold fasts. The louver shall be provided with **glass** of thickness as specified in the item description. The glass shall be fixed at an angle in the frame as shown in the drawing. The frame shall be painted/ polished as specified in the item description in SOQ. The glass slats shall of specified width of 5 mm thickness for span up to 60 cms. and 6 mm for span above 60 cms. The glass for slats (louvers) shall be either plain or frosted.

The **rate** shall include providing of frame, architrave, glass louvers, painting /polishing etc. all complete.

Mode of Measurement:

It shall be measured in Sq.M. The outer to outer of the frame shall be measured.

4.11 -Do- as Item Spec. no. 4.10 but with wired glass louvers.

The specification shall be same as per Item Spec. no. 4.10. The thickness of the wired glass shall be as specified in the item description in SOQ.

Mode of Measurement: Same as per Item Spec. no. 4.10

4.12 Providing & Fixing built in cupboard

These shall be made of **frame** of specified size and class of wood fixed with anchor screws or appropriate method. The **shutter** shall be made of 19mm or 25mm thick block board or particle board or marine ply as specified in the item in SOQ. TW **lipping** 6 to 10 mm thick and of suitable width shall be provided on all edges. Horizontal / vertical partitions shall be provided as per the drawings/instructions. Piano type hinges as specified, brass oxidized/Aluminium handle as specified locking arrangement, multi lock of approved make with set of keys, magnetic / ball catch shall be provided in the item. The inside shall be painted with **paint** of approved make and exterior shall be painted with two or more coats of first quality synthetic enamel paint over a coat of wood primer/ polished with wood polish as specified/directed.

The rates shall include provision of frame, shutter, horizontal and vertical partitions, beading and painting/polishing all complete.

Mode of Measurement: It shall be measured in SqM in elevation. The outer to outer of the frame shall be measured.

4.13 Providing & Fixing Meter box cupboard on wall

The **frame** shall be of specified size and class of wood. It shall be fixed with 2 no. of holdfasts and the same may be grouted with CC 1:2:4 blocks of size 230x230x300. The **shutter** shall be of 19mm thick Nova teak or approved laminated board/ply. A slit shall be provided in the shutter as directed by the Engineer. 3mm thick **glass** shall be fixed in the slit. **Architrave** shall be provided as directed by the Engineer. Fixtures of approved make like hinges, handles, locking arrangement, magnetic/ ball catch as specified in SOQ shall be provided. The shutter, frame and the architrave shall be painted with 2 or more coats of approved make first quality synthetic enamel paint.

Mode of Measurement: It shall be measured in Sq.M. The outer to outer of the frame shall be measured.

4.14 Providing and fixing TW baluster (moulded hand rail)

The hand rail shall be of specified quality of teak wood. The size, shape and the design shall be as per the Architect's drawing. The rounding, horizontal / vertical curve at the landing shall be made up of monolithic one

piece as per drawing. The hand rail shall be fixed on MS flats with screws/anchor bolts as specified. It shall be applied with 2 or more coats of approved make first quality synthetic enamel paint / wood polish as specified.

Mode of Measurement: It shall be measured in CuM. Measurement shall be for the rectangle or square cross-section circumscribing the curve ends and the actual length .

4.15 Extra for making vision panel / Ventilation in flush door / panelled door. (other than TW panelled door)

These shall be provided as shown in the drawings. The inside of the opening shall be lipped. The glass shall be braced with beading and putty. The lipping and the beading/ architrave shall be painted with 2 coats of approved paint or polished as directed. Opening up to 0.259 sq.m. shall not be deducted from the shutter area for payment.

(A glass slit in TW panelled door shall be provided in the respective item of partly panelled partly glazed door and this item shall not be applicable if details included in the drawing however view panel in the fabricated/ existing door shall be covered in this item)

Mode of Measurement: It shall be measured in Nos./SqM as specified in SOQ.

4.16 Providing & Fixing cupboard below platform:

TW **frame** of specified size and class of wood shall be provided. The **shutter** / horizontal/ vertical partition shall be of approved make 19mm thick commercial block board / particle board / pre-laminated board / marine ply shutter or as specified in SOQ. The shutter / shelf to be provided with TW **lipping** 6-10mm as specified. Including providing approved make brass oxidised/ Aluminium anodised or as specified hinges, handles, locking arrangement, magnetic ball catch etc as per details given in SOQ. The frame and both the sides of shutter if non-laminated shall be duly painted with 2 or more coats of approved make first quality synthetic enamel paint / wood polish as directed. **Architrave** shall be provided as specified and the same shall be painted as directed.

Mode of Measurement: It shall be measured in SqM. The measurement shall be out to out of the frame.

4.17 Providing and fixing of flush door shutters.

The door **shutters** shall be 35 / 38 mm thick, as specified in the item description, of approved make and quality commercial type, hot pressed at high temperature of 150 Degree C, thermosetting synthetic resin (phenol

formaldehyde) bound, solid baton core with minimum 10 mm thick TW / hard wood lipped of first class commercial ply veneering with vertical grains on both faces of the shutter. The doors shall be of approved make as per IS. It shall be provided with approved make door fixtures and fittings as specified in the SOQ such as oxidized brass hinges, handles, tower bolts, Al-drop, door stopper etc. and painting with one coat of wood primer and two more coats of first quality synthetic enamel paint of approved make and colour as per Architect's drawing / as directed by the Engineer.

Mode of Measurement: It shall be measured in Sq.M. The measurement shall be outer to outer of the shutter only

4.18 Providing and fixing of Laminated flush door shutters

The specification of item shall be same as per Item Spec. no. 4.17 but flush door shutter of 35 mm thickness provided with 1 mm thick lamination on both side fixed with adhesive, of approved quality / make / shade, (Painting or polishing shall be applied only on the lipping).

Mode of Measurement. It shall be measured in Sq.M. The measurement shall be outer to outer of the shutter only

4.19 Providing and fixing of Teak Veneered flush door shutters

Providing and fixing single or double leaf 38 mm thick (total thickness) teak veneered flush door shutter as per Item Spec. no. 4.17 with 1.5 mm thick teak veneer on both the faces with TW lipping, two or more coats of **French polish** etc complete as directed by the Engineer /Architect drawing.

Mode of Measurement. It shall be measured in Sq.M. The measurement shall be outer to outer of the shutter only

4.20 Providing and fixing fibber-glass reinforced door

Providing and fixing fibber-glass reinforced composite **door frame** 3" x 2" frame and 30mm thick **shutters** as per the following specifications. The door frame shall be made out of FRP moulded economy range section of size 3"x2" and internally reinforced with 1.2 mm thick GI section to take the load of door hinges and grouting. The door shutter internal MS frame shall be fabricated out of invisible tubular frame of size 20mm x 20mm X 1.20mm thick as reinforcement all around the shutter. There shall be one horizontal MS frame section of size 50mm X 1.20mm thick at the centre and 2/3 nos. of 20mm X 20mm MS tubes at upper half portion of the door and 2/3 Nos. at lower half portion of the door welded to the tubular frame. The door shall be finished with 2.5mm thick fibber glass reinforced composite single piece moulded on front and back with approved colour and pattern like wood finish etc. The shutter shall have 3 Nos. 125 mm powder coated hinges; SS tower bolts handles etc complete

Mode of Measurement: Out to out of the frame shall be measured in SqM.

ALTERNATE TO ITEM SPEC. NO. 4.20

Providing and fixing fibber- reinforced plastic coated flush door

The flush shutter shall be as per Item Spec. no. 4.17 but 30 mm thick and 10 mm thick lipping of hard wood .All the surfaces of the door shall then be coated with fibber reinforced plastic coating of thickness 3/4 mm as specified in the item specification. The finished surface shall be smooth and nicely finished in approved shade. Necessary pad plate with groove as may be required for fixing hinges shall be provided and also for mounting other fittings like handles, tower bolts, locks etc. The pad plates should be fixed at correct location and level so that the fittings can be fixed with screws.

4.21 Supplying and fixing anodized / powder coated Aluminium Door.

Supplying and fixing in position glazed, fixed/open able, double or single leaf Aluminium anodized/powder coated **doors with frame and sub frame** if any as specified in SOQ, fabricated out of extruded sections confirming to BIS IS 733 as detailed in the architect's drawing of specified size and shape with anodizing silver or of approved shade not less than 20 micron or powder coating of approved shade with minimum thickness of 60 microns, including supplying and fixing necessary holdfasts/self tapping screws for fixing, clits, cadmium coated screws, anodized/powder coated aluminium handle of approved size and finish for each leaf on both sides, anodized/powder coated aluminium tower bolt of specified size on top and bottom, lock, 125mm SS butt hinges or pivots and all fixtures fastenings as per requirement, 5mm thick float glass of approved make fixed with special EPDM gasket felt and anodized/powder coated aluminium beading, leaf mounted open or concealed door closer of approved make such as, filling the gap around the frame with gun grade silicon to ensure the joint water tight, with all labour and materials complete as per drawings. Powder coating/anodizing shall be rendered uniform in appearance free from disfiguring scratches, stains or other blemishes. Door shall be fabricated to size shown and shall be of sections, sizes, combinations and details as given in the drawings. All Aluminium members shall be wrapped with approved self adhesive non-staining PVC tapes.

Mode of Measurement: It shall be measured out to out of the frame in SqM.

4.22 Supplying and fixing partly PVC panelled / partly glazed anodized / powder coated Aluminium Door.

The specification of item shall be same as per Item Spec. no. 4.21 but aluminium anodized/powder coated door partly glazed partly panelled fixed with panels of approved colour and texture 4 mm thick PVC (Foam Plastic)

of approved make including providing and fixing glass pans as per drawings / details etc complete as directed

Mode of Measurement: Same as per Item Spec. no. 4.21

4.23 Supplying and fixing floor mounted door closer for Entrance doors:

Providing and fixing , floor mounted door closer of approved make in place of SS hinges/ pivots and leaf mounted/ concealed door closer including making necessary provision for fixing, cutting the floor grouting and providing face plate to match with the floor, consumables, materials etc complete as directed by the Engineer.

Mode of Measurement: This will be measured in Number.

4.24 Providing and fixing anodized / powder coated Aluminium fixed glass partition panels, windows / ventilator

Providing and fixing anodized/ powder coated Aluminium fixed glass partition panels, windows/ ventilator fabricated out of extruded sections confirming to BIS IS 733 and wall thickness as detailed in the drawing of specified size and shape with anodizing silver or of approved shade not less than 20 micron or powder coating of approved shade with minimum thickness of 60 microns, including supplying and fixing the frame with expansion bolts / screws, necessary clips for jointing with cadmium coated screws/ bolts nuts including providing and fixing glazing using 4 mm thick or as specified in SOQ float glass of approved make , with the help of EPDM gasket felt etc complete as per drawing. The gap around the frame should be filled with gun grade silicon to ensure the joint watertight. Powder coating / anodizing shall be rendered uniform in appearance free from disfiguring scratches, stains or other blemishes. Door shall be fabricated to size shown and shall be of sections, sizes, combinations and details as given in the drawings. All Aluminium members shall be wrapped with approved self adhesive non-staining PVC tapes

Mode of Measurement: This will be measured out to out of frame or sub frame in SqM. The door shutter or window provided in the partition shall be deducted and measured in the relevant item

4.25 Providing and fixing anodized/powder coated Aluminium fixed partition panels, windows/ ventilator, partly glazed partly PVC panelled.

The specification of item shall be same as per Item Spec. no. 4.24 but providing and fixing partly glass panels / partly 4 mm thick PVC panels for fixed panelling (partition) as per drawing / details

Mode of measurement: Same as per Item Spec. no. 4.24

4.26 Providing and fixing anodized/ powder coated Aluminium fixed ventilator (Aluminium louvers)

Providing and fixing anodized/ powder coated Aluminium ventilators as per Item Spec. no. 4.24 but for providing and fixing fixed standard anodized / powder coated Aluminium louvers of approved make and profile in accordance with the drawing etc complete as directed by the Engineer

Mode of Measurement: Same as per Item Spec. no. 4.24

4.27 Supply & fixing of anodised / powder coated Aluminium sliding windows-2 track.

Supply and fixing in position anodized / powder coated Aluminium windows open able/ partly open able 2 track sliding type, with frame and sub frame if any as specified in SOQ, fabricated out of extruded sections confirming to BIS IS 733 & IS 1285, as per architectural drawing using members/ profiles of specified size, shape and thickness (profile for frame shall be with draining arrangement and drilling/ providing holes for easy draining of water is covered in this item) shall be with 20 micron anodizing of silver or colour anodizing with approved shade or powder coating with minimum thickness of 60 microns of approved shade specified in schedule of quantities including, supplying and fixing necessary holding bolts / screws , handles, locking arrangement (concealed handle CuM locking arrangement of approved quality and make as per details) anodized/ powder coated Aluminium fixtures and fastenings as per requirement and 4 mm thick or of specified thickness as given in SOQ float glass fixed with special EPDM gasket felt and anodized / powder coated Aluminium beading, filling the gap around the frame with gun grade silicon sealant to make it watertight as per drawing etc complete as directed by the Engineer. Powder coating / anodizing shall be rendered uniform in appearance free from disfiguring scratches, stains or other blemishes. Door shall be fabricated to size shown and shall be of sections, sizes, combinations and details as given in the drawings. All Aluminium members shall be wrapped with approved self adhesive non-staining PVC tapes.

Mode of Measurement: It shall be measured out to out of frame in SqM.

4.28 Supply and fixing of anodised / powder coated Aluminium sliding windows - 3 track.

The general specification of item shall be same as per Item Spec. no. 4.27 but for Supplying and fixing 3 track anodized / powder coated Aluminium windows with 50 % glass each in the first two tracks and fly mesh in the third track (fly mesh shutter will be paid in the Item Spec. no. 4.30).

Mode of Measurement: Same as per Item Spec. no. 4.27

4.29 Supply & fixing of anodised/ powder coated Aluminium sliding windows-4 track.

The general specification of item shall be same as per Item Spec. no. 4.27 but for Supply and fixing 4 track anodized / powder coated Aluminium windows

Mode of Measurement: Same as per Item Spec. no. 4.27

4.30 Supply and fixing of anodized/ powder coated Aluminium mosquito / fly proof shutter.

Providing and fixing in position anodized / powder coated Aluminium mosquito/ fly proof window **shutters** in sliding type track windows, fabricated out of extruded sections conforming to BIS IS 733 7 IS 1285 as per architectural drawing with sections/ profiles of heavy gauge, size, shape and thickness with 20 micron anodizing silver or colour anodizing of approved shade or powder coating with minimum thickness of 60 microns of approved shade as specified in the schedule of quantities including providing and fixing **SS wire mesh** of 23 gauge tightly with matching beading as per architect's details including supplying and fixing handles, locking arrangement (concealed handle CuM locking arrangement of approved quality and make as per details) fixtures and fastenings of anodized /powder coated Aluminium etc. complete as directed by the Engineer. Powder coating/ anodizing shall be rendered uniform in appearance free from disfiguring scratches, stains or other blemishes. Door shall be fabricated to size shown and shall be of sections, sizes, combinations and details as given in the drawings. All Aluminium members shall be wrapped with approved self adhesive non-staining PVC tapes

Mode of Measurement: It shall be measured in SqM. Area shall be out to out of shutter.

4.31 Supplying and fixing natural anodized/powder coated sub frame

Supplying, fabricating and fixing in position natural anodized /powder coated sub frame made out of approved make section of size 62x14x1.5mm thick. The size of sub frame shall be as per out to out window sizes specified in the drawings. The sub frame shall be placed in the masonry/concrete opening and fastened to plumb and in true alignment and level with cill sloped for water to drain off easily. After finishing external and internal plaster and painting main Aluminium window outer frame shall be fixed to this sub frame with self tapping screws GKW make/stainless steel screws.

Mode of Measurement: This will be measured in Running meter

4.32 Extra for providing & fixing 6 mm thick wired glass

Extra for providing 6mm thick wired glass of approved make free from any defect in place of plain glass for glazed windows / ventilators/door.

Mode of Measurement: This will be measured in SqM. Glass area of the window / ventilator shall be measured only.

5.00 FINISHING WORKS

Applicable Codes

IS:2394 Code of practice for application of lime plaster finish.

IS:1477 *Code of practice for painting of ferrous metals in buildings and allied finishes (part I &II)*

IS: 427 Distemper, dry colour as required

IS:2395 Code of practice for painting concrete, masonry and plaster surfaces.

IS:428 Distemper, oil emulsion, colour as required.

5.01 Providing & Applying Cement plaster 12 mm thick

The surface to be plastered shall be washed with fresh clean water free from all dirt, loose material grease etc. and thoroughly wetted for 6 hours before plastering work is commenced. Concrete surfaces to be plastered will however be kept dry. The wall should not be too wet but only damp at the time of plastering the dampening shall be uniform to get uniform bond between the plaster and the wall. The junction between the brickwork and RCC should be fixed with chicken wire mesh/PVC strip as directed before plaster.

The proportion of the mortar shall be as specified under the respective items of work. Cement shall be mixed thoroughly in dry condition and then just enough water added to obtain a workable consistency. The quality of water, sand and cement shall be as mentioned in the Specifications for Concrete & allied works. The mortar thus mixed shall be used immediately and in no case shall the mortar be allowed to stand for more than 30 minutes after mixing with water. The plaster shall be laid in a single coat. The mortar shall be splashed on the prepared surface with a trowel and finished smooth by trowelling. The plastered surface shall be rubbed with iron plate till the surface shows cement paste. The work shall be in required line, level and plumb including cutting and providing grooves of 20mm x6mm or as per the details. Curing of plaster shall be started as soon as the applied plaster has hardened enough so as not to be damaged. Curing shall be done by continuously applying water in a fine spray and shall be carried out for at least 7 days.

The plaster shall be carried out on jambs, lintel and sill faces top and undersides, etc. as shown in the drawing or as directed by the engineer.

Mode of Measurement:

The quantity of work to be paid for under this item shall be calculated by taking the projected surface of the area plastered after making necessary deductions for openings, doors, windows etc. as given below:-

- i) No deductions shall be made for opening or end steel joints, beams, post girders etc. up to 0.5 SqM area. No addition shall be made for joints, soffits and sills of such openings. This is applicable to both the sides of the wall.
- ii) Where opening exceeds 0.5 SqM but does not exceed 3 SqM and also when only one side of the wall is treated and other side is not treated, deduction shall be made if the width of the reveal on the treated sides is less than that on the untreated side but if the width of the reveal is more then no deduction nor addition shall be made for reveals for jambs, soffits, sills etc.
- iii) For openings more than 0.5 SqM but not exceeding 3 SqM and also when both the sides of the wall is plastered with the similar plaster, deduction shall be made for one face only. But when both the sides treated with different plaster, then deduction shall be made from the side on which the reveal is less and no deduction on the other side.
- iv) For openings whose respective areas exceed 3 SqM deduction shall be made for the full opening of the wall treatment on both faces while at the same time jambs, sills and soffits shall be measured in sq m for payment. In measuring the jambs deduction shall not be made for the area in contact with the frames of doors, windows etc.
- v) If the average thickness of the plaster is more than the specified thickness due to any account nothing extra shall be paid for the same.
- vi) Nothing extra shall be paid for double scaffolding and the rate is applicable for work at all levels.

It shall be measured in SqM.

5.02 Providing & Applying Cement plaster 19 mm thick

The general specification is same as Item spec. no. 5.01 but for 19 mm thickness of the plaster. The plaster work shall be carried out in single or two layers as specified in schedule of quantities, the first layer being 12 mm thick and the second layer being 7mm thick. The proportions of the mortar for both the layers shall be as specified in the item specification. The first

layer shall be splashed against the prepared surface with a trowel to obtain an even surface. The second layer shall then be applied and finished leaving an even and uniform surface, trowel finished unless otherwise directed by the engineer. The plastered surface shall be rubbed with the iron plate till the cement paste comes on the surface.

Mode of Measurement: Same as per Item spec. no. 5.01.

5.03 Providing & Applying lime punning to the plastered surface

The plastered surface shall be finished smooth by trowelling on the surface with neeru (lime cream). Neeru shall be properly slaked fat lime with addition of 10 % cement to prepare neeru for bond as per the instructions of Engineer. The neeru shall be applied at the rate of 2.2 kg per SqM.

Mode of Measurement: Same as per Item spec. no. 5.01

5.04 Providing and Applying 19mm sand faced plaster

This shall be applied in 2 coats. The first coat or the base coat should be 12 mm and shall be continuously carried out without break to the full length of wall or natural breaking points such as doors, windows etc. The base coat shall be splashed on to the prepared surface with heavy pressure, brought to true and even surface and then lightly roughened by cross scratch lines, to provide bond for the finishing coat. The mortar proportion for this base coat shall be as specified in the respective item of work. The base coat shall be cured for at least seven days

The second coat shall be 7mm thick. Before application of the second coat, the base coat shall be evenly damped. This coat shall be applied from top to bottom in one operation and without joints, finish shall be straight, true and even. The mortar proportions of this coat shall be as specified under the respective item work. Sand to be used for the second coat and for finishing work shall be as specified in the item description. The second coat shall be finished with sponge to give proper finish. Grooves of 20mm 10mm or of specified size as per drawings / instructions of the Engineer shall be cut and provided and finished as per the drawings. These grooves shall be formed in the first coat and then finished in second coat. This includes double scaffolding. All the scaffolding holes if any, shall be bridged and finished in the first coat of plaster.

Mode of Measurement: Same as per Item spec. no.5.01.

5.05 Providing & Applying rough cast plaster

This shall be carried out in two coats. The base plaster shall be of 12 mm thick and of specified proportion of cement mortar. It shall be roughened to receive the top coat. The top coat shall be 7mm thick. It shall be of 3 parts

cement, 6 parts coarse sand & 4 parts of 6mm single or crushed stone aggregate. General specifications are same as of Item spec. no. 5.04.

Mode of Measurement: Same as per Item spec. no.5.01.

5.06 Providing & applying water-proof cement plaster

The plaster shall be of specified thickness and of specified mortar proportions. The contractor shall use approved waterproofing admixture manufactured by reputed manufacturer in the mortar for plasterwork. The quantity to be used shall be in accordance with the manufacturer's instructions, however subjected to the approval of the Engineer. The use of Calcium chloride shall be prohibited unless specifically allowed by engineer and shall conform to IS: 2645. The plaster shall be cured at least for 7 days.

General specification shall be same as item n0. 5.01

Mode of Measurement: It shall be measured in SqM. The quantity of waterproofing material used in this item shall be measured and paid for separately.

5.07 Providing & Applying neat cement

The specification same as per item 5.03 except that neat cement is applied to the plaster surface in place of lime neeru.

Mode of Measurement: Same as per Item spec. no. 5.01

5.08 Providing & applying cement pointing

The dust shall be brushed out of the joints and the wall be washed with water.

The mortar shall consist of one part of cement to one part of fine sand. Mortar shall be filled into joints and well pressed with special steel trowels. The joints shall not be touched against after it has once begun to set.

The joints of the pointed work shall be neat. The lines of false joints shall be allowed.

The work shall be cured for a week after the pointing is complete. Whenever coloured pointing has to be done the colouring pigment of the colour required shall be added to cement in proportion as recommended by the manufacturer and as approved by the engineer.

Mode of Measurement: Same as per Item spec. no. 5.01

5.09 Providing & Applying White washing on new works/old work - 3 or more coats

Walls to be thoroughly scrapped with sand paper before white wash is applied. White wash shall be prepared from a good quality fat lime. Lime shall be slaked with water to the Consistency of a cream and allowed to remain under water for 2 days. It shall then be strained through a cloth and 2 kg of clean gum of approved quality shall be added for every cubic meter of lime or ready to use binding compound of approved make be added as per manufacturer's specification, as specified in the item specification or by the Engineer, and indigo up to 3gm per kg of lime dissolved in water shall then be added and stirred well.

It shall be applied with a stroke of the brush from the top downwards, another from bottom upwards over the first stroke and similarly one stroke from the right and another from the left over the first brush, before it dries. Minimum three coats shall be applied on the plastered surface for desired finish. If the desired finish is not obtained extra coats shall be applied without any extra cost.

The rate shall be applicable for carrying out the work at all heights, double scaffolding etc. all complete. Extra 20% shall be added to the area for AC corrugated sheets and 10% for semi-corrugated sheets, cornices and others.

Mode of Measurement: Same as per Item spec. no. 5.01 for plain surface.

5.10 Providing & Applying Plastic Emulsion paint

Paint to be used should be of approved make. The painting work shall be carried out as directed by the engineer, keeping however in view the recommendations of the manufacturer. Where painting with plastic emulsion is specified, all uneven surfaces shall thoroughly cleaned of all dust dirt and sand papered including rubbing the surface with 60 grit grinding stone in case of smooth plastered surface (without neat cement / neeru finished surfaces). One primer coat with cement putty shall be applied and rubbed smooth with sand paper to prepare the surface. The surface thus prepared shall be free from undulations / waviness. The prepared surface shall then be applied with minimum 2 coats of emulsion paint to be applied with roller / brush to give an even finish. The scope of work includes providing necessary scaffolding / staging. Workmanship shall conform to the requirements of IS: 2395.

Mode of Measurement : Same as per Item spec. no. 5.01 for plain surface.

5.11 Providing & Applying Cement paint

This may be "SNOWCEM" or of equivalent make to be applied over plastered surface including sand faced plaster. The surface shall be prepared cleaning

the surface washing etc. This shall be applied with brush on the plastered wall. The painting work shall be carried out as per the procedure recommended by the manufacturer. The strokes shall be even and it shall be cured at least for 7 days. No patch or brush stroke shall be seen. Two or more coats to be applied in succession one after the other at a gap of 24 hours as per the instructions of the Engineer.. A pre coat of primer as per manufacturer's specification shall be applied with out extra cost.

Mode of Measurement:

It shall be measured in SqM. The deductions for opening shall be as specified in the Item spec. no. 5.01.

5.12 Providing & applying silicon paint

This shall be applied over the exposed / external surface for rendering it waterproof. The paint shall be of approved quality and reputed approved make. The paint shall be applied as per the manufacturer's specification. This shall be applied with brush to achieve full coverage. Nothing extra shall be paid for applying on uneven surface such as exposed aggregate plaster.

Mode of Measurement:

It shall be measured in SqM. The deductions for opening shall be as specified in the Item spec. no. 5.01.

5.13 Providing & fixing GI chicken wire mesh

The GI wire mesh shall be of 24 gauge of specified width as per details / instructions of the Engineer and it shall be fixed with screws at the junction of brick masonry and RCC elements. The screw holes shall be drilled in RCC elements to ensure fixidity. If need be washers to be provided for holding. The chicken wire mesh shall not sag in between the screws. This shall be done before the application of plaster.

Mode of Measurement: It shall be measured in SqM. Measurement shall be taken before the application of the plaster.

5.14 Providing & Applying dry distemper:

Distemper shall be of approved make. It shall be applied by a broad stiff brush in two coats over a coat of primer. The first and second coat shall be applied only after the primer coat has thoroughly dried. The first coat shall be of a lighter tint. The shade of the distemper shall be got approved by the Engineer. Water bound and oil bound distemper shall conform to the requirements of IS: 427 and IS 428 respectively.

Mode of Measurement:

It shall be measured in SqM. The deductions for opening shall be as specified in the Item spec. no. 5.01.

5.15 Providing & Applying Colour Wash

The mineral colours, not affected by lime shall be added to white wash. Colour wash shall be applied the same way as white wash. Necessary and approved colouring chemical shall be added to the white wash, which has been strained. Only colour wash required for the day's work shall be prepared. If the finished surface is Powdery and comes off easily or the general appearance is streaky, the work shall be rejected. The Contractor has to redo the work at no extra cost. Indigo (Blue / Neel) shall not be added in colour wash.

Mode of Measurement: Same as per Item spec. no. 5.09.

5.16 Providing and Applying Exposed Aggregate Plaster

Exposed aggregate plaster shall be applied on walls at all heights above and below plinth level with 8 to 10mm size hard approved variety stone chips or as specified in the item description. Stone chips to be screened, washed and dried properly. The base mortar shall be in two layers. The first layer shall be 12mm thick plaster with cement mortar 1:4 with necessary grooves of 20 to 12 mm width as shown in architect's drawing and as directed and continuously carried out to the full length of wall or natural breaking points such as doors, windows or a through joint by splashing on to the prepared surface with heavy pressure, brought to true and even surface and then lightly roughened by cross scratch lines, to provide bond for the finishing coat. If instructed water proofing admixture to be added which will be paid under relevant tender item.

The top layer shall be cement paste of thickness up to 4mm applied over the 1st layer plaster surfaces. The cement paste shall be applied on a limited area at a time so that it would not become hard before stone chips are applied. The stone chips shall then be applied after properly raking the plastered surfaces by means of floats or trowels, dashing them against the still fresh cement paste already applied. Where uniform texture is not obtained, chips shall be stuck suitably by hand. Care should be taken that application of cement paste shall be done uninterruptedly within one panel so that the joints and patches are avoided. Precautionary steps to be taken to protect the surface already done, during the process of finishing adjoining areas so that the areas completed shall not get stained. Necessary scaffolding curing breaking the chips etc. are to be done as per the instruction of the Engineer. All the inner/ outer corners shall be finished properly up to the drip moulds in case of soffits of lintel / beams or slabs. The grooves shall be pointed with cement slurry mixed with water proofing compound to make them water proof before applying top stone chips finish without any extra cost.

Mode of Measurement: It shall be measured in SqM. The measurement shall be taken for un-plastered surface. The deductions for the openings etc shall be as specified under Item spec. no. 5.01.

5.17 Exposed aggregate (Grit Wash) Plaster

This is the type of finish in which aggregates particle are embedded in the plaster and exposed to give a permanent, natural and beautiful look specially for facing walls. The finish is widely used on exterior surfaces and is obtained by washing the finished surface with water thus exposing the aggregate. The aggregate used can either be white or coloured or a mixture of both in any proportion to get the desired effect. The aggregate commonly used are marble chips dolomite or calcined flint stone etc. of 3 to 10 mm size and it is advisable to add about 10% of finer aggregate size 1.5 mm for better grading. **As far as possible only marble stone aggregate should be used. Use of sand stone aggregate should be avoided.**

Raw materials

White cement of approved make

Marble Powder – Marble powder of 100-150 mm mesh free from duct, dirt and other foreign impurities.

Aggregate – Marble chips of sizes 2A/2B/3 or mixture of these three sizes. One could use a greater proportion of larger chips, if so desired.

Colouring pigments – synthetic inorganic pigments or oxide colours as per the colour / shade desired.

Water – Water used for mixing and curing should be potable quality, clean, free from salt, foreign impurities, dust, dirt, oil and grease etc.

Mix proportion

Dry Mix: The required quantity of white cement or cement as specified is mixed with marble powder and with marble chips. For preparing colour mix, the required quantity of colouring pigment should be mixed and dispersed thoroughly with white cement before mixing marble chips and sieved through a fine “malmal” cloth to obtain uniform shade.

Wet mix: To one volume of dry mix add less than half volume of water (appx. Water cement ration = 0.41) and mix well to get uniform and thick workable plastic consistency. The quantity of wet mix prepared should be consumed within one hour.

Technique of Application

Surface preparation

- a) Old masonry surface: For proper adhesion of finishing plaster, it is important that the base plaster should be rough. So the surface of old masonry plaster should be chipped properly to make it rough and washed thoroughly to remove old dust or dirt and wet well before the application of finishing plaster.
- b) New plastered surface: In case the base plaster is new or freshly applied and proper combing has been done, the finishing plaster can be applied directly after cleaning and curing.
- c) Smooth Brick work: Where the brick work is smooth and even a base plaster of ordinary Portland cement mortar is applied before the finishing plaster of white cement mortar. For base plaster, one part of ordinary Portland cement should be mixed with 3 parts of clean sand and 2% water proofing compound. The thickness of basecoat should be made rough by combining it with wavy horizontal lines to form a key surface for the finishing plaster. After drying the surface should be cured thoroughly with water and finishing coat should be applied after 24 hours.
- d) Rough Brickwork: When the brick work is rough and uneven, two layers of ordinary cement plaster should be applied. The thickness of the second layer should be about 8mm. The preparation of mortar mix and treatment of the surface will be the same as suggested above.

Application

1. Under layer of 12mm thick in cement plaster 1:4 (1cement:4 coarse sand) be applied to prepare the surface in true line and level and roughened by cross scratch lines.
2. Apply a thick coat of cement slurry over the base coat.
3. Top layer 15mm thick cement and stone grit in mix 1:1 (1cement 50% white cement 50% grey cement : 1 stone grit 12mm to 15mm) including addition of 15% marble dust to the cement.
4. The aggregate plaster finish shall be laid in panel as per Architectural drawing. Grooves of size up to 20mm to 25mm shall be provided between panels by nailing in the wall 20mm to 25mm wide and 15mm thick trapezoidal wooden beading in true plumb, line, and pattern and at corners as per architectural drawing.
5. Excess mortar on the surfaces of the aggregates shall be removed by washing with water or with a solution of dilute hydrochloric acid and

then by water and finished by applying two coats of silicon paint (coat of silicon paint with labour etc shall be paid under relevant item).

6. The grit shall be broken approved natural grey colour granite stone aggregates and graded by sieving through two sieve of 15mm mesh. Only aggregate which passes through sieve of 15mm mesh and retaining on 12mm mesh shall be used in the works.

All grooves shall be pointed with neat cement paste mixed with water proofing compound as per manufacturer's specification

Prepare neat cement or coloured cement slurry and brush it within the panel shortly ahead of application of the finishing plaster. The cement or specified mortar is placed on the wall with trowel, after the water has receded sufficiently and about 30 minutes later, it re-trowelled. At this stage the surface should be made smooth by rubbing and trowelling and covering all the aggregate particles with skin with white cement / equivalent. The surface is washed after the coat has partially hardened. The water is poured lightly on the surface and rubbed simultaneously with a soft nylon brush to expose aggregate particles. Initial rubbing helps in removing the skin of J. K. white cement / equivalent and subsequent rubbing, with washing exposed aggregate particles. During rubbing, with water should be poured on the surface simultaneously to wash out the cement. Now the wooden strips should be taken out after the washing is completed.

Special care should be taken to take out the wooden strips. After 24 hours of air drying of the plaster, cure the surface thoroughly with clean water three to four times a day periodically for 7 days.

The time of washing is most important and its determination requires experience as the same is affected by temperature and other atmospheric conditions. If the washing is done early, aggregate particles will start falling down and if washing is delayed, it will be difficult to expose aggregate particles.

In case the surface of the aggregate with cement which cannot be washed off, the surface may be washed with dilute hydrochloric acid, but this acid washing is required the treatment should be done after the cement has set and fully hardened. Care should be taken to flush the residual acid thoroughly, otherwise the residual acid will tend to make the surface pale or yellow.

Precautions

- a) The aggregate should be washed before use.
- b) White cement and marble powder should be mixed thoroughly before further mixing with marble chips.

- c) Only thick plastic consistency of White cement mortar should be maintained.
- d) The plaster should be cured thoroughly at regular intervals for 7 days.
- e) While washing the plaster to expose the aggregate care should be taken to not use excess water as it invites the problem of cracking.
- f) Washing should start from top of the surface and subsequently go down.
- g) While washing rub the surface with brush in a circular movement instead of straight rubbing.

Mode of Measurement: It shall be measured in SqM. The measurement shall be taken for un-plastered surface. The deductions for the openings etc shall be as specified under Item spec. no.5.01.

5.18 Providing and applying wrinkle plaster

Providing and applying wrinkle plaster in two coats at all levels. First coat shall be of 12 mm thick cement plaster in cement mortar Cement: Sand 1:4 duly roughened by combining it with wavy horizontal lines to form a key surface for the finishing plaster curing the same. All the wholes in the wall surface should be bridged and finished evenly and no spots should be seen. The second and finishing coat shall be with pure cement paste of required consistency @ 10 kgs per SqM to form uniform wrinkle finish with the help of sponge. The strokes shall be unidirectional and workmanship need to be ensured. The finishing coat for each face of the building shall be applied from top to bottom and each building shall be finished at a stretch. Cement used for the second coat i.e. finishing coat shall be from one lot of the specific make to ensure the colour is maintained even on all the faces of a building and also all the buildings in premises. The finish shall be terminated up to grooves created at the soffit of the lintel / beams / chajjas which are smooth finished as per the architectural drawings and directions of the Engineer. The scope of work includes double scaffolding, curing etc complete.

Mode of Measurement: It shall be measured in SqM. The measurement shall be taken for un-plastered surface. The deductions for the openings etc shall be as specified under Item spec. no. 5.01.

5.19 Providing and applying plain 15 mm thick smooth plaster over insulation

The general specification same as per Item spec. no. 5.01 but for Providing and applying plain 15 mm thick smooth cement plaster in C: M 1:3 over Insulated Surface, to be applied over a coat of cement slurry to be applied over the insulated surface for the bond, smooth finishing the surface with iron plate without any undulation including necessary staging / scaffolding, curing the plaster etc. complete as directed.

The surface of walls to be insulated shall be inspected jointly prior to carrying out plastering for preparation of the surface to receive insulation. The correctness of the surface shall be checked jointly on completion of insulation work and to prepare the surface for application of plastering. The line, level and plumb shall be maintained.

Mode of measurement: Same as per Item spec. no.5.01.

5.20 Providing and applying Acrylic based, Anti Fungus Exterior Paint (Sandtex-matt)

The general specification same as per Item spec. no. 5.11 for providing and applying 2 coats of acrylic based, anti fungus exterior paint of approved shade and make like Sandtex Matt of Snowcem / or Asian Paints, Weather Coat of Berger or Shalimar Paints on smooth / sand faced / grit plaster finish as per as specified in the schedule of quantities, over a coat of Cement Paint in accordance with the manufacturers specifications etc complete.

Mode of Measurement: This will be measured in SqM for the area painted.

5.21 Providing and applying synthetic enamel paint / flat paint

Providing and applying synthetic enamel paint / flat paint of approved shade and makes like on walls / ceilings or any of the building elements at all heights, over new / old work including cleaning / sand papering / preparation of surface by applying cementious putty and rubbing to make the surface true without any waviness , application of approved quality paint in two or more coats to give an even finish including all the materials, labour , scaffolding with two or more coats of approved first quality enamel paint as directed.

Mode of Measurement: This will be measured in SqM for the area painted.

5.22 Providing and applying Epoxy Paint

The general specification same as per Item spec. no.5.21 but for providing and applying two coats of Epoxy paint of approved make and shade, including preparation of surface on walls at all heights, of required shade and approved make on new / old work as specified in the schedule of quantities.

The painting shall be carried out as per the recommendation of the manufacturer.

Mode of Measurement: This will be measured in SqM for the area painted.

5.23 Providing and applying Poly Urethane (PU) coating

Providing and applying PU coating of approved shade and make like Shalimar Paints or equivalent make on new / old work including the preparation of surface by cleaning the surface, rubbing with sand paper applying cementitious putty including clearing the cleaned surface to achieve sound sub-base free from any type of defects like soft spots, waviness application of two coats of the PU coating as per manufacturer's specification for painting, including applying primer to give even and uniform finish including all the materials, labour, scaffolding etc complete as directed.

Mode of Measurement: This will be measured in SqM for the area painted.

6.00 FLOORING

Applicable codes

IS: 1443 Code of practice for laying and finishing of cement concrete flooring tiles.

IS: 2114 Code of practice for laying in situ terrazzo floor finish.

IS: 777 Glazed earthenware tiles

6.01 Providing & Fixing pre-cast Mosaic tile flooring

The type, quality, size, thickness, colour etc. of the tiles for flooring shall be as per the item description given in the Schedule of Quantities and of best quality. The tile shall be factory made under pressure process with backing layer of cement to aggregate proportion of 1:3 and wearing layer of minimum 6 mm conforming to approved sample / manufacturer. The contractor shall provide the Engineer with necessary sample for approval.

Before the tiling work is commenced, the sub-surface shall be thoroughly cleaned and washed of all loose material, dirt, and scum and then shall be wetted without forming water pools on the surface. The tiles shall be laid on cement mortar or lime mortar bedding of thickness and proportion as specified in the item description. The mortar shall be evenly spread on the sub-floor. Over this mortar bed, 4.4 kg of cement per SqM of floor area shall be spread. The tiles shall be fixed on this bed one after another. Each tile being gently tapped with a wooden mallet till it is properly bedded and in level with the adjoining tiles. The joints shall be perfectly straight and uniform in thickness. The tiles shall be laid perfectly in level unless otherwise specified by the Engineer. After laying the tiles the joints shall be cleaned with wire / coir brush and finished with cement slurry of matching colour with addition of pigment as specified / directed.

Floor tiles laid adjoining the wall shall project 12mm or as specified under the plaster, skirting or dado as directed by the Engineer. Half tiles and

pieces shall be avoided as far as possible. After laying the tiles, it shall be cured for at least 14 days. About a week after laying the tiles each and every tile shall be lightly tapped with a small wooden mallet to find out if it gives a hollow sound, if it does, such tiles along with any other cracked or broken tiles shall be removed and replaced with a new tile to proper line and level. The same procedure shall be followed again after the tiles are finally polished. For the purpose of ensuring that such replaced tiles match with those earlier laid it is necessary that the Contractor order enough extra tiles from the factory to meet this contingency.

After the joints have attained sufficient strength, the floors shall be machine polished using carborundum stone of No. 60, followed by 120, 150 and final coat with 320 Grit stone to the desired finish approved by the Engineer. Sufficient quantity of water shall always be used during polishing to prevent scratches. After each coat of polish with grit No. 60, 120 / 150 the surface to be applied with cement slurry of matching shade and cured before next polish is taken up. After final polish with No. 320 stone, the surface to be cleaned with water and dried. Oxalic acid shall then be dusted over the surface @ 33 gms sprinkled with water and rubbed hard with Namadah blocks with machine.

Wax polishing shall be carried out as specified in the item specification by applying wax over the cleaned surface and sprinkling dry saw dust when the wax is set and then polish with machine fitted with Namadah or woolen rags block. The used saw dust shall then be swept to get polished surface. Care should be taken that the saw dust used is free from dust particles or any impurities. The final surface should not show any trace of wax when polished.

The final polished surface shall be mopped with wet cloth every day at least for 10 days.

Mode of Measurement: Unit of measurement for floor tiling shall be SqM or part thereof of the superficial area. Actual quantity of tiling work carried out shall be measured and paid for after making deductions for openings etc. The rate shall include embedding of tile below wall plaster / skirting.

6.02 Providing & fixing pre-cast Mosaic tiles in skirting, dado and risers

Quality of tile shall conform to same as specified in item 6.01 and of thickness not less than 12 mm. For dado and skirting work, the vertical surface shall be thoroughly cleaned, scraped/ dismantled so as to provide the face of the skirting/ dado in desired plane and wetted. Thereafter it shall be evenly and uniformly covered with about 12mm thick 1:3 cement mortar. For this work the tiles as obtained from the factory shall be of the size required and practically fully polished. The back of each tile to be fixed shall be covered with a thin layer of neat cement paste and the tile shall then be gently tapped against the wall with a wooden mallet. This shall be done from the bottom of the surface upwards. The joints shall be as close as possible

and the work shall be truly vertical and flush. The tiles shall be fixed flush with the plaster or projected as specified by the Engineer. The junction of the plaster and the skirting or dado shall be neatly finished. The joints shall be cleaned and filled with cement with or without pigment to match the shade of tile. After the tile has set and cured the same to be polished with machine/ hand with carborundum stones as detailed in Item spec. no. 6.01 so that the surface ;attains a glossy finish. Corners and junctions be finished true.

Mode of Measurement: Skirting, dado or risers shall be measured in SqM. or part thereof. The rate shall include providing tiles including wastage, laying as per specifications, filling joints, curing, rubbing and polishing etc. all complete.

6.03 Providing & laying cast-in-situ Marble chips flooring

The marble chips shall be of best quality and of approved size, colour and shade. The cement used may be grey Portland or white cement or cement mixed with colouring pigments or specific proportion of white and grey cement to archive silver grey shade as directed by the Engineer. The proportion of marble chips to cement shall be as specified in the item description, or it shall be cement marble powder mix 3:1 (3 cement : 1 marble powder) by weight in proportion of 4:7 (4 cement marble powder mix : 7 marble chips) by volume using the materials with prior approval of Engineer. The entire work shall conform to the approved samples. The terrazzo chips shall be laid after placing the base. The base shall consist of a layer of 28 mm thick 1:2:4 cement concrete (1 cement, 2 coarse sand, 4 19 mm and down graded stone aggregate) spread and levelled. While laying the flooring dividing strips of glass/PVC/Aluminium of specified thickness shall be inserted in the mortar bed according to the design of the floor. Care being taken to see that no panel exceeds 2.0 SqM in area. The top of strips shall be 10 mm above the surface of the under bed and shall conform to the finished level of the floor. Chips shall be thoroughly mixed dry and then white cement or cement of approved colour shall be added in specified proportion. Dry mix should be prepared for entire piece of work and stored in protected area. Chips and cement shall be thoroughly mixed and evenly spread on the platform and not heaped. Water shall then be added to obtain a plastic mix of suitable consistency as directed by the Engineer. Terrazzo layer shall be placed as soon as the screed coat has set sufficiently but in no case than the day thereafter. The thickness of terrazzo topping shall not be less than 10mm. The surface shall be rammed to obtain the consolidation and a levelled surface. Additional chips shall be sprinkled on the surface and rammed in until surplus cement is checked out and chips forced together so that the finished floor will show not less than 70% aggregate. The surface is finally trowelled lightly. The Contractor shall keep the floor moist for not less than seven days. After setting the wearing surface and curing for 36 hours the surfaces shall then be machine polished with course grade corboroundum stone (No.60) and washed clean and applied with cement grout with cement of matching colour. Then it shall be cured, kept

moist for 5 to 7 days. The surface shall be polished with stone of 120 grit, then be cleaned, washed and applied with grout as before and cured for 3 to 5 days. The surface shall be polished with stone of 320 grit to get even surface. The surface shall then be cleaned and washed with oxalic acid as well as wax polish and mopped as detailed in 6.01 the floor shall be refinished wherever necessary during the stages right from laying wearing layer to final polishing to leave the work in first class condition.

Mode of Measurement: This shall be measured in SqM. The rate shall include providing and laying marble chips flooring with dividing strips, curing, machine/hand polishing. This item shall be also applicable for flooring in landings, kitchen platform cast in situ sinks etc.

6.04 Providing &Laying cast-in-situ marble chips in skirting and dado

The height of the skirting/dado shall be as per the drawing. The base layer shall be 12mm cement mortar of 1:3 proportion (1 cement, 3 coarse sand) and top 7 mm thick layer shall be of approved marble chips in proportion as specified in Item spec. no. 6.03 While laying the skirting/dado glass strips of specified width shall be provided. The skirting/dado shall be flush with the plaster or projected as specified by the Engineer. The junction between the skirting/dado and the plaster shall be finished properly as per the details/as directed by the Engineer. The skirting/dado shall be hand machine polished as detailed in 6.03.

The rate shall include providing and laying marble chips in skirting/dado, dividing strips, curing, rounding off the corners of the floor and the skirting, hand polishing, cleaning etc.

Mode of Measurement: It shall be measured in SqM.

6.05 Providing & laying pre-polished machine cut green Kota stone flooring

Stones shall be of selected quality, hard, sound, dense and homogenous in texture free from cracks, decay weathering and flaws and of approved quality, size and uniform thickness as specified in the item specification, edges shall be chisel dressed/ machine cut and the top surfaces shall be machine polished with joints running true and parallel from side to side. The sides (edges) shall be table rubbed with coarse sand or machine rubbed before paving. Stones should be laid on a bed of cement or lime mortar of specified mix and thickness. The pattern of the flooring shall be as per the Architect's drawing or as directed by the Engineer. Thickness of mortar bedding shall be as specified in the item specification however thickness any place shall not be less than 12 mm. The stone slabs shall be thoroughly wetted with clean water. Mortar of the specified mix shall be spread under

the area of each slab in accordance with the overall slope, roughly to the average thickness as specified in item. It shall be pressed tapped with wooden mallet and brought to the level. The stone to be lifted and laid aside. The top surface of the mortar to be corrected by adding fresh mortar at hollows. The mortar is allowed to harden a bit and cement slurry of honey like consistency shall be spread over the same @ 4.4 Kg per SqM. The edges of the slabs already paved to be buttered with cement with or without pigment. The slab to be tapped to desired level with a fine joint. The surplus cement slurry to be cleaned.

Care should be taken so that the stone slab is set over the bed and fixed over cement slurry without any hollow pocket. There should be no voids left underneath. The joints should be struck smooth cleaned with wire/ coir brush and grouted with cement slurry of matching colour. If specified terrazzo filling of specified thickness or strips of different stone strip shall be provided in the joints between the Kota stone slabs. The floor should be kept covered with damp sand or water for a week. The stone flooring shall be machine polished and then cleaned with oxalic acid and wax polished as specified in the item specification no.6.01. The finished floor shall be mopped with water mixed with kerosene as directed by the Engineer for 10 times in next 7 to 10 days.

The general slope for any area as per the drawing / directions of the Engineer shall be provided in sub base / PCC and or the grade slab as the case may be. Excess thickness of bedding mortar in the event of failure of maintaining necessary slope shall not be paid. The contractor should mark the levels well in advance and preceding course should be laid accordingly. The contractor should also make level marks as per the final finished floor level before taking up the flooring work.

The rate shall include providing and laying, curing, machine polishing, cleaning etc. all complete.

Mode of Measurement: This shall be measured in SqM.

6.06 Providing & Laying pre-polished machine cut Kota stone in skirting and dado

The stone shall be of required sizes and the thickness shall be as mentioned in the item specification. The stones shall be pre-polished and machine cut. The thickness of the exposed edges shall be uniform and polished smooth before fixing. The stone's edges shall be dressed fine true, straight and at right angles to each other. The stones shall be fixed over cement mortar bed 1:4 (1 cement: 4 coarse sand) when dried with the help of cement slurry. The joints are filled with cement with addition of pigment to match the shade and machine/ hand polished washed as per Item spec. no. 6.01 and wax polished. The joint between the top of skirting/dado and plaster shall be finished properly. The joints in the flooring shall be continued in the skirting/dado also. The work shall be cured properly.

Skirting shall be of varying height where slopes are provided in the floor. The top of skirting / dado should be made in horizontal and in level to receive dado of glazed / ceramic tiles as per the approved scheme / drawing where finished surface shall be maintained in one plane. Cutting of masonry wall to the required depth keeping in view the finished wall treatment is included in this item.

Mode of Measurement: This shall be measured in SqM. The triangle skirting of staircase shall also be paid under this item.

6.07 Providing & laying pre-polished, machine cut single piece Kota stone in treads, cills, and riser up to 1 M long.

Pre-Polished green kota stone of specified thickness with machine cut edges shall be fixed for treads of steps in single piece or on the kitchen platform or open shelves and window sills as directed. It will be laid over average 20 mm thick cement mortar bedding of CM 1:4 (1 part cement : 4 parts sand) and thick cement slurry (as detailed in Item spec. no. 6.05) The horizontal slab shall be embedded underneath in adjoining riser / plaster. If asked for, grooves to be provided in the treads without any extra cost. The thickness of all the exposed edges shall be uniform and polished smooth before fixing. The stones shall be machine / hand polished followed by cleaning with oxalic acid and wax polished as specified in the item specification. The laying procedure, curing, polishing and mopping is same as specified in the item 6.06 above.

Mode of Measurement: Measurement shall be in SqM of the stones laid. Embedding of the treads, cills, and platform tops shall not be measured and deemed to have been included in the item rates.

6.08 Providing & laying pre-polished, machine cut single piece Kota stone in treads, cills, and riser up to 1.5 M long.

The general specifications shall be same as per item 6.07.

Mode of Measurement: Same as per Item spec. no.6.07.

6.09 Providing & fixing Kota stone shelves

Stones shall be of selected quality, hard, sound, dense and homogenous in texture free from cracks, decay weathering and flaws and of approved quality, size and uniform thickness as specified in the item specification, edges shall be machine cut and both the top and bottom surfaces shall be full machine polished to fine grit .The exposed side (face) shall be made to uniform thickness and shall be machine rubbed prior to fixing. Thickness of the stone for a particular set of shelves should be uniform. The stones shall be placed in the brick masonry/ concrete jharies/ grooves with proper bearing equal to thickness of stone and the same shall be pointed and

finished neatly with matching colour cement if required with addition of pigment. Or to be fixed over MS bracket (which will be paid under item of MS insert as per tender item). The finished work to be washed with oxalic acid, wax polished (as detailed in 6.01) and mopped for 10 times.

The rate shall include providing Kota stones, cutting jharies, placing the shelves, filling jharies, propping them till the CM sets and curing all complete.

Mode of Measurement: This shall be measured in SqM.

6.10 Providing & laying rough chiselled Kota stone Flooring

Stones shall be of selected quality, hard, sound, dense and homogenous in texture free from any defect cracks, decay weathering and flaws and of approved quality, size and uniform thickness as specified in the item specification, edges shall be chisel dressed / machine cut and the top surfaces shall be uniform. The size of the stone shall be 17" x 23" or 23"x23" with corners cut if asked for as per details. (When corners are cut as per specific details the gap shall be finished while pointing and top to be finished with neat cement)

The stones shall be laid over bedding of cement mortar as specified with uniform grooves as per details / as directed by the Engineer. The laying procedure shall be same as in Item spec. no. 6.05 however joints shall be kept all-around uniform width and depth and shall be racked. The joints shall be pointed with CM 1:2 (1 part cement, 2 parts fine sand) leaving groove or flush pointed with neat cement topping as per drawing / details. The slope shall be maintained as given in the drawing or as directed. The surface shall be finally cleaned and mopped for with coir / cloth for 7 days.

Mode of Measurement: This shall be measured in SqM.

6.11 Providing & laying 40mm thick IPS flooring

The mix shall be CC 1:2:4 (1 part cement, 2 parts coarse sand and 4 parts graded stone aggregate-12.5 mm nominal size). The flooring shall be laid in panels of uniform sizes of 2 SqM or as specified / directed by the Engineer. They shall be laid in alternate panels on alternate days. The edges shall be protected properly. Glass/PVC/ Aluminium strips shall be provided to separate the panels, as per the item description in the Schedule of Quantities. The slope shall be maintained as per drawing or as directed by the Engineer.

The mix shall be prepared by volumetric and shall be done in one bag mixers machine. The concrete shall be placed in position well compacted and levelled up with the help of wooden straight edge and trowel and beaten up well till slurry comes on top and holes filled up with concrete. If IPS has to be laid directly on RCC slab, the surface of the RCC slab shall be

roughened up with brushes while the concrete is green. Before laying the floor, the laitance, loose materials, cake of mortar dropping shall be removed and the surface of the slab hacked and coat of cement slurry @2.75 kg of cement per SqM. shall be applied so as to get a good bond between the slab and IPS. If IPS has to be provided on lean concrete no slurry is required.

The flooring shall be finished with 12 mm thick cement mortar (1:2) and cement slurry @2.2kg of cement per SqM. and water shall be applied on top with wooden float till the voids in the concrete are filled with mortar cream. The surface must be uniform and even in colour. Minimum water cement ration to be maintained. Dry cement or cement sand mixer shall not be sprinkled to absorb excess moisture in the flooring. Colour pigments shall be added to the flooring if instructed by the Engineer. Curing shall be done for 10 days till the top layer is hardened. The edges of the panels shall be protected from damage. The finished surface to be cleaned and mopped.

The rate shall include providing and laying IPS flooring, finishing the work, curing, rounding of the edges between the walls and skirting.

Mode of Measurement: The flooring shall be measured in SqM. The finishing including neat cement finish is an integral part of IPS flooring item and shall not be measured & paid for separately.

6.12 Providing & Laying, 50 mm thick IPS flooring

-Do- same as item 6.11 but for 50mm thick. However, the under layer of concrete shall be 38 mm thick and top layer shall be of 12 mm thick.

Mode of Measurement: Same as per Item spec. no. 6.11

6.13 Providing and laying 19 mm thick IPS in skirting/dado

The specification shall be same as the item 6.11 but for the work is to be done on vertical surfaces. It is of two layers, the base layer shall be of 12mm thick PCC 1:2:4(1 cement; 2 sand; 4 graded stone aggregate of size 12mm and down). Then it shall be finished with 7mm thick plaster with CM 1:2. It shall be flushed with wall or projecting out by 6 mm uniformly from wall plaster, including rounding off the corners as directed by the engineer. The final surface to be finished smooth with neat cement @ 2.2 kg/ sq m and cured cleaned.

Mode of Measurement: This shall be measured in SqM.

The rate shall include the chipping of RCC/brick work, dividing strips, laying the base and the top layer, curing etc. all complete

6.14 Providing , mixing and laying of Floor Hardener

The non-ferrous Floor hardener / Ironite shall be of approved make / confirming to approve sample to be mixed / applied as per manufacturer's specifications. In case of Ironite, it shall be uniformly graded iron particles, free from non-ferrous metal particles, oil, grease, sand and soluble alkaline compounds and shall be mixed with cement in proportion of 4 cement and 1 compound by weight in the wearing course (top course) of the IPS. The laying procedure is same as per the specification for IPS flooring.

In case of Floor Hardener for the self finish concrete pavements / floors the application shall be as per manufacturer's specification.

Mode of Measurement: This shall be measured in Kg.

6.15 Providing & Laying PVC flooring

PVC flooring material shall conform to IS: 3462. It may be tiles, sheet or rolls as specified. It shall consist of a thoroughly blended composition of thermoplastic binder, filler and pigments. It shall be of approved make and shade and the thickness as specified. This shall be laid over IPS, concrete or any plane flooring. The tiles / rolls shall be fixed as per the Manufacturer's specifications. Before commencing the work the sub floor shall be examined for evenness and dryness. The sub-floor shall be cleaned with cloth, air blower. The flooring should not be laid unless the sub-floor is perfectly dried. The layout of the PVC flooring on sub-floor to be covered should be marked with guidelines. The PVC flooring shall then be laid for trial without adhesive and set the pattern. The PVC flooring should then be fixed with application of rubber based adhesive of approved make as per recommendation of the manufacturer. The PVC tiles shall be laid edge to edge without any gap where as the sheet / rolls to be welded to give a even and uniform finish. After laying the flooring material it shall be tapped with suitable roller weighing 5 Kg to develop proper contact. It shall be ensured that full contact is made and no air pocket or formed. Cills, doorways, skirting shall be provided under this item observing necessary care and with due protection of the edges. Any part of work having any air gap or defect shall have to be re-done at no extra cost.

Mode of Measurement: This shall be measured in SqM.

6.16 Providing & Laying acid and alkali proof, non-skid ceramic tile flooring

Ceramic tiles of minimum 10 mm thick and of size, shade & quality **as specified in the item description** shall be laid over average 20 mm thick cement mortar bedding in CM 1:4 (1 part cement, 4 parts coarse sand). The floor shall be first applied with a coat of acid alkali primer and then the bed mortar is laid. One part cement for preparing the bed mortar shall be mixed with acid alkali proof powder of approved make and grade in a proportion specified / recommended by the manufacturer. The tiles shall be laid in desired pattern in proper line, level and slope with cement slurry of honey like consistency striking the joints all around

of 6- 8 mm. The joints shall be of even thickness and 12 mm deep. The joints should be cleaned of the cement mortar or any slurry neat and with coir and finally with cloth after the mortar is set. These shall be filled with granular sand if directed to protect them from damage. It shall be cured for 7 days. After curing the floor to be dried and the joints should cleaned off the sand. These joints shall be filled with acid alkali proof epoxy mixed with hardener and filler material of approved make and grade in requisite proportion as per the manufacturer's recommendation. The joints after thorough cleaning and fully drying should be cleaned with air blower to remove any dust or burrs as well as joints are heated with blow lamp is to remove any residual moisture. The joints shall be filled with epoxy as stated here above with trowel and finished smooth.

All joints shall be finished neat and it shall be kept dry for at least for 48 hours.

Mode of Measurement: This shall be measured in SqM.

6.17 Providing & Laying Acid & Alkali proof pre-polished red Mandhana stone in flooring

Mandhana Stone slabs shall be of selected quality, hard, sound, dense and homogenous in texture free from any defect cracks, decay weathering and flaws and of approved quality, size and uniform thickness as specified in the item specification, edges shall be chisel dressed / machine cut and the top surfaces shall be uniform and pre polished smooth. The stone slabs should be selected and of uniform red colour and ones with any defect or spots of different colour shall be rejected.

The sizes of the stones shall be 600 mm x 600 mm or 600 mm x 450 mm or 450 mm x 450 mm or 450 mm x 300 mm or 300 mm x 300 mm, as directed , and the thickness shall be 25 to 30 mm for flooring and 18 to 20mm for skirting and dado. The skirting stone shall be of height up to 250 mm and length to match with the size of flooring stone. The stone shall be acid and alkali resistance shall be approved by the Engineer.

The approved quality of acid and alkali preventive primer shall be applied uniformly in two coats over the slab or the concrete surface. The acid-alkali proof powder shall be mixed with the cement in the proportion 2:1 (2 part cement; 1 part powder) or as per the manufacturer's specification. The cement-powder mix and the sand shall be mixed in the ratio 1:4 (1 part cement, acid alkali proof powder: 4 parts coarse sand) for bed mortar. average 30 mm thick. The stones shall be laid on 30 mm thick mortar bed in level and line with 6mm to 8 mm wide joints (of even width) all around.

The flooring to be laid in line and level in approved pattern over prepared surface coated with acid and alkali proof primer over bed 30 mm thick

mortar as detailed. The joints should be raked to a depth of 12 mm and shall be filled epoxy as detailed in Item spec. no. 6.16.

The flooring shall then be machine polished. First coat of machine polish shall be using diamond tipped stone of grit No.60. The second coat shall be with grinding stone of grit No. 120 and final with 320 to give an even and flawless smooth finish. The surface then shall be washed with oxalic acid and wax polished and mopped as detailed in Item spec. no. 6.05. The work place shall be kept dry for the joint filling operation. Where ever the polishing machine can not be applied, the area shall be hand polished.

The rates include providing and fixing treads of stems, cills, door way, platform / machine foundation / pedestal top etc. The exposed edges of the stones shall be machine cut to uniform even thickness. Nothing extra shall be paid for cutting holes in the stones, machine cutting of edges of stones.

Mode of Measurement: This shall be measured in SqM.

6.18 Providing & Laying Acid & Alkali proof pre-polished red Mandhana stone for skirting, dado

The specification shall be same as per Item spec. no. 6.17 but with Mandana stone of 18 to 20 mm thick to be laid over 12 mm thick cement mortar bed/ plaster (with acid alkali proof powder over two coats of acid and alkali proof primer). The size of the stones shall be as specified in Item spec. no. 6.17 however height of skirting shall be up to 250 mm and risers shall be as per requirement. The skirting/ dado over pedestals, columns shall be with creating a right angle groove as per detail. The skirting/ dado shall be either flush with wall finish or projecting evenly. The rate shall include cutting of masonry / concrete elements to suit the level.

Joints filling and polishing shall be as per Item spec. no. 6.17.

Mode of Measurement: This shall be measured in SqM.

6.19 P & L Ceramic tiles in flooring

The ceramic tiles in flooring shall be of first class quality and approved make, size and shade. Sample and source of the tile shall be approved by the Engineer. The tiles shall be of standard size without warp and with straight edges, true and even in shape and size and of uniform colour. The tiles surface shall be of fine grained texture, dense and homogeneous. The thickness of the tile shall be as per the details and approved by the Engineer. The tiles shall be submerged in water till the bubbles cease.

They should be laid over a bed of 20 mm thick cement mortar of CM 1:4 (1 part cement: 4 parts coarse sand) and be fixed with cement slurry of paste

consistency (3 kg/SqM). They shall be laid in line level, required slope as directed. The joint shall be very thin, uniform and perfectly straight.

Where full tiles are not possible, the same should be cut to take care of any circular opening of pipes or rectangular opening etc. or sawn to the required size and their edge rubbed to ensure straight and true joints. After the tiles are laid, extra cement grout shall be removed. The joints shall be cleaned with wire/ coir brush and then the joint shall be floated neatly with white or cement matching colour (white cement with addition of pigment) as approved by the Engineer. The horizontal surface of the pedestals machine foundations etc to be finished under this item with necessary cutting / metering and grinding the cut edges. The tiles shall be cleaned after the work is complete and finally cleaned with mild acid.

The rate quoted for flooring and dado work shall be inclusive of angles and corner pieces, cutting tiles for water points, such a way that the point is in the junction of four tiles, electrical points etc.

Mode of Measurement: This shall be measured in SqM.

6.20 Providing and laying ceramic tiles in skirting /dado

The ceramic tiles shall be of first class quality and approved make, size and shade of minimum 7 mm thickness. Sample of the tile shall be approved by the Engineer. The tiles shall be of standard size without warp and with straight edges, true and even in shape and size and of uniform colour. The tiles surface shall be of fine grained texture, dense and homogeneous. The tiles shall be submerged in water till the bubbles cease. They should be laid over a bed of 12 mm thick cement mortar of CM 1:3 (1 part cement: 3 parts sand) and be fixed with cement slurry of paste consistency (3 kg/SqM). They shall be laid in line; level and plumb flush with wall finish or uniformly projecting from the wall surface. The bed to be prepared exactly in line level and the surface be scratched with wire up to depth of 2 to 3 mm for better bond cured by keeping it damp for 2 to 3 days. The joint shall be very, uniform, square and perfectly straight in line or staggered as per details and directions.

Where full tiles are not possible, the same should be cut to take care of any circular opening of pipes or rectangular opening etc. or sawn to the required size and their edge rubbed to ensure straight and true joints. After the tiles are laid extra cement grout shall be removed. The joints shall be cleaned with wire / coir brush and then the joint shall be floated neatly with white or cement matching colour (white cement with addition of pigment) as approved by the Engineer. The vertical surfaces of the pedestals machine foundations etc to be finished under this item with necessary cutting / metering and grinding the cut edges. The exposed edges shall be of virgin and the piece if any, to be accommodated properly at a convenient location. Necessary mark up of tiling pattern as per dimensions of the tile to be marked with blue or appropriate means after over bedding plaster so as

make provision for cutting the tiles and adjust the full tiles, locate the electrical switch boxes, plumbing outlets/ points get the locations adjusted if required, and determine appropriate location for the cut tiles if any. The dado work should be carried out in co-ordination with internal electrification and plumbing agencies. The tiles should be cut neatly with proper tools to suit the opening and the edges be ground. By default cut piece of tiles should not be used in top most layer of dado or at corners other than jambs of width less than tile size. The backing cement paste shall be evenly applied and struck so as to ensure that no hollow pocket is left. In case any cavity is spotted in the day's work, then the same should be grouted on next day with out any extra cost. In case the finished and cured surface sounds hollow and found to have cavity, same shall be removed and re-done. The entire work to be cured for 7 days. The tiles shall be cleaned after the work is complete and finally cleaned with mild acid.

The rate quoted for flooring and dado work shall be inclusive of angles and corner pieces, cutting tiles for water points, such away that the point is in the junction of four tiles , electrical points etc.

Mode of Measurement: This shall be measured in SqM.

6.21 Providing & Laying white glazed tiles in skirting / dado

The glazed tiles shall be of 1st quality, free from any defect and of even colour size and thickness conforming to approved quality and make as specified in Item spec. no. 6.19. The colour, size, thickness shall be as specified in the item specification Bedding mortar and fixing shall be carried out as detailed in Item spec. no. 6.19.

Mode of Measurement: This shall be measured in SqM.

6.22 Providing & Laying Coloured glazed tiles in skirting / dado

The general specifications shall be same as per Item spec. no. 6.19 but with approved coloured tiles.

Mode of Measurement: This shall be measured in Sq m.

6.23 Providing & Laying SHON ceramic tiles in skirting/dado/floor

Ceramic tiles shall be of size 1"x1" or 1.5"x1.5" of approved make either glazed or matt finish of approved colour, pattern and design (with multiple coloured tiles) sound, without any crack or any other defect, as per architectural drawing and as directed in floor skirting dado over circular / or any shaped surface at all heights including scaffolding etc.. The tiles shall be pre arranged with backing brown paper (it is manufactured and supplied mounted over backing paper with water soluble adhesive, in specific pattern/ design). The tiles in blocks shall be fixed over 12 mm thick

cement mortar bed in CM 1:3 (one part cement : 3 parts sand) with white cement or white cement with pigment thick slurry in line level and plumb. When it is set sufficiently hard, then backing paper to be wiped off carefully and the joints to be cleaned with wire / coir brush gently (to ensure that tile do not get disturbed) and the joints shall be filled with cement of white or matching colour. Bed with 12 mm thick cement mortar should be prepared and scratched with wire and cured for three days by keeping it damp then, the layout be marked with blue or chalk as per the pattern true to line level and plumb to ensure all the horizontal and vertical joints are matched exactly. The top of the dado be finished smooth. The entire work is required to be cured for 7 days. The finished work shall be cleaned with water followed by cleaning with water mixed with mild acid etc complete.

Mode of measurement: It will be measure in SqM.

6.24 Providing special mirror finish polish on Kota stone

This shall be carried out over smooth polished surface by using 500 to 2000 grit emery polishing in six stages and final finishing with 2000 grit tin oxide and felt pads. The work shall be carried out with polishing machine with vibration free rubber lined mounting wheels.

Mode of measurement: It shall be measured in SqM.

6.25 Providing special mirror finish polish on Mandhana stone

This shall be carried out over smooth polished surface by using 500 to 2000 grit emery polishing in six stages and final finishing with 2000 grit tin oxide and felt pads. The work shall be carried out with polishing machine with vibration free rubber lined mounting wheels.

Mode of measurement: It shall be measured in SqM.

6.26 Providing & Laying Marble flooring

The stone shall be of specified quality, hard, sound, homogeneous in texture, free from cracks, weathering and flaws. All stones shall match each other All edges shall be true, square and free from chippings, the surface shall be level, smooth and machine cut and rubbed. The bed concrete base shall be cleaned and marked with the layout by chalk exactly as per the size and pattern of the flooring. The marble slab shall be placed over bed of dry sand in required level to check up and decide on the cutting etc. as may be required including matching the grain / streaks. The stone slab be cleaned of dust or powder sticking fully in advance, wetted at the time of laying. The stones shall be appropriately marked for fine cutting as the case may be and kept aside. The dry sand shall then be removed and the floor concrete base be cleaned of the sand and dust etc and wetted with water with small quantity of grey cement. The stones shall be laid on a cement mortar bedding of 20mm thick 1:4 (1 cement : 4 sand) with white

cement slurry of honey like consistency @ 4.4 Kg per SqM with minimum possible joint width in line level and slope as specified / directed. Care should be taken to match the corners and the sides are stuck with white cement while laying individual slabs to ensure no hollow or cavity is left under any stone or part thereof. The joints shall then be cleaned with coir brush and grouted with cement slurry. The stone work to be cured for 7 days. The surface be polished with polishing machine as per the procedure detailed in Item spec. no. 6.05 including mopping the floor.

The corners shall be finished with square cut groove by diagonally cutting the edges at the junction in part of the thickness and adjusting as well as the projecting exposed edges shall be rounded off (moulded) polished smooth as per architectural details or as directed without any extra cost.

The flooring bands in the flooring of other material or specific pattern slab shall be paid under this item without any extra cost.

Flooring to be machine polished as described in Item spec. no.6.17 and 6.05. No cement slurry shall be applied after each grinding.

Mode of Measurement: It shall be measured in SqM

6.27 Providing & Laying Marble in skirting / dado / risers

Specification same as per Item spec. no. 6.26 but for skirting , dado, risers to be laid over 12 mm thick cement mortar bedding 1:3 (1cement :3 parts of coarse sand) with white cement paste @ 4.4kg/SqM. The wall cladding (dado) will include cost of plaster of Paris for holding the stone slabs in position, etc completed as directed.

Mode of Measurement: It shall be measured in SqM

6.28 Providing & Laying Shahabad stone in flooring

The specification is same as per Item spec. no. 6.05.

Mode of Measurement: Same as per Item spec. no. 6.05.

6.29 Providing and Laying Shahabad stone in skirting and dado

The specification shall be same as per Item spec. no. 6.06.

Mode of Measurement: Same as per Item spec. no. 6.06.

6.30 Providing & applying 115mm thick cement based brickbat water proofing treatment

The terrace or area to be cleaned, removing any over burden, mortar droppings etc and finally cleaned with coir brush. To start with the levels to be checked and level marks to be provided as per slope. The area to be wetted and applied with thin cement slurry and first layer of about 20mm thick cement mortar CM 1:3(1 part cement, 2 parts coarse sand) mixed with waterproofing compound to be added with cement as per manufacturer's specification, shall be laid as instructed by the Engineer. Then brickbats out of well burnt bricks shall be laid over this in required slopes and levels as per the drawings and the instructions of the Engineer impregnating in base mortar with gap of 12 mm all around. The brick bats shall be sound and shall be either half brick or trimmed to suit the final slope. Brick bats should be prepared separately and should not be stacked on the same terrace where waterproofing treatment is taken up. The layer shall be cured for 3 days. The joints of already laid brick bats shall then grouted with cement mortar mixed with water proofing compound followed by application and filling with cement mortar CM 1:3(1 cement: 3 coarse sand) mixed with waterproofing compound with due compaction so as to achieve a layer of around 15 to 20 mm over the brick bats. The surface shall be well floated and finished and finally floated with cement slurry @ 2.75 kg per sq m finished smooth with thread marks at 300 x 300 in desired patterns. All openings, sleeves, drains, pipes etc. shall be specially treated and made sure that they are water tight. The collection point near rain water pipe inlet be depressed by 25 mm with slope if asked for. To ensure that the ridges and valley are formed and proper slope is provided for efficient drainage of water. The treated area shall be cured with ponding the water at least for 15 days.

The sand to be used shall be screened, free from clay, silt, pebbles, organic matter and shall be 50% fine and 50% coarse or as directed by the Engineer. The work to be carried out at all the levels including lift and lead.

The returns shall be in 75 mm thick water proofing treatment and shall be measured separately in the respective item.

The work should be carried out through an approved specialized agency. A guarantee certificate for a period of ten years against leakage shall be issued by the Contractor for free maintenance of the treated area.

Mode of Measurement: The plan area treated shall be measured in SqM.

6.31 Providing & Laying 75mm thick cement based brickbat water proofing

Specification shall be same as per Item spec. no. 6.30 but for 75mm thick waterproofing for balconies, sunk slabs, toilets, water tanks, slopping terrace, returns etc. with brick bat or stone aggregate of required size , and as directed by the engineer.

For the water tanks the construction joints to be grouted with cement slurry mixed with water proofing compound by making holes at 1 M c/c or as instructed by the Engineer and fixing sleeve pipe sleeves / coupling using a grouting pump or by gravity so as to ensure the joints to be water tight.

Mode of Measurement: Same as per Item spec. no. 6.30.

6.32 Providing & Laying Cast iron tile flooring/skirting

Cast iron tiles of specified size shall be as per Implementation of Bull Production Through Imported Embryos of HF & New Jersey Under NDP-1 Vikas Khand – Kalsi. Distt. Dehradun standard drawing top surface ground smooth and sides metered without any air or pin holes, casting burrs confirming to approved sample and the weight specified in the item specification.. The contractor should get a sample of the tiles approved prior to supplying

The tiles shall be laid over a bed of 30mm thick cement concrete 1:2:4, (1 part cement : 2 parts coarse sand : and 4 parts graded stone aggregate of nominal thickness 12 mm and down) in floor, skirting, treads or riser etc.. The tiles shall be fixed in line, level and slope as per the drawing and as directed by the Engineer over bed concrete and tapped with wooden mallet so that 50% depth of the holes are filled in. The concrete to be compacted with multiple pronged tool When the bed concrete is green, the remaining 50% holes of the tiles shall be filled with rich concrete mix prepared out of 6 mm aggregates and fine sand. The joints shall be of minimum uniform width of 2 mm. The joint should than be cleaned with wire brush and grouted with cement mortar (CM) 1:1. The top of the flooring be cleaned with soft cloth and coated with cement slurry. The surface to be cured at least seven days. The floor /skirting to be grinded with grinding machine with corundum stone of grit no. 80 followed by 120 / 150 smooth and area be cleaned off with water. Wherever machine grinding is not possible it should be grinded by hand grinding Curing shall be done at least for 15 days. The tiles shall be cut to suit site requirement with out any extra cost. Wastage if any shall be to the contractors account.

Nothing extra shall be paid for cutting tiles around drains and for corner pieces.

Mode of Measurement: This shall be measured in SqM.

6.33 Providing &Laying pre-polished Cuddapah stone in treads

The specification is same as per Item spec. no. 6.07 for this item the stone shall be of specified quality, hard, sound, homogeneous in texture, free from cracks, weathering and flaws. All stones shall match each other All edges shall be true, square and free from chippings, the surface shall be level, smooth and machine cut and rubbed.

Mode of Measurement: Same as for Item spec. no. 6.07.

6.34 Providing & Laying Cuddapah stone in shelves

The specification shall be same as per item 6.09. The stone shall be of specified quality, hard, sound, homogeneous in texture, free from cracks, weathering and flaws. All stones shall match each other. All edges shall be true, square and free from chippings, the surface shall be level, smooth and machine cut and rubbed.

Mode of Measurement: Same as for Item spec. no. 6.09.

6.35 Providing and fixing 3 / 5 mm thick 37 to 50 mm wide glass strip

Glass strips shall be cut from sheet glass of specified width and 1.2 m long suiting to size of the panels. These should not be bent or having angular sharp edges. The strips to be fixed in required pattern and in line level and slope corresponding to finished slope of floor or the plane of the vertical surface with cement concrete 1:2:4 at regular interval, firmly prior to taking up the flooring or dado after thoroughly cleaning the base and removing any overburden or plaster / concrete droppings as per details / as directed by the Engineer. This shall be cured till the flooring / dado is laid.

Mode of measurement: It shall be measured in RM

6.36 Providing and fixing 3 / 5 mm thick 18 / 19 mm wide glass strip

The specification is same as per Item spec. no. 6.35

Mode of measurement: It shall be measured in RM

6.37 Providing and fixing 3 mm thick Aluminium strip- 37 / 40 mm wide

Aluminium strips shall be of good quality straight, without any wrinkles or deformation and shall be specified width. Full length strip shall be used for forming the panels. The strips to be fixed in required pattern and in line level and slope corresponding to finished slope of floor or the plane of the vertical surface with cement concrete 1:2:4 at regular interval, firmly prior to taking up the flooring or dado after thoroughly cleaning the base and removing any overburden or plaster / concrete droppings as per details / as directed by the Engineer. This shall be cured till the flooring / dado is laid.

Mode of measurement: It will be measured in RM

6.38 Providing and fixing 3 mm thick Aluminium strip- 50 mm wide

The specification is same as per Item spec. no. 6.37

Mode of measurement: It shall be measured in RM

6.39 Providing and fixing 3 mm thick Aluminium strip- 18/19 mm wide

The specification is same as per Item spec. no. 6.37

Mode of measurement: It shall be measured in RM

6.40 Providing and laying Pre-polished Granite stone flooring

The Granite stone shall be natural pre polished, to mirror finish, machine cut of best quality uniform thickness, and approved colour, pattern and the size free from any flaws, surface irregularity and of specified origin. The size of the stone and laying pattern shall be as per the architectural drawings / as directed by the engineer. The contractor should mark the layout over cleaned base and lay the slabs over dry sand bed to decide / get the laying pattern approved. The stones shall be kept aside and sand be cleaned. The surface of bed concrete to be cleaned and applied with moisture barrier of epoxy coating of approved quality and make as per manufacturer's recommendations. Exposed edges of the Stones slabs for platform top, treads / cills shall be suitably rounded of as per details / directions. Stone to be laid over 20 mm thick cement mortar 1:4 (1 cement : 4 parts sand) with cement paste @ 4.4 Kg .The joints shall be minimum, the slabs shall be accurately without gap however the hair joints to be cleaned and grouted with matching coloured cement, curing , polishing, protection of finished surface by covering with alkathin sheets and coating with plaster of Paris for allowing normal working for other agencies like interior / AC etc as per the directions, cleaning the same finally etc. complete as directed. Rates shall be inclusive of all the costs.

Mode of measurement: It shall be measured in SqM

6.41 Providing and laying Pre-polished Granite stone for skirting / dado

The specification is same as per Item spec. no. 6.40 but to be laid over 12 mm thick cement plaster of specified proportion.

Mode of measurement: same as per Item spec. no.6.40

6.42 Providing and laying Pre-polished 6 to 10 mm thick Marble/ Granite Tile dado

The Marble / Granite tiles shall be natural pre-polished, to mirror finish, machine cut of best quality uniform thickness, and approved colour, pattern and the size free from any flaws, surface irregularity and of specified origin. The size of the tiles and laying pattern shall be as per the architectural drawings / as directed by the engineer. The skirting, dado shall be flush with wall finish or projecting uniformly to be laid over 12 mm thick cement mortar 1:3 (1 cement : 3 parts sand) with polymer modified tile fixing

adhesive of approved make and grade matching with the colour of the tile as per recommendations of the manufacturer, necessary curing, protection of finished surface, cleaning the same finally. The internal / external corner to be finished properly if required metering the abutting edges. After application of bed plaster tile fixing layout to be marked accurately to decide on the pattern including incorporate / adjust the tiles or cut them to accommodate the switch boxes / get the switch boxes adjusted through concerned agency prior to laying the tiles in position.

The surface to be kept damp and cleaned finally etc complete.

Mode of measurement: It shall be measured in SqM.

6.43 Providing and laying fine dressed 40 mm thick SIRA stone flooring

The stones shall be of specified quality, sound free from any defects flaws and shall be fine dressed machine cut or hand cut and dressed 40 mm thick SIRA stone confirming to approved sample in flooring, treads, platforms with or without exposed edges in required size, (single piece for treads, plate forms) as per details to be laid in pattern over 20 mm thick cement mortar 1:4 (1 cement : 4 parts sand) with cement paste @ 4.4 Kg close jointing or with 5 mm wide groove with pointing as per details, curing, cleaning the same with water and water mixed with mild acid etc complete. as directed. The sizes of the stones slabs, colour and laying pattern shall be as per architectural drawing / as directed by the Engineer.

Mode of measurement: It shall be measured in SqM.

6.44 Providing and laying fine dressed 40 mm thick Sand Stone flooring

The specification same as per Item spec. no. 6.43 but providing and laying Sandstone.

Mode of measurement: :It shall be measured in SqM.

6.45 Providing and laying self finish Cement Concrete of M-20 flooring

Providing and laying self finish cement concrete of grade M-20 in self finished flooring of 75 to 150 mm thickness or as specified in drawing over prepared sub-base in alternate panels of area 12 to 15 SqM and width up to 3.5 M or as per site conditions in line and level maintaining slopes as per drawing including Formwork using MS channels of required height, compacting with needle and surface vibrator, levelling with screed leveller, finishing smooth with a float of cement or cement mixed with floor hardener, curing, by providing grooves of specified width and depth along construction and expansion joints using proper size wooden strips with application of mould oil and finishing the same or cutting the concrete for all types of construction, contraction and expansion joints of size 10 mm wide x 6 to

8mm deep, providing necessary steel reinforcement, curing etc complete as per the drawing / as directed by Engineer.

General specification shall be same as Item spec. no. 2.05. Reinforcement, floor hardener expansion joint filler shall be measured separately in relevant tender items and paid for. The construction, contraction and expansion joints shall be maintained straight and marked for cutting a uniform width joint exactly over the concrete joints.

Mode of measurement: It will be measured in CuM.

6.46 Providing and laying self finish Cement Concrete of M-25 flooring.

The Specifications are same as per Item spec. no.6.45 but with providing and laying self finish Cement Concrete of grade M-25 in flooring.

Mode of measurement: It will be measured in CuM.

6.47 Providing and carrying out vacuum de-watering floor finish over concrete surface or any surface as specified.

Providing and carrying out vacuum de- watered floor finish of specified thickness, over concrete surface laid under item 6.45 and 6.46 involving levelling with trimix surface vibrator, Vacuum De-watering with trimix vacuum pump, floating and further compaction with trimix skin floater, floating disc, curing, cutting the concrete for all types of construction, contraction and expansion joints of size 10 mm wide x 6 to 8mm deep same as specified in Item spec. no. 6.45 and 6.46 providing necessary steel reinforcement, curing etc complete as per the drawing / as directed by Engineer.

The construction, contraction and expansion joints shall be cut straight of uniform width exactly over the concrete joint.

Reinforcement steel, if provided, shall be paid under relevant item.

Mode of measurement: This shall be measured in CuM.

6.48 Providing and laying Pressed Clay tiles over roof/ terrace

The pressed clay tiles shall be sound, modular from approved source free from any defect and of approved size, thickness minimum 20mm and smooth / flawless finish with out any surface irregularities. Tiles to be laid on roof tops / terraces over 20 mm thick cement mortar bed of CM 1:4 (1 part cement : 4 parts fine sand) with cement slurry, racking the joints with wire / coir brush and grouting with CM 1:2 mortar mixed with 2% integral water proofing compound, in line level and slope including cement slurry with waterproofing compound application over prepared surface, curing for ten days, cleaning / washing with water etc complete.

The tiles shall be metered / cut suitably for accommodating the drainage out let or any of the projections from the surface of roof / terrace. Special care should be taken to grout and finish so as to make it water tight.

Localized depression to be made around the rainwater out let if asked for. Junction of horizontal and vertical surface to be treated specifically by providing the corners be hunched and tile should be embedded in the in finishing of the vertical surface.

Mode of measurement: It will be measured in SqM

6.49 Providing and laying Pressed Clay tiles Flooring

The specifications are same as per Item spec. no. 6.48 but for providing and laying pressed clay tiles in flooring including cleaning with water, wax polishing / buffing with hand / machine using Namadah blocks etc complete.

Mode of measurement: It will be measured in SqM.

6.50 -do- as per Item spec. no. 6.23 but for 1"x1" or 1.5"x 1.5" glass mosaic tiles.

Glass mosaic tiles shall be of size 1" x1" or 1.5"x1.5" of approved make finish of approved colour, pattern and design (with multiple coloured tiles) sound, without any crack or any other defect, as per architectural scheme and as directed in skirting dado over circular / or any shaped surface at all heights including scaffolding etc.. The tiles shall be pre arranged with backing brown paper all other details shall be same as per item 6.23.

Mode of measurement: It will be measured in SqM.

7.00 STEEL WORK

Applicable Codes

IS:4351	-	Steel door frames
IS:1038	-	Steel door, windows and ventilators.
IS: 814 815 and 816	-	Metal arc welding

7.01 Providing & Fixing Pressed steel frames for doors

It shall be made of hollow metal pressed section of approved make. It shall be single/ double rebated as per the Architect's drawing. It shall be made of CR sheet and size 65x125x1.25 mm or 65x150x1.25 mm thick or as specified. It shall be provided with butt hinges of 125x2 mm thick. Minimum three hinges shall be provided per leaf of the door of width and height up to 900 mm and 2000 mm respectively, number of hinges to be suitably increased for the larger shutter as per drawing/ as directed. The frame shall be provided with 3 holdfasts of size 150x20x3 mm for each side and the same shall be embedded in brick work with CC 1:2:4 blocks of size 200 x 230/115 x 150 mm. The hollow portion of the frame shall be filled with CC 1:2:4 (1part cement: 2 Sand: 4 parts stone aggregates 10mm and down graded) and cured before the frame is fixed in position.

The frame shall be thoroughly cleaned, free from rust, mill scale, oil by mechanical means or chemical picking and painted with shop coat of zinc chromate primer after inspection of the same or as directed by the Engineer. There shall be provision in the frame for fixing of tower bolts, al-drop, louvers, mortise lock, bed plate for hydraulic door closer etc. The frame shall be painted with two or more coats of synthetic enamel paint of approved make and first quality to get a uniform finish.

Mode of Measurement: The length shall be measured in Running Meter correct to cm along the centre line of the frame.

7.02 Providing & fixing pressed steel section windows / Ventilators Open-able windows / ventilators

The frame shall be of size 100x60x1.25mm thick and it shall be of approved make. The windows to be got fabricated in an approved workshop as approved by the Engineer. The frames shall be double rebated. The frame shall be provided with 3 holdfasts of 100x15x3 mm long and the same shall be grouted with CC 1:2:4 in the brickwork or to RCC member. Shutters shall be made of standard steel sections style F7d, sash bar of T6 and locking bar of F4b section. The hollow portion of the frame shall be filled with CC 1:2:4 as stated in Item spec. no. 7.01 before fixing the frame.

Glazing shall be using float glass of approved make minimum 4mm thick and as per the area of glass pan as specified in Item spec. no. 4.01, shall be fixed with beading as per the Architectural drawing. The beading shall be of Aluminium or GI hollow square pipe of 10 sq.mm and wall thickness 1.25 mm or as specified with EPM rubber gasket. The glass pane when tapped should not give rattling sound.

The section shall be provided with approved make powder coated aluminium stays, Al-drop, handles and washers etc.. The window section shall be shop painted with one coat of zinc chromate / red-oxide primer as specified and shall be painted after completion of the finishing work with two or more coats of synthetic enamel paint of approved make, first quality and shade followed with one coat of red oxide primer at site.

Mode of Measurement: It shall be measured in SqM out to out of frame.

7.03 Providing & fixing pressed steel section windows Partly open-able and partly fixed windows

The specification for this item is same as Item spec. no. 7.02.

Mode of Measurement: Same as per Item spec. no. 7.02.

7.04 Providing & fixing pressed steel section windows / Ventilators - fixed type

The specification for this item is same as Item spec. no. 7.02.however, without fittings , handles, stays etc.

Mode of Measurement: Same as per Item spec. no. 7.02.

7.05 Providing & fixing pressed steel section - louvered ventilators

Same as per Item spec. no. 7.02 however, fixed glass louvers of 4 mm or 5.5 mm thick float or frosted glass (4 mm thick for louvers up to 450 mm long and 5.5 mm for length of 451 mm or more) to be provided as per architectural drawing.

Mode of Measurement: Same as per Item spec. no. 7.02.

7.06 Providing & fixing MS Mosquito/ fly proof shutter

This shall be fabricated out of approved standard rolled sections (window sections) with 22 to 23 SWG galvanised wire net. The beading shall be of MS hollow pipe beading of 10 Sq.mm X 1.25 mm with screws. The shutter shall be provided with adequate number of hinges as per details / as directed.. Matching section shall be provided with an arrangement for fixing tower bolts and handles including providing and fixing aluminium

oxidized/powder coated fittings as specified and as per architect's drawing. It shall be painted with one coat of primer and 2 or more coats of synthetic enamel paint approved make and first quality. The contractor should get the shop drawing approved. The fabrication shall be done through an approved manufacturer and approval of the Engineer be obtained in advance. General specification shall be as per Item spec. no. 7.02.

Mode of Measurement: The fly proof shutter out to out shall be measured in SqM without frame.

7.07 Providing & Fixing GI BRC fabric grill

This shall have a GI rectangular or square shape 75, 50, 25mm size as specified in the item specification.. The gauge of the wire shall be 8 to 10 SWG. The gap size shall be 75 x 25 mm in general unless specified otherwise. This shall be welded / bolted to the M S frame made of angle iron 40 x 40 x 6 and tee 40 x 40 x 6mm with a MS beading of 30x3 or 30x6 mm as per details. The fabricated grill shall be provided with a shop coat of zinc chromate primer and fixed in position by grouting the hold fasts in cement concrete blocks (sides , bottom / top as the case may be) or a pad plate be provided which shall fixed with expansion bolts as directed. Up on fixing and finishing the surrounding, it shall be painted 2 or more coats of synthetic enamel paint of approved quality and make over a coat of primer.

The MS sections used shall be paid under relevant items as specified in the item description. Grouting of the hold fasts in CC block of size 230x200 x150 or fixing with expansion bolts is included in the above item(s) and nothing extra shall be paid for.

Mode of Measurement: The area of BRC fabric in to in of the holding frame shall be measured in SqM.

7.08 Providing & Fixing Rolling shutters – Push and Pull type

The rolling shutters shall conform to IS 6248 of reputed approved make and shall be of 18 gauge MS solid laths or grill with all the accessories such as top cover conform to the size indicated in drawings and shall be of quality specified in the item specification. The rolling slats shall be in one piece and be made of heavy gauge cold rolled steel strips. The thickness of the sheets from which the lathe sections have been rolled shall be not less than 0.9mm for the shutters up to 3.5 m width and 1.2 mm for shutters above 3.5 M width. Depth of the guide shall be 65 mm for rolling shutters of width 3.5 M and 75 mm for width 3.5 to 8 M. A cylindrical hood shall be of MS sheet not less than 0.90 mm thick with appropriate MS angle/ flat stiffeners and of an approved profile shall be provided on the top to enclose the shutter when it is open. The rolling shutters shall be provided with suitable locking arrangements from inside and outside and deep channel guides. In case galvanised rolling shutters are specified the rolling shutter shall be made of

hot dip galvanised slats hood, deep channel guides all preferably in one piece. The channels, guides shall be fixed with holding down bolts with PCC 1:2:4 (1 cement, 2 sand, 4 coarse aggregate of nominal size 12mm and down).

In case of hand operated pull and push type rolling shutters and very large gear operated rolling shutters of sizes larger than 10 SqM in area, they shall be provided with ball bearings for smooth and efficient operation. In case of large rolling shutters and depending upon local wind conditions, the rolling shutters should be provided with special locking type of wider channel guides or it shall be provided with central movable channel supports to take up the design wind pressures in the area. The rolling shutters shall be painted with a shop coat of primer and upon fixing and finishing be painted with two or more coats of enamel paint of approved make and quality followed by a coat of primer at site. **Contractor shall submit GA drawing as well as material details and get the make / arrangement approved prior to execution.**

Mode of Measurement: The measurement shall be in SqM .It shall be clear size of opening plus guide channels on both sides for width and 450mm on top for drum.

7.09 Providing & Fixing Mechanically operated rolling shutters

General specification shall be same as in Item spec. no. 7.08. In case of large opening with mechanical device, for opening the shutter the roller shall be fitted with a pinion wheel at one end which in contact with a worm fitted to the bracket plate , caging and pulley with two ball bearing shall be provided with liver box, pair of handles. The arrangement shall be got approved from the Engineer.

Mode of Measurement: Same as per Item spec. no. 7.08.

7.10 Providing & Fixing partly grilled Rolling shutters

Rolling grills are similar in design, construction and operation to rolling shutters and all provision of Item spec. no. 7.08 and shall be applicable to rolling grill and shall confirm to IS:6248. Grill portion shall be fabricated with 8 mm diameter round bars. Straight bars and bent bars bent to the required profile are placed alternatively and held in position with 20 mm wide and 5 mm thick MS flat links. Straight bars shall space as per requirement 100 to 150 mm as per approved drawing. All other arrangement shall be same as per Item spec. no. 7.08.

Mode of Measurement: Same as per Item spec. no. 7.08.

7.11. Providing & Fixing partly grilled and partly with solid lathe Rolling shutters with mechanical device.

The general specifications shall be same as per Item spec. no. 7.08, 7.09 and 7.10

Mode of Measurement: Same as per Item spec. no. 7.08.

7.12 Providing & Fixing in position grill, railing, steel ladder etc.

This work shall be carried out as per the detailed drawing of the Architect. The MS sections shall be of approved quality. The welding shall be perfect and the junctions shall be ground properly. The frames shall be provided with holdfasts and the same shall be grouted with CC blocks of 1:2:4 in brickwork Or fixed with anchor bolt in RCC. It shall be painted with one coat of primer and 2 or more coats of synthetic enamel paint of approved make and first quality over a shop coat of primer.

No wastage or rolling margin for over weight of steel members/sections shall be payable whereas for under weight it should be paid at actual if allowed to use.

Mode of Measurement: The dimensions of the members shall be measured in unit lengths/area (for plates) and the same shall be converted in to weights as per the standard steel table. The payment shall be made based on the weight of the item in kg. Nothing extra shall be paid for rolling margin.

7.13 Providing & Fixing MS inserts in RCC and Brick work

MS inserts shall be using MS rolled sections like Channels, angles, "T", "I" sections, plates, flats etc. of approved make with necessary lugs/ bolts as per drawings and details. Inserts, bolts etc. shall be provided in masonry and concrete works as indicated on the drawing. It is imperative that all inserts, bolts fixtures and fittings shall be provided in their position very accurately. Such inserts and bolts are to be fixed with necessary templates. If due to negligence on the part of the contractor, the inserts, bolts fixtures, and fittings etc, are out of alignment the contractor shall make arrangements to have the inserts and bolts removed and refitted in their proper position as directed by the engineer, at no extra cost. The inserts shall be painted with shop coat of primer followed by one coat of primer and two or more coats of synthetic enamel paint of approved make and quality on completion.

Additional MS members used in the items like chain link fencing etc. other such items beyond the requirements detailed in the relevant item shall also be paid under this item.

Mode of Measurement: Same as per Item spec. no. 7.12.

7.14 Providing & Fixing MS gate

It shall be as per the drawing using standard rolled/ hollow sections, standard cold rolled MS sheets. The welding/ riveting shall be perfect and the junctions shall be ground properly. The welding joints shall be made proper including preparation of edges, welding grinding etc. The grid out of MS square sections/ flats shall be fabricated by cutting, splicing or neatly riveting as per architect's details. The rates shall be inclusive of providing MS square sections with necessary turning for pivots/ hinges, guide channel/ rail track etc as per architects drawing. The gate shall be provided with arrangements for closing; hinges, locking arrangement, stays and it shall be painted with shop coat of primer followed and two or more coats of synthetic enamel paint of approved make and quality over a coat of primer after erection and completion of finishing works.

Nuts, bolts, washers required for fastening the hinges (permanent fasteners) shall be measured in Kg with hinge/ holdfasts and shall be paid as per quoted unit rate of the Item spec. no. 7.14.

Mode of Measurement: Same as per Item spec. no. 7.12

7.15 Providing & Fixing MS pipe railing

It shall be done with the specified class of MS pipe as per the item in the Schedule of Quantities. The design shall be as per the drawings/ instructions. All necessary specials, bends, elbows, tees and holdfasts or clamps shall be provided. If the pipe railing is to be fixed on ground or brick work, it shall be done by embedding the holdfasts, as directed by the Engineer, in concrete blocks PCC 1:2:4 (1cement, 2 sand, 4 graded coarse aggregate of size 12 mm and down). If it is to be fixed to a RCC member, the pipe shall be welded to the steel plate by embedding it in the RCC member. The fabricated railing shall be painted with a shop coat of primer and 2 or more coats of enamel paint of approved make and quality over a coat of primer.

Mode of Measurement: All the members of the railing shall be measured in unit lengths/area and the same shall be converted in to weight using standard steel tables as stated in Item spec. no. 7.12. Concrete for grouting shall be paid under relevant item. Nothing extra shall be paid for rolling margin. **It shall be paid in kg.**

7.16 Providing & fixing MS door frame

It shall be fabricated from standard MS rolled sections like flats, angle T etc. as per the details and drawings. All the members shall be free from rust, flakes, cracks and other fabrication defects. All holes for hinges, bolts, locking plates etc. shall be provided as per drawings/ instructed. The welding shall be smooth. The frame shall be erected and fixed with MS holdfasts of specified size and grouted with cement concrete 1:2:4 (1 cement, 2 sand, 4 graded coarse aggregate of nominal size 12mm and down) The frame shall be painted with a shop coat of primer before erection and 2 or

more coats of synthetic enamel paint of approved make and quality over a coat of primer after erection.

Mode of Measurement: Same as per Item spec. no. 7.12.

7.17 Providing & Fixing MS sheet door

The frame shall be of MS as specified. The door shall be as per the Architects design. The specified gauge MS sheet door shall be welded to the shutter frame work. It should have 3 to 6 hinges as specified depending on the shutter size. It shall have fittings as specified in the item/ Architect's drawings. The door shall be applied with shop coat of primer and 2 or more coats of synthetic enamel paint of approved make and quality as specified over a coat of primer.

Mode of Measurement: Same as per Item spec. no. 7.12.

7.18 Providing & Fixing GI barbed wire fencing

This fencing shall be either made with RCC posts and struts or with MS posts and struts. RCC posts and struts shall be of size and length as specified in the item description in the Schedule of Quantities. It shall be free from cracks, twists and honeycombing.

MS posts and struts shall be of size and section as specified in the item description. One end of the angle shall be forked to have grip in the concrete and the other side shall have holes to fix the fencing wire. The post shall be applied with a coat of primer and 2 coats of first quality synthetic enamel paint.

GI wire

It shall be 12 to 14 gauges with 4 points barb with two wires twisted together or as specified in the item description. It shall be circular in section, free from scale and other defects and uniformly galvanised. The type, length and standard weight of the GI barbed wire shall be as specified below:-

Nominal dia. of wire Line wire	Point wire	Nominal distance between two bars	Length in M/100Kg		
			Nominal	Min.	Max.
2.5	2.2 4	75	1000	934	1066
2.5	2.2 4	150	1134	1066	1200

2.24	2.2 4	75	1576	1490	1668
2.24	2.2 4	150	1890	1778	2000

The GI barbed wire shall be well stretched in number of rows as specified with two diagonals. The spacing shall be at least 15cm from the ground and the rest shall be equidistant. The posts and struts shall be embedded in PCC 1:2:4 or as specified. It shall be fixed in line, level and plumb. The grouting concrete shall be cured for 7 days. The barbed wire shall be held to posts by means of GI staples, U clips or GI binding wire as specified. Turn buckles and straining bolts shall be used at the ends. Two struts shall be provided at the corners and at every 25M. The length of the strut shall be 1.5 times the length of the post. Rate to include all material as MS post, cement concrete, painting etc.

Mode of Measurement: This shall be measured in Running Meter.

7.19 Providing & Fixing GI barbed wire fencing – 1050mm high

General specification are same as in Item spec. no.7.18 but fencing to be fixed over compound wall of height specified in schedule of quantities including flaring the end to be grouted, painting the same with bitumen, grouting the post in cement concrete 1:2:4 (1 part cement: 2 parts coarse sand: 4 parts aggregates) block of specified size, 600 mm length of the angle straight and balance 450 mm will be bent, duly drilled with holes for running/ securing barbed wire in position, placed at 2, 5 M, centre to centre, every 10th post and corner posts or at the change in level the vertical post to be strutted with MS angle of size 50x50x6 mm from both sides and the end post from one side using MS angle 50x50x6 mm grouted in concrete. This includes centring/ shuttering for the CC blocks as may be required, providing and fixing GI barbed wires of 12 to 14 gauge, 4 points wire with 7 horizontals and 4 diagonals fixing with approved U clips, painting the angles posts and struts with two or more coats of approved quality and make Aluminium/ synthetic enamel paint over a coat of primer etc all complete as per drawing/ as directed.

Mode of Measurement: This shall be measured in Running Meter.

7.20 Providing & Fixing of Steel Windows/Ventilators fixed type

Steel windows/ventilators of standard rolled sections (fabricated as per architects design) joints mitred and electrically flash welded (manufactured to relevant IS standard specifications) with non-oxidized lugs (15 x 3mm and not less than 100 length) embedded in cement concrete block 150 x 100 x 100mm of 1:2:4 (1 cement: 2 coarse sand: 4 hard stone ballast 20mm and down grade) cement concrete including glazing of approved quality float

glass of standard thickness as specified in the item shall be fixed with aluminium / MS beading of approved quality and size.

The windows shall be fabricated through reputed manufacturer upon with the approval of drawing and the agency by the Engineer. Standard rolled section like T2,T3,T6, FF2, F3, F5,F4B,F7D, FX6,FZ7,FX8,FZ5,K11B,K12B of approved manufacturer shall be used as per the details. Stay, handle, locking arrangement, tower bolt etc shall be provided as per requirement. Providing and applying shop coat of zinc chromate yellow primer coating for rust proof and 2 or more coats of approved shade and quality enamel paint after installation over a coat of primer.

- i) The section should confirm IS 4351-1976.
- ii) All frames supplied shall be phosphate on all surfaces and finished with zinc chromate yellow primer coating for rust proof.
- iii) All casements shall be measured at site and approved prior to fabrication.
- iv) Shop drawing to be made and approval to be obtained from Client/Architect prior to fabrication..
- v) Hardware fittings shall be provided at appropriate locations in the frames. The shop drawing should indicate the type of provision to be made for hardware fittings.
- vi) A sample of door/ window shall be submitted and got approved from the Engineer.

Mode of Measurement: This shall be measured in SqM out to out.

7.21 Providing and fixing MS Windows / ventilators – Side / top hung operable

General specification is as per Item spec. no. 7.20

Mode of Measurement: Same as per Item spec. no. 7.20

7.22 Providing and fixing MS Windows / ventilators – Partly fixed partly operable

General specification is as per Item spec. no. 7.20

Mode of Measurement : Same as per Item spec. no. 7.20

7.23 Providing & fixing MS Window/ventilator–Centre hung type.

General specification are as per Item spec. no. 7.20. Central hung window / ventilators shall hung on pair of brass cup pivots, riveted to inner and outer frames to permit the shutter to swing to an angle of approx 85Degree. The opening portion of the window / ventilator shall be so balanced that it

remains open at any desired angle under normal weather conditions. Necessary handle, stay and locking arrangement to be provided.

Mode of Measurement: Same as per Item spec. no. 7.20

7.24 Providing and Fixing Louvered Window / Ventilators

These will be fabricated following general specification of Item spec. no. 7.20 It shall be fitted with machine made louvers made out of standard steel sheets to suit the width and thickness of wired glass of 5.5mm thickness. The machine louvers to be fixed with the frame by riveting as per approved drawing.

Mode of Measurement: Same as per Item spec. no. 7.20

7.25 Providing and fixing 'Z' type ventilator

General specification shall be as per Item spec. no. 7.20. Ventilators to be made out of standard MS sections as per architects design. Top and bottom fixed glazing shall be of 4 mm float glass as per Item spec. no. 4.01. In between 8 gauge BRC mesh of 25x25 mm shall be welded the horizontal plane with 10 x 3 mm MS flat or of the suitable size beading with stiffeners as required..

Mode of Measurement: This shall be measured in SqM in the elevation out to out of frame.

7.26 Providing and fixing Fibre glass sky light dome.

The fibre glass dome shall be made out of specified thickness of fibre glass of any shape and colour as per architect's detail. The shop drawing shall be submitted and got approved as well as sample shall be got approved from the Engineer. A rim of adequate width and thickness and shape shall be provided in the design for fixing the dome on the bearing of element where it will be fixed with GI bolts, neoprene washers and nuts. The bolt head/nuts to be coated with epoxy compound to safeguard it against rusting. The rim shall overlap the width of wall or parapet to ensure and check ingress of rain water. If need be MS bearing plate or frame made out of standard MS section as per approved details to be fixed. approved drawing. The reinforcing MS members shall be coated with fibreglass and base plate etc. painted with one coat of primer and two or more coats of enamel paint of approved make and quality.

MS sections / base plates used shall be paid under relevant tender item.

Mode of Measurement: The surface area shall be measured in SqM. MS standard section used for structure shall be paid under the item 8.01.

7.27 Providing and fixing Poly carbonate sky light.

Plain or smoke brown plain polycarbonate sheet or multi-walled sheets of approved make, quality, thickness and shade as specified in schedule of quantities fixed with all accessories supported over anodised aluminium, MS powder coated or galvanized members with EPDM or approved gaskets, fixing hooks, cadmium coated self tapping screws, EPDM or approved washer nuts & bolts, clips including apply two or more coats of enamel paint of approved make and quality paint over a coat of red oxide over MS material etc. complete as directed. The entire job is to be executed using approved material as per architect's drawing including providing and filling gaps silicon sealant wherever necessary to make the surface water tight and leak proof. Nothing extra for providing silicon sealant shall be paid.

Mode of Measurement: This shall be measured in SqM. MS standard section used for structure shall be paid under the item 8.01.

7.28 Providing and fixing GI pipe railing

GI pipe of specified class and diameter of 800 to 1000 mm height above finish floor level shall be fixed @ 1000 mm c/c as vertical and top and bottom rail of GI "A" class 32 mm dia. NB or to be provided as per Architectural drawing including welding, specials, bends and 2 coats of enamel paint over a coat of red oxide primer. GI pipe railing shall be fabricated as per the drawing including cutting/fitting, grinding / mitring to match curvature, preparation of surface for close jointing welding, bending etc. The supports, horizontal members shall be in single piece.

MS rolled sections used for base plate / or any other member in the railing work shall be paid under relevant Item spec. no. 7.12.

Mode of measurement: Length of the pipe(s) shall be measured to correct cm and multiplied by standard coefficient or actual unit weight which ever is lower to arrive quantity in Kg. It shall be paid in kg.

7.29 Providing and fixing grill made out of MS hollow section

General specification shall be same as per Item spec. no. 7.12 but using MS hollow round, square or rectangular sections as specified / as per drawing. MS standard sections like plates, angles, flats, channels etc used in the fabrication shall be measured separately under relevant Item spec. no.7.12.The grill / ladder shall be given a shop coat of anti rust zinc chromate primer and two or more coats of enamel paint of approved make, quality and shade over a coat of primer after installation.

Mode of Measurement:

The individual members shall be measured and converted in weight as per unit weights as per standard co-efficient or actual unit weight which ever is lower to arrive quantity in Kg.

It shall be paid in kg.

8.0 ROOFING

8.01 Providing, fabricating and erecting MS structural steel work for trusses, purlins, girders, columns, rafters, runners, struts, wind ties, bracings, sag rods, etc.

All structural steel materials such as angles, RS joists, flats, tees, plates, channels, etc. shall conform to the latest edition of IS 226. All structural steel shall be free from twists/bents before fabrication and such lengths should be discarded. Cutting of members shall be done by shearing, cropping, sawing or gas cutting. Contact surfaces of plates and butt joints shall be accurately machined over the whole area so that the parts connected shall butt over the entire surface of contact. Welding of pieces shall be done with the approval of the Engineer.

The components parts shall be assembled in such a manner that they are not damaged in any way and specific cambers as shown in the drawing or as directed by the engineer, shall be provided.

For bolted connection, where ever necessary washers shall be tapered or otherwise suitably shaped to give satisfactory bearing. The threaded portion of the bolt shall project beyond the nut by at least 1.5 threads.

Welding shall be done in accordance with the latest edition of IS 813 and 814, Code of Practice for use of Electric Arc welding for general construction in mild steel. In welding it must be ensured that the base metal is in fused state when filled metal makes contact with it, filler metal does not overflow upon and unused base metal, base metal is not cut along the weld edges, flowing metal floats the slag, oxide and gas bubbles at the surface behind advance pole. For this purpose current shall be adjusted or the electrode size is changed. Welding shall be free from cracks, discontinuity, under or over size welding thickness.

Surface to be welded shall be free from loose mill scale, rut, grease, paint and any other foreign material. As far as possible avoid the welding at heights and at difficult positions. Generally fillet welding is preferred. The parts to be welded are brought in as close contact as practicable and rigidly clamped together.

Before erection steel work shall be thoroughly cleaned of rust, loose scale, dust, welding slag and shall be given one coat of red oxide primer of approved make and one coat of first quality synthetic enamel paint of approved make as specified in the item before erection and final coat of painting after the erection as directed.

Steel members shall be hoisted and put in position carefully without any damage to the member and to the building and labour. The trusses shall be lifted at such points that they do not buckle or deform or be unduly

stressed. The end of the truss which faces the prevailing wind shall be fixed and the other end may be kept free to move. The steel work shall be securely fastened wherever necessary, temporarily braced, to provide for all loads to be carried by the member during erection including the load due to the erection equipment and its operation. No permanent bolting or welding is done until proper alignment has been obtained. The holes for the rivets shall be determined with the help of templates and drilled. Erection clearance of the cleared ends shall not be more than 1.5mm and without cleating end clearance shall not be more than 3mm. Grouting or embedding of structural steel members done after the approval of the alignment, level and position of the members by the engineer. In case, bolts receiving the base plate of the truss is not grouted using template and pockets left, in such case the bolts shall be grouted with non shrink ready mix grout.

Important points:

Before the actual execution of the job, the contractor shall prepare fabrication drawings for all structural steel work from the structural drawings supplied to him and determine the exact cutting lengths of the members, sizes of gusset plates, welding lengths by marking out on a level platform to full scale.

Welding plant, electrodes and other equipment, scaffolding, labour shall be arranged by the contractor at his cost. Erection equipment of required capacity, sufficient number of spare parts and staff should be maintained by the contractor at site at his cost.

Mode of Measurement: All structural steel members shall be measured in length, area of MS plates shall be measured in SqM and converted into weights as per IS tables for steel and paid for in Kg. All rivets, bolts shall be measured in Kg and paid for in same rate as structural steel. No deduction shall be made for rivet holes and bolts. Nothing extra shall be paid for wastages and rolling margin in case of over weight. However in case of underweight actual shall be paid for.

8.02 Providing, fabricating and erecting MS structural steel work for trusses, purlins, girders, columns, rafters, struts, wind ties, bracings, etc. with MS B class pipes/ Tubular section

The general specifications are same as given in item 8.01 but with MS B class pipes, medium duty square or rectangular sections of approved make as per item description given in the schedule of quantities. Part of work involving standard rolled sections shall be measured and paid under Item spec. no. 8.01.

Mode of Measurement: Same as per Item spec. no. 8.01

8.03 Providing, cutting, fabricating and fixing MS chequered plates

The chequered plates shall be cut to the required shape by shearing or with arc gas cutting machine. The cut edges shall be ground and finished properly. The treads of the stair case or any other element shall be bent to a profile so that edge do not hit while traversing. The plates shall be given a shop/site coat of primer and two or more coats of approved first quality synthetic enamel paint over a coat of primer after installation.

Handles / lugs etc shall be paid in relevant item of MS inserts.

Mode of Measurement: The area of the plates as laid shall be measured and it shall be converted into weight using standard IS table for steel and paid for in Kg. Nothing extra shall be paid for wastages / rolling margin in case of over weight. However in case of underweight actual shall be paid for.

8.04 Providing and fixing MS holding down bolts

The MS holding down bolts of specified diameter, length and shape shall be provided as per the drawings in line and level. These shall be fixed to RCC work or brickwork by grouting it with concrete. The bolt shall be provided with nuts and washers. The grease shall be applied to the threaded portion. If the bolts need some adjustment, it shall be provided with a wooden piece 75 x 75mm or 50mm diameter. GI pipe around bolt shall be provided at the time of concreting and shall be removed after initial set. If required template should be provided.

Mode of Measurement:

The length of the bolt shall be measured and according to the diameter. of the bolt, the length shall be converted into weight using standard steel tables and paid for in kg.

8.05 Providing and fixing AC corrugated sheets

AC sheet and accessories shall be free from cracks, chipped edges and corners. The fixing shall be done as per the latest edition of IS 459 at all heights including storage, shifting, handling, scaffolding/staging as required. The spacing of the purlins shall not be more than 1.4m for 6mm sheets. The light shall not be visible from the joints of the AC sheets. The AC sheets to be kept on ceiling/cladding shall be placed with smooth side upward and the AC sheets to be put in cladding shall be placed with smooth side out side. The AC sheets shall have at sides a lap of half corrugation and an end lap of 150mm minimum. The free over hangs at ends shall not be more than 300mm. It shall include all tools, plants, ladder, scaffolding, and triangular pieces in cladding, at gable ends, at north light, side laps or end laps. The work shall be carried out at all heights without any extra cost.

Hole for 8 mm diameter L or J bolts shall be drilled and not to be punched in the ridge of the corrugation. The diameter of the hole shall not be more than the diameter of the bolt by 1.5mm. The bolts shall be galvanised J or L hooks with nuts and 2 Nos. of bitumen washers. Sheet should be laid leak

proof. All AC sheet accessories shall be painted or white washed as specified in the item or directed by the engineer and shall be paid under relevant item. The rate to be inclusive of overlaps wastage etc.

Mode of Measurement: The AC sheet roofing shall be measured in SqM without overlaps. Overlap, corrugation, wastage are inclusive in this item.

8.06 Providing and fixing AC accessories

The general specification are same as per Item spec. no. 8.05 but for providing and fixing north light curve, AC ridges, curves, corner pieces, bargeboards, eaves board, etc all required accessories. The rate to be inclusive of overlaps wastage etc

Mode of Measurement: These accessories shall be measured in Running Meter. Overlap, corrugation, wastage are inclusive in this item.

8.07 Providing fabricating and fixing aluminium flashing

The aluminium flashing shall be by using aluminium sheet of thickness specified in the item and shall be fabricated as per the profile confirming to the drawing / instructions (suiting to the requirement) As far as possible, the flashing without joint shall be provided however joints if any inevitable, shall be specially formed to ensure water tightness and making it leak proof. This shall be fixed between the RCC fascia and the AC sheets with bitumenistic compound / bitumen to prevent leakage including embedding if required and sealing it appropriately with bitumenistic compound. The rate to be inclusive of overlaps wastage etc.

Mode of Measurement: This shall be measured in SqM. Overlap, corrugation, wastage are inclusive in this item.

8.08 Providing and fixing FRP sheet

Providing and fixing FRP sheet of specified thickness of approved make, colour and quality in matching corrugation and of transparency as per requirement for sky light or for roofing, including special washers, anchors etc A sample of the sheet should be got approved. The rate to be inclusive of overlaps wastage etc.

Mode of Measurement: This shall be measured in SqM. Overlap, corrugation, wastage are inclusive in this item.

8.09 Providing and fixing GALVALUME colour coated sheet.

Providing & fixing **GALVALUME colour coated cold rolled sheets** made out of 0.5mm base metal thickness and Total Coated Thickness as 0.55mm, yield and tensile strength minimum 550 Mpa cold rolled sheet with hot dip metallic coating of aluminium zinc alloy 150 Gms/SqM, density minimum

4.8 Kg/SqM with minimum 20 microns super durable polyester paint or silicon modified polyester on top of sheet subsequent to the corrosion inhibitive primer, conversion coating and zinc alloy coating applications including 5 microns back-up epoxy coating at the bottom of sheets on corrosion inhibitive primer and conversion coating having 1020/1080mm cover width with minimum 32 mm high crest at 220/250mm C/C in length as approved by the architect and with necessary suitable imported galvanised carbon steel 40micron zinc coated/minimum 20micron Zinc-Tin alloy coated Hexagonal head, self drilling & self tapping screws of ITW Buildex(R) AS 3566 Class 3/ HILTI/BOSCH having drilling capacity minimum 6-8mm and in required diameter and length fixed using torque drill machine all complete with EPDM sealing washers with sealant.

Rate shall include cost of plastic caps of approved colour of UV resistance and button bolts etc. for the fasteners.

Rate to include also fixing in roofing, cladding and all accessories and utilities like ridge, corner piece, aprons, barge boards, gutters, flashings, end pieces, etc., all accessories etc. complete as per the drawing and directed by the Engineer.

The rates shall include all materials, tool / tackles, labour, scaffolding, staging including handling and storage of the materials etc at all heights.

Providing guarantee of sheets against perforation by weathering for 20 years and guarantee against peeling, chalking and fading for 15 years etc complete as directed.

Measurement shall be paid for the plain area of the sheet laid. Overlaps, wastages, corrugation etc are inclusive with the rates and shall not be paid for.

Mode of Measurement: This shall be measured in SqM. Overlap, corrugation, wastage are inclusive in this item.

8.10 Providing and fixing plain GALVALUME sheet for cladding / ceiling

The general specifications are same as per Item spec. no. 8.09. The rate to be inclusive of overlaps wastage etc.

Mode of Measurement: This shall be measured in SqM. **Overlap, corrugation, wastage are inclusive in this item.**

8.11 Supplying and fixing polycarbonate sheet

Supplying and fixing polycarbonate sheet of specified thickness and colour of approved make plain or in curved profile roof sheeting with anodised aluminium beading over structural steel member (structural steel members shall be paid under relevant tender Item spec. no. 8.01 or 8.02) fixed with GI

bolts or EPDM coated self tapping screws with EPDM sealing washer with filling the gaps with silicon sealant. Item rates shall include cost of plastic caps of approved colour of U V resistance, sealant wherever required etc complete as per architects drawing and as approved The work shall be carried out for all heights with scaffolding, labour tools etc. without any extra cost. **The rate to be inclusive of overlaps wastage etc.**

Mode of Measurement: This shall be measured in SqM. Overlap, corrugation, wastage are inclusive in this item.

SECTION 9.00 MISCELLANEOUS WORKS

9.01 Providing and fixing night latch of approved make such as Godrej or equivalent.

The night latch shall be approved make, quality and finish with locking horn and set of three keys (original supplied with lock) to fixed with brass screws of matching colour.

The rate shall be quoted for providing night latch of approved quality and make fixing the same in the door shutters / frame and finishing and polishing the surrounding.

Mode of Measurement: This shall be measured in Number.

9.02 Providing & fixing approved make 6 lever Mortise lock with pair of brass oxidized / chromium plated handles.

The lock shall be of approved make and finish with locking horn and set of three keys (original supplied with lock).

The rate quoted shall be for providing mortise lock with handles in doors and finishing as per item schedule.

Mode of Measurement: This shall be measured in Number.

9.03 Providing & fixing tubular lock.

The lock shall be of brass chromium plated or oxidized of approved make and model with locking horn to be fixed in doors and provided with a set three keys (original supplied with lock).

Mode of Measurement: This shall be measured in Number.

9.04 Providing and fixing hydraulic door closer of approved size and make.

The hydraulic door closer shall be of approved shape, size and colour suiting to the requirement. Shall be fixed well secured on door shutter and frame with brass screws of matching colour including filling and maintaining oil till the operations are set including fine adjustment. This shall be fixed at places as directed by the Engineer.

Mode of Measurement This shall be measured in Number.

9.05 Providing and fixing PVC hand rail 50 mm wide of approved colour.

The PVC hand rail shall be in one length and to be fixed over base flat securing it tightly including bending in curvature welding if needed and finishing smooth. The ends to be properly terminated so that it does not tend to come out etc complete as directed.

Mode of Measurement: This shall be measured in Running Meter.

9.06 Providing & Filling the electrical jharis 250mm to 150mm wide and depth as specified in schedule of quantities with cement mortar 1:3 and finishing the same to match with the surrounding, curing for 7 days, finishing with painting/ white wash or any other finish, etc. complete as directed. The work is to be coordinated with internal electrification contractor and ensure that the conduits are secured properly. The top finish should be matched and should not be visible separately after finishing.

Mode of Measurement This shall be measured in Running Meter.

9.07 Dismantling brick masonry walls and partitions, plastered or unplastered as per instructions including finishing the broken surface to match with the surrounding, removing the debris as directed within site, cutting the reinforcements if any etc. complete as directed. The rates include necessary cordoning the area including erecting appropriate screen if required and necessary scaffolding etc. The dismantled debris is required to be collected and disposed off within the site including all lead and lifts. The dismantling for the opening shall be carried precisely as directed by the Engineer layer by layer.

Mode of Measurement: This shall be measured in CuM.

9.08 Dismantling the RCC beams, slabs, lintels, columns, parti walls, platform etc. including finishing the broken surface to match with the surrounding, removing the debris within site, including cutting the reinforcement if any etc. complete as directed. The rates include necessary cordoning the area including erecting appropriate screen if required and necessary scaffolding etc. The dismantled debris to be collected and disposed off within the site including all lead and lifts with the progress of dismantling work. The dismantling for the opening shall be carried precisely as directed by the Engineer. The reinforcement steel recovered from dismantled concrete shall be stacked separately and shall be ultimately handed over to stores/yard of the Project Authority / Implementation of Bull Production Through Imported Embryos of HF & New Jersey Under NDP-1 Vikas Khand – Kalsi. Distt. Dehradun at site.

Mode of Measurement This shall be measured in CuM.

- 9.09 Filling the jharis 25mm to 150 mm wide and 50 to 100 mm deep with PCC (1:2:4) and Finishing the top with plaster of appropriate grade to match with surroundings including painting as stated in Item spec. no. 9.06 etc. complete.**

Mode of Measurement This shall be measured in Running Meter.

- 9.10 Making holes up to 30 CM in dia. or 30 x 30 cms. in size in RCC works and filling the same with PCC(1:2:4) and finishing the same as per surrounding including scaffolding, cutting the reinforcement bars, curing etc. complete.**

Mode of Measurement This shall be measured in Number.

- 9.11 Providing and fixing approved quality and make Hydraulic floor door spring.**

This shall be fixed in floor. The floor shall be cut properly for the placing of the Hydraulic floor spring if necessary. The flooring near the spring location shall be redone matching the existing flooring. Nothing extra shall be paid for this.

Mode of Measurement: This shall be measured in Number.

- 9.12 Providing and fixing 150mm wide PVC water stop in proper alignment at construction joint, joining as per Suppliers recommendation complete as per direction of Engineer. Rate to be inclusive of wastage and overlap.**

Mode of Measurement This shall be measured in Running Meter.

- 9.13 Providing and fixing in RCC side wall or bottom or cover slab of sump 75mm dia GI B class pipes up to 600 mm long with puddle flange and outside flange or threaded end for connecting the inlet, outlet, washout and overflow pipes.**

The specification of the GI pipe shall be as per the specification given in Section 11.00 of the this Technical specifications. It shall be placed during concreting the walls of the sump/over head water tank etc. The rate quoted shall be for the providing and placing of the pipe with flange or threaded in line and level.

Mode of Measurement: This shall measured in Number.

- 9.14 Providing and fixing in RCC side wall or bottom or cover slab of sump 50mm dia. GI B class pipes up to 600 mm long as per Item spec. no. 9.13.**

Mode of measurement: This shall be measured in Number

- 9.15 Providing and fixing in RCC side wall or bottom or cover slab of sump 38 or 40mm dia. GI B class pipes up to 600 mm long as per item spec. no. 9.13.**

Mode of measurement: This shall be measured in Number.

- 9.16 Providing and fixing in RCC side wall or bottom or cover slab of sump 25mm dia. GI B class pipes up to 600mm long as per item spec. no. 9.13.**

Mode of measurement: This shall be measured in Number.

- 9.17 Providing and fixing removable CI gratings of approved quality for rain water pipes including painting the same with two coats of approved enamel paint for 100mm dia**

Mode of Measurement: This shall be measured in Number

- 9.18 Providing and fixing removable CI gratings of approved quality for rain water pipes including painting the same with two coats of approved enamel paint for 150mm dia**

Mode of Measurement: This shall be measured in Number.

- 9.19 Providing and fixing special CI drain in flooring**

Providing and fixing of the special floor trap (CI or SS traps) and fixing in position as per drawing / details and as directed including providing and constructing 600 mm deep, 300 x 300 and 230 mm thick brick chamber in CM 1:6 with 75 mm thick PCC 1:4:8 PCC finishing the inside smooth with cement mortar 1:4 with neat cement punning, bottom to be finished with IPS 40 mm thick. The trap is required to be fixed at required level and be connected with CI / SW pipe to drainage line. The trap if required to be fixed line and level over the chamber but in PCC 1:4:8 (in lieu of internal finishing) as per the details. The out let of the trap shall be connected to CI / SW pipe up to required level before it is connected to main line through Tee etc complete as directed. CI / SW pipe line shall be measured and paid under relevant tender item.

Mode of Measurement: This shall be measured in Number.

- 9.20 Providing and fixing Air vent Cowl**

The Air vent cowl shall be of CI or PVC as specified in the item description. it shall be of approved quality and size matching to the air vent pipe including sealing the joint.

Mode of Measurement: This shall be measured in Number.

9.21 Dismantling kota / mandhana stone / mosaic tiles ceramic / glazed tile in flooring, dado or skirting

Work shall be carried out as per instructions of the engineer; including dismantling of under laid cement mortar and finishing the broken/dismantled surface of match with the surroundings. Disposal of debris/muck within the site at approved location, stacking the recovered stone pieces, stacking at site and handing over the useable ones to stores / yard etc. complete as directed.

Rate includes all labour, material, etc. complete.

Mode of Measurement: This shall be measured in SqM of area dismantled.

9.22 Dismantling plain cement concrete (PCC) of any grade in flooring/pavement/wall foundation, etc. as per instruction of the site engineer and disposal of debris/muck within the site at approved location, etc. complete.

Mode of Measurement: This shall be measured in CuM of PCC dismantled.

9.23 Removing existing MS/Wooden doors/ windows/ ventilators/ grills, Rolling shutter etc. carefully by removing screws / dismantling hold fasts as directed, stacking the same at site and handing over to project authority/ Implementation of Bull Production Through Imported Embryos of HF & New Jersey Under NDP-1 Vikas Khand – Kalsi. Distt. Dehradun to Stores / yard. The broken surface shall be finished to match with surroundings. The rate includes all labour, material, etc, complete.

Mode of Measurement: This shall be measured in SqM of the clear opening from the door/ window/ ventilator and grill rolling shutter is removed.

9.24 Dismantling CI tile flooring including the under laid cement mortar. Disposing debris/muck/broken CI tiles as directed within the site at the approved location. The full CI tiles shall be handed over to the project authority to stores / yard.

Mode of Measurement: This shall be measured in SqM of CI tile flooring dismantled.

9.25 Providing and fixing aluminium sheet 20 gauge, 30cm wide on the expansion joint. One end of the sheet to be fixed with SS screw and other end to be kept partially free by making an elliptical slot and fixing with the screw so as to allow for the expansion of the building and consequent

movement of the aluminium sheet. Rate includes all labour material, etc. complete.

Rate to be inclusive of wastage and overlap.

Mode of Measurement: Measurement shall be taken for actual area of aluminium sheet laid and shall be paid in SqM.

9.26 Dismantling/scraping and removing fully the plain/sand faced/grit cement plaster from the brick/RCC works including necessary scaffolding at all height and levels and disposing the debris within the site at approved location, etc. complete. Rate includes all labour, materials, etc. complete.

Mode of Measurement: shall be taken of the actual area exposed after the cement plaster is fully removed.

9.27 Cutting RCC roads/floors/pavements with groove cutting machine to make grooves 6 –10mm wide and up to 25mm deep in true line and absolutely vertical. The grooves shall be cut within 7 to 10 days of laying using RCC wing sharp cutter using appropriate cutting wheel and skilled operator in the perfect line as per the layout of groove already approved by the site engineer. The joints should be properly marked while laying flooring and be cut absolutely matching the construction expansion joint.

Mode of Measurement This shall be measured in the Running Meter of the grooves cut.

9.28 Providing and filling silicon sealant of approved make and grade in grooves in specified section (i.e. width and depth) as per the details and at the junction of windows/door/ventilators with the walls and in the floor grooves. The interior of the joints shall be filled with material like polypropylene rod and the sealant applied. The depth of sealant shall be 6 – 10mm or as specified for curing and vulcanization. The work shall be done strictly as per the manufacturer specification and preferably by their authorized applicator. Payment shall be made in running meter, per cm width per cm depth of the sealant applied. The rates shall be inclusive of all the labour, cost of material, filler and sealant etc. complete.

Procedure (general): Install the proper sealant as per the manufacturer specification in a neat workman like manner.

Material shall be stored at site as per manufacturer's specification.

Material which has exceeded its recommended shell life shall not be used.

Weather and temperature condition during installations shall confirm to manufacturer's recommendations

Prepare a mock installation of each major type and use of sealant at site for approval.

Test for the adhesion of the sealant by cutting about 10 cm length of the cured sealant and peel the remaining sealant from the substrates. The sealant should tear within itself and should not come out from the substrates line a ribbon bead. The product data and samples, the joint preparation and condition, joint design, joint filler material, application maintenance and site quality control should be as per manufacturer specification.

Mode of Measurement This shall be measured in Running Meter of joint sealed proportionate to the section of joint sealed.

9.29 Providing and fixing gypsum board false ceiling

Providing and fixing gypsum board false ceiling with necessary GI frame work/suspenders as per the specifications of India Gypsum Ltd. or approved equivalent in the profile as per architects drawing.

Suspenders (hangers) shall be of 4mm diameter GI rods to be fixed with GI fasteners, carriers and holding rails as per the specifications of the false ceiling manufacturer. The gypsum board to be joined and finished so as to have a flush look which includes filling and finishing the tapered and square edges of the board with jointing compound and applied with paper tape and a coat of primer suitable for gypsum board and providing and applying two coats of plastic emulsion or synthetic enamel paint, etc. complete as directed.

Mode of Measurement: This shall be measured in SqM.

9.30 Taking the delivery of Insulated door (Cold Store / Deep Freeze doors) of maximum size 3m x2.5m, from the Implementation of Bull Production Through Imported Embryos of HF & New Jersey Under NDP-1 Vikas Khand – Kalsi. Distt. Dehradun / Contractors site store and fixing the same in line and level, cutting the brickwork, RCC and fixing with holdfast in cc 1:2:4 blocks or to be grouted in RCC mullion including supporting to keep in exact position till the CC blocks / RCC mullion attains sufficient strength, finishing the surface smooth, curing etc. in line level and plumb , all complete as directed. The concrete blocks or RCC mullion shall be paid under relevant tender item. This work to be carried out in coordination with the Cold Stores / Deep Freeze contractor.

Mode of Measurement: This shall be measured in SqM.

SECTION 10.0 ROAD WORK

Materials

Moorum:

It shall be got from approved quarries. It shall be granular and gritty. It shall be free from dust, all rubbish, and any organic materials as well as clods of black cotton soils. The material shall be got approved prior to its use in road construction.

The material shall be stacked on a level ground. If the item is only for supplying of moorum, then it shall be measured in CuM. The rate shall include digging the moorum, supplying at site, conveying with all lead and lift and stacking the same at site as directed by the Engineer. The rate shall also include all tolls, duties, fees, royalties etc.

Sand:

The sand shall be from a river or nala or sea. It shall be clear, sound, properly graded; free from organic material, silt, clay etc. and it shall be well graded.

Metal:

The stone metal shall be hard, sound, durable, stone of close texture as is locally available and reasonably free from decay and weathering. It shall be angular or cubical. Round elongated or flaky metals shall be rejected. No round or oblong pebbles or angular chips shall be allowed. The size of the metal shall be 40mm to 63mm as specified in the item. All disintegrated stone shall be rejected. The metals shall be tested for Abrasion value, Aggregate Impact value and Flakiness Index in standard laboratories before the material is put to use and they shall conform to relevant IS codes as given in page 4.17 of this section. Metal shall be stacked at site on fairly level ground.

Rolling:

A power roller shall, as a rule, be not less than 8-10 tonnes but if at any time still heavier rollers are required on the works the contractor shall have to bring them as may be directed by the Engineer. A hand roller should not be less than a ton. Rolling shall progress from edges to the centre of the road in strips parallel to the centre line of the road. Rolling shall be done by lapping uniformly each preceding rear wheel track by at least one half width of the track.

On super elevations, rolling shall be started at inner edge and shall progress towards outer edge. During and after rolling, the surface shall be checked for grade and camber, with camber plate. The roller shall be started, worked or stopped without jerks. Rolling shall normally be done for a minimum length of 100 M.

10.01 Surface dressing including preparation of sub grade

The high portion of ground shall be cut down and /or hollows and local depression shall be filled up to 300mm to bring the sub grade to required

level and camber. The gradient and camber/slope should be maintained as per requirement so as to give an even, neat and tidy look to the work.

The area requiring cutting more than 300mm, quantity of cutting shall be paid separately under relevant items of earthwork for the quantity exceeding 300mm depth of cutting. Similarly when quantity of filling exceeds the available quantity of earth for filling such filling shall be paid separately under relevant item of earth work. This includes road formation in embankment where filling and rolling is involved. **The rate for the items shall also include jungle clearing wiz, trees, plants, shrubs; grass etc. Nothing extra shall be paid towards site clearing.**

Preparation of Sub grade

The sub grade shall be levelled to the proper level and camber by filling depressions with excavated material and cutting of protuberances. The sub grade shall be made to have as nearly as practicable, a uniform bearing layer and all hard spots therefore be properly excavated and refilled. All soft and spongy parts of the sub grade shall be excavated and refilled with approved materials of 15 cm layers for the same reason. The cost of excavation in excess of 300mm depth will be paid under the item for excavation. The sub-grade shall be watered as directed at least 12 hours before rolling the sub-grade using 8-10 MT smooth wheeled road rollers to achieve desired compaction.

Proper accesses should be prepared for the roller to get to the sub-grade and all manholes frames and covers should be removed and replaced by plates of adequate strength free of cost whenever they interfere with the free rolling of the sub grade.

After rolling the camber, super elevation and longitudinal slope etc. of the sub grade shall conform in shape to those of the finished road surface. This should be checked with the help of levelling instrument, level strings and camber board as requirement and as directed by engineer. When sub-grade consists of black cotton soil (or as instructed by engineer), a thin layer of moorum or coarse sand shall be provided below any base course, watered and rammed and rolled tightly. Supply and filling sand or moorum shall be paid under relevant item.

Mode of Measurement: This shall be measured in SqM.

10.02 Providing & Laying Base course

65 mm nominal size or as specified, metal shall be spread over the prepared base to a thickness of 130 mm for consolidated one or two layers as specified, the metal layer dry and wet shall then be rolled and consolidated by a 8-10 tonne power roller to achieve consolidated thickness of 100 mm. After the dry rolling is completed, smaller size of similar stones, stone grit, stone dust, sand etc. shall be spread. The

thickness of the consolidated layer after completing all the operations described below shall be less than 100mm then blinding material like moorum or red bajri shall be laid and watered and rolled. Rolling shall start from edge of road and proceed towards the crown in longitudinal strips overlapping on successive strips by at least one half the width of the rear wheel of the roller. The operation shall continue till no visible settlement of the metal or movement under the roller is observed. The gradient and camber shall be checked from time to time by means of level, stacks, strings camber board etc. Any depression or hump shall be corrected by removing completely the metal layer there at the spot and rolling the same satisfactorily.

Moderate sprinkling of water and rolling shall be continued and stone dust shall again be spread if required till all the voids are completely filled and the movement of metal under the wheel ceases. If there is excess powder the same shall be removed lightly by brooms.

The surface shall be checked for camber etc. the unevenness or undulations shall be rectified as required. The whole surface shall be then watered, extra powder added if required, brushed and rolled to obtain a mosaic surface. This type of surfaces shall be maintained till upper layer is laid.

Mode of Measurement: This shall be measured in CuM for the consolidated thickness laid

10.03 Providing & laying wearing course

50 mm metal shall be spread, in one or two layers as specified, over the prepared base to a thickness of 75 mm consolidated each and the rate of spreading similar stone grit shall not be less than 10 to 15 cft/100 sq.ft. the other operations such as rolling watering etc. as per Item spec. no. 10.02.

Mode of Measurement: This shall be measured in CuM for the consolidated thickness laid.

10.04 Providing & laying 20mm thick layer of hot asphalt & aggregate (pre-mix carpet) over the wearing course

Laying and compacting carpet of 20mm thickness in single course composed of suitable small sized aggregates premixed with bituminous binder on prepared base. The surface shall be brushed free of any loose blinding material out of the voids into which it has set. The surface then shall be tested for depression, which shall be made up by re-metalling and blinding with aggregate of a size equivalent to the depth of the depression.

Tack coat: Bitumen 80/100 of approved brand, heated to a temperature of 350 Deg. F. shall then be applied evenly to the cleaned WBM surface by means of a pressure distributor at the rate of 4.0 kg per 10 SqM.

Proportioning of materials: 0.18 CuM of stone aggregates of 13.2 mm; passing 22.4 mm sieve and retained on 11.2 mm sieve and 0.09 CuM stone aggregates of 11.2 mm size passing 13.2 mm sieve and retained on 5.6 mm sieve i.e. total 0.27 CuM per 10 SqM shall be premixed with 9.5 kg of bitumen for 13.2 mm and 5.1 Kg for 11.2 mm aggregates. The stone aggregate shall be hot & dry and contain not more than 2% moisture before use. It shall be first screened of dust, measured and heated. Bitumen of approved make and grade shall be used.

Preparation of premix; Hot mix plant of appropriate capacity and type shall be used for preparation of mix material. The hot mix plant shall have separate dryer arrangement for heating aggregates and pug mill for mixing aggregates and binder. The temperature of the bitumen binder at the time of mixing shall be in the range of 150 to 163 Degree C and that of aggregates 155 to 163 Degree C so as to discharge the mix at 130 to 60 Degree .

While the bitumen 80/100 is still hot the surface shall be laid evenly with premix by suitable means and rolled with smooth wheeled 10 T rollers in required line level and camber. Rolling shall begin at edge and progress towards centre longitudinally, except on the super elevation and unidirectional cambered portion, it shall progress from the lower to upper edge parallel to the centre of the pavement. Any soft spot or depressions detected at a later date shall be made up as directed by the engineer.

Mode of Measurement: This shall be measured in SqM.

10.05 Providing & Laying Seal coat with hot bitumen

Providing and laying premix seal coat comprising of a thin application of fine aggregates premixed with bitumen binder is applied to water proof road, to seal the surface, to prevent oxidation due to air circulation to strengthen bitumen surface or to improve texture, reduce porosity and tendency to disintegration.

Seal coat with hot bitumen: Treatment consist of laying premixed stone chippings 0.09 Cu.m (aggregates) of 6.7 mm size defined as 100 % passing from 11.2 mm sieve and retained on 2.36 mm sieve mixed with 9.8 Kg bitumen of approved make and grade per 10 SqM.

The binder shall be heated in boilers of suitable design to the temperature appreciate to grade of bitumen approved by Engineer, and the seal coat applied through suitable means and rolled by smooth wheeled roller of 10 T including spreading required quantity of dry sand/ aggregate dust and

removing the excess sand / dust after 2-3 days after opening the road for traffic or as directed by Engineer. .

Mode of Measurement: This shall be measured in SqM.

10.06 Providing & Laying Seal coat with bitumen emulsion

The General specification shall be same as per Item spec. no. 10.05 but providing and laying Seal coat with bitumen emulsion.

Mode of Measurement: This shall be measured in SqM.

10.07 Providing & Laying Seal coat with pre-mixed sand

The General specification shall be same as per Item spec. no. 10.05 using sand or grit which will consist of clean, hard durable uncoated dry particles and shall be free from dust, soft or flaky/ elongated material, organic matter or other deleterious substances. The sand/grit shall pass 2.36 mm sieve and be retained on 180 micron sieve. The quantity of sand/grit for premixing shall be 0.06 CuM per bitumen 6.8 Kg of approved make and grade for 10 SqM areas.

The binder shall be heated in boilers of suitable design to the temperature appreciate to grade of bitumen approved by Engineer, and the seal coat applied through suitable means and rolled by smooth wheeled roller of 10 T including spreading required quantity of dry, clean sand and removing the excess sand after 2-3 days or as directed by Engineer.

Mode of Measurement: This shall be measured in SqM.

10.08 Providing & Laying RCC kerb

Road kerbing shall be cast-in-situ / pre-cast using concrete of grade M-20 as per the exposed or smooth plastered with neat cement finish as specified in the item description in the Schedule of Quantities. The item will include clearing the site up to desired level so as to match the level of kerb stone with that of road (including excavation / removal of earth/ fill if any), laying 100 mm thick PCC base as specified in the item, necessary centring / shuttering, moulding / chamfering curing etc. Steel reinforcement in case provided as per the drawing shall be measured and paid under relevant tender item of steel reinforcement

In case of pre-cast kerb it shall be laid over plain 100 mm thick cement concrete or as specified in the item and the joint between the two stones shall be filled up with cement mortar (1:4). The pre-cast kerb stone as per approved drawing shall be cast within the project premises and cured for at least 15 days. Contractor shall have to make one tank at his own cost for curing the stones.

Mode of measurement: This shall be measured in Running Meter.

10.09 Providing & Laying RCC Pavements in Cement Concrete M-20.

The cement concrete of grade M-20 as per designed mix (conforming to the general and item specification for RCC under trade 2.0 in the tender) to be laid in roads, pavements, kerbs laid on the prepared base, compacting with needle vibrator, surface vibrator & levelling screed, finishing, floating the top surface or striped / broom finish in required panels as per drawing/directed by Engineer including, providing maintaining and finishing all types of the construction, contraction and expansion joints, form work using appropriate sized MS channels, reinforcement, curing etc complete.

The reinforcement steel shall be measured and paid in the relevant tender item.

The road / pavement to be cast in alternate panels not exceeding 3.5 M in width and 6.0 M in length with uniform or staggered joints shall be laid in required line, level maintaining necessary slopes as per drawing / as directed by Engineer.

The grooves of all types of the construction, contraction and expansion joints shall be filled with granular sand till these filled with the joint filler. (Joint filling using joint filler shall be paid under relevant item)

Kerbs included in this item are cast-in-situ kerbs to be laid over the edge of concrete pavement using MS channel shutters and chamfered edges using MS angles. In case separate stone with base to be executed this will be executed as per relevant tender item of kerb stone in Running Meter.

Mode of Measurement: This shall be measured in CuM.

10.10 Providing and Laying RCC pavements / roads in Cement Concrete M-25

The general specification same as per Item spec. no. 10.10 but providing and laying cement concrete of grade M-25.

Mode of Measurement: This shall be measured in CuM.

10.11 Providing and laying Vacuum De-watered cement concrete of grade M-20

Providing and laying Vacuum De-watered cement concrete of grade M-20 in pavements, roads over prepared sub-base in alternate panels in required thickness for required sizes in line level maintaining slope including form work using MS channels of required height, compacting with needle / surface vibrator, levelling with trimix, surface vibrator,

Vacuum De-watering with trimix vacuum pump, floating and further compaction with trimix skin floater equipped with floating disc, cutting the concrete with concrete cutting machine for contraction/ expansion joints of size 10mm wide x 15mm deep providing stripped / broom finish evenly, providing necessary steel reinforcement, curing etc complete as per the drawing / as directed by Engineer.

Reinforcement, expansion joint filler and construction of kerbs shall be measured separately in relevant tender items and paid for.

Mode of measurement: This shall be measured in CuM

10.12 Providing and fixing construction/ expansion joints with polysulphide/ Silicon sealant

Providing and filling the construction/ expansion joints with polysulphide/ Silicon sealant of approved make and grade as specified in the item specification including cleaning the joint providing primer as per specifications of the manufacturer and sealing / finishing etc complete as directed for 10 mm x15 mm section or as specified in the schedule of quantities etc complete as directed by Engineer.

Mode of measurement: This shall be measured in Running Meter.

10.13 Providing and laying pre-cast 50 mm thick RCC M-20 pavement stone

Providing and laying pre-cast 50 mm thick RCC M- 20 pavement stone with nominal reinforcement 2 kg/SqM. of the size 600 x 600 mm or of smaller size and shape in smooth / stripped finish with border. The rate is inclusive of casting, shuttering mould reinforcement, curing, transporting joint filling with fine sand preparing sub-base of 100 mm thick sand layer over compacted earth, etc. complete as per drawing and directed by Engineer. (Steel reinforcement, 100 mm thick sand layer in sub base shall be measured and paid under relevant tender item. Actual area of the stones laid shall be measured in SqM for payment).

Mode of measurement: This shall be measured in CuM

10.14 Providing and laying interlocking pre-cast cement concrete paving blocks

Providing and laying interlocking pre-cast cement concrete paving blocks of approved size, shape, quality and make having compressive strength of 250 kg/sq.cm and thickness not less than 75mm with smooth / approved finish and edges duly chamfered over a water compacted 50 mm thick

natural sand bed to the required line, level and compacting the stones laid by plate vibrator including cost of labour for surface dressing of the base as specified in normal surface dressing Item spec. no. 10.01 etc complete as directed by Engineer.

Mode of measurement: This shall be measured in SqM.

10.15 Providing & fixing construction / expansion joints in road with ready Bituminous Sealing Compound.

Providing and filling construction / expansion joints grooves in RCC pavement / road of size specified in the item description with ready sealing compound of Shalitek make of grade 'A' confirming to IS-1834 1984 .Before applying the sealing compound the grooves are to be cleaned of sand/dust/silt and shalitek primer should be applied as per manufacturers recommendation. The Shalitek sealing compound should be heated to 170 degree as recommended by manufacturer.

Mode of measurement: This shall be measured in Running Meter.

10.16 Providing and laying 40 mm thick Paver Finish Bituminous Macadam

Providing and laying paverfinished bituminous macadam surfacing with 40 mm thick (compacted) carpet with a tack coat of 7.5 Kg./10.00 Sq M of approved type of cutback bitumen using aggregate (trap stone metal 6 to 20 mm size as per gradation) with asphalt @ 3.7% by weight of mix including supplying all the materials at site of work, scrubbing the surface, heating the asphalt, mixing with aggregate by continuous batching mixing in hot mix plant laid process and laying with paver finisher and consolation with power road roller of about 10.00 MT capacity etc. complete. (Rate shall be inclusive of providing all labours and material like fuel, firewood, kerosene, maxphalt, equipment, tools and plants, providing and operating plant and machineries, hot mix plant, paver finisher, power road roller etc. at contractor's cost. Bitumen required for the work to be provided by the contractor).

Mode of measurement: This shall be measured in SqM.

10.17 Providing & laying Paver Finish Bituminous seal coat

Providing and laying paver finished bituminous macadam surfacing with seal coat average 18 mm thick (compacted) using trap stone grit 3 to 10 mm coated with approved type cut back bitumen @ 4.5 % by weight of mix including supplying all the materials at site of work, scrubbing the all surface, heating the asphalt, mixing with aggregate by continuous batching mixing in hot mix plant laid process and laying with paver finisher and consolation with power road roller 10 T capacity etc. complete. (Rate should be inclusive of providing all labour and material

like fuel, maxphalt, equipment, tools and plants, providing and operating plant and machineries, hot mix plant, paver finisher, power road roller etc.) spreading sand/aggregate dust free of organic matter/silt and removing the excess after traffic is moved for 2-3 days etc complete as directed by Engineer.

Mode of measurement: This shall be measured in SqM

10.18 Providing, fabricating and fixing GI chain link fencing 1.8 M high

Providing and fixing the GI chain link fencing 1.80 M high or the height as specified of approved quality & gauge as specified in item specification and as per drawing / details using MS medium class box section poles and MS angles, flats, clits, base plates for frame work. MS box section poles with necessary clits and MS base plate shall be fabricated and fixed in line, level at the specified distance in cement concrete M-20 block and fabricated frames fixed with GI chain link with help of MS flat tightly securing with GI washers, bolts and nuts. The poles shall be grouted in cement concrete block of specified strength in the toe wall or ground, curing etc., painting entire work with anti-corrosive metal primer and two or more coats of enamel paint or Aluminium paint of approved shade & make. The cost of the item shall include, concrete bock, form work, drilling necessary holes in the clits for fixing the frames in position using GI bolts and nuts as specified in the item specification and as per approved drawing etc complete.

This is complete item shall be measured in running meter for Chain Link of specified height. Additional member if any required in addition to what is included in schedule of quantity during execution same shall be measured in relevant item of steel work and paid for.

Mode of measurement: This shall be measured in Running metre for chain link of specified height.

10.19 Providing, fabricating and fixing GI chain link fencing 1.5 M high.

The general specification same as per Item spec. no. 10.18 but for providing, fabricating and fixing chain link fencing of 1.5 M height.

Mode of measurement: This shall be measured in running meter for chain link of specified height.

Alternate to Item spec. no. 10.02

Granular Sub-base

Providing, laying and compacting well graded Granular Sub-base using natural sand, crushed stone combination confirming grading 1 of table 400—1 of MOST with minimum CBR of 30 spreading by mortar grader and compaction by power roller (vibratory roller) all as laid down in clause 401 of MOST. The compacted thickness of sub-base shall be 100 / 150 or as specified in the item / drawing to be laid in lines, grades and cross section as per drawing / requirement and directed by engineer. The material shall be free from organic or other deleterious constituents and conform to one of the grading 400-1 or as specified, in accordance with grading as per MOST specification. The sub-base shall be laid over prepared sub-grade. Mixing of different size aggregates shall be done mechanically by mix in place using rotavator or similar approved equipment capable of mixing the material to the desired degree. Moisture of content of the loose material shall be checked in accordance with IS 27720 (Part 2) and adjusted .Water to be sprinkled from truck / trailer mounted tank for applying water or by other means approved by Engineer so that at the time of compaction it is from 1 to 2 % below optimum moisture content. Immediately thereafter, rolling shall start using smooth wheeled roller of 10 T for sub base up to 100 mm thickness and vibratory roller.

Grading for close graded granular Sub Base Materials (Ref Table 400-1)

IS Sieve Designation	% By Weight Passing the IS sieve		
	Grade I	Grade II	Grade III
75.0mm	100	--	--
53.0mm	80-100	100	--
26.5mm	55-90	70-100	100
9.5mm	35-65	50-80	65-95
4.75mm	25-55	40-65	50-80
2.36mm	20-40	30-50	40-65
0.425mm	10-25	15-25	2—35
0.075mm	3-10	3-10	3-10
CBR Value	30	25	20

Strength of the sub-base : It shall be ensured prior to actual execution that material to be used in the sub- base satisfy therequirements of CBR and other physical requirements when compacted and finished. When directed by the engineer, this shall verified by performing CBR tests in the laboratory as required on specimens re-moulded at field dry density and moisture content and any other tests for the “quality” of materials , as may be necessary.

Mode of measurement: This shall be measured in CuM.

Alternate to Item spec. no. 10.03

Providing and laying water bound macadam 75 mm compacted thickness in first layer using 63 mm to 45 mm grading sound road metal conforming to grade-2 of MOST 100 % passing from 90mm, 90-100% passing from 63mm 25-75 % passing from 53mm, 0-15 % passing from 45mm and 0-5 % from 22.4 mm sieve, to be laid on prepared cleaned surface free from soft spots, consolidation, filling the voids by screening of size 11.2 and 5.6 mm (100 % passing 13.2, 95-100 % passing 11.2mm, 15-35 % passing 5.6 mm and 0-10% passing 180 micron) binding with river sand gravel, quarry dust mixed with PI value not exceeding 6, watering and rolling with power roller 8 / 10 T capacity or vibratory roller as per MOST specification in line level and camber etc complete as directed by Engineer.

Mode of measurement: This shall be measured in CuM.

SECTION 11.0 WATER SUPPLY**11.01 Providing & Laying under ground GI pipe line for 80 mm dia.**

The pipes shall be galvanized mild steel welded pipes and screwed and socketed tubes conforming to the requirements of IS: 1239-1982, for medium grade. They shall be of the diameter (nominal bore {NB}) specified in the description of the item. The sockets shall be designated for the respective nominal bores of the pipes for which they are intended. The pipes and sockets shall be cleanly finished well galvanized in and out and free from cracks surface flaws, laminations, and other defects. All screwed threads shall be clean and well cut. The ends shall be cut cleanly and square with the axis of the tube.

All screwed tubes and sockets shall have pipe threads conforming to the requirements of IS: 554 screwed tubes shall have taper threads while the sockets shall have parallel threads.

The fittings shall be of malleable cast iron or mild steel tubes complying with all the appropriate requirements as specified for pipes. The fittings shall be designated by the respective nominal bores of the pipes for which they are intended. The fittings shall have screw threads at the ends conforming to the requirements of IS: 554 Female threads on fittings shall be parallel and male threads (except on running nipples and collars of unions) shall be taper.

The pipes and fittings shall be inspected at site before use to ascertain that they conform to the specification. The defective pipes shall be rejected. Where the pipes have to be cut or re-threaded, the ends shall be carefully filed out so that no obstruction to bore is offered. The end of the pipes shall then be threaded conforming to the requirements of IS: 554 with pipe dies and taps carefully in such a manner as will not result in slackness of joints when the two pipes are screwed together. The taps

and dies shall be used only for straightening screw threads which have become bent or damaged and shall not be used for turning of the threads so as to make them slack, as the latter procedure may not result in a water tight joint. The screw threads of pipes and fitting shall be protected from damage until they are fitted.

The pipes shall be cleaned of all foreign matter before being laid in jointing the pipes, the inside of the socket and the screwed end of the pipes shall be oiled and rubbed over with white lead and a few turns of spun yarn wrapped round the screwed end of the pipes. The end shall then be screwed in the socket, tee etc. with the pipe wrench. Care should be taken that all pipes and fittings are properly jointed so as to make the joints completely water tight and pipes are kept at all times free from dust and dirt during fixing. Burr from the joint shall be removed after screwing. After laying, the open ends of the pipes shall be temporarily plugged to prevent access of water, soil or any other foreign matter. Any threads exposed after jointing shall be painted or in the case of underground piping thickly coated with approved anticorrosive paint to prevent corrosion.

If the galvanized iron pipes and fittings are laid in trenches, the widths and depths of the trenches for different diameters of the pipes shall be as in the table given below:-

Table:

Diameter of pipe	Width of trench	Depth of trench
15 mm to 50mm	30 cm	60 cm
65 mm to 100mm	45 cm	75 cm

At joints the trench width shall be widened where necessary. The work of excavation and refilling shall be done true to line and gradient in accordance with general specifications for each work in trenches. After successful pressure testing, the pipe line to be painted a coat of APCOMIN ROZC primer PQ 1741, 25 micron DFT followed by two coats of Bituminous paint of approved make OR pipes shall be wrapped with thermo-fusible composite film 4 mm thick made out of fibre glass mat base with polymeric coatings (like PYKOTE) of approved make, as per the procedure recommended by the manufacturer **as specified in schedule of quantities**. The pipes shall be laid on a layer of 7.5 cm sand and filled up to 15 cm above the pipes. The remaining portion of the trench shall then be filled with excavated earth. The surplus earth shall be disposed off as directed. When excavation is done in rock the bottom shall be cut deep enough to permit the pipes to be laid on a cushion of sand 7.5 cm minimum. In case of bigger diameter pipes where the pressure is very high thrust blocks of cement concrete 1:2:4 (1 cement: 2 coarse sand : 4 graded stone aggregate of 20 mm nominal size) shall be constructed on all bends to transmit the hydraulic thrust without impairing the ground sand spreading it over a sufficient area.

TEST:

After laying and jointing, the pipes and fittings shall be inspected under working conditions of pressure and flow. Any joint found leaking shall be redone and all leaking pipes removed and replaced without extra cost.

The pipes and fittings after they are laid shall be tested to hydraulic pressure of 6 kg/sq.cm. (60 MWC). The pipes shall be slowly and carefully charged with water allowing all air to escape and avoiding all shock or water hammer. The draw off takes and stop cocks shall then be closed and specified hydraulic pressure shall be applied gradually. Pressure gauge must be accurate and preferably should have been recalibrated before the test. The test pump having been stopped the test pressure should maintain without loss for at least half an hour. The pipes and fittings shall be tested in sections as the work of laying proceeds, keeping the joints exposed for inspection during the testing. High thrust blocks of CC 1:2:4, if provided shall be paid under relevant concrete item.

Mode of Measurement: GI pipes with fittings completely fixed in position shall be measured and paid for the finished centre line lengths and the measurement shall be in Running Meter.

11.02 Providing & laying under ground GI pipe line for 50mm dia underground

The general specification is same as per Item spec. no. 11.01.

Mode of Measurement: Same as per Item spec. no.11.01

11.03 Providing & Laying GI pipe 40 mm dia under ground

The general specification is same as per Item spec. no. 11.01.

Mode of Measurement: Same as per Item spec. no.11.01

11.04 Providing & laying 25mm dia GI pipe under ground

The general specification is same as per Item spec. no. 11.01.

Mode of Measurement: Same as per Item spec. no.11.01

11.05 Providing & Laying GI pipe 20mm dia under ground

The general specification is same as per Item spec. no. 11.01.

Mode of Measurement: Same as per Item spec. no.11.01

11.06 Providing & Laying GI pipe 15 mm dia under ground

The general specification is same as per Item spec. no. 11.01.

Mode of Measurement: Same as per Item spec. no.11.01

11.07 Providing & Laying open GI pipe line 80 mm dia

For open line work the galvanised iron pipes and fittings shall run on the surface of the walls or ceiling (not in chase) unless otherwise specified. The fixing shall be done by means of standard pattern holder bat clamps, keeping the pipes about 1.5 cm clear of the walls ceiling. pipes may be fixed in the ducts or recesses etc. provided there is sufficient space to work on the pipes with the usual tools.

All pipes and fittings shall be fixed truly vertical and horizontal unless unavoidable the pipes shall be fixed to walls with standard pattern holders bat clamps made out of MS flat carrier fixed with bolts in the RCC or brick masonry and "C" clamp fixed to secure the pipe with GI bolts / screws / washers of required shape and size so as to fit tightly on the pipes when tightened with screwed bolts. The clams shall be painted with two coats of enamel paint over a coat of anti-corrosive primer. The clamps shall be fixed at short length and near the fittings as directed by the Engineer. The pipe line shall be tested as specified in item 11.01.

The rate shall include providing and laying the pipe line with all necessary specials in open, properly fixing it with clamps and testing the line all complete including necessary scaffolding.

Mode of Measurement: GI pipes with fittings completely fixed in position shall be measured and paid for the finished centre line lengths and the measurement shall be in Running Meter.

11.08 Providing & Laying open GI pipe line 50mm dia

The general specification is same as per Item spec. no. 11.07

Mode of Measurement: Same as per Item spec. no.11.07

11.09 Providing & Laying open GI pipe line 40 mm dia

The general specification is same as per Item spec. no. 11.07

Mode of Measurement: Same as per Item spec. no.11.07

11.10 Providing & Laying open GI pipe line 25mm dia

The general specification is same as per Item spec. no. 11.07

Mode of Measurement: Same as per Item spec. no.11.07

11.11 Providing & Laying open GI pipe line 20mm dia

The general specification is same as per Item spec. no. 11.07

Mode of Measurement: Same as per Item spec. no.11.07

11.12 Providing & Laying open GI pipe line 15 mm dia

The general specification is same as per Item spec. no. 11.07

Mode of Measurement: Same as per Item spec. no.11.07

11.13 Providing & Laying concealed in structure GI pipe line 80 mm dia

For internal work the pipes shall be concealed in the brick masonry / RCC. Chasses or zarries shall be cut in the walls and the pipes shall be laid. The pipes laid in the zarries (recess /grooves) shall be secured in position by approved arrangement like duly painted MS holding hook The pipes shall not ordinarily be buried in solid floors. Where unavoidable pipes may be buried for short distances provided adequate protection is given against damage, but the joints in pipes shall not be buried. Where directed by the Engineer MS sleeve of appropriate diameter GI pipe shall be fixed at a place where a pipe is passing through a wall or floor for inception of the pipe and to allow freedom for expansion movements and contraction and other. All the embedded pipe lines in walls or floors to be painted with anti-corrosive bituminastic paint of approved quality. The pipe should not come in contact with lime mortar or lime concrete as the pipe shall be laid in layer of sand filling done under concrete floors or as directed by the Engineer. **The floor and wall shall be finished same as the surrounding surface after the completion of the work.** The line shall be tested as specified in the item 11.01. The rate shall include making zarries in the wall, cutting floor, making holes, painting the pipe line with anticorrosive bituminastic paint all complete.

Mode of Measurement: GI pipes with fittings laid properly shall be measured along the centre line lengths and the measurement shall be in Running Meter.

11.14 Providing & Laying concealed in structure GI pipe line 50mm dia

The general specification is same as per Item spec. no. 11.13

Mode of Measurement: Same as per Item spec. no.11.13

11.15 Providing & Laying concealed in structure GI pipe line 40 mm dia

The general specification is same as per Item spec. no. 11.13

Mode of Measurement: Same as per Item spec. no.11.13

11.16 Providing & Laying concealed in structure GI pipe line 25mm dia

The general specification is same as per Item spec. no. 11.13

Mode of Measurement: Same as per Item spec. no.11.13

11.17 Providing & Laying concealed in structure GI pipe line 20mm dia

The general specification same as per Item spec. no. 11.13

Mode of Measurement: Same as per Item spec. no.11.13

11.18 Providing & Laying concealed in structure GI pipe line 15 mm dia

The general specification is same as per Item spec. no. 11.13

Mode of Measurement: Same as per Item spec. no.11.13

11.19 Providing and fixing Sluice valve for 80 mm dia pipe line

Providing and fixing 80 mm diameter Sluice valve of approved make confirming to relevant IS etc complete as directed by Engineer.

Mode of Measurement: This shall be measured in Number.

11.20 Providing and fixing Sluice valve for 50mm dia pipe line

The general specification is same as per Item spec. no. 11.19

Mode of Measurement: Same as per Item spec. no.11.19

11.21 Providing and fixing Sluice valve for 40mm dia pipe line

The general specification is same as per Item spec. no. 11.19

Mode of Measurement: Same as per Item spec. no.11.19

11.22 Providing and fixing Sluice valve for 25mm dia pipe line

The general specification is same as per Item spec. no. 11.19

Mode of Measurement: Same as per Item spec. no.11.19

11.23 Providing and fixing Sluice valve for 20mm dia pipe line

The general specification is same as per Item spec. no. 11.19

Mode of Measurement: Same as per Item spec. no.11.19

11.24 Providing and fixing Sluice valve for 15 mm dia pipe line

The general specification is same as per Item spec. no. 11.19

Mode of Measurement: Same as per Item spec. no.11.19

11.25 Providing and fixing of Gunmetal Wheel valve of approved quality for 80 mm dia pipe line

Providing and fixing 80 mm diameter Wheel valve of approved make confirming to relevant IS etc complete as directed by Engineer.

Mode of Measurement: This shall be measured in Number.

11.26 Providing and fixing of Wheel valve of approved quality for 50mm dia pipe line

The general specification is same as per Item spec. no. 11.25

Mode of Measurement: Same as per Item spec. no.11.25

11.27 Providing and fixing of Wheel valve of approved quality for 40mm dia pipe line

The general specification is same as per Item spec. no. 11.25

Mode of Measurement: Same as per Item spec. no.11.25

11.28 Providing and fixing of Wheel valve of approved quality for 25mm dia pipe line

The general specification is same as per Item spec. no. 11.25

Mode of Measurement: Same as per Item spec. no.11.25

11.29 Providing and fixing of Wheel valve of approved quality for 20mm dia pipe line

The general specification is same as per Item spec. no. 11.25

Mode of Measurement: Same as per Item spec. no.11.25

11.30 Providing and fixing of Wheel valve of approved quality for 15mm dia pipe line

The general specification is same as per Item spec. no. 11.25

Mode of Measurement: Same as per Item spec. no.11.25

11.31 Providing & Fixing Bib cock for 15mm dia pipeline

A bibcock (foam flow) is a draw off tap with horizontal inlet and free outlet. It shall be of brass chromium plated (CP) the finish obtained electrolytically by applying layer of chromium so as to improve the appearance, enhance surface hardness, heavy duty of specified size and approved make & type and shall be of the screw down type. The closing device should work by means of a disc carrying a renewable non-metallic washer, which shuts against water pressure on a seating at right angles to the axis of the threaded spindle, which operates it. The handle shall be catch type securely fixed to the spindle. The cocks shall open in anti-clockwise direction. The bib cocks shall be chromium plated, the chromium plating shall be of grade B type conforming to IS: 1068 in finish and appearance, the plated articles shall be free from plating defects such as blister, pits, and roughness and shall not be stained or discoloured. A suitable matching CP brass flange is included in this item. A sample of each kind of fittings shall be got approved from the Engineer and all supplies made according to the approved sample.

Mode of Measurement: This shall be measured in Number.

11.32 Providing & fixing long body bib cock

The general specification is same as per Item spec. no. 11.31. but for providing and fixing the bib cock with long body which is generally provided for the kitchen sink or similar utilities.

Mode of Measurement: This shall be measured in Number.

11.33 Providing & Fixing stop cock for 15mm dia. pipeline

A stopcock (stop tap) is a valve with a suitable means of connections for insertion in a pipe line for controlling or stopping the flow. It shall be heavy duty made of Brass chromium plated of an approved make, specified size and shall be of the screw down type. The closing device should work by means of a disc carrying a renewable non-metallic washer, which shuts against water pressure on a seating at right angles to the axis of the threaded spindle which operates it. The handle shall be catch type securely fixed to the spindle. Valve shall be of the loose letter seated pattern. The cocks shall open in anti-clockwise direction. The chromium plating shall be of grade B type conforming to IS: 1068, in finish and appearance, the plated articles shall be free from plating defects such as blister, pits, roughness and shall not be stained or discoloured. A sample of each kind of fittings shall be got approved from the Engineer and all supplies made according to the approved sample.

Mode of Measurement: This shall be measured in Number.

11.34 Providing & Fixing stop cock for 20mm dia pipe line

The general specification is same as per Item spec. no. 11.33.

Mode of Measurement: This shall be measured in Number.

11.35 Providing & Fixing Angle valve

The brass fittings shall be of heavy quality, CP. and approved manufacture and pattern with screwed or flanged ends as specified. The fittings shall in all respects comply with the requirements of IS: 781. The standard size of brass fittings shall be designated by the normal bore of the pipe to which the fittings are attached. A sample of each kind of fittings shall be got approved from the Engineer and all supplies made according to the approved samples. All cast fitting shall be sound and free from lumps pot holes and pittings, both internal and external surfaces shall be clean, smooth and free from sand etc. burring, plugging stopping or patching of the casting shall not be permitted. The bodies, spindles and other parts shall be truly machined or that when assembled the points shall be axial, parallel and cylindrical with surfaces smoothly finished. The area of the water way of the fittings shall not be less than the areas of the nominal bore. The fittings shall be fully examined and cleared of all foreign matter before being fixed. The fittings shall be fitted in the pipe line in a workman like manner. The joints between fittings and pipes shall be made leak proof. The joints and fittings shall be leak proof when tested to a pressure of 6 kg/sq.cm and the defective fittings and joints shall be replaced or redone. The rates shall include providing and fixing of angle valve with the flange (disc) all complete.

Mode of Measurement

This shall be measured in Number.

11.36 Providing & Fixing shower rose

CP Brass heavy duty overhead shower of approved make and model confirming to approved sample with CP brass 190 mm matching arm with wall flange . The Shower shall be pressure adjusted shower with revolving joint or single flow shower as specified in the item specification etc complete as directed by the Engineer

Mode of Measurement: This shall be measured in Number.

11.37 Providing & fixing 25mm dia GI hydrant for gardening

The work shall be carried out as per the drawing and as directed. It shall be provided with a wheel valve and a vertical piece of GI pipe to keep the hydrant above dressed ground level or at a height as directed by the Engineer. The scope of work includes excavation, making connection with main GI pipeline, GI specials as required, connecting pipe, spout of appropriate GI pipe etc complete as directed by the Engineer.

In case a brick chamber is necessary same shall be of size 450x450 mm and depth 230 to 500 mm to suit the site conditions. The bottom of the chamber shall be finished with PCC 1:4:8 100 mm thick and the walls shall be finished with 12 mm thick plaster in CM 1:4. with a MS cover for the chamber however the chamber shall be measured under relevant tender items and shall be paid for. Nothing extra shall be paid over and above item rates for the construction of chamber if required to be provided. The rates shall be for providing the hydrant and connecting it to the main line with required specials, providing and fixing wheel valve and GI pipe piece, as specified above.

Mode of Measurement: This shall be measured in Number.

11.38 Providing & fixing 6mm thick asbestos or other equivalent non asbestos string for 25mm dialine

This shall be wound closely and uniformly wound over the GI pipe line to open/ concealed in structure. Sample of asbestos string shall be got approved from the Engineer before use.

Mode of Measurement: This shall be measured in Running Meter of the pipe treated as above.

11.39 Providing & fixing 6mm thick asbestos or other equivalent non asbestos string for 15mm dia line

The general specification is same per as Item spec. no.11.38

Mode of Measurement: Same as per Item spec. no. 11.38

11.40 Providing & Fixing Towel rail

This shall be heavy duty brass chromium plated or as specified, of approved make. The length shall be 610 mm and the rod shall be of 20mm dia cover cup / disc. It shall be fixed with brass screws on each end, firmly securing the towel rail firmly, as directed by the Engineer. Sample of the towel rail needs to be got approved by the Engineer.

Mode of Measurement: This shall be measured in Number.

11.41 Providing & Fixing CI manhole cover of 40 kg

This shall be of approved make and conforming to relevant IS specification. The cover shall be provided over CI frame. The frame shall be properly grouted in the brickwork / RCC cover slab of the chambers.

Mode of Measurement: Manhole cover with frame (as one unit) shall be measured in Number.

11.42 Providing & Fixing Ball cock for 40mm dia pipe

This shall be of approved class and make. This may be of brass or PVC as specified in the item with arm and the ball to be fixed in the incoming water supply line. The cock shall withstand the pressure and shall be fixed directly on the water line as directed by the Engineer.

Mode of Measurement: This shall be measured in Number.

11.43 Providing & fixing ball cock for 25mm dia pipe

The general specification is same as per Item spec. no.11.42

Mode of Measurement: Same as per Item spec. no. 11.42

11.44 Providing & Fixing Ball cock for 15mm dia pipe

The general specification is same as per Item spec. no.11.42

Mode of Measurement: Same as per Item spec. no. 11.42

11.45 Providing & Fixing CP brass water spout 15mm dia

This shall be provided and fixed at places as directed by the Engineer. The part of brickwork around the spout shall be finished to match the external finish. No patch shall be seen. The spout shall be of approved quality and make.

Mode of Measurement: This shall be measured in Number.

11.46 Providing & Fixing GI 'B' class water spouts of 80mm dia

The spout shall be 200 to 450 mm in length as directed by the Engineer. One end of the pipe shall be cut diagonally and tack welded at the bottom to facilitate the flow of water. It shall be fixed at places as directed by the Engineer. The brickwork after the placement of the spout shall be finished properly to match the external finish. The spout shall be painted with paint of approved shade and make. The rate shall be quoted for providing and fixing water spout in RCC or brick work as specified above.

Mode of Measurement: This shall be measured in Number.

11.47 P&F GI water spout of 50mm dia

The general specification is same as per Item spec. no.11.46

Mode of Measurement: Same as per Item spec. no. 11.46

11.48 P&F GI water spout of 40mm dia

The general specification is same as per Item spec. no.11.46

Mode of Measurement: Same as per Item spec. no. 11.46

11.49 P&F GI water spout of 25mm dia

The general specification is same as per Item spec. no.11.46

Mode of Measurement: Same as per Item spec. no. 11.46

11.50 Fixing of Geyser

The Geyser shall be shifted from the Site stores to the required place. Supply and fixing the geyser with necessary anchor bolts with nuts, washer, CP brass angle valves, CP brass copper pipes and installation of the standard accessories supplied by the geyser supplier etc complete as directed by the Engineer. The rate shall be quoted for fixing Geyser including angle valve and chromium plated copper pipe as specified above

Mode of Measurement: This shall be measured in Number

11.51 Fixing of Water coolers

The Water cooler shall be shifted from the Site stores to the required place. Then necessary coach/anchor bolts with nuts, CP brass pipes and CP brass angle valves for inlet and GI outlet pipe of 25mm dia up to drain point shall be provided and fixed. The rate shall be quoted for fixing of Water cooler and other accessories supplied by the manufacturer as specified above.

Mode of Measurement: This shall be measured in Number

11.52 Fixing HDPE/ PVC water tank- 2000 Ltr. capacity

To take delivery of the tank / shifting from the site stores to the place of installation as directed by the Engineer. All accessories supplied by shall be fitted to the tank and the tank shall be properly installed over the

Pedestals / base constructed for installation as directed by the Engineer. (Construction of the pedestals / base shall be carried out and same shall be measured and paid under relevant tender item. Nothing extra shall be paid for the construction of pedestals / base. The rate shall be quoted for fixing water tank as specified above.

Mode of Measurement: This shall be measured in Number.

11.53 Fixing HDPE/PVC Water Tank- 1000 Ltr. capacity

The general specification is same as per Item spec. no. 11.52.

Mode of Measurement: This shall be measured in Number.

12.00 SANITARY WORKS

12.01 Providing & laying various 300 mm diameter (internal diameter) non-pressure Hume pipes class NP2

The pipe shall be with reinforcement as required and of the class as specified. These shall conform to IS: 458. The reinforced cement concrete pipes shall be manufactured by centrifugal (or spun) process. All pipes shall be true to shape, straight, perfectly sound and free from cracks and flaws, the external and internal surface of the pipes shall be smooth and hard. The pipes shall be free from defects resulting from imperfect grading of the aggregate mixing or moulding. The unreinforced pipes (non pressure pipes) shall withstand a test pressure equivalent to 0.7 kg/Sq.cm. (7 m head) of water.

Concrete used for the manufacture of reinforced concrete pipes and collars shall not be leaner than Grade M20. The maximum size of aggregate should not exceed one third of the thickness of the pipe or 20 mm whichever is smaller. The reinforcement in the reinforced concrete pipes shall extend throughout the length of the pipe. The circumferential and longitudinal reinforcements shall be adequate to withstand the specified hydrostatic pressure and further bending stresses due to the weight of water when running full across a span equal to the length of pipe plus three times its own weight. The minimum cover for reinforcement of spun pipes and for all other pipes shall be as given below:

<u>Pipe thickness</u>	<u>Spun pipe</u>	<u>Pipe other than Spun pipe</u>
mm	mm	mm
Less than 30 mm	9	12
30 mm to 75 mm	12	18
75 mm and over	18	18

Where the pipe shall be bedded directly on soil, the bed shall be suitably rounded to fit the lower part of the pipe the cost for this operation being included in the rate for laying the pipe.

Loading, transporting, and unloading of concrete pipes shall be done with care. Handling shall be as to avoid impact. Gradual unloading by inclined plane or by chain block is recommended. All pipe sections and connections shall be inspected carefully before being laid. Broken or defective pipes or connections shall not be used. Pipes shall be lowered into the trenches carefully mechanical appliances may be used pipes shall be laid true to the line and grade as specified laying of pipe shall proceed upgrade of a slope.

If the pipes have spigot and socket joints, the socket ends shall face upstream. In the case of pipes with joints to be made with loose collars, the collars shall be slipped on before the next pipe is laid. Adequate and proper expansion joints shall be provided where directed.

In case where the foundation conditions are unusual such as in the proximity of trees or holes under existing or proposed tracks, manholes etc. the pipe shall be encased all-round in 15 cm thick cement concrete 1:5:10 (1 part cement: 5 part coarse sand: 10 part graded stone aggregate 40mm nominal size) or compacted sand or gravel.

In cases where the natural foundation is inadequate the pipes shall be laid either in concrete or cradle supported on proper foundations or on any other suitably designed structure. If a concrete cradle bedding is used the depth of concrete below the bottom of the pipe shall be at least 1/4th of the internal diameter of the pipe subject to a minimum of 10 cm and a max. of 30 cm. The concrete shall extend up the sides of the pipes at least to a distance of 1/4th of the outside diameter for pipes 300 cm and over in diameter. The pipe shall be laid in this **concrete bedding** before the concrete has set pipes laid in trenches in earth shall be bedded evenly and firmly and as far up the haunches of the pipes as to safely transit the load expected from, the backfill through the pipe to the bed. This shall be done either by excavating the bottom of the trench to fit the curve of the pipe or by compacting the earth under the curve of the pipe to form an even bed. Necessary provision shall be made for joint wherever required. When the pipe is laid in a trench in rock, hard clay, shale or other hard material the space below the pipe shall be excavated and replaced with an equalising bed of concrete sand or compacted earth. In no case shall pipe be laid directly on such hard material. When the pipes are laid completely above the ground the foundations shall be made even and sufficiently compacted to support the pipe line without any material settlement. Alternatively the pipe line shall be supported on rigid foundations at intervals. Suitably arrangements shall be made to retain the pipe line in the proper alignment such as by shaping the top of the supports to fit the lower part of the pipe. The distance between the supports shall in no case exceed the length of the pipe. The pole shall be supported as far as possible close to the joints. In no case shall the joint come in the centre of the span. Care shall be taken

to see that superimposed loads greater than the total load equivalent to the weight of the pipe when running full shall not be permitted. Suitably designed anchor blocks at change of directions and grades for pressure lines shall be provided where required.

Jointing of the pipes shall be done as described below:

- a) Collar shall be spaced symmetrically over the two pipes and the space between collar and pipe filled with cement mortar 1:1 thoroughly rammed with caulking tools.

The joint shall be finished with a fillet sloping at 45. Joints shall be protected and cured for about 10 days. If specified in the item specification wedge shaped groove in the end of the pipe shall be filled with a special bituminous plastic compound for bitumen soaked spun yarn. The collar shall then be slipped over the end of pipe and next pipe butters well against tee plastic compound by suitable appliance so as to compress the plastic compound in the grooves, care being taken not to disturb concentricity and level of the pipes. The open ends of the pipes during execution shall be plugged with suitable gunny gags to ensure that the surrounding earth do not enter the pipes.

The RCC Hume pipe lines provided for road cross over for rain water, electrical/ telephone or communication cables shall be provided with suitable chambers as per details which shall be paid under relevant tender item.

Providing and laying of pipe links, rounding off the bed to fit the lower part of the pipe, jointing of pipes all is inclusive in this item. The concrete bed and blocks of CC M20 provided at junction shall also be included in this item.

Mode of Measurement: This shall be measured in Running Meter

12.02 Providing & Laying 230 mm diameter non-pressure Hume pipe class NP2

The general specifications shall be same as per Item spec. no. 12.01.

Mode of Measurement: Same as per Item spec. no. 12.01

12.03 Providing & Laying 150mm dia non-pressure Hume pipe class NP2

The general specifications shall be same as per Item spec. no. 12.01.

Mode of Measurement: same as per Item spec. no. 12.01

12.04 Providing & laying stoneware pipe of 300mm dia (internal dia)

All pipes with spigot and socket ends shall conform to IS 651 and shall be of **grade `A'**. These shall be sound free from visible defects such as fire cracks or hair cracks. The pipes shall have uniform glazing on both inside and outside surface and shall be free from crazing or any other defect. The pipes shall give a sharp clear sound when struck with a light hammer. There shall be no broken blisters.

The approximate thickness of 60 cm long pipes shall be as given in the table.

Internal diameter of the pipe	Thickness the barrel and socket	Weight of each pipe per M
Mm	Mm	Kg
100	12	14
150	16	22
200	17	33
230	19	42
250	20	52
300	25	79
350	30	100
400	35	128
450	38	147

The length of pipes shall be 60 cm exclusive of the internal depth of the socket. The pipe shall be handled with sufficient care to avoid damage to them.

All pipes shall be **laid on a bed of 15 cm cement/ brickbat or lime concrete** as specified, projecting on each side of the pipe to the width of the trench which shall be nominal dia of pipe + 400 mm. The rate shall be inclusive of necessary earth work in excavation for the trench. The pipes with their crown level at 1.20 m depth and less from ground shall be covered with 15 cm thick concrete above the crown of the pipe and sloped off to meet the outer edges of the concrete, to give a minimum thickness of 15 cm all-round the pipe. Pipes laid at a depth greater than 1.20 m at crown shall be concreted at the side up to the level of the centre of the pipe and sloped off from the edges to meet the pipe tangentially. The concreting shall be done as per specifications for concrete. The pipes shall be carefully laid to the alignment levels and gradients shown on the plans and sections great care shall be taken to prevent sand etc. from entering the pipes. The pipes between two manholes shall be laid truly in a straight line without vertical or horizontal undulation. The pipe shall be laid with socket up the gradient. The body of the pipe shall for its entire length rest on an even bed of

concrete and places shall be formed in the concrete to receive the socket of the pipe.

Where pipes are not bedded on concrete the trench floor shall be left slightly high and carefully bottomed up as pipe laying proceeds, so that the pipe barrels rest on firm and undisturbed ground. If the excavation has been carried to low the desired levels shall be made up with concrete 1:5 10 (1 part cement: 5 part coarse sand : 10 part graded brick bat of 40 mm nominal size for which no extra payment shall be made.

If the floor of the trench consists of rock or very hard ground that cannot easily be excavated to a smooth surface the pipe shall be laid on a levelling course of concrete as desired. When SW pipes are used for storm water drainage, no concreting will normally be necessary. The cement mortar for jointing will be 1:1 (1 part cement: 1 part fine sand) testing of joints will also not be done.

Tarred gasket of hemp yarn soaked in thick cement slurry shall first be placed round the spigot of each pipe and the spigot shall then be slipped home well into the socket of the pipe previously laid. The pipe shall then be adjusted and fixed in the correct position and the gasket caulked tightly home so as to fill not more than 1/4th of the total depth of the socket.

The remainder of the socket shall be filled with stiff mixture of cement mortar in the proportion of 1:1 (1 part cement : 1 part fine sand when the socket is filled, a fillet shall be formed round the joint with a trowel forming any angle of 45 with the barrel of the pipe. After a day's work any extraneous material shall be removed from the inside of the pipe. The newly made joints shall be cured.

Water test:

- a) Stoneware pipes used for sewers shall be subjected to a test pressure of 1.5 m head of water at the highest point of the section under test. The test shall be carried out by suitably plugging the low end of the drain and the ends of the connection if any and filling the system with water. A buckle bend shall be temporarily jointed in at the top end and a sufficient length of vertical pipe jointed to it so as to provide the required test head. Or the top may be plugged with a connection to a hose ending in a funnel which could be raised or lowered till the required head is obtained and fixed suitably for observation. Where leakage will be visible the defective part of the work shall be removed and made good.

In cases where pipes are not bedded on concrete special care shall be taken in refilling trenches to prevent the displacement and subsequent settlement at the surface resulting in uneven street surfaces and dangers to foundations etc. The backfilling materials shall be packed by hand under and around the pipe, and rammed with a shovel and light tamper. The method of filling will be continued up to the top of pipe. The refilling shall

rise evenly on both sides of the pipe continued up to 60 cm above the top of pipe so as not to disturb the pipe. No tamping should be done within 15 cm of the top of pipe. The remainder of the backfill shall not be done until 7 days have elapsed for brick sewers and 14 days of concrete sewers, unless local conditions or materials are suitable for the earlier placing of load on the pipes. The tamping shall become progressively heavier as the depth of the backfill increases. The trenches shall be back with due care and uniform compaction and surplus earth shall be disposed within site.

In measuring the length of sewer pipes, laid length between faces of manholes shall only be measured omitting lengths of channels between inside faces of walls of manholes or chambers.

Providing and laying of pipes, the cement concrete bed provided for the pipes jointing as per above specifications and testing of pipes which carry waste water and sewage, excavation and back filling etc all are inclusive in this item.

The concrete provided for hunching shall be paid under the respective concrete item.

Mode of Measurement: This shall be measured in Running Meter

12.05 Providing & Laying Stoneware pipe of 230 mm dia

The general specifications shall be same as per Item spec. no. 12.04.

Mode of Measurement: Same as per Item spec. no. 12.04

12.06 Providing & laying Stoneware pipe of 150mm dia

The general specifications shall be same as per Item spec. no. 12.04.

Mode of Measurement: Same as per Item spec. no. 12.04

12.07 Providing & laying stoneware pipe of 100mm dia

The general specifications shall be same as per Item spec. no. 12.04.

Mode of Measurement: Same as per Item spec. no. 12.04

12.08 Providing & Laying CI Waste Water line concealed in structure 150mm dia with cement joint

All cast iron pipes and fittings shall be of approved ISI make, shall be of uniform thickness with strong and deep sockets, free from flaws, air holes, cracks, hand holes and other defects and non-form to IS:1729. The pipes and fittings shall be true to shape smooth and cylindrical and shall

ring clearly when struck over with a light hand hammer. All pipes and fittings shall be properly cleaned of all foreign material before being fixed.

The annular space between the socket and spigot shall be filled with a gasket of hemp or spun yarn soaked in neat cement slurry. The joint shall then be filled with stiff cement mortar 1:2 (1 part cement: 2 part fine sand) well pressed with caulking tool and finished smooth on top at an angle of 45 Deg. The joint shall be kept wet for not less than 7 days by tying a piece of gunny bag and kept moist. Joints shall be perfectly air and water tight.

The thickness of fittings and their socket and spigot dimensions shall conform to the thickness and dimensions specified for the corresponding sizes of straight pipes.

The connection between the main pipe and branch pipes shall be made by using branches and bends with access doors for cleaning. Floor traps shall be provided with 25mm dia puff pipe where the length of the waste is more than 1800mm or the floor trap is connected to a waste stack through bends.

All cast iron pipes and fittings including joints shall be tested by a smoke test to the satisfaction of the Engineer and left in working order after completion. The smoke test shall be carried out as stated under:-

Smoke shall be pumped into the pipe at the lowest end from a smoke machine, which consists of a bellow and burner. The material usually burnt is fresh cotton waste which gives out a clear pungent smoke which is easily detectable sight as well as by smell if it is leaking at any point of the pipeline.

Water test and air test shall be conducted as stipulated in IS: 5329.

The rate includes the cost of providing and laying of CI pipe, with all fittings such as branches and plug bends, fencing the holding clamps with 1:2:4 CC blocks on to the walls, cement joint in 1:2 (1 part cement: 2 part fine sand) painting with two coats of bitumastic paint and testing the pipe line.

Mode of Measurement: CI pipes shall be measured along with centrelines of pipes in Running Meter.

12.09 Providing & Laying CI waste water line concealed in structure 100 mm dia with cement joint

The general specifications shall be same as per Item spec. no. 12.08.

Mode of Measurement: Same as per Item spec. no. 12.08

12.10 Providing & Laying CI waste water line concealed in structure 75 mm dia with cement joint

The general specifications shall be same as per Item spec. no. 12.08.

Mode of Measurement: Same as per Item spec. no. 12.08

12.11 Providing & Laying CI waste water line open with cement joint 75mm dia

The general specification of the pipes shall be as per item 12.08.

Pipes shall be fixed to the wall by GI or MS holder hack clamps, unless projection ears with fixing holes are vertical or to the lines and slopes as indicated. The clamps shall be fixed to the walls by embedding their hooks in cement concrete blocks (1:2:4) 10x10 cm by making necessary holes in the walls at proper places. All holes and breakages shall be made good. The clamps shall be kept 25mm clear of the finished face of the walls to facilitate cleaning and painting of pipes. CI pipes and fittings which are exposed shall be first cleaned and then painted with two coats of bitumastic paint.

The pipe shall be tested as specified in item 12.08.

Mode of Measurement: Same as per Item spec. no. 12.08.

12.12 Providing & Laying CI waste water line open with cement joint 100mm dia

The general specifications shall be same as per Item spec. no. 12.11.

Mode of Measurement: Same as per Item spec. no. 12.08

12.13 Providing & Laying CI soil pipe line 100mm dia with cement joint.

The general specifications for the CI pipe shall be as per item 12.08.

All plug points of drainage pipes shall be provided with inspection and cleaning caps, covers which shall be fixed with nuts and screws.

Mode of Measurement: Same as per Item spec. no. 12.08.

12.14 Providing & Laying CI soil pipe line 150mm dia cement joint.

The general specification shall be same as per Item spec. no.12.13.

Mode of Measurement : Same as per Item spec. no. 12.08.

12.15 Providing & Laying CI soil pipe 100mm dia with lead joint

CI pipes with socket and spigot ends shall be provided with lead caulked joints wherever specified and the joints shall conform to the requirements of IS: 3114.

The general specifications shall be same as per item 12.13.

Mode of Measurement: This shall be measured along the centre line of pipe line in Running Meter.

12.16 Providing & Laying CI soil pipe 150mm dia with lead joint

The general specification shall be same as per Item spec. no.12.15.

Mode of Measurement: Same as per Item spec. no. 12.15

12.17 Providing & Laying CI soil pipe 100mm dia with cement joint in open

The general specifications shall be same as items 12.11 & 12.13.

Mode of Measurement: Same as per Item spec. no. 12.15

12.18 Providing & Laying CI soil pipe 150mm dia with cement joint in open

The general specifications shall be same as item 12.17.

Mode of Measurement: Same as per Item spec. no. 12.15.

12.19 Providing & Laying open uPVC rain water line 75mm dia

The strength of the pipe shall vary from 4kg/sq.cm to 10 kg/Sq.cm as specified in schedule of quantities. It shall be of approved make. It shall be provided with all necessary specials. It shall be jointed with adhesive as per the manufacturer's specifications. The rate shall include providing and fixing over clamps made out of MS flat fixed with GI bolts with the wall / RCC member and firmly securing with bat clamps with GI nuts and washer including painting with two coats of enamel paint over a coat of anticorrosive primer.

The rate shall include providing the specified quality of pipe with necessary specials, cutting the walls and making them good after the laying, jointing with adhesives all complete

Mode of Measurement: This shall be measured in Running Metre.

12.20 Providing & Laying open uPVC rain water line 100mm dia

The general specifications shall be same as item 12.19

Mode of Measurement: Same as per Item spec. no. 12.19

12.21 Providing & Laying open uPVC rain water line 150mm dia

The general specifications shall be same as item 12.19.

Mode of Measurement: Same as per Item spec. no. 12.19

12.22 Providing & Laying CI 100mm dia RW line concealed in the structure

It should be of approved ISI make. It shall be free from pin holes and defects and be neatly finished from out side and inside, painted with two coats of bituministic paint. The joints of the pipes shall be filled with spurn yarn soaked with cement slurry & then finish with CM 1:2 (1 part cement, 2 part coarse sand). All necessary bends, plug bends, elbow gratings, shoe, fixing with holder bat clamps shall be provided. Pipe shall be cut to required lengths if the site condition demands so. The weights of the pipes of 1.83m long shall be as follows:-

Description	75mmdia	100mmdia	150mmdia
Plain single socket pipe	14 Kg/no	19 kg/no	34.5 kg/no
Plain double socket	15	20	37.20
Eared single socket pipe	14.50	19.50	35.40
Eared double socket pipe	15.40	20.40	38.00
Plain short pieces	8.20 kg/m	10.40kg/m	19.00 kg/m
Plain bends	3.20 kg/no	4.50kg/no	9.10 kg/no
Offsets 55 mm projection	2.70	5.00	8.20
75 mm projection	3.20	5.50	9.10
115 mm projection	4.10	5.90	9.50
225 mm projection	5.00	7.30	11.80
300 mm projection	6.00	8.60	12.70
Branches single Y	5.00	7.30	14.50
Branches double Y	6.80	10.00	19.10
Plain shoe	3.20	4.10	8.60
Head	6.40	6.80	11.30
For erosion fitting	0.90	0.90	1.35
For inspection door	1.80	1.90	2.25

This item shall include all bends, collars etc.& the unit rate shall include providing and fixing of CI pipes, jointing, cutting of pipes wherever necessary, painting with bituministic paint, curing of joints .

Mode of Measurement: This shall be measured in Running Meter.

12.23 Providing & Laying CI 150mm dia rain water line concealed in the structure

The general specifications shall be same as item 12.22.

Mode of Measurement: Same as per Item spec. no. 12.22

12.24 Providing & Laying CI 100 mm dia rain water line in open

The general specifications shall be same as item 12.22 but in open.

Mode of Measurement: Same as per Item spec. no. 12.22.

12.25 Providing & Laying CI 150mm dia rain water line in open

The general specifications shall be same as item 12.22 but in open.

Mode of Measurement: Same as per Item spec. no. 12.22

12.26 Providing & fixing marble pardi

It shall be of single piece of marble of approved quality and type and size as specified in the item description. The edges shall be machine cut to the required shape. Both the sides shall be well polished. The pardi shall be properly embedded in the wall with CC 1:2:4 (minimum 7.5 cm should be embedded).

Mode of Measurement: This shall be measured in SqM including embedded portion in wall.

12.27 Providing & Fixing European WC

Water closets shall be either of white glazed earthenware, white glazed vitreous china or white glazed fire clay as specified and shall be of "Wash down type". The closets shall be of one piece construction. Each water closet shall have 4 holes having a minimum diameter of 6.5 mm for fixing to floor and shall have an integral flushing rim of suitable type. It shall also have an inlet or supply horn for connecting the flush pipe. The flushing rim and inlet shall be of the self draining type. The water closet shall have a weep hole at the flushing inlet. Each water closet shall have an integral trap with either 'S' or 'P' outlet with at least 50mm water seal. Where required the water closets shall have an anti siphonage 50mm dia

vent horn on the outset side of the trap. The inside surface of water closets and traps shall be uniform and smooth in order to enable an efficient flush. The narrated part of the outlet shall not be glazed externally. The water closet when sealed at the bottom of the trap in line with the back plate, shall be capable of holding not less than 10 litres of water between the normal water level and the highest possible water level of the water closet as installed. The rate shall include for a heavy duty plastic seat and cover as approved by the Engineer.

Mode of Measurement : It shall be measured in Number

12.28 Providing & Fixing Orissa pan WC

This shall be the long pan pattern with footrests/Orissa pattern, as specified, made of white glazed vitreous china or of white glazed fire clay. Each pan shall have an integral flushing rim of suitable type. It shall also have an inlet or supply horn for connecting the flush pipe. The flushing rim and inlet shall be of the self draining type. It shall have a weep hole at the flushing inlet to the pan. The flushing inlet shall be in the front unless otherwise specified or ordered by the Engineer. The inside of the bottom of pan shall have sufficient slope from the front towards the outlet and the surface shall be uniform and smooth to enable easy and quick disposal while flushing. The exterior surface of the outlet below the flange shall be an unglazed surface which shall have grooves right angles to the axis of the outlet. Pans shall be provided with a trap 'P' or 'S' type with vent horn etc. complete.

The rate shall include the providing and fixing of the footrests also.

Mode of Measurement: This shall be measured in Number.

12.29 Providing & fixing lipped urinal

Urinals basins shall be large flat back or corner wall type lipped in front as specified in the item description in the Schedule of Quantities. They shall be of white glazed vitreous china or white glazed fire clay, and of size as specified. The urinals shall be of one piece construction. Each urinal shall be provided with not less than two fixing holes of a minimum dia of 6.5 mm on each side. Each urinal shall have an integral flushing rim of suitable type and inlet or supply horn for connecting the flush pipe. The flushing rim and inlet shall be of the self draining type. It shall have a weep hole at the flushing inlet of the urinal. At the bottom of the urinal, an outlet for connecting to an outlet pipe shall be provided. The exterior of the outlet horn shall not be glazed and the surface be provided with grooves at right angles to the axis of the outlet to facilitate fixing to the outlet pipe. The inside surface of the urinal shall be uniform and smooth throughout to ensure efficient flushing. The bottom of pan shall have sufficient slope from the front, towards the outlet such that there is efficient draining of the urinal. The waste fittings shall be chromium plated. Also CP brass spreader

and pipe of suitable dia shall be provided. The rate shall include CI brackets & screws, CP brass spreader pipe etc. all complete. The bottle trap if asked to be provided, it shall be measured in numbers and paid for separately.

Mode of Measurement: This shall be measured in Number.

12.30 Providing & Fixing Wash basin

Wash basins shall be of white glazed earthenware, white glazed vitreous china or white glazed fire clay as specified. These shall be of the following type and sizes indicated against each type:

<u>Types</u>	<u>Size</u>
Flat back	630x450 mm
Flat back	550x400 mm
Flat back counter top with Anti splash rim	530x430 mm

Wash basins shall be of one piece construction, including a combined overflow. All internal angles shall be designed so as to facilitate cleaning. Each basin shall have a rim on all sides except sides in contact with the walls and shall have skirting at the back. Basins shall be provided with single or double tap holes as specified. The tap holes shall be square. A suitable tap hole button shall be supplied if one tap hole is not required in installation. Each basin shall have a circular waste hole to which the interior of basin shall drain. The waste hole shall be either rebated or be bevelled internally with diameter of 63mm at top and a depth of 10 mm to suit a waste plug having 64 mm diameter. Each basin shall be provided with a non-ferrous 32 mm washer fitting. Stud bolts to receive the brackets on the underside of the wash basins shall be suitable for a bracket with stud not exceeding 13mm diameter 5mm high and 305mm from the back of basin to the centre of the stud. The stud slots shall be of depth sufficient to take 5mm stud every basin shall have an integral soap holder recess or recesses which shall fully drain into the bowl. The position of the chain stay hole shall not be lower than the over flow slot. A slot type overflow having an area of not less than 5 sq cm shall be provided and shall be so designed so as to facilitate cleaning of the overflow. The specifications for waste plug, chain and stay shall be the same as given for sinks.

All the waste fittings shall be chromium plates bottle trap conform to IS:5434 the chromium plating shall be of grade B type conforming to IS:1068. Also CI brackets shall be provided with screws.

The rate shall be quoted for providing and fixing wash basin as specified above.

Mode of Measurement: This shall be measured in Number.

12.31 Providing & fixing kitchen sinks

The sinks shall be of white glazed earthenware, white glazed vitreous china or white glazed fire clay as specified and shall be of the following sizes:-

450x300x150 mm

600x450x250 mm

They shall be of one piece construction including a combined overflow; the floor of the sink shall gently slope towards the outlet. The outlet shall in all cases be suitable for waste fittings having flanges of 64mm diameter and the waste hole shall have a minimum diameter of 65mm at the bottom to suit the waste fittings. The waste hole shall be either rebated or bevelled having a depth of 10 mm. Each sink shall be provided with a non-ferrous 40 mm dia waste fitting. The sink shall have overflow of the waste type and the inverts shall be 30 mm below the top edge. Each sink shall be provided with a waste plug of suitable dia. chain and stay. The plug shall be of rubber or other equally suitable material and shall be water-tight when fitted plug chains shall be of brass wire of 1.80mm with brazed oval links approximately 13 mm in length and shall be chromium plated.

It shall have an overall length from the collar to the stay of not less than 300 mm. There shall be a triangular or D shackle at each end, one of which shall be brazed to the plug and the other securely fixed to the stay. The 150mm long shank of the waste shall be threaded conforming to the requirements for IS: 2556 for sinks only. The waste fittings and plug fittings shall be chromium plated. The chromium plating shall be of grade B type conforming to IS: 1068.

Mode of Measurement : This shall be measured in Number.

12.32 Providing & Fixing Stainless Steel sink with drain board

It shall be of approved make. It shall be provided with fittings and specials like 63 mm diameter waste coupling, rubber plug with heavy duty plastic grating, overflow, CP brass chain, CI brackets 40mm dia GI B class waste pipe. The waste pipe and the brackets shall be painted with two coats of synthetic enamel paint over a coat of anti corrosive primer.

Mode of Measurement: This shall be measured in Number

12.33 Providing & Constructing SW 100mm dia gully trap

SW gully trap for 100/150mm dia pipe shall be fixed in a chamber of 230 thick wall of size 300x300 mm, 12mm thick plaster in CM 1:4 inside , 100mm thick PCC 1:4:8 bed shall be laid over that 38mm thick IPS flooring shall be provided and finished properly. The chamber shall be provided with a CI frame and cover. The unit rate shall include all works necessary for the item as specified above

Mode of Measurement: This shall be measured in Number.

12.34 Providing & fixing flushing cisterns

- a) The flushing cisterns shall be automatic or manually operated high level or low level, as specified. For water closets and urinals high level cistern is intended to operate with minimum height of 125 cm and a low level cistern with a maximum height of 30 cm between the top of the pan and the underside of the cistern. They shall comply with the requirement of IS: 774 for flushing type and IS: 2326 for automatic flushing cistern and IS: 7231 for plastic cistern.
- b) Cisterns shall be of vitreous china, pressed steel and plastic. The body thickness including cover shall be not less than 6 mm. The body of pressed steel cistern shall be of seamless or welded construction, of thickness not less than 1.6 mm before coating, and shall be porcelain enamelled or otherwise protected against corrosion by an equally efficient coating. The cistern shall be free from manufacturing faults and other defects affecting their utility. All working parts shall be designed to operate smoothly and efficiently. Cisterns shall be mosquito proof a cistern shall be considered mosquito proof only if there is no clearance any where which would permit a 1.6 mm wire to pass through in the permanent position of the cistern i.e. in the flushing position or filling position.
- c) The breadth of a low level cistern, from front to back, shall be such that the cover or seat, or both of water closet pan shall come to rest in a stable position when raised. The cistern shall be supported on two cast iron or mild steel brackets of size as approved by the Engineer. These shall be properly protected by suitable impervious paint. Alternative the cisterns shall have two holes in the back, set above the overflow level, for screwing into the wall, supplemented by two cast iron or mild steel wall supports. A 5 litre cistern, however, may be supported by lugs or brackets cast on the body of the cistern.
- d) Manually operated cisterns shall be of the curved Siphon type and shall conform to the specifications given in IS 2526. The cistern shall have a removable cover which shall fit closely on it and be secured against displacement. In designs where the operating mechanism is attached to the cover, this may be made in two sections, but the section supporting the mechanism shall be securely bolted or screwed to the body.
- e) The outlet fitting of each cistern shall be securely connected to the cistern. In case of high level cisterns, the outlet shall be of 32mm nominal bore and in the case of low level cisterns, the outlet shall be of 40 mm nominal bore. Ball cock shall be of screwed type 15 mm in

diameter and shall conform to IS No.1703. Ball valves (Horizontal plunger type) including. Floats for water supply purposes. In the case of high level manually operated cistern, the level arm of the cistern shall have a suitable hole near the end through which a split ring of a (S) hook shall pass. A chain shall be attached to the ring or hook.

- f) The chain shall be GI and strong enough to sustain a suddenly applied pull of 10 KG or a dead load of 50 kg without any apparent or permanent deformation of the shape of the link. The chain shall terminate in a suitable handle of 'Pull' which shall be of pottery, galvanised iron non-ferrous metal, or a moulding in any heat resisting and non-absorbent plastic. The finish shall be smooth and free from burrs. In case of low level flushing cisterns, the handle shall be chromium plated.
- g) The discharge rate of the cistern shall be about 5 ltrs in 2 seconds when connected to an appropriate flush pipe, and there shall be no appreciable change in the force of flush during the period of discharge. The cistern shall have a discharge capacity of 5, 10 or 12.5 litres as specified.

Mode of Measurement: This shall be measured in Number.

12.35 Providing & Fixing Automatic Flush valve

It shall be automatic Flush Valve of CP Brass construction of approved make as specified complete with elbow set with provision of setting and operating lever. Chromium plating shall be conforming to relevant specification. .

Mode of Measurement: This shall be measured in Number.

12.36 Providing & Fixing HCI Nahani trap

The trap shall be with or without inlet rim (as per requirement) painted with anticorrosive paint and fixed in position with PCC 1:2:4(1 cement, 2 sand, 4 graded coarse aggregate of nominal size 20mm and down) The brass CP jali shall be placed over the trap. The flooring around the trap shall be properly finished. (The trap at intermediate location shall have a rim for receiving inlet pipe)

Mode of Measurement: This shall be measured in Number.

12.37 Providing & Fixing CP brass bottle trap

It shall be of heavy duty cup type CP brass approved quality and make with a ease of cleaning by un screwing the cup. The bottle trap shall be fixed with waste coupling and the waste pipe provided under relevant item of wash basin / urinal etc..

Mode of Measurement: This shall be measured in Number.

12.38 Providing & fixing paper holder

It shall be of approved quality. It shall be glazed white vitreous china recessed type. It shall have a wooden roller or aluminium or a specified and a roll of paper.

Mode of Measurement: This shall be measured in Number.

12.39 Providing & Constructing Manholes of inside size 1.2 Mx1.2 M x 1.5 to 2.0 M depth

Manholes of different types and sizes as specified shall be constructed in the sewer line at such places and to such levels and dimensions as shown in the drawings or as directed by the Engineer. The size indicates the inside dimensions of the manhole.

Excavation and back filling shall be as per respective specifications.

Manhole shall be built on a bed of **brickbat cement concrete 1:4:8** (1 part cement: 4 part sand: 8 part brickbats of 40 mm nominal size). The thickness of the bed concrete shall be 150 mm unless otherwise specified.

Brick work shall be in cement mortar 1:6 (1 part cement: 6 part sand). The external joints of the brick masonry shall be finished smooth. The joints of the pipes with the masonry shall be made perfectly leak-proof with cement concrete 1:2:4.

The brick walls of the manholes shall be plastered inside surface and out side of chamber up to 300 mm below top on all sides with 12mm thick cement plaster 1:4 (1 part cement : 4 part sand) finished smooth with a floating coat of neat cement the balance out side surface to be pointed with cement mortar CM 1:2..

Channels and benching shall be in cement concrete 1:2:4 (1 part cement : 2 part sand : 4 part graded stone aggregate)The depth of channels and benching shall be as indicated in the table given below:

Size of drain mm	Top of channel at the centre above bed concrete in cm	Depth of benching at side walls above bed concrete in cm
100	15	20
150	20	30
200	25	35
250	30	40

300	35	45
350	40	50
400	45	55
450	50	60

All manholes deeper than 1.0 m shall be provided with CI **foot rest**. These shall be embedded 20 cm deep with 20x20x10 cm blocks of cement concrete M 15. The block with CI foot rest placed in its centre shall be cast-in-situ along with the masonry and the surface finished with 12 mm thick cement plaster 1:4 (1 part cement: 4 part sand) finished smooth. Foot rests shall be fixed 30 cm apart vertically and staggered laterally and shall project 10 cm beyond the surface of the wall. The top foot rest shall be 45 cm below the manhole cover. Foot rests shall be painted with coal tar, the portion embedded in cement concrete block painted with thick cement slurry before fixing.

CI manhole covers and frames shall conform to IS: 1726. The covers and frames shall be cleanly cast and they shall be free from air and sand holes and from cold struts. They shall be neatly dressed and carefully trimmed. All casting shall be free from voids whether due to shrinkage, gas inclusion or other causes. Cover shall have a raised chequered design on the top surfaces to provide an adequate non slip grip. The cover shall be capable of easy opening and closing it shall be fitted in the frame in workmanship like manner. The cover shall be gas tight and water tight. Covers and frames shall be coated with a black bituminous paint. It shall not flow when exposed to a temperature of 63 Deg. Cent. and shall not be brittle as to chip off at temperature of 0 Deg. Cent.

Manhole cover and frame shall conform to medium duty 500 mm internal diameter and shall weight 58 kg for frame and 58 kg for cover unless other wise mentioned in the item description.

Manholes shall be measured in numbers. The depth of the manhole shall be reckoned from top level of CI cover to the invert levels of channel. The depth shall be measured correct to centimetres.

Sewers of unequal sectional area shall not be jointed at the same invert level in a manhole. The invert of the smaller sewer at its junction with main shall be, at a height at least 2/3 the diameter of the main, above the invert of the main. The branch sewer should deliver sewage in the manhole in the direction of main flow and the junction must be made with care so that flow in the main is not impeded. No drains from house fittings e.g. GT, soil pipe etc. exceeding a length of 6m shall be connected unless it is inevitable.

Acid/alkali proof ceramic tiles/Mandana lining on the benching/internal walls up to desired height shall be provided as per the details / instructions which will be measured and paid for in the relevant tender item.

The frame of the manhole cover shall be firmly embedded to correct alignment and levels in 150 mm thick RCC 1:2:4 (1 part cement : 2 part sand : 4 part graded stone aggregate) on top of the brick masonry. After completion of the work manhole covers shall be smeared by means of thick grease.

Mode of Measurement This shall be measured in Number

12.40 Providing and constructing Manhole Chamber of size 1.0 M x 1.0 M x 1.0 to 1.5 M depth.

The general specification shall be same as per Item spec. no. 12.39

Mode of Measurement: This shall be measured in Number.

12.41 Providing and constructing Manhole Chamber of size 0.6 M x 0.6 M up to 1.0 M depth.

The general specification shall be same as per Item spec. no. 12.39 but CI cover and frame of 455mm dia or 605x605 mm weighing 60 kg (double seal)

Mode of Measurement: This shall be measured in Number

12.42 Providing and laying RCC Hume pipe of 450 mm diameter.

The general specification shall be same as per Item spec. no. 12.01

Mode of Measurement: This shall be measured in Running Meter.

12.43 Providing and laying RCC Hume pipe of 600 mm diameter.

The general specification shall be same as per Item spec. no. 12.01

Mode of Measurement: This shall be measured in Running Meter.

12.44 Providing and fixing small flat back or corner lipped urinal including all the fixtures / fittings etc complete.

The general specification shall be same as per Item spec. no. 12.29

Mode of Measurement: This shall be measured in Number.

12.45 Supply and fixing in position CI manhole cover

CI manhole covers and frames shall conform to IS: 1726 and of the weight and size as specified in the schedule of quantities. The covers and frames shall be cleanly cast and they shall be free from air and sand holes and from cold struts. They shall be neatly dressed and carefully trimmed. All

casting shall be free from voids whether due to shrinkage, gas inclusion or other causes. Cover shall have a raised chequered design on the top surfaces to provide an adequate non slip grip. The cover shall be capable of easy opening and closing it shall be fitted in the frame in workmanship like manner. The cover shall be gas tight and water tight. Covers and frames shall be coated with a black bituminous paint. It shall not flow when exposed to a temperature of 63 Deg. Cent. and shall not be brittle as to chip off at temperature of 0 Deg. Cent.

The rate shall include grouting the frame in CC or the RCC cover slab including finishing the soffit / top surface to match the surrounding.

Mode of Measurement: This shall be measured in Number.

12.46 Providing and fixing 100 mm diameter GI Rain Water Pipe

The GI pipe shall be of class as specified in the schedule of quantity and of approved make like TATA, including necessary specials such as offset, plugs, bends, shoes and welding, application of anti rusting protective galvanizing compound (over weld joint), fixing with hot dipped Galvanized MS clamps and GI bolts nuts/ washer or RCC cantilever bracket duly finished as per surrounding as per drawing / details, grouting the pipe making it leak proof, painting the pipe with two coats of enamel paint over a coat of primer.

Mode of Measurement: The pipe line shall be measured in Running Meter.

12.47 Providing and fixing 150 mm diameter GI Rain Water Pipe

The general specification shall be same as per Item spec. no. 12.46. but for providing GI pipe of 150 mm diameter.

Mode of Measurement: The pipe line shall be measured in Running Meter.

12.48 Providing & Constructing Dispersion Soak Trench

The dispersion trench shall be 1.2 M wide and 1.44 M deep in section as specified in the schedule of quantity including earth work in excavation, preparing the base by providing 300 mm thick coarse sand layer and laying 150 mm diameter stone ware pipes in slope 1:150 with loose jointed and cover (fill up) on sides and top up to 750 mm with sound and even sized brick bats and covering the dispersion trench with Bamboo mat of grid 150 x150 mm covered with coal tar levelling the earth in a hip of 300 mm at the centre with due compaction disposal of excess surplus earth as directed.

The invert level of the pipe shall match the invert level of the incoming pipe. Excess excavation if any required shall be paid under relevant tender item of

earth work. The item shall include supply of all the materials as specified here above.

Mode of Measurement: The dispersion trench shall be measured in Running Meter.

12.49 Providing and fixing recessed soap dish

The soap dish shall be white glazed vitreous of approved make and the size as specified modular to match the standard glazed tile pattern including cutting the brick work fixing including pointing with white cement etc complete.

Mode of Measurement: This shall be measured in Number.

12.50 Providing and fixing looking mirror

Providing and fixing looking mirror 5 mm thick of approved make such as Modi Float / Golden fish over a backing of 12 mm thick novaboard with T W moulded beading to match with the size of the mirror firmly fixed with brass oxidized screws , CP cup type screw etc. including the painting backing board, polishing/ painting the exposed beading/ frame etc complete as directed.

Mode of Measurement: This shall be measured in SqM.

12.51 Providing and fixing liquid soap bottle

Providing and fixing liquid soap holder with soap bottle of approved make such as fixed with CP brass screws etc. complete as directed.

Mode of Measurement: This shall be measured in Number.

12.52 Providing & Constructing Soak pit

The earth excavation shall be carried out to the exact dimensions as shown in the drawing. The soak pit shall be constructed of honey-comb dry brick work of 230mm thick in cement mortar 1:6, filled with brick bat up to height as specified, RCC M20 cast-in-situ slabs 150mm thick for top cover with reinforcement, CI manhole cover 455 mm dia of 53 kg weight, 150mm dia stone ware tee, outlet vent, 75mm dia CI pipe 2m high fixed on masonry pedestal with cowl and bituministic painting, refilling, watering, consolidating etc. all complete.

Mode of Measurement

All above mentioned works shall be measured under the respective Trades & items as given in the Schedule of Quantities.

12.53 Providing & Constructing Drop chamber/connection

In cases where branch sewer enters the manholes of main pipe sewer at a higher level than the main sewer, a drop connection should be provided. Pipes and specials conforming to IS: 1729 shall be of the same size as the branch pipe sewer.

For 150 mm and 250 mm main line if the difference in level between the water line (peak flow level and the invert level of branch line is less than 60 cm a drop connection may be provided within the manhole by giving a suitable ramp. If the difference in level is more than 60 cm the drop should be provided externally.

The excavation shall be done for the drop connection at the place where the branch line meets the manhole. The excavation shall be carried up to the bed concrete of the manhole and to the full width of the branch line excavation and backfilling shall be done as per respective specifications.

At the end of branch sewer line SCI tee shall be fixed to the line which shall be extended through the wall of manhole by a horizontal piece of SCI pipe to form an inspection of cleaning eye. The open end shall be provided with chain and lid. The SCI drop pipe shall be connected to the tee at the top and to the SCI bend at the bottom. The bend shall be extended through the wall of the manhole by a piece of pipe which shall discharge into the channel. Necessary channel shall be made with cement concrete of grade M-20 and finished smooth to connect the main channel. The joint between SCI pipe and fittings shall be lead caulked. The joint between SCI tee and SW branch line shall be made with cement mortar 1:1 (1 part cement : 1 part fine sand) as for encased all round with minimum 15 cm thick concrete 1:5:10 (1 part cement:5 part coarse sand : 10 part graded stone aggregate 40 mm nominal size) and cured. For encasing the concrete around the drop connection the necessary centring and shuttering shall be provided the holes made in the walls of the manhole shall be made good with brick work in cement mortar 1:5 (1 part cement : 5 part coarse sand) and plastered with cement mortar 1:3 (1 part cement: 3 part fine sand) on the inside of the manhole wall. The excavated earth shall be back filled in the trench in level with the original ground level.

Mode of Measurement

All above mentioned works shall be measured under the respective Trades & items as given in the Schedule of Quantities.

12.54 Providing & Constructing Road gully chambers/ Yard gully

The chamber shall be of brick masonry and shall have a CI grating with frame fixed in 150 mm thick cement concrete of grade M-20 at the top. The size of the chamber shall be taken as clear internal dimensions of the CI

frame. The chamber shall have a SW connection pipe, the length of which between road gully chamber and the point of discharge to drain or to open ground shall be measured separately. The chamber shall be built at the locations indicated in drawings.

Bed concrete, brick work, plastering RCC work. Excavation, backfilling etc. shall be as per details given on the drawing and in compliance with the requirements laid down in the specifications for the respective items.

The MS grating cover shall be hinged to the frame to facilitate its openings for cleaning and repairs. The weight of grating shall be 75 kg minimum or as specified.

After the completion of the work the exposed surfaces of the grating and the frame shall be painted with two coats of synthetic enamel paint.

Mode of Measurement:

All above mentioned works shall be measured under the respective Trades & items as given in the Schedule of Quantities.

12.55 Providing & Constructing Septic tank

Septic tanks shall be built as per the drawings. The cost of all works such as excavation backfilling, concrete, reinforcement etc. shall be paid under the respective items included in the specification.

Mode of Measurement

The various works involved shall be measured and paid for in the respective trade as given in the Schedule of Quantities.

Note:

1. All Samples of Fixtures / Fittings shall be got approved from Engineer / Consultant prior to bulk ordering.
2. The equivalent brand shall be got approved from Engineer/ Consultant in writing prior to bulk ordering.

**TECHNICAL SPECIFICATION
(INTERNAL ELECTRIFICATION)
CONTENTS**

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TECHNICAL SPECIFICATIONS FOR INTERNAL ELECTRIFICATION WORKS

The following specifications will apply under all circumstances to the equipment to be supplied and installed against this contract and it is to be ensured that the contractor shall obtain for himself at his own expense and on his own responsibility all the information which may be necessary for the purpose of submitting the tender and for entering into a contract keeping in view the specifications of installation and inspection of site etc.

1.0 STANDARDS AND CODES

The following Indian Standard Specifications and code of practices amended as on date will apply to the equipment, materials and installation for this contract:

a)	Steel boxes for enclosure of electrical accessories	IS 5133 – 1969 Part I
b)	Fittings for rigid steel conduits	IS 2667 – 1964
c)	Rigid PVC conduits for electrical wiring	IS 9537 Part III
d)	Accessories for rigid PVC conduits for electrical wiring	IS: 2667-1964 & IS: 3857-1966
e)	Switch socket outlets	IS 4615 - 1968
f)	Three pin plug and socket outlets	IS 1293 - 1967
g)	Switches for domestic and similar purpose	IS 3854 - 1966
h)	PVC wires	IS 694 – 1990
i)	PVC Insulated Heavy Duty Cables	IS 1554 - 1976
j)	Conductor for Insulated Electric Cables	IS 8130 - 1984
k)	PVC Insulated & PVC Sheathed solid Al conductor cables – 1100 volts.	IS 4288 - 1988
l)	Low Voltage Switchgears & Control Gears	IS 13947 – 1993
m)	Switchgear bus bars	IS 375 - 1963
n)	Enclosures for low voltage switchgear	IS 2147 - 1962
o)	Moulded Case Circuit Breakers	IS 13947 - 1993
p)	Miniature Air Circuit Breakers for AC Circuits	IS 13947 – 1993
q)	Code of Practice for Installations & Maintenance of power cables	IS 1255 – 1983
r)	Code of Practice for Electrical wiring installation	IS 732 - 1989
s)	Code of Practice for Selection, Installation & Maintenance of Switchgear & Control gear	IS 10118 – 1982
t)	Code of practice for Earthing	IS 3043 – 1987
u)	Code of Practice for Lightening protection	IS 2309 – 1989
v)	Code of Practice for personal hazard & fire safety of buildings	IS 1644 – 1960
w)	Code of Practice for Electrical Installation fire Safety of Building	IS 1646 – 1982

Indian Electricity Rule 1956 & Indian Electricity Act 1910 amended as on date and NATIONAL BUILDING CODE OF INDIA

2.0 CONCEALED / SURFACE CONDUIT WORKS

2.1 Rigid PVC Conduits specification & size

2.1.1 Rigid PVC Conduits : These shall be grey coloured rigid PVC conduit of perfectly circular tubing having minimum wall thickness of medium gauge 1.8 mm approved by F.I.A. & I.S.I. and shall conform to IS 9537 Part III. No PVC conduit of less than 25 mm dia shall be used for electrical wiring.

- i) Up to 38 mm diameter - min. 1.8 mm wall thickness
- ii) Above 40 mm diameter - min. 2.2 mm wall thickness

2.1.2 PVC Conduit fittings : Connections between PVC conduit shall be with rigid PVC conduit accessories only. PVC conduit accessories / fittings such as couplers, unions, bends, tees, junction boxes, reducers, chase nipples, split couplings, plugs etc. shall be specifically designed and manufactured for their particular application. All conduit accessories shall be PVC grip type and shall conform to IS: 2667-1964 and IS: 3857-1966. As far as possible, the conduit system shall be so laid out that it will alleviate the use of tees, and sharp bends. No elbows shall be used and only PVC regular bends, slip in type shall be used for bonding/turning.

In long distance straight runs of conduits, inspection boxes at reasonable intervals shall be provided. The conduit pipes including all bends, unions, couplers, tees, junction boxes etc. forming part of the conduit system shall be adequately supported. Bending of conduit with large radius while laying at site to minimize use of readymade bends shall be adopted as far as possible. For diversion purpose pipes shall be bent."

2.1.3 Conduit Cross Section / Size : The conduit shall be of ample section area to facilitate the drawing of PVC wires/cables. In no case shall the total cross section of wires/cables measured overall, be more than half the inside area of the conduits. Refer Table provided at Clause No. 13, Page IV-48 for maximum no. of wires that can be pulled in various sizes of conduits.

MINIMUM CONDUIT DIA (O.D.) FOR ELECTRICAL WIRING - 25 MM

2.2 Laying of Conduits

2.2.1 Conduits shall be laid before casting in the upper portion of a slab/in PCC if below flooring or otherwise, as may be instructed in accordance with approved drawings, so as to conceal the entire run of conduits and ceiling outlet boxes with a concrete cover of **minimum 12 mm**. Conduits shall be so laid that they are interconnected. This is required to facilitate pulling of wires from different routes in case of any of the portion of conduit/junction box/outlet box is blocked during slab casting. Vertical drops shall be cut in masonry work by the contractor to sufficient depth to allow full thickness of plaster over conduits. The width of the chases will

be made to accommodate the required number of conduits. The chases will be filled with cement, coarse sand mortar (1:4) and properly cured by watering by the contractor. This filling of chases shall be done by electrical contractor prior to building contractor doing finishing plaster on walls.

- 2.2.2 When the conduit is to be embedded in a concrete member it shall be adequately tied by steel wires to the reinforcement to prevent displacement during casting/vibrating of concrete. Tying wire shall be supplied by the contractor. Conduit in chases or laid in the slab shall be supported at maximum of 1 m centre.
- 2.2.3 Cutting of chases in any R.C.C. member/finished floor/ already finished wall surface is not allowed unless prior approval of Site Engineer is taken in site instruction book. If a chase is cut in an already finished surface, the contractor shall fill the chases and finish it to match the existing finish including painting at his cost to Site Engineer's satisfaction.
- 2.2.4 Contractor shall not cut any steel reinforcement bars or steel structure to fix the conduits. Puncturing of wooden/ steel shuttering for R.C.C. slab/beams/column etc. for conduit work is also not allowed, unless Site Engineer permits in site instruction book under special conditions.
- 2.2.5 Run of conduit pipe through expansion joints in R.C.C. members should be avoided as far as possible and if unavoidable, flexible conduit pipe should be used with ceiling outlet box on both sides of expansion joint.
- 2.2.6 Surface Conduiting : Conduit on surface of walls/R.C.C. members shall be avoided as far as possible and if unavoidable prior approval of Site Engineer on sample saddles, clamps, screws and a minimum 5 M conduit laid on surface shall be taken, to achieve best possible workmanship. Distance between 2 consecutive clamps for fixing conduit on surface shall not exceed 600 mm. No wooden gutties for fixing saddles/clamps shall be used. Roll plug/steel fastener with hard setting/sealing compound shall be used. Conduits & boxes fixed on surface shall be painted with finishing paint of approved colour & finish.

WHERE EVER FALSE CEILING IS BEING PROVIDED, CONCEALED CONDUITS IN RCC SLAB SHALL NOT BE PROVIDED BUT SURFACE CONDUITING WITH MS SUPPORTS / CLAMPS ETC. SHALL BE DONE OVER FLASE CEILING. SIMILARLY FOR INSULATED CEILING & WALLS, ONLY SURFACE CONDUITING TO BE PROVIDED.

- 2.2.7 Conduiting on Stone wall: In case of stone masonry, necessary conduits with MS boxes should be placed as the masonry is in progress, since after completing masonry; it is very difficult to cut chases in walls. Special location of cement concrete shaft is also recommended to conceal conduit in stone masonry and the same shall be provided by the NDDB.

- 2.2.8 Conduits below floor: In ground floor conduiting below the flooring should be avoided. Wherever it is unavoidable GI 'A' class pipe or heavy gauge PVC pipe shall be used with prior approval of Site Engineer.
- 2.2.9 Steel draw wires : All conduits shall be provided with steel draw wires (fish wires) of at least 16 SWG wherever required.

2.3 Ceiling/Wall outlet boxes for lights/fans

- 2.3.1 Outlet boxes shall be **of minimum 16 SWG** steel sheets or of casting with removeable cover sheet for all the light points & the fan points and so installed as to maintain continuity throughout. These shall be protected at the time of laying by filling with jute/earth/cotton etc. so that no cement mortar finds its way inside during concreting or plastering etc. **Typical sketches SK – 18 A & B** for such outlet boxes are attached. While installing lighting fixture and ceiling fans, removeable covers to be removed and **3 mm** thick matching colour hylem sheet covers to be used.
- 2.3.2 For fixing lighting fixtures/brackets, outlet boxes complete with check nut for holding conduits shall be used. For fixing lighting fixture suitable for 14 /18 /20 Watts fluorescent tubes/ incandescent lamps/discharge lamps on RCC slabs/walls, only **one** outlet box is required. For fixing lighting fixture suitable for 28 / 36 / 40 / 54 Watts fluorescent lamps in RCC slabs/walls, **two** numbers outlet boxes should be provided at a distance of **300 mm** away from the centre in the longitudinal direction of the fixture, so that the use of gutties / rawl plugs etc. may be avoided, as well as wiring from outlet box to the light fitting is completely concealed. However, if for fixing of lighting fixture suitable for 28/36/40/54 W fluorescent lamp in RCC slab walls, **2 nos.** anchor fasteners are being used, only one outlet box may be provided. If the light fitting is to be installed in RCC beam, and due to heavy reinforcement at the bottom of beam it is not possible to provide outlet boxes, simple conduit should be provided. These details have been shown in the **attached sketch no. SK-16** and these should always be followed.
- 2.3.3 For fixing ceiling fans, circular outlet boxes, made of **minimum 14 SWG** Sheet Steel, **125 mm** diameter, complete with **12 mm dia** Mild Steel rod **525 mm** long, with loop in the box & hylem sheet cover **150 mm dia** at bottom shall be used. See attached **sketch no. SK - 17** for the details of this special outlet box and fan fixing detail. However, if anchor fasteners with D-hook specially designed for fixing ceiling fans are used, simple outlet box without mild steel rod shall be used.

2.4 Draw Out Junction Boxes

Heavy gauge PVC / Steel draw out boxes fabricated from **minimum 16 SWG** sheet steel of ample dimensions shall be provided at convenient points on walls/ceilings to facilitate pulling of long runs of cables/wires. These shall be completely concealed with **3 mm** thick hylem sheet covers, flush with

plasterwork. These draw out boxes should be five sided. The location of these boxes is to be decided prior to fixing, as per site requirement and following shall be treated as general guidelines for deciding the location of these:

- a) These shall be provided at a place where these are not in direct view. Recommended place is **400 / 450 mm** below ceiling, if conduits are running vertically.
- b) Junction boxes in the offset of bottom of R.C.C. beamed vertical wall shall not be provided.
- c) If junction boxes are coming side by side for two or more conduits, one common MS box of proper size can be used to act as junction box.
- d) Junction box in ceiling to be avoided as far as possible & if junction box is to be provided in ceiling, its position should be so located that it is in line with other light/fan points.
- e) Junction boxes shall never be used for splitting one conduit into two or more. Junction box for such functions is avoidable and for this, number of conduits to be connected to one switchboard shall be calculated correctly as per drawing before laying conduits in ceiling.
- f) Locating junction boxes on outer surface of exterior walls of building shall be avoided as these are in direct view and are also exposed to weather.
- g) Junction boxes shall never be closed permanently by plaster. Removable covering of Aluminium / Sheet Steel shall be provided for conduit boxes acting as junction boxes and for MS junction boxes removable hylem (white colour) plate shall be provided. This cover shall be painted with wall colour.
- h) Junction boxes in important areas shall be avoided and can be located in toilets/corridors/service shafts & stores etc.

2.5 A Switch Boxes (for Piano type switches)

Steel boxes of required sizes fabricated from **16 SWG steel sheets**, shall be provided to house speed regulators of fans, switches for lights, fans, plug sockets etc. as per requirement of drawings. These should be so designed that accessories on hylem sheet could be mounted with tapped holes and brass machine screws, leaving ample space at the back and on the sides for accommodating wires and check nuts at conduit entries. These shall be attached to conduits by means of check nuts on all walls of the boxes through which the conduits are entering. These shall be completely concealed leaving edges flush with finished wall surfaces. **3 mm** thick hylem cover should be fixed to these switch boxes by means of brass chrome plated machine screws. Utmost care shall be taken by contractor to ensure that all switch boxes are in line and level. Inside each switchbox, one bolt shall be welded to receive earthing wire.

TYPICAL SKETCHES FOR THESE SWITCHBOXES ARE SHOWN IN THE ATTACHED SKETCH NO. SK-19. UNLESS OTHERWISE SPECIFIED IN EXECUTION DRAWINGS, THE HEIGHT OF SWITCH BOXES, OUTLET BOXES

FOR LIGHTS IN WALLS, POWER PLUGS ETC. FROM FINISH FLOOR LEVEL SHALL BE AS SHOWN IN SKETCH NO. 20 (ATTACHED).

2.5 B Switch Boxes (for Modular type switches)

Same as above but only Zinc chromate passivated MS boxes suitable to house modular type switches, fan regulators & sockets of required ratings. These shall be so designed that accessories are mounted on a grid plate with tapped holes for brass machine screws. The grid plates & MS boxes shall be fitted with a brass earth terminal. Moulded front covers made from high impact resistant, flame retardant and ultra violet stabilized engineering plastics shall be fixed by means of counter sunk chromium plated brass machine screws.

NOTE-

CONVENTIONAL PIANO TYPE OR MODULAR SWITCHES AND CORRESPONDING SWITCH BOXES SHALL BE USED AT LOCATIONS AND AS PER THE DETAIL SPECIFIED IN SCHEDULE OF QUANTITIES/ DRAWINGS/ INSTRUCTION OF SITE ENGINEER.

2.6 Cleaning and Protection of Conduit System

The entire conduit system including outlet boxes, junction boxes and switchboxes shall be thoroughly cleaned after completion of erection and tested for non-blockage by air/sound or steel wire (minimum 16 gauge) prior to finishing of building and before drawing in of cables/wires.

To safe guard conduit system against filling up with the plaster/cement slurry/water etc. all the outlet and switch boxes will have to be provided with temporary jute/cotton filling, covers and plugs etc. within tendered cost which shall be replaced later on by hylem sheet cover after wiring as required.

2.7 Painting of MS Outlet & switch boxes

All outlet & switch boxes etc. should have their original finish & paint in good finish prior to erection & if due to long storage in open, painting has been peeled off/damaged/worn-out; fresh coat of paint should be applied.

2.8 Raceways

These shall be used for drawing wiring for system like UPS, telephone, data processing etc. specially under floors or above false ceiling, due to use of modular furniture. Heavy-duty removable cover raceways of sizes as per schedule of quantities/ drawings fabricated from 14 SWG sheet of approved design and make shall be provided. The raceways shall be embedded in floors, with covers flush with finished floor level or shall be fixed on surface over false ceiling, as indicated in drawings

and as required. Covers of raceways shall be screwed on neoprene gasketed top with counter sunk brass chrome plated screws. Sheet steel raceways shall be galvanised. Fixing of raceways in floors shall be done in close co-ordination with civil works & utmost care shall be taken to prevent mortar from seepage into the raceways. These raceways be provided when floors are being laid. If these have to be provided after laying of floors, cost of cutting chases in floor and making them good, as required shall be without any extra cost. All telephone & data raceways shall be at least 300 mm away from those of electrical unless otherwise stated / shown in drawings. Common raceways with steel partition can be used (with approval) for power and telephone data purpose.

3.0 WIRING AND SWITCHES:

3.1 Specification of wires, sizes and laying / termination.

All wires shall have been manufactured in accordance with the latest IS Specification (IS 694-1990 Part II). All wires shall be PVC insulated, unsheathed, single core, FRLS (Fire Resistance Low Smoke), copper conductor (stranded), of 1100 volt grade. Cross section of the conductor shall be as per the specification mentioned in schedule of quantities.

MINIMUM CROSS SECTION OF COPPER STRANDED CONDUCTOR FOR ELECTRICAL WIRING - 1.5 MM SQUARE.

For single phase wiring, colour of live conductor's insulation shall be Red/Yellow/Blue (only one of these colour for one building) and Black for neutral. Earthing is to be done by green PVC insulated copper conductor. For three phase wiring, colour of live conductor's insulation shall be Red/Yellow/Blue, as per relevant phase and black for neutral. However, if due to unavoidable circumstances, these colour codes cannot be used by contractor, prior approval of the Site Engineer shall be taken and correct colour PVC tape should be put in distribution board/ outlet boxes/switch boxes etc. wherever these wires are to be inspected. Earth wire shall always be of Copper conductor PVC insulated & colour of insulation shall be Green. Whenever wires are being terminated in a Distribution Board / Switch Box / Plug Points / Outlet Box etc., a minimum of 200-mm long extra wire should be provided in the form of a loop for future maintenance/use. Conductor having nominal cross sectional area exceeding 4 Sq. mm. Shall always be provided with crimping socket unless switchgear is having facility to receive direct naked wires.

NO JOINTS IN WIRES SHALL BE MADE INSIDE CONDUITS AND INSPECTION DRAWOUT BOXES.

3.2 A Switches And Sockets (Conventional piano key type)

All 6 and 16 Ampere switches shall be conventional piano key type 240 volts AC of best quality & standard. The switch's moving & fixed contacts shall be of silver nickel and silver graphite alloy & contact tips coated with silver. Switches controlling the light, fan or sockets shall be connected on to the phase wire of the circuit. 6 A socket shall be 3-pin type with safety shutter, suitable for 240 V AC, 16 A socket shall be universal type (6 pins) suitable for 240 V AC with safety shutter.

3.2 B SWITCHES AND SOCKETS (Modular type)

All 6 & 16 A switches shall be of the modular flush mounting type, 240 V AC of best quality & standard. The switch's moving & fixed contacts shall be of silver nickel & silver graphite alloy & contact tips coated with silver. Housing of switches shall be made from high impact resistant, flame retarding & ultra violet stabilized engineering plastic material. Fan regulators shall be fixed inside the switch boxes on grid plates with tapered holes & brass machine screws leaving ample space at the back & sides for accommodating wires. Switches & sockets shall be provided with moulded cover plates of approved colour, shape & size made from high impact resistant, flame retarding & ultra violet stabilized engineering Plastic material & secure the box with counter sunk / round head chromium plated brass screws, where two or more switches are installed together, they shall be provided with one common switch cover plate as described above with notches to accommodate all switches either in one, two or three rows. 6 / 16 A socket outlets shall be of modular flush mounting type & shall be switch three pin type (for 6 A) and 6 pin type (for 16 A) and fitted with automatic linear safety shutters to ensure safety from putting fingers. Socket outlets shall be made from high impact, flame retarding & ultra violet stabilized engineering plastic material. Switch & sockets shall be located in the same plate.

3.3 Point wiring

3.3.1 For lights, fans, call bells & 6 A plug points in lighting switch boards

- (a) Providing & fixing of conduit, conduit accessories, draw out boxes, outlet boxes and switch boxes etc. in concealed / surface system.
- (b) Looping system shall be adopted from terminal to terminal throughout including supply and drawing of required numbers and sizes (minimum 1.5 sq. mm copper stranded conductor) of wires without stripping off the insulation in-between.
- (c) All flush type switches and accessories will be used on **3 mm** thick hylem sheet in MS switch box or modular switches in special boxes as per technical specifications & requirement given in schedule of quantities.
- (d) The point will commence from the switch box and would end up to outlet box and shall also include supply and fixing of 6 A switch for

each light point or group of light points as the case may be for the items.

(CIRCUIT WIRING INCLUDING CONDUITING UP TO SWITCH BOARDS IS NOT INCLUDED IN SCOPE OF POINT WIRING)

- (e) POINT WIRING AND CIRCUIT WIRING IN SAME CONDUIT IS NOT ALLOWED AND THESE SHOULD BE DRAWN IN INDEPENDENT CONDUITS. POINT WIRING ORIGINATING FROM TWO DIFFERENT PHASES SHALL NOT BE RUN IN THE SAME CONDUIT.
- (f) The ceiling fan point shall be complete with special outlet box as specified in **2.3.3.** including fixing and connection of regulator. Supply and fixing of 6A switch and electronic stepped fan regulator for each ceiling fan is included in scope of the contractor. Switch box for ceiling fan shall be suitable for electronic type regulators unless otherwise specified.
- (g) For exhaust fans, ceiling rose near exhaust fan to be provided.
- (h) In any switch box, not more than **six (6)** regulators for ceiling fans should be provided unless approved in writing by the Site Engineer.
- (i) Joining of wires by taping inside the switch box to be avoided by utilizing neutral & phase pin of 6/10, 16/20, 6/16, 10/20, 25 A socket or of suitable capacity connector if there is no socket in switch box.
- (j) Fan regulator in switch box should be earthed if it is chocked or resistance type. **Earthing of light fittings / call bells / fans not required.** 6 Amp. convenience plug point's 3rd pin to be earthed with 2.5 sq. mm. green PVC insulated copper wire.
- (k) In one switch box, only one phase circuit shall be provided.
- (l) BUILDING FOR POINT WIRING (LIGHTS, FANS, CALL BELLS AND 6 A PLUG POINTS N LIGHTING SWITCH BOARDS) SHALL BE TWO TYPES:
 - TYPE A - NON INDUSTRIAL BUILDING SUCH AS RESIDENTIAL QUARTERS, OFFICE BUILDINGS, HOSTLES, MARKETING SHOPS/MILK BOOTHS AND GUEST HOUSES ETC.
 - TYPE B - INDUSTRIAL BUILDINGS SUCH AS PRODUCTION BLOCK, SERVICE BLOCK, SUB-STATION, REF. BLOCK, BOILER HOUSE AND WORKSHOP ETC.

3.3.2 For 16/20 A Power Plug Points

- (a) Providing & Fixing of conduit, conduit accessories, draw out boxes switch boxes etc. in concealed/surface system including supply and drawing of circuit wiring. Conduit and wiring up to power plug point shall be paid separately and is not including in the scope of work for supplying & fixing power plug point.
- (b) Providing and drawing of wires of sizes as specified in the item. In one circuit, there shall not be more than 2 nos. 16/20 A power plug points and circuit shall be **2 x 2.5/4.0 sq. mm** copper stranded conductor wires, as specified in schedule of quantities.
- (c) One no. flush type plug socket outlet and switch shall be supplied and fixed for each power point on 3 mm thick hylem sheet cover. Plug

socket shall be universal type (one common 16 A switch for 6/16 or 10/20 A sockets). 6-pin switch & socket to be piano type in conventional MS box or modular type in special MS box as required in schedule of quantities.

- (d) The point would commence from the distribution board and will end up to the switch box. Looping of circuit would be done to second 16/20 A power point from first 16/20 A power point.
- (e) Each circuit would have its own **2.5/4.0 sq. mm.** green PVC insulated copper wire from distribution board to switch box and would be connected to third pin of socket outlet.
- (f) For some special 16/20 A power plug point, only one point on one circuit has to be provided as required in schedule of quantities/drawings.

Note : Conduit and wiring up to 16 / 20 A power plug point from DB shall be paid under circuit wiring on length basis and supplying fixing of MS box with switch & socket shall be paid on number basis for each point.

3.3.3 For 20 / 25 A Power Plug Point

- (a) Providing and fixing of conduit, conduit accessories, draw out boxes & switch box etc. in concealed/surface system.
- (b) Providing and drawing of wires of sizes as specified in the item. In one circuit, there shall be only one power point and circuit shall be **2 x 4.0 sq. mm** copper stranded conductor wire as specified in schedule of quantities, complete with 4.0 mm sq. green PVC insulated copper wire.
- (c) One no. M.C.B. 20 / 25 A, single phase shall be fixed for each power point on 3-mm thick hylem sheet cover, in such a way that only knob is outside MS switch box. It should also have one no. 20/25 A three-pin metallic type socket outlet complete with metallic plug top if specified in schedule of quantities. However, for modular socket & MCB grid & switch plate with special MS box shall be provided.
- (d) The point would commence from the distribution board and will end up to the switch box.

Note : Conduit and wiring up to 20/25 A power plug point from DB shall be paid under circuit wiring on length basis and supplying fixing of MS box with switch & socket shall be paid on number basis for each point.

3.4 Group Wiring (for industrial lighting)

- (a) Specification for this would be applicable if either 1 or more lights of total 200 Watts or more lighting load is controlled by one M.C.B.
- (b) Lights would be controlled by M.C.B. of rating and wire size, as specified in schedule of quantities. However, it shall not be less than **6 A and 2.5 sq.mm** copper conductor respectively. Light points controlled by one M.C.B. would be in parallel.
- (c) M.C.B. for these lights would be installed in a suitable modular MS box with modular grid & switch plate. Total electric load to be

controlled from this "Group Lighting Board" would not exceed **3000 W or 6 groups of lights.**

- (d) 'Group Lights' point would commence from group lighting switch board in surface / concealed conduit system, necessary wiring and up to the last light of the group.
- (e) Group light points having fluorescent lamps light fittings with total wattage up to **500 W or less** should be covered under the **item 81.36 to 81.38**. For discharge lamp type light fittings if total wattage is more than **150 but less than 750 watts** it should be covered under the **item no. 81.32 to 81.35** of library of schedule of quantities. However, if wattage of each point is above **500 W**, each fitting may be controlled by independent MCB under **item no. 81.33** of library of schedule of quantities.

3.5 Circuit / Sub Mains Wiring

3.5.1 Circuit wiring with PVC insulated wires

Specification for this item covers, PVC insulated wires from distribution boards to light switchboard or to Group lighting switchboard, or to 6/16/20/25 A isolated power plug points, in surface/concealed conduit system. This shall also cover wiring between two light switchboards or between two group lighting switchboards or between Two 6 / 16 / 20 / 25 / 30 A power plug points. This shall be carried out as follows:

- (a) Supply and fixing of conduit, conduit accessories, draw out boxes, etc. in concealed/surface system as per specification given in **2.0**.
- (b) Providing and drawing of wires of sizes as specified in items details specified in schedule of quantities. For each circuit, independent conduit of size as specified in schedule of quantities to be provided i.e., pulling of more than one circuit in one conduit is not allowed. However, this condition can be relaxed by Site Engineer as per site conditions. In such cases one circuit shall be paid as per the relevant circuit wiring item and wires for other circuits shall be paid in items of pulling wires in existing conduits. Specification of wires shall be as per details given at **3.1**.
- (c) Each circuit shall have a parallel independent running earthing of green PVC insulated copper stranded conductor wire of sizes as specified in schedule of quantities. For single-phase (2 wires) circuit one earthing wire and for 3 phase (4 wires) circuit, 2 earthing wire shall be drawn.
- (d) For the purpose of determining the load per circuit, the following electric rating of points shall be assumed:

Light points (4' Fluorescent lamp)	80 Watts
Light points (incandescent lamp)	60 Watts
Light points (Compact Flu. lamp)	20 Watts
Light points (Discharge lamps)	As per the load of the fitting
Call bell point	20 Watts

Convenience plug point 6/10 A	100 Watts
Fan points	60 Watts
Exhaust fan points	300 Watts or as specified.
Convenience plug point 16/20 A	1000 Watts

Type and size of circuit shall be specified in the drawings. However, if this is not specified the same may be worked out based on following guidelines:

1. For non-industrial buildings such as office building, worker's amenity, staff quarters etc. the load per lighting circuit (light points, fan points & 6 A socket outlet) shall not exceed **1000 W or a total of 10 lights, fan or socket points which ever is less** and hence circuit of **2.5 sq. mm** copper conductor wire may be used.
2. For industrial buildings load per lighting circuit can be more than 1000 W. Size of copper conductor wire for circuit may be

For load up to 1500 W	: 2.5 sq.mm circuit
For load above 1500 & up to 2000 W	: 4.0 sq.mm circuit
For load above 2000 & up to 3000 W	: 6.0 sq.mm circuit
For load more than 3000 W	: 10 sq. mm circuit

 For Industrial Building depending upon the load 3 phase circuits of 4.0 & 6.0 sq.mm can also be used.
3. For 16/20/25 A power plug points circuit wiring of min. size 2.5 sq. mm copper conductor to be used. Maximum two 16 A power plugs points can be provided in one power circuit.

3.5.2 Sub-Main Wiring with PVC insulated wires

Specification for this item covers, PVC insulated wires/cables from main switch board to distribution board or from one distribution board to other distribution board in surface/concealed conduit system. This shall be carried out as specified in **3.5.1**.

3.5.3 Sub-Main Wiring with PVC insulated, PVC sheathed armoured cables.

Same as **3.5.1** above except that PVC insulated, PVC outer & inner sheath, armoured, Al. conductor cables shall be used instead of PVC insulated wire/cable. These cables shall be supplied & laid as specified in **4.0** of tender' technical specification.

4.0 POWER CABLE WORK

4.1 Specification of Cables

Heavy duty, PVC insulated, PVC outer and inner sheath, steel armoured, Al. conductor cables suitable for 1100 Volts AC, as per IS 1554 (Part-I-1976) of sizes as specified in schedule of quantities. The conductor of cable of size 16 sq. mm. & above shall be stranded whereas cables of size up to 10 sq. mm. shall be of single strand. While deciding the sizes of cable (if not specified in drawings) for current rating following conditions may be considered

- | | | |
|----|--------------------------------------|-----------------------------------------------------|
| a) | Maximum conductor Temperature | 70 deg. C |
| b) | Ambient Air Temperature | 45 deg. C. |
| c) | Ground Temperature | 30 deg. C |
| d) | Depth of Laying | 750 mm. |
| e) | Load | Maximum connected load |
| f) | Grouping of cable | yes |
| g) | Voltage drop | Not to exceed 5% from one end to another end |

4.2 General Precautions for handling of cables

- 4.2.1 Before laying cables, these shall be tested for physical damage, continuity, absence of cross phasing, insulation resistance to earth and between conductors. Insulation resistance tests shall be carried out with **500/1000-Volt** Insulation Tester.
- 4.2.2 The cables shall be supplied to site wound on wooden drum as far as possible. For smaller length and sizes, cable in properly coiled form can be accepted. The cables shall be laid by mounting the drum of the cable on drum carriage (specially for cable of sizes above 50 sq. mm.). Where the carriage is not available, the drum shall be mounted on a properly supported axle, and the cable laid out from the top of the drum. In no case the cable will be rolled on, as it produces kinks which may damage the conductor.
- 4.2.3 Sharp bending and kinking of cables shall be avoided. The bending radius for PVC insulated and sheath armoured cable shall not be **less than 12 D where 'D' is overall dia of the cable.**
- 4.2.4 While drawing cables through GI pipes and conduits & RCC pipe, ensure that size of pipe is such that, after drawing cables, **40% area is free.** After drawing cable, the end of GI pipes/conduits shall be sealed with cotton/bituminous compound. After drawing cables through RCC pipes, the ends shall be sealed with lean mortar of brickbat.
- 4.2.5 Electric power cables and telephone wires/cables shall not be laid in same trench, G.I./conduit/R.C.C. pipe. Minimum distance of **400 mm** between power and telephone wire/cable shall be maintained.
- 4.2.6 Armoured cables shall never be concealed in walls / floor/ roads without GI pipes, conduit or R.C.C. pipes.

4.3 Laying of Cables (Underground System)

- 4.3.1 Cables shall be so laid in ground that these will not interfere with other underground structures. All water pipes, sewage lines or other structure which become exposed by excavation shall be properly supported and protected from injury until the filling has been rammed solidly in places

under and around them. Any telephone or other cables coming in the way are to be properly shielded, diverted as directed by the Site Engineer.

- 4.3.2 Cables shall be laid at a minimum depth of **750 mm** from existing ground level. Excavation will generally be in ordinary alluvial soil. The width of the trench shall be sufficient for laying of required number of cables.
- 4.3.3 Sand bedding **75 mm** thick shall be made below and above the cables. A layer of second class bricks (full size 230 x 100 x 75 mm) shall be laid over the cable, above sand bedding to cover cable completely. More than one cable can be laid in the same trench by providing sand between two cables. For details of laying of cables see **sketch no. SK-26 attached**. However, the relative location of cables in trench shall be maintained till termination. The surface of the ground after back filling the earth shall be made good so as to conform in all respects to the surrounded ground and to the entire satisfaction to Site Engineer.
- 4.3.4 Cable Joints: Joints in the cable throughout its length of laying shall be avoided as far as possible and if unavoidable, prior approval of site engineer shall be taken. If allowed proper straight through epoxy joint shall be made including preparing necessary bedding without any additional cost.
- 4.3.5 **Cable Loops :** A minimum loop of **3 M** shall be provided on both ends of the cable at entry of buildings, or after every **150 M** of un-jointed length of cable, and on both ends of straight through cable joint. This additional length shall be used for fresh termination in future. Cable for this loop shall be paid for supply and laying.
THE LOOP SHALL BE KEPT IN "S" FORM AND LOOPS OF DIFFERENT CABLES SHOULD NOT OVERLAP.
- 4.3.6 Route Markers

For all underground cables, route markers should be used:

- (i) Separate cable route marker should be used for L.T., H.T. and Telephone cables.
- (ii) Standard specification of cable markers is as follow:
Galvanised cast iron plate with marking (LT/HT/Telephone cable) dia 100 mm with 600 mm long GI 'B' class 20 mm pipe or 35 x 35 x 6 mm MS angle (Galvanized) riveted/bolted with this plate.
- (iii) Route markers should be grouted in ground with **1:2:4 cement concrete pedestal size: 230 x 230 x 300 mm.**
- (iv) Cable markers should be installed at an interval not exceeding **50 M** along the straight routes of cables at a distance of **0.5 M** away from centre of cable with the arrow marked on the cable markers plate indicating the location of cable. Cable markers should also be used to

identify change in direction of cable route and for location of every joint in underground cable. The typical sketch of a cable marker is shown in **Sketch no. SK-27 attached.**

- 4.3.7 R.C.C. hume pipe for crossing road in cable laying shall be provided by purchaser/Client. Similarly masonry/concrete trench inside building if required shall be provided by NDDB. However, 'A' class GI pipes for laying cables in walls/floors/concrete block etc. near cable ends/if required shall be provided by contractor without any extra cost. Sealing of GI pipes/conduits, R.C.C. hume pipe, trenches etc. also shall be done by electrical contractor without any extra cost.

4.4 Laying of cables (in air)

- 4.4.1 If major length (**more than 75 %**) of cable is in air above ground & balance underground, full length would be considered laid in air whereas if major portion (**more than 75%**) is in the ground and part length is in air, full length would be considered in underground system.

- 4.4.2 Cables in air shall be laid in **GI 'A' class pipes or on cable trays**, as specified in schedule of quantities. Clamping of cables directly on wall surface shall not be allowed. Suitable aluminium clamps with aluminium cast saddles to be provided if GI pipes is laid on wall surface. For fixing cables on cable trays, Aluminium strip clamp of **minimum 2-mm thickness** shall be used. Providing and fixing of MS supports for cable tray would be done by electrical contractor without any extra cost. However cable trays shall be paid extra.

- 4.4.3 **Clause no. 4.3.4, 4.3.5, 4.3.7** of underground cable system shall be applicable to cable in air system also.

- 4.4.4 Cable Trays:

These shall be perforated type, heavy duty, return flange or inward bend shape, manufactured from mild steel conforming to IS 226 and hot dip galvanized as per IS 2629 / BS 729. Width of cable Tray shall be as per the requirement. Height to be **minimum 50 mm & thickness of plate to be 1.5 mm up to 300 mm cable tray width. For cable Trays having width more than 300 mm, height to be 75 mm & Thickness of plate to be 2.0 mm.** Cable Trays to be supplied to site in standard length of **2.5 M.** Necessary accessories of cable trays such as coupler side plates for joining cable trays, bends, outside riser, inside riser etc. to be provided. MS supports for cable trays and fixing of these supports to RCC roofs with anchors fasteners are included in scope of supply and installation.

4.5 Termination & Jointing of Cables

- 4.5.1 On both ends of cables suitable size **brass chrome plated (CP)** heavy duty, **double compression type** cable glands shall be used before it enters terminal box/main L.T. panel/distribution board/sub-distribution board/joint box/cable box etc. Armour of cable shall be connected to earth point.
- 4.5.2 All the cores of PVC cables, of conductor size **exceeding 4 sq. mm.** shall be connected at the ends with the help of appropriate size and type of sockets/lugs. These sockets shall be of tinned copper or Aluminium alloy (socket material to be same as of cable conductor) and these shall be fitted on conductor **by crimping process** only with appropriate crimping tool. Following is the recommended procedure for crimped joint and the same shall be followed:
- (i) Strip off the insulation of the cable and with every precaution, not to severe or damage any strand. All insulations to be removed from the stripped portion of the conductor and ends of the insulation should be clean and square.
 - (ii) The cable should be kept clean as far as possible before assembling it with the terminal/socket. For preventing the ingress of moisture and possibility of re-oxidation after crimping of the Aluminium conductors, the socket should be fitted with corrosion inhibiting compound. This compound should also be applied over the stripped portion of the conductor and the palm surface of socket.
 - (iii) Correct size and type of socket/ferrule/lug should be selected depending on size of conductor and type of connection to be made.
 - (iv) Make the crimped joint by suitable crimping tool.
 - (v) If after crimping the conductor in socket/lug, some portion of the conductor remains without insulation the same should be covered sufficiently with PVC tape.

5.0 TELEPHONE, COMPUTER DATA AND TELEVISION WIRING

5.1 Point Wiring for Telephone System

- (a) The point wiring shall be carried out with telephones wires/cables, **2 pair**, un-armoured, PVC insulated and sheath, **0.51 mm** dia annealed tinned copper conductor, conforming to ITD specification S/WS-113C armouring and outer sheath as per IS: 1554 (Part -I) in **25 mm** PVC conduit (one pair always remaining spare for one point). If more than one telephone point has to be provided at one point, multi-core, un-armoured telephone cable shall be used (pairs required are equal to 2 x no. of points) in suitable size conduit. If specifically mentioned in schedule of quantities, instead of ordinary PVC insulated telephone wire as specified above, UTP cable Cat – 5 to be supplied & laid. The item includes providing and fixing/laying of conduit, switch boxes, socket for telephones connection and telephone wires/cables etc.

MINIMUM DIAMETER OF PVC CONDUIT FOR TELEPHONE WIRING – 25 MM

- (b) The point shall commence from the main telephone tag box/sub tag box and would terminate at outlet box of point. Connection at both ends included in point wiring.
- (c) Steel conduit, accessories, draw out boxes, switch boxes etc. shall be supplied & laid as per the details given at 2.0.
- (d) Each telephone point shall have 1 no. flush type RJ11 telephone jack fixed on **3 mm** thick, hylem sheet in MS outlet box (**size 100 x 100 mm**). More than one telephone socket outlet (maximum 2 nos.) can be fixed on one outlet box, provided these points are at one place and multi-pair (more than 2 pair) telephone cable has been drawn to this point from tag box. However if specified in schedule of quantities, telephone cord grid plate mounted outlet unit (RJ – 11) with moulded cover plate in recessed galvanised MS box to be provided.
- (e) Joint in telephone wiring (between main tag box/sub tag box and outlet box of point) shall not be allowed and the contractor should bear the wastage of wire if resulted due to this special requirement of telephone system. No looping in telephone system is allowed unless specifically shown in the drawing or instructed by site engineer in the drawing/instruction book.
- (f) Telephone and computer data wiring can be drawn in the same conduit, provided after drawing wires, **50%** of conduit cross sectional area is free. However independent PVC insulated telephone & data wire of suitable size shall be used for telephone and computer data.
- (g) To identify each pair of multi-pair telephone wire/cable, PVC indication numbers shall be put on both end of pair just before termination.

5.2 Point Wiring (Computer Data)

- (a) The point wiring shall be carried out with data cable of **4 (FOUR) pairs** (or as specified in schedule of quantities) un-armoured, PVC insulated and sheath, **0.50 mm** dia annealed tinned copper conductor (**CAT 5E or CAT 6** as specified in schedule of quantities), in suitable size conduit.

The item includes providing and fixing/laying of conduit, switch boxes, socket for computer connection and data wires/cables etc

MINIMUM DIA OF PVC CONDUIT FOR COMPUTER DATA WIRING - 25 MM.

- (b) The point shall commence from the main junction box or sub junction box at floor of computer data system, and would terminate at outlet box of point. Connection at both ends of cable shall be carried out by purchaser.

- (c) General specification for concealed/surface conduit system of telephone system **(clause no. 5.1 (c), 5.1 (d) & 5.1 (g) shall be applicable for this system also.**
- (d) Joint in computer data cable (between junction box and outlet box of point) shall not be allowed and the contractor should bear the wastage of cable if resulted due to this special requirement of computer data system.

5.3 Telephone Cable Work (Underground System)

- (a) The cable shall be suitable for telephone system of suitable pairs (as specified in schedule of quantities), steel armoured, PVC insulated and sheath, 0.51 mm dia annealed tinned copper conductor, conforming to ITD specification S/WS-113C armouring and outer sheath as per IS:1554 (Part-I). All telephone cables for underground laying shall be **jelly filled type.**
- (b) Specification for laying of telephone cable in underground system shall be same as for electrical system **(clause nos. 4.2, 4.3, 4.4 and 4.5** and the same shall be followed.

5.4 Telephone Tag Boxes

These shall be of KRONE type using insulation displacement technique in which there is no stripping or soldering of wire, of MS sheet **14 G** with connector suitable for telephone connection. It shall have hinged MS sheet cover. Tag box to be of sufficient size to not only accommodate required KRONES but also space for dressing of wires.

5.5 Television Point Wiring

- (a) ONLY STEEL CONDUIT MINIMUM 25 MM DIA SHALL BE PROVIDED AND LAID FOR ALL TV WIRING. ALL SPECIFICATIONS FOR CONDUITING SHALL BE SAME AS MENTIONED AT 2.0.
- (b) Co-axial TV cable of single strand tinned copper conductor of diameter 0.80 mm, complete with metallic shield. Cable having signal loss less than 6 db per 100 Mts. for band 1 UHF should be provided and laid.
- (c) One number TV wall outlet in suitable MS box should be fixed at each receiving end.
- (d) In each 25 mm dia conduit max. 2 nos. co-axial cables should be drawn. There should be the least possible number of bends in the conduit system.
- (e) The samples of TV cable & wall outlet should be got approved before installing.

- (f) Matter to be checked by contractor with purchaser, whether system of each TV point having its own TV antenna is there for the project or cable TV system having common antenna for project is to be followed. This shall be specially applicable if in the project residential quarters are also included. If central cable TV system is their, necessary amplifier, tap-off, and splitters etc. to be provided as per detail drawings and schedule of quantities.

6.0 EARTHING & LIGHTENING PROTECTION SYSTEM

6.1 Earth Pit

- (a) Plate or pipe type earth electrode with earth pit shall be provided for this work unless otherwise advised by site engineer due to typical site conditions. Earthing electrode and pit shall be as per IS 3043-1987, the latest revision (code of practices for Earthing). For ready reference, sketches for pipes and plate type earth electrode earthing pit have been shown in the **attached sketch no. SK - 25**. All earth electrodes shall preferably be driven to a sufficient depth to reach permanent moist soil.

PRIOR APPROVAL OF SITE ENGINEER SHALL BE TAKEN FOR SELECTING TYPE OF EARTH ELECTRODE (PIPE OR PLATE).

- (b) Earth pit centre shall be at a minimum distance of **3 M** from nearest building, unless otherwise advised. The minimum **3 M** distance shall be maintained between centres of 2 earth pits.
- (c) Earth electrode for Neutral of transformer shall be of copper, whereas the same for all other application shall be of GI.

6.2 Earth Bus, Earthing Lead & Earth Wire/Strip

- (a) All single phase & three phase distribution boards, LT Panels shall be provided with two earth point from 2 independent earthing systems.
- (b) Bare round/flat sections of galvanised Iron or PVC insulated aluminium conductor wire of sizes as specified in schedule of quantities shall be used for taking out earthing from earth electrodes, for making earthing bus or for connecting to LT panels/distribution board etc.
- (c) Heavy duty, PVC insulated, PVC outer and inner sheath armoured copper conductor cable suitable for 1100 Volts as per IS-1554 (PART - 1 : 1976) of sizes in specified in schedule of quantities shall be used from earth electrode to concealed distribution board shall be laid underground. Specification 4.2, 4.3, 4.4 & 4.5 of handling and laying of power cable shall be applicable for this cable also.

6.3 Lightning Protection System

For lightning protective system IS 2309-1989 "Code of practice for the protection of building & allied structures against lightning" shall be followed.

6.3.1 Lightning Arrestor/Vertical Air Termination

Vertical air terminations shall comprise of finals made of **25-mm** dia GI tube 1200 MM long with multiple spikes at the top. Vertical terminations when provided shall project at least **300 mm** above the salient point or network on which it is fixed. Roof conductors/down conductor/GI strip as specified in schedule of quantities shall be fixed to base plate of this lightning arrestor. Lightning arrestor shall be fixed on highest point of the tallest building of the project. Numbers and building on which it has to be installed shall be shown in the drawings/ finalised by site engineer.

6.3.2 Roof Conductors

These shall be used as per drawings (if required) to interconnect the various lightning arrestors of one building near the top, to extend zone of protection. These shall be of GI strip of size 25x3 mm or as specified in schedule of quantities and shall be fastened securely to the building surface by means of GI saddles, maximum 1 m apart with GI nails/screws.

6.3.3 Down Conductors

These shall be used for connecting the lightning arrestors/roof conductors to earth electrode of earth pit. Structures with a base area of up to 90 sq. m may if the height of the lightning arrestor gives sufficient protection, be equipped with one down conductor only. These shall be of GI strip size 25 x 6 mm or as specified in schedule of quantities fastened securely to the building surface by means of GI saddles, maximum 1 m apart with GI nails/screws. Each down/conductor shall have its own independent earth pit.

6.3.4 General

The lightning protective system shall have as few joints as possible and they shall be mechanically and electrically effective. In general, joints for strips shall be tinned, soldered and at least double riveted. Bolted joints shall only be used on test points or on bonds to existing metals. Each down conductor shall be provided with a testing joint in a position convenient for testing but inaccessible for interference.

All other metal objects such as water tanks, iron staircase/railings, water or gas pipes on top of, inside or by the side of a building should be at least 2 m away from the lightning roof conductor/down conductor system. If this is not possible they should be provided with a separate down conductor and earth pit.

Structures with explosive or inflammable contents shall not have any spire, flagstaff or other salient point, which can impair the efficiency of air termination/lightning arrestor. No outdoor radio aerials or overhead line poles may be located within a distance of **15m** from the structure. Special instructions for earthing system:

- a) EARTHING SYSTEM USED FOR LIGHTNING PROTECTION MUST BE INDEPENDENT OF THE EQUIPMENT/ DISTRIBUTION EARTHING SYSTEM.
- b) EARTHING SYSTEM FOR TELEPHONE SYSTEM SHALL NOT BE MIXED WITH EQUIPMENT/DISTRIBUTION OR LIGHTNING EARTHING.
- c) EARTHING SYSTEM FOR COMPUTER SYSTEM SHALL NOT BE MIXED WITH OTHER EARTHING SYSTEMS.
- d) EARTHING SYSTEMS FOR UPS AND DG SETS SHALL NOT BE MIXED WITH OTHER EARTHING SYSTEMS.

7.0 SUPPLY & INSTALLATION OF LIGHTING FIXTURES/FANS

7.1 Technical specifications of lighting fixtures/fans

Lighting fixtures, fans and exhaust fans are generally not to be supplied by the contractor and hence the detail specifications of these are not being given here.

7.2 Installation of Lighting Fixtures

- 7.2.1 Scope of work under this item shall start from light point, with a 6 A bakelite connector, 2 core 1.5 Sq. mm PVC insulated copper stranded conductor wires from this connector to the connector inside the lighting fixture, connections, fixing of lighting fixture complete with all accessories, lamps on wall/roof/steel truss etc. testing the lighting fixture and commissioning. If wire length of light point is enough to reach connector of light fitting, connector in light point can be deleted.
- 7.2.2 If lighting fixtures are being supplied by Purchaser/Client, the contractor would take delivery of these from site store, test the same before installation and if found defective, the defect would be brought to the notice of site engineer. Repair of wiring/circuit of the fitting shall be carried out by contractor without any additional cost. However, if any

component of the lighting fixture is defective/ damaged, the same would be located and brought to the notice of site engineer, who would arrange repair/procurement of the same. However, labour for replacement of the damaged/defective component of lighting fixture shall be done by contractor without any additional cost.

- 7.2.3 Contractor shall clarify from site engineer for type of installation (direct on ceiling/hanging) of lighting fixture, if not specifically mentioned on drawings. Length of the suspension rods shall also be decided in consultation with site engineer.

7.3 Installation of Ceiling Fans

- 7.3.1 Scope of work under this item shall start from fan point with a 6 A bakelite connector, 2 core 1.5 Sq. mm PVC insulated copper stranded conductor wires from this connector to the connector fan, connections, fixing of fan (complete with all accessories) to the fan hook of fan point, testing the fan with regulator and commissioning.

- 7.3.2 If ceiling fans are being supplied by Purchaser, the contractor would take delivery of these from site store, assemble the same, test before installation and if found defective, the defect would be brought to the notice of site engineer. If any component of fan is defective/damaged, the same shall be located and brought to the notice of site engineer, who would arrange repair/procurement of the same. However, labour for replacement of the damaged/defective component of fan shall be done by contractor without any additional cost.

- 7.3.3 Extension/replacement of hanging rod of fans shall be carried out only if advised by site engineer on drawing/site instruction book. Only GI pipe ('B' class) shall be used for ceiling fan hanging. Screwed joint within the length of fan hanging rod is not allowed and shall never be adopted. Fan hanging rod should be preferably of one piece and if not possible, welded joint can be allowed. This hanging rod shall be painted with enamel paint as directed.

7.4 Installation of wall fans

Specification same as **7.3** except that fan has to be fixed on wall with screws/bolts grouting instead of on fan hooks.

7.5 Installation of Exhaust fans

- 7.5.1 Scope of work under this item shall start from exhaust fan point, with a ceiling rose, 2 core 2.5 Sq. mm PVC insulated copper stranded conductor cable in flexible conduit from ceiling rose to connector of exhaust fan, connections, fixing of exhaust fan in existing opening, complete with accessories and louvers on walls with hold- fasts, testing the exhaust fans and commissioning.

- 7.5.2 Same as **7.3.2** (read exhaust fan instead of ceiling fans).
- 7.5.3 If instructed by Site Engineer, Electrical contractor shall make opening in wall for exhaust fan including repair and finishing of opening. Charges of this work shall be paid separately as per schedule of quantities.

7.6 Special Notes

- 7.6.1 Location of lighting fixtures/fans shall be shown on the working drawings and the same shall be followed. However, if due to site conditions the location can not be adhered to, the same shall be brought out to the notice of site engineer for advice.
- 7.6.2 Maintenance & custody of light fixture/fans after installation/commissioning would be with contractor till that building/area is completed and handed over to NDDB Site Engineer in satisfactory working order.

8.0 STREET LIGHTING

8.1 Street Light Poles Specification

These shall be of steel tubular type with suitable arrangement at the top of the pole for fixing the lighting fixture. Poles shall be fabricated out of MS medium class pipes ERW type, in stepped sections as specified in the attached drawing of streetlight poles. For reducing the section of pole's pipe for stepped design, SWAGGING process only shall be used. Poles will have one mast/two mast readily equidistant/three mast readily equidistant as specified in schedule of quantities for fixing one/two/three lighting fixtures. Each pole would have one MS watertight box fabricated out of **14 SWG** sheet steel complete with a **4 way heavy duty 30 Amp.** power connector, four way heavy duty **30 Amp** neutral connector, **10 A SP MCB** of 10 KA rupturing capacity etc. **See the attached drawing of street light poles.**

The pole shall be painted with two coats of anti-corrosive Zinc chromate red-oxide primer before despatch to site and two coats of enamel/Al. paint of approved make and shade after installation.

The earthing of each street light pole shall be carried out with PVC insulated black colour **10 Sq. mm** (single core) Aluminium conductor cable, connected to perforated **38 mm NB GI 'B' class pipe 2.5 M** long, driven in earth (**150 mm** dia pit filled with charcoal & salt). The pipe should have removable plug at top.

8.2 Bracket for street light fittings on buildings - Specification

The brackets shall be made of **38 mm NB MS class `B' pipe**, approx. 1.8 M long, bent at the centre at an angle of 10 degree from horizontal, with necessary holding brackets, hold fasts etc. with special reducer at end to accommodate type of street light fitting to be fixed. Bracket shall have two coats of anti-corrosion Zinc chromate red-oxide primer before despatch to site and 2 coats of approved make and shade of enamel paint at site after installation. Each bracket to be provided with suitable MS flat clamps for fixing. Each bracket shall also be provided with one MS water tight switch box, complete with a **4 way** connector, **4 way** connector or neutral, **10 A SP MCB with 10 KA** rupturing capacity etc. similar to box being provided for street light poles. **See attached drawing of street light poles.**

8.3 Installation of poles

Installation of poles shall be done as per attached drawing of street light poles. The depth of pole to be buried in ground shall be 1/5th of total pole length unless otherwise specified in pole drawing. Special care shall be taken in erecting poles so that these are not strained or damaged during erection and are firmly stayed till the foundation are secured. The pole shall be grouted inside ground pit (**cross section 600 x 600 mm**) with cement concrete **1:2:4**. Before the placement of pole in the pit, 100-mm thick 600 x 600 mm, 1:2:4 cement concrete bed shall be prepared and only after its drying, poles shall be put in pit. Before placement of concrete around pole in the pit, necessary GI class A pipes (**not less than 38 mm dia. NB**) shall be placed for facilitating drawing of cables and earthing wire. Separate pipes shall be provided for incoming and each outgoing cable. The cement concrete shall be protected from premature drying by curing for at least seven days after pouring. All concrete surfaces from 150 MM below ground level to top shall be finished smooth with **cement mortar 1:4**. Nothing extra shall be paid for these GI pipes which are there to facilitate pulling of armoured cables & earthing wire, as cost of these are included in laying of cables.

8.4 Installation of street light fixtures

This includes fixing of street light fitting complete with accessories and lamps at the end of the pole/bracket, connecting it with **3 X 2.5 Sq.mm** Copper stranded conductor, PVC insulated, flexible cable from water tight MS switch box, testing & commissioning. One core of cable shall be connected with earthing point of light fitting at one end & earthing point of MS switch box at the other end. If the pole has more than one light fitting, each fitting should have independent flexible cable from MS switch box to fitting. While fixing streetlight fitting on bracket (8.2 above), supplying and fixing of necessary MS conduit between MS switch box and fitting is also included in contractor's scope without any extra cost.

8.5 Installation of post top lantern

8.5.1 For entrance gate

This includes providing & **fixing 65 mm NB MS class `B' pipe of 0.5 M** long and **25 mm dia MS `B' class pipe** with bend at lower end for pulling wire in brick/RCC column, including MS water tight switch box (specification same as that of street light pole) and installation of post top lantern complete with all accessories and lamp, connecting it with **3x2.5 Sq. mm copper stranded conductor**, PVC insulated flexible cable, testing & commissioning. Painting of the exposed portion of the pipe with **two** coats of approved make & shade of enamel paint is also included. One conductor of flexible cable shall be used for earthing.

8.5.2 For open ground

This includes providing and fixing **65 mm dia MS class `B' pipe of total length 3.5 M** (including 750 mm in ground to be grouted with **300 x 300 x 1000 mm cement concrete 1:2:4**) and water tight switch box (specification same as that of street light poles) installation of post top lantern complete with all accessories and lamp connecting it with **3 x 2.5 sq.mm** copper stranded conductor, PVC insulated flexible cable, testing and commissioning. Painting of exposed pipe length with **2** coats of approved make & shade of enamel paint is also included. One conductor of flexible cable shall be used for earthing.

The earthing of each street light pole shall be carried out with PVC insulated black colour **10 Sq.mm Aluminium conductor** (single core) cable, connected to perforated **38 mm NB GI `B' class pipe 2.5 M long**, driven in earth (150 mm dia pit filled with charcoal & salt). The pipe should have removable plug at top.

8.6 Flood Lighting on Tower

8.6.1 Flood Light Tower Specification

Flood lighting tower shall be either of **steel tubular or MS angle** type with suitable arrangement at the top of the tower for fixing the lighting fixtures. Tower shall be fabricated out of MS medium class pipes ERW type or with MS angles/flats etc. **as specified in the attached drawing**. Each tower would have one MS water tight switch box fabricated out of **14 SWG** thick sheet steel complete with a heavy duty **30 A, 6 way power connector, 6 way heavy duty 30 A connector for neutral, 15 A SP MCB with 10 KA rupturing capacity** as shown in the **attached drawing of flood light tower**. The control gearbox of each light fitting, received with the fittings, shall be installed on the working platform at the top of tower. MS switch box at bottom of tower and control gear box of each light fitting on tower platform shall be connected by three-core, copper conductor of suitable size, FRLS, PVC insulated and sheathed un-armoured cable in conduit pipe through a common junction box installed at the tower platform as shown in the attached drawing of tower. Cost of this conduit, cable and junction box at tower platform is included in supply and installation cost of tower. The tower shall be painted with two coats of anti-corrosive zinc

chromate red-oxide primer before despatch to site and two coats of Aluminium paint after installation. The earthing of tower shall be carried out with PVC insulated **10 Sq. mm** Aluminium conductor (single core) PVC insulated black wire, connected to perforated **38 mm GI `B' class pipe** as shown on **flood light pole drawing**, driven in earth near tower (150 mm dia pit filled with charcoal and salt).

8.6.2 Installation of flood light tower

Installation of flood light tower shall be done by the contractor on concrete pedestal, **which shall be made ready by NDDB as per the drawing.** However necessary GI pipes (**minimum 38 mm NB**) shall be provided by electrical contractor to put in the concrete pedestal to facilitate pulling of power cables & earthing wire. Nothing extra shall be paid for providing these GI pipes, as cost of the same is including in laying & connecting of cables/wires.

8.6.3 Installation of flood lights on tower

This includes fixing of street light fittings complete with accessories and lamps on the bracket of tower, connecting it with **3 x 4 Sq. mm** copper stranded conductor, FRLS , PVC insulated,& sheathed, un-armoured cable in a flexible GI conduit from water tight MS junction box installed on tower platform through control gear box of light fitting, testing and commissioning. One conductor of cable shall be connected with earthing point of light fitting at one end and earthing point of MS junction box at the other end. If the tower has more than one light fitting, each fitting should have **3 x 4 sq. mm** copper stranded conductor, independent cable from MS junction box to fitting.

8.7 Flood Lighting on building top

This includes supplying and installation of MS switch box (specification same as that of street light pole) approximately 1 M above ground, laying of **25 mm** conduit up to fitting on top of building, installation of flood light with grouting of clamps etc. if required, connecting with **3 x 2.5 Sq. mm** copper stranded conductor PVC insulated cable, testing and commissioning of flood lights.

8.8 General notes for Street & Flood Lighting

- 8.8.1 For supplying and laying of cable, **clause no 4.1, 4.2, 4.3, 4.4 & 4.5** of technical specification (**POWER CABLE WORK**) shall be applicable.
- 8.8.2 If Purchaser supplies street light fixtures, flood lights and post top lanterns, **clause no. 7.2.2** of technical specification shall be applicable.
- 8.8.3 For street light poles along roads, nearest finished road level shall be taken as ground level and for street light poles and flood light poles along

compound wall/away from roads, existing ground/finished ground shall be taken as ground level.

8.8.4 Minimum Distance of **1.5 M** shall be maintained between centre of pole and centre of curb of road. For compound wall poles, distance between compound wall and poles shall be minimum **5 M**.

8.8.5 A minimum loop of **1.5 M** of cable shall be provided near each street light pole for all incoming and outgoing cables.

9.0 SWITCH BOARDS AND DISTRIBUTION BOARDS

9.1 Cubicle type electrical switch boards

9.1.1 General

It shall be of cubicle type (having individual cubical for each incoming and outgoing feeder), totally enclosed, dust and vermin proof, floor mounted, fabricated out of **14 G** mild steel sheets of commercial quality. However doors & covers may be fabricated from **1.6 mm thick (16 G)** CRCA sheets. A base channel of **75 x 75 mm** shall be provided at the bottom. A horizontal wire way cable compartments with screwed cover shall be provided at the top or bottom (as per site conditions, first preference being at top) to take inter connecting control wiring between vertical sections. Separate cable compartments of adequate size running for the complete height of the switchboard in the case of front access boards shall be provided for incoming and outgoing cables. Adequate & proper support shall be provided in cable compartments to support cables.

The height of switchboard to be so designed that no operating switch is at more than **1900 mm** and less than **300 mm** from finished floor level. Door closing shall be by quick open able thumb screws. Mechanical interlocking to be there for doors of cubicles having incoming/outing feeder such that door can be opened only if feeder is OFF.

9.1.2 Painting

All the MS parts shall be given rigorous rust proofing process comprising degreasing, pickling, phosphatising etc. and anti rust primer coating, following by powder coating finish with two coats of shade 692 to IS 5 with outside & white on the inside paint thickness shall not be less than 50 microns approved shade. Half-litre paint shall be supplied along with panel for touch up wherever necessary.

9.1.3 Gaskets

All joints between different sections and the switchboard shall be provided with synthetic rubber gaskets so as to make the complete board completely dust proof as per **IP 54**.

9.1.4 Bus Bars

A completely enclosed ventilated dust & vermin proof bus bar compartment for the horizontal & vertical busbars. The rectangular busbar shall be made of high conductivity Aluminium alloy, PVC sleeved (heat shrinkable), air insulated, and of adequate size (full load current for phase busbars and half rated current for neutral busbars), current density to be considered as 0.8 Amp/sq.mm for operation on 3 phase, 4 wire, 440 V, 50 Hz. AC supply system, as per IS 345-1963 with amendment till date. The busbars shall be supported and separated by strong epoxy based SMC/DMC blocks at close intervals to prevent busbar sag and to effectively withstand electro-magnetic stresses in the event of a short-circuit (25 MVA fault level on 415 volts for 1 sec). Minimum clearance to be maintained for enclosed indoor air insulated busbars working at system voltage up to 600 V shall be as follows:

Phase to neutral - 20 mm Phase to phase - 25 mm

Feeder boxes should be completely shrouded by sheet steel plates provided between the feeder boxes and the busbar chambers, in order to avoid falling down of any nuts/ bolts/parts into the busbar chambers while carrying out maintenance of the feeder components.

MINIMUM SIZE OF MAIN AL. BUSBAR OF CUBICAL TYPE MAIN SWITCH BOARD TO BE -- 40 X 6 SQ.MM.

9.1.5 Components of switch boards

The panel shall be provided with switches, fuses, MCB, MCCB, meters and instruments etc. of size, capacity as specified in schedule of quantities. Only approved make as selected by contractor in annexure III can be used for manufacture of switchboard.

Switches disconnecter fuse switches:

The load break switches shall conform to IES-947-3 and IS 13947-3 specification. They shall be suitable for continuous maximum rating having positive isolation with position indication of contact separation. They should have high short circuit making and withstanding capacities. Breaking capacity should correspond to AC 23A utilisation category. Switches handle shall be provided with door interlocking arrangement. Also 'defeat' arrangement shall be provided to open the door in switch 'Close' position for testing purpose. Live terminals of the switch shall be shrouded.

HRC cartridge fuse links

These shall be non deteriorating HRC cartridge link type with operation indicator which will be visible without removing fuses for the service.

These shall be complete with moulded phenolic fuse base and cover. The fuse base shall be so located in the modules to permit insertion of fuse pullers and removing of fuse links without any problem.

Miniature circuit breakers (MCB)

These shall be suitable for 230/415 V, 50 Hz. AC supply and current rating as specified in schedule of quantities. These shall be of short circuit current of 10 KA minimum at 0.5 pf on 230 V.AC, long mechanical and electrical operation life, with over load tripping through accurately calibrated thermal bimetal strips and short circuit tripping through magnetic coil. Complete MCB should be housed in heat resistant moulding. Over current tripping should result in switching off all poles automatically even if tripping only takes place in one pole. Miniature circuit breakers shall confirm IS 13947 - 1993.

Moulded case circuit breakers (MCCB)

The MCCB shall be as per to provisions of IS 13947 – 1993. The MCCB's shall be of triple / four pole construction arranged for simultaneous three /four pole manual closing or opening and automatic instantaneous tripping on short circuits. Closing mechanism shall be quick make, quick break and trip-free type. 'ON', 'OFF' and 'Trip' indications shall be provided on the front cover with door interlocking facility. All feeders having MCCB shall be provided with neutral link complete with isolating link, if not FOUR POLE type. The control voltage shall be 240 V AC. MCCB's shall be provided with following interlocking devices for interlocking to door of switchboard.

- Handle interlock to prevent unnecessary manipulation of the breaker.
- Door interlock to prevent doors being opened when the breaker is on ON position.
- De-interlocking device to open the door even if the breaker is in ON position.

The MCCB's shall be rated for continuous maximum duty as specified. The rating of the MCCB's shall be as per the feeder details. Rated breaking capacities shall be as under:

MCCB's up to 100 Amps	25 kA (minimum) at 415 volts
Above 100 A to 400 Amps	35 kA (minimum) at 415 volts
Above 400 A	50 KA (minimum) at 415 volts

Measuring instruments & Indication Lamps

Measuring instruments shall be of square pattern having approximate dimensions 96mm x 96mm, flush mounting type. Necessary auxiliary instruments like CTs, PTs etc. are also included in the scope of supply.

All AC meters shall be of moving iron type having class 1.0 accuracy for voltmeters and 1.5 for ammeters. Voltmeter shall be suitable for direct line connection. Voltmeters shall be connected through fuses only.

Energy meters shall be suitable to measure unbalanced/balanced loads of 3-phase 3/4-wire system.

Ammeters provided for switch fuse units shall be with rotary selector switches and those for motors shall be without selector switches.

All voltmeters shall be provided with selector switches.

Ammeters for 40 Amps and above shall be CT operated.

For each outgoing feeder, LED type indication Lamp shall be provided in its cubicle door. For incoming feeder, LED type indication lamp shall be provided for all three phases.

If specifically asked in schedule of quantities, digital type Ammeters, Voltmeters & Energy meters shall be provided rather than analogue type specified above.

Current Transformers (CTs) & Potential Transformers (PTs)

CTs shall be cast resin insulated type. Primary and secondary terminals shall be marked indelibly. CTs shall preferably be mounted on stationery parts. CT rating and ratios shall be as per feeder ratings. These shall be capable of withstanding momentary short circuit and symmetrical short circuit current for 1 second. Neutral side of CTs shall be earthed. Protection CTs shall have low reactance, accuracy class "SP" and an accuracy limit factor greater than "10". Instrument CTs shall be of accuracy class "1.0" and accuracy limit factor less than "5.0". CT shall confirm to IS 2705 (part I, II & III) in all respects. PTs shall confirm to IS 3156 (part I, II & III) in all respects.

Earth leakage circuit breakers (ELCB/RCCB)

These current operated ELCB's shall be suitable for 2/4 poles 230/415 V, 50 Hz. AC supply, current and sensitivity rating to be as specified in schedule of quantities. (If not specified it may be taken as 30 MA). These shall be able to withstand short circuit current of 3 kA minimum at 230 V AC and have long operational life. This shall incorporate highly sensitive relay to trip the circuit in case of earth leakage. This shall have the facility to trip the circuit during interruption in the earth connection or loss of supply neutral. Over current tripping should result in switching off all poles automatically even if tripping takes place in one pole. Earth leakage circuit breakers shall conform to BS - 4293.

9.1.6 Connections

Connections to the busbars shall be made by drilling holes. However, no holes shall be left in the busbars. The bolts & nuts used for connections to busbars shall be of Aluminium alloy or tinned forged brass. For tapping of connections from busbars suitable size PVC insulated copper stranded conductor wire (minimum size for power wiring 4.0 sq. mm & for control wiring 1.5 sq. mm.) shall be used with suitable size and type of crimped lugs/cable sockets. For connection of feeder above 63 Amps, only Al. alloy busbar links with PVC tapes shall be used. Suitable size cable boxes shall be provided for incoming/ outgoing cable of sizes more than 95 sq.mm. For all outgoing cables, cable alleys of suitable sizes in sides and tops, as required for proper cable connections/laying inside the panel, shall be provided. Switchboard shall be suitable for Aluminium conductor PVC insulated incoming and outgoing cables. Removable gland plates shall be provided for cable entries.

9.1.7 Earthing

Two independent earthing points shall be provided outside the panel near bottom and these shall be inter-connected with GI earthing busbars of minimum size **40 x 6 mm**. All earthing points inside the distribution board shall be interconnected to these earthing points with suitable size copper conductor PVC insulated wire.

9.1.8 Name plates

Switch board/distribution board shall be provided with danger plate and name plates for all incoming and outgoing feeders. These name plate shall be of PVC (black colour base & white letters engraved) screwed to panel. PVC identification ferrule numbers shall be used for all internal wiring.

9.1.9 Approvals

The drawing showing general arrangements and detailed wiring diagram for the switch board shall be submitted to employer for approval, prior to manufacture and switch board shall be got inspected, prior to despatch to project site. The complete switchboard and its component shall conform to Indian Electricity Rules & relevant I.S.S. Approval if required from Electrical Inspector shall be obtained by contractor and changes if desired by Electrical Inspector shall be carried out.

9.1.10 Rubber Matting

A **15 mm** thick rubber matting, 1 meter wide shall be provided in front and along full length of the main switchboard. The rubber mat shall withstand **15 kV for 1 minute** & Leakage current shall not exceed **160 mA**.

9.1.11 Space Heaters

The main switchboard shall have thermostatically controlled space heaters with a controlling 16 A 230 V MCB & socket outlet to eliminate condensation.

9.2 Electrical Distribution Boards

9.2.1 General

These shall be wall mounted, surface/flush type, indoor type enclosure, hinged front cover, dust and vermin proof fabricated out of **16 G** mild steel sheet of commercial quality. All components such as switches, M.C.B. etc. to be so mounted inside the distribution boards, that only operating handles/knobs are visible outside the front hinged door. Detachable cable/conduit entry plates with required 25 mm dia knockouts shall be provided on top and bottom of D.B.

If distribution board is concealed and receiving incoming power from bottom of board by Armoured cable through GI pipes, height of DB shall be increased suitably, so that 2 mm thick gland plate can be fixed as shown in the **attached sketch no. 24**.

Alternatively, if specifically asked, **readymade DBs** (in standard size/capacity) of reputed make, as approved by the purchaser, **with double metal door (16/18 G sheets)** may also be provided and installed.

9.2.2 Painting

'Same as clause no. 9.1.2 of cubicle switch boards.

9.2.3 Gaskets

Same as clause no. 9.1.3 of cubicle switch boards.

9.2.4 Bus bars

Same as clause no. 9.1.4 of cubicle switchboard except that these shall be only of copper & minimum size of busbars shall be 19 x 6 mm, current density being 1.5 A per sq. mm.

9.2.5 Component of Distribution board

Same as clause no. 9.1.5 of cubicle switch board.

9.2.6 Connections

All interconnections shall be done either by solid copper PVC insulated or by suitable size (minimum 4.0sq.mm.) Copper stranded conductor PVC insulated wires with suitable size and type of crimped type plug. Arrangement shall be there for directly mounting of M.C.B. on busbars. The bolts and nuts used for connections to busbars shall be of Al. alloy or tinned forged brass.

Enough space shall be provided inside the distribution board to accommodate loop of surplus incoming and outgoing wires. For all line conductor PVC colour of wire would be Red, Yellow, Blue & that of neutral to be Black. For accommodating neutral wires of all incoming and outgoing circuits , suitable size connector or neutral bus shall be provided inside the distribution board.

9.2.7 Earthing

Two independent earthing points shall be provided inside the distribution board in case of 3 phase and one earthing point in case of single phase distribution system. An earthing bus of copper shall be provided inside the D.B.

9.2.8 Name plates

Same as clause no. 9.1.8 of cubicle switch boards.

9.2.9 Approval

Same as clause no. 9.1.8. of cubicle switch boards except that sample approval of only one typical distribution board may be taken from employer.

9.2.10 Components of distribution boards

Same as clause no. 9.1.5 of cubicle switch boards.

10.0 COMPLETION TEST AND DRAWINGS

After supply and installation of complete project or a particular building/area, following tests shall be carried out by the contractor before switching on the power to installation and the results shall be recorded and submitted to the site engineer. If results are not satisfactory/as per the standard set herewith, the contractor shall identify the defects/short coming and shall rectify the same. Nothing extra shall be paid for carrying out these tests and contractor has to arrange all necessary instruments.

10.1 Insulation resistance to earth

This to be measured with all fuse links in place, all switches on, all lamps and appliances in position by applying a voltage not less than twice the working voltage (subject to a limit of 500V). Insulation resistance of the whole or any part of the installation to earth must not be less than 50

Mega-ohms divided by the number of outlets (points and switch positions) except that it need not exceed 1 Megaohm for the whole installation.

10.2 Insulation resistance between conductors

Test to be made between all the conductors connected to one pole or phase conductor of the supply and all the conductors connected to the middle wire or neutral or the other pole or phase conductors of the supply. For this test, all lamps shall be removed and all switches put on. The result of the test must be 50 Mega-ohms divided by the number of outlets (point and switch positions) but need not exceed one Megaohm for the whole installation.

10.3 Polarity of single pole switches

Test shall be made to verify that all non-linked single pole switches are on phase conductor (Live) and not on the neutral or earthed conductor. This can be done by connecting test lamps between two terminals of switch and earth. If the lamp lights up when switch is ON & either terminal is touched the switch is correctly installed.

10.4 Resistance of metal conduits/sheaths (Earth continuity test)

In case of cables encased in metal whether conduit of metallic sheathing, the total resistance of the conduit or sheathing from the earthing point any other position in the completed installation shall not exceed 2 ohms. This can be carried out by the circuit shown in Annexure VII. One end of the lead is connected to the ECC at its connection with the electrode and the other to the farthest point of the ECC. First, current through the circuit is measured with the resistance of 2 ohms short-circuited by the link. Next, current is measured through the two ohms resistance by disconnecting the two leads from the ECC and joining them together. If current is more in the first case, the resistance of ECC is less than two ohms.

10.5 Completion Drawings and Documents

10.5.1 Completion drawings

After completion of works & before issuance of virtual completion certificate the contractor shall submit completion drawings in the form of one complete set of originals on sepia cloth with two sets of blue prints & three sets of documents as listed below:

- i) As built conduit layout for lights, sockets, outlets, fans, telephones and computer data circuits & sub-mains showing position of bends/inspection boxes/draw-out boxes/junction boxes / outlet boxes / switch boxes, conduit size, number & size of wires in each run, number & size of earth continuity conductor etc.

- ii) As built layout of lights, sockets outlet, telephone points, computer data points, telephone tag boxes, computer data patch panels, switch boards, distribution boards etc.
- iii) As built details of electric, telephone & computer cable runs, showing size, type & number of cables of mode of installation.
- iv) As built detail earthing conductors, earth pits and lightning protection system etc.
- v) As built General Arrangement and schematic diagrams of switchboards & distribution boards.
- vi) A certificate shall be furnished by the contractor countersigned by the licensed electrical supervisor, under whose direct supervision the installation was carried out. This certificate shall be in the prescribed form as required by the local supply/electrical inspector authority. The contractor shall be responsible for getting the electrical installation inspected & approved by the local & statutory authorities concerned.

11.0 MODE OF MEASUREMENT

11.1 WIRING (PART I) TRADE CODE 81

Item Mode of Measurement

1. Each light point shall be measured as one no.
2. Two light points shall be measured as one no.
3. Three light points shall be measured as one no.
4. Four light points shall be measured as one no.
5. Each light point shall be measured as one no.
6. Two light points shall be measured as one no.
7. Three light points shall be measured as one no.
8. Four light points shall be measured as one no.
9. One light with 2 switches shall be measured as 1 no.
10. One light with 2 switches shall be measured as 1 no.
11. One fan point shall be measured as one no.
12. One fan point shall be measured as one no.
13. One exhaust/bracket fan shall be measured as one no.
14. One exhaust/bracket fan shall be measured as one no.
15. One buzzer point shall be measured as one no.
16. One buzzer point shall be measured as one no.
17. One buzzer extension shall be measured as one no.
18. One isolated 6 A power point shall be measured as one no.
19. One 6 A power point in lighting SB shall be measured as 1 no.
20. One isolated 6 A power point shall be measured as one no.
21. One 6 A power point in lighting SB shall be measured as 1 no.
22. One 16 A power point shall be measured as one no.

23. One 20 A power point shall be measured as one no.
24. One 25 A power point shall be measured as one no.
25. One 16 A power point shall be measured as one no.
36. One 25 A power point shall be measured as one no.
27. One 30 A power point shall be measured as one no.
28. One 6 A switch and socket shall be measured as one no.
29. One 6 A socket shall be measured as one no.
30. One 16 A ON/OFF switch and socket shall be measured as one no.
31. One aviation light point shall be measured as 1 no.
32. Each light point shall be measured as one no.
33. Two light points shall be measured as one no.
34. Three light points shall be measured as one no.
35. Four light points shall be measured as one no.
36. Each light point shall be measured as one no.
37. Two light points shall be measured as one no.
38. Three light points shall be measured as one no.
39. Four light points shall be measured as one no.
40. One fan point shall be measured as one no.
41. Blank
42. One fan point shall be measured as one no.
43. One exhaust/bracket fan shall be measured as one no.
44. One exhaust/bracket fan shall be measured as one no.
45. One buzzer point shall be measured as one no.
46. One light controlled by one MCB shall be measured as one no.
47. Group of 2 lights controlled by 1 MCB shall be measured as one no.
48. Group of 3 lights controlled by 1 MCB shall be measured as one no.
49. Group of 4 lights controlled by 1 MCB shall be measured as one no.
50. Group of 3 lights controlled by 1 MCB shall be measured as one no.
51. Group of 4 lights controlled by 1 MCB shall be measured as one no.
52. Group of 5 lights controlled by 1 MCB shall be measured as one no.
- 53 to 58 Length of single run of PVC insulated wire for circuit (Not total of 3 or 5 wires but one length) used, to be measured in meter. (This will be equal to conduit length as loose/loop wire inside distribution board/lighting switch box / 6, 16, 20 A power plug boxes, not to be measured but to be carried out). Measurement in meters to be restricted up to two points after decimal.
- 59 to 65 Length of single run of PVC insulated wire for sub-main used, to be measured in meter. (This will be equal to conduit length as loose/loop wire inside distribution board not to be measured but to be provided). Measurement in meters to be restricted up to two points after decimal.
- 66 to 68 Length of conduit including bends laid shall be measured in meters. Measurement to be restricted up to two points after decimal.
- 69 to 72 Length of GI pipe including bends shall be measured in meters. Measurement to be restricted up to two points after decimal.
- 73 to 75 Length of raceway to be measured in meters without junction box. Measurement to be restricted up to two points after decimal

- 76 to 78 Each raceway junction box to be measured as one no.
- 79 One 16 A power point with piano switch & socket placed separately shall be measured as one no.
- 80 One 16 A power point with modular switch and socket outlet installed separately shall be measured as one no.
- 81 to 85 Length of single run of wire shall be measured in meters. Extra wire at ends for switch loops etc. not to be measured. Measurement shall be restricted up to two points after decimal.
- 86 to 87 Length of GI pipe including bends shall be measured in meter. Measurement to be restricted to two points after decimal.
- 88 to 90 Length of cable tray including bends used to be measured in Meter. Measurement to be restricted up to two points after decimal.

11.2 INSTALLATION AND SUPPLY OF FIXTURES (PART-II)

TRADE CODE 82

Item	Mode of Measurement
1 to 9	Each lighting fixture shall be measured as one no.
10 to 12	Each fan shall be measured as one no.
13	Each exhaust fan shall be measured as one no.
14	Each buzzer/bell/musical bell shall be measured as one no.
15	Each aviation light (consisting of 2 bulbs) shall be measured as 1 no.
16 to 17	Each opening of exhaust fan shall be measured as one no.
18 to 19	Each clamp shall be measured as one no.
20	Each GI bolt shall be measured as one no.

11.3 STREET LIGHTING (PART-III)

TRADE CODE 83

Item Mode of Measurement

- 01 Each pole with one arm shall be measured as one no.
- 02 Each pole with two arms shall be measured as one no.
- 03 Each pole with three arms shall be measured as one no.
- 04 Each pole with one arm shall be measured as one no.
- 05 Each pole with two arms shall be measured as one no.
- 06 Each pole with three arms shall be measured as one no.
- 07 Each street light bracket shall be measured as one no.
- 08 Each flood light tower shall be measured as one no.
- 09 Each flood light tower shall be measured as one no.
- 10 Each pole for post top lantern shall be measured as one no.
- 11 -do-

- 12 Each light on street light pole arm shall be measured as one no.
 13 Each light on street light bracket shall be measured as one no.
 14 Each post top lantern shall be measured as one no.
 15 -do-
 16 Each floodlight shall be measured as one no.
 17 -do-
 18 Each control panel shall be measured as one no.
 19 Each floodlight shall be measured as one no.

11.4 EARTHING AND LIGHTING PROTECTION (PART-IV)

TRADE CODE 84

Item	Mode of Measurement
1	Each plate type earthing pit shall be measured as one no.
2 to 8	Total length as laid of continuity conductor shall be measured in meter. Overlaps shall not be measured. Measurement shall be restricted to two points after decimal.
9	Each lighting arrestor shall be measured as one no.
10	Total length as laid of roof conductor shall be measured in meter. Overlaps shall not be measured. Measurement shall be restricted to 1 st point after decimal.
11	Each earthing pit shall be measured as one no.
12 to 13	Length of PVC insulated cable to be measured in Metres. (Portion of cable without outer insulation and armouring inside the distribution board/junction box/cable joint/switch box also to be measured and paid. All loops inside the board/switch box/ground/trench also to be measured. No deduction in quantity or rate to be effected for more than one cable laid in same trench).No deduction in quantity or rate to be effected for cable laid in hume pipe/GI pipe/trench etc. provided by employer. Measurement to be restricted up to two points after decimal.

TELEPHONE AND COMPUTER DATA WIRING SYSTEM (PART-V)

TRADE CODE 85

Item	Mode of Measurement
1 to 2	Each telephone point shall be measured as one no.
3 to 4	Two telephone points in one box shall be measured as one no.
5 to 6	Each telephone point shall be measured as one no.
7 to 8	Two telephone points in one box shall be measured as one no.
9 to 10	Length of wire/cable laid shall be measured in Meters, loose wire provided in junction box/ tag box/ outlet box shall not be measured and paid. Measurement to be restricted up to two points after decimal.
11	One telephone outlet shall be measured as one no.
12	Two telephone outlet in one box shall be measured as one no.
13 to 14	One telephone outlet shall be measured as one no.

15		Length of CAT 5 UTP cable laid shall be measured in meter. Wire provided in junction box / tag box/outlet box shall not be measured and paid. Measurement to restricted to two points after decimal.
16 17	to	Each computer outlet shall be measured as one no.
18 20	to	Length of cable laid shall be measured in meter. length of cable & without outer insulation and armouring inside tag box / junction box/outlet box etc. shall also be measured and paid. Loop of cable provided shall also be measured. No deduction in quantity or rate shall be done for laying more than one cable in same trench. No deduction in measurement or rate shall be made for cable drawn through hume pipe/trench/GI pipe etc. provided by employer. Measurement to be restricted up to two points after decimal
21		Spare
22		Each extension of telephone point shall be measured as one no.
23		Spare
24 29	to	Length of cable laid shall be measured in meter. length of cable & without outer insulation and armouring inside tag box / junction box/outlet box etc. shall also be measured and paid. Loop of cable provided shall also be measured. No deduction in quantity or rate shall be done for laying more than one cable in same trench. No deduction in measurement or rate shall be made for cable drawn through hume pipe/trench/GI pipe etc. provided by employer. Measurement to be restricted up to two points after decimal
30 34	to	Each tag block shall be measured as one no.
35 38	to	Length of Telephone cable shall be measured in meters. All loops of cable in ground, tag box etc to be measured. Measurement to be restricted up to two points after decimal.
39		Length of TV cable shall be measured in meters. All loops of cable in air and boxes not be measured and paid. Measurement to be restricted up to two points after decimal.
40 41	to	Each TV outlet to be measured as one no.
42		Length of UTP cable shall be measured in meters. All loops of cable in air and boxes not to be measured and paid. Measurement to be restricted up to two points after decimal.
43		Length of TV cable shall be measured in meters. All loops of cable in air and boxes shall be measured and paid. Measurement to be restricted up to two points after decimal.
44 47	to	Length of Telephone cable laid shall be measured in meters. All loops of cable in ground/air, tag box etc to be measured. Measurement to be restricted up to two points after decimal.

11.6 DISTRIBUTION SYSTEM (PART-VI)

TRADE CODE 86

Item **Measurement**

1 to 65	Each switchboard /distribution board complete with switchgear for incoming and outgoing feeder shall be measured as one set.
66 to 82	Total length of cable supplied to be measured in metre. Measurement to be restricted up to two points after decimal.
83 to 90	Length of PVC insulated and sheath cable to be measured in meters (Portion of cable without outer insulation and armouring inside the main panel/distribution board also to be measured and paid. All loops inside the board/in ground or trench also to be measured and paid). Measurement in meters to be restricted up to two points after decimal and in addition no reduction in rates or quantity to be effected for drawing cable through hume pipe/ trench/ GI pipe etc. provided by employer for not providing bricks and sand etc. NOTE : FOR ITEM NO. 83 TO 90, ONE CABLE SHALL BE MEASURED UNDER ONE ITEM ONLY THOUGH IT MIGHT HAVE BEEN LAID UNDER TWO ITEMS (UNDER GROUND AS WELL AS IN AIR) FOR DIFFERENT PORTION OF IT'S LENGTH. ITEM AS PER WHICH MORE LENGTH HAS BEEN LAID SHALL BE APPLICABLE FOR COMPLETE LENGTH.

11.7 GENERAL

The following guidelines to be followed for recording part payment of various items, if rather than secured advance, Engineer Incharge agrees to recommend part rate for incomplete work.

11.7.1 Part I (Wiring)

- (a) Point wiring, sockets wiring, group wiring, circuit wiring, sub-main wiring etc.
- Supply & laying of conduit in ceiling only (30% of the item rate)
 - Supply & laying of conduit in ceiling/ walls and switch boxes i.e., point ready without wiring (30% of the item rate)
 - Item ready with wiring & switches but without testing / commissioning (30% of the item rate)
 - Testing & commissioning (10% of the item rate)
- (b) Providing and fixing Cable Tray
- Supply of cable tray only (85% of the item rate)
 - Laying of cable trays (10% of the item rate)
 - Testing & commissioning (5% of the item rate)
- (c) Wiring in existing conduit/pipes/modular furniture etc.
- Supply of wires (80% of item rate)
 - Laying of wires (10% of item rate)
 - Testing and commissioning (10% of item rate)

11.7.2 Part II (Installation of Fixtures)

- After installation of fixture (90% of the item rate)

- After testing & commissioning (10% of the item rate)

11.7.3 Part III (Street Lighting)

(a) Street light poles and Towers

- Supply of street light poles & flood light towers (80% of the item rate)
- Installation of street light poles & towers (15% of the item rate)
- Testing & commissioning of poles/ towers (5% of the item rate)

(b) Installation of fixtures

- Installation of fixtures (90% of the item rate)
- Commissioning of fixtures (10% of the item rate)

11.7.4 Part IV (Earthing & Lighting Protection)

- Supply of item only (85% of the item rate)
- Installation of item (10% of the item rate)
- Testing & commissioning of item (5% of the item rate)

11.7.5 Part V (Telephone & Computer Data Wiring System)

(a) Point Wiring & wiring

- Supply & laying of conduit in ceiling only (30% of the item rate)
- Supply & laying of conduit in ceiling/ walls and switch boxes i.e., point ready without wiring (30% of the item rate)
- Item ready with wiring and switches but without testing/commissioning (30% of the item rate)
- Testing & commissioning (10% of the item rate)

(b) Supply of Cable

- Supply of cables only (95% of the item rate)
- Testing & commissioning (5% of the item rate)

(c) Laying of cables

- laying of cables (90% of the item rate) testing and commissioning (10% of item rate)

(d) providing wires & laying of wires in existing conduits/ pipes/ modular furniture

- Supply of wires (80% of item rate)
- Laying of wires (10% of item rate)
- Testing and commissioning (10% of item rate)

11.7.6 Part VI (Distribution System)

(a) Supply and installation of panels / distribution boards

- Supply of Panel / DB (85% of the item rate)
- Installation of panel / DB (10% of the item rate)
- Testing & commissioning of panel / DB (5% of the item rate)

(b) Supply of cables

- Supply of cables (90% of item rate)
- Testing & commissioning (10% of item rate)

(c) Laying of cables

- Laying of cables (90% of item rate)
- Testing and commissioning (10% of item rate)

LIST OF SUGGESTED MAKES

The following is the suggested list of products and name of the manufacturer against each product for civil and electrical works. The contractor shall quote rates for the various items of works such that their rates should be valid for all makes suggested hereunder and or equivalent. It will be prerogative of Implementation of Bull Production Through Imported Embryos of HF & New Jersey Under NDP-1 Vikas Khand – Kalsi. Distt. Dehradun to approve any make out of this list or any other equivalent make. Wherever make is not suggested, the material should be as per relevant BIS specification.

CIVIL WORKS:

S. N.	ITEM DESCRIPTION	Suggested Makes/Manufactures
➤	Cement Grey- OPC IS8112-43 grade/IS-12269-53 grade	Ultratech/ACC/JK/BINANI /BIRLA/GUJARAT AMBUJA /SANGHI
➤	White Cement, Putty, Primer to be applied with putty	Birla White/ JK White / Birla putty & Primer / JK Putty & Primer
➤	Water Proofing Compound, Other all Construction Chemicals, Concrete admixtures of all types, Epoxy and Resin materials etc. Acid and Alkali resistant primers/powder	FOSROCK/SIKA/CICO/PIDILITE /MYK SCHAUMBURG/CIBA / BASF
➤	Reinforcement Steel-IS1786-Fe415 (minimum) - all diameters.	SAIL / TISCON / ESSAR / RINL
➤	Reinforcement Steel-IS1786-Fe415 or Fe500 (8mm diameters only)	ARCELORMITTAL/SANGHI/ BARNALA/ Electrotherm
➤	Structural Steel and all Mild Steel elements and plates.	SAIL / TISCO / ESSAR / VIZAG /JINDAL/ARCELOR MITTAL
➤	Laminates, all Ply materials, Flush Shutters	Century/Greenlam/KITPLY / AICA /(Formerly known as Sunmica)/Merino/Formica
➤	Glazing	Modi Float/Asahi Float/Saint Gobain/TATA/Triveni

➤	SS Fittings	Kich/Golden/ Gerge /ENOX/
➤	Aluminium Sections	Hindalco/Jindal
➤	Friction Stay	Hettich/Hafele/EBCO
➤	Hydraulic Door Closure- IS-3564-1986	Golden/Godrej/Hardwyn/EVERI TE/HYPER
➤	Aluminium Composite Panel	Alucobond/Reynobond/Alpolic
➤	Anti-termite treatment	Pest Control (India) Limited
➤	All types of Paints and Primers/red-oxide	Asian/Nerolac/Berger/ICI/Snow cem India Ltd.
➤	Ceramic / Glazed Tile/Vitrified tiles	Kajaria/Somani/H&R Johnson/NITCO/RESTILE/BELL /SPARTEK/ORIENT
➤	Vitrified Tile	Restile/Navin/Bell Granito/H&R Johnson/Nitco/Asian /RAK.
➤	Looking Mirror	MODI / LION/ CERA / Golden Fish
➤	Floor Hardener	FOSROCK/SIKA/CICO
➤	Green Kota	As per Sample Approval
➤	MS Tube/Pipe	Jindal/TATA structura
➤	Stainless Steel	Salem/Jindal
➤	uPVC Pipe, specials and fittings/all PVC materials	Finolex/Supreme/Astral/Prince
➤	PVC Vinyl Flooring	BHOR / ARMSTRONG
➤	PVC water stop	Maruti / EQUIVALENT
➤	PVC Water Tank	SINTEX
➤	Door Closer	Golden/Godrej/Hardwyn
➤	Floor Spring	Enox/Doorma/Ozon
➤	CI Rungs	Neco or equivalent approved
➤	Polysulphide Silicon Sealant	FOSROCK/SIKA/CICO/PIDILITE
➤	Bitumen, Sealing Compound, Bitumen Board	Shalitex, IOC or equivalent approved
➤	All Sanitary wares and Plumbing Fixtures, fittings, accessories, pipes etc all	Jaquar/Parryware/Hindustan/ Cera/EssEss
➤	CP Fittings	Jaquar or equivalent approved

➤	CI Soil, Waste & Fittings (IS:3989)	NECO or equivalent approved
➤	GI Pipes-medium class (IS:1239)	TATA / Jindal
➤	GI Fittings	“R” / “KS” / UNIK brand or equivalent approved
➤	SS Sink	Nirali or equivalent approved
➤	CI S & S Class LA pipe	IISCO/Kesoram/Electrosteel
➤	CI Butterfly Valve (IS13095)	ZOLOTO/LEADER
➤	CI Manhole Cover	NECO / SRIF / RIF
➤	CI Valves	ZOLOTO /LEADER
➤	SW pipe	As per approval
➤	Door locks and hardware fittings	GODREJ / WELMADE / GOLDEN
➤	Gun Metal wheel valve	ZOLOTO / LEADER
➤	Anti cockroaches Stainless Steel Perforated trap	Chilly make or equivalent approved
➤	Stainless Steel Perforated trap cover	Chilly make or equivalent approved
➤	Galvalume Sheets	TATA BLUESCOPE / METACOLOUR/ INTERARCH /ISPAT
➤	Fibre Glass Wool Insulation Sheets	TWIGA/Lloyd/MINWOOL/ROCK WOOL
➤	TURBO VENTILATOR/ROOF EXTRACTOR/ECO VENTILATOR	DEVASHISH TURBO / SYGURU VADODARA or approved equivalent.
➤	HUME PIPE	Indian Hume Pipe Co. /equivalent approved.

INTERNAL ELECTRIFICATION WORKS

Sr	ITEM DESCRIPTION	STANDARD APPROVED MANUFACTURER/MAKES
➤	MS Conduits	AKG, BEC, RAMA
➤	MS Conduit Accessories	SHARMA, RAMA, AKG
➤	PVC Conduits & Accessories	PRECISION, POLYCAB, POLYPACK

➤	PVC insulated, flexible stranded copper conductor FRLS wires	SKYSTONE, HAVELL'S, FINOLEX, L&T, LAPP
➤	PVC insulated armoured, Aluminium conductor cables	GLOSTER, FINOLEX, UNIVERSAL, NICCO, POLYCAB,
➤	Flush types, piano switches and sockets outlet etc.	ANCHOR, ELLORA
➤	Modular switches, socket outlet & moulded cover plates	MK ELECTRIC, ROMA CLIPSAL, LKPACE (ENGLISH MODULE)
➤	Miniature Circuit Breakers (M.C.B)	MDS (LEXIC), ABB, L&T (HAGER), C&S, SPRECHER SCHUH, SIEMENS, STANDARD, INDO ASIAN
➤	Earth Leakage Circuit Breakers (ELCB/RCCB)	MDS (LEXIC), ABB, L&T (HAGER), C&S, SPRECHER SCHUH, SIEMENS
➤	Moulded Case Circuit Breakers (MCCB)	L&T, SIEMENS, ABB, MDS (LEGRAND), BCH, C&S, SCHNEIDER, SPRECHER SCHUH
➤	Ammeters, Voltmeters, PF Meters (Analogue)	AUTOMATIC ELECTRIC, L&T, RISHABH, MECO
➤	Ammeters, Voltmeters, PF Meters (Digital)	CONZERV, MECO, L&T, RISHABH, AE
➤	Current Transformers (Cast Resin)	KAPPA, MECO, GILBERT MAXWELL, AUTOMATIC ELECTRIC
➤	Energy Meters (Mechanical)	UNIVERSAL, JAIPUR, HAVEL
➤	Energy Meter(Electronic)	CONZERV, REICO, SECURE, HPL, BENTEC
➤	Telephone wires & Cables	DELTON, FINOLEX, SKYSTONE
➤	Computer Data Cables (CAT 5/6)	LUCENT, AT&T, AMP
➤	Telephone Tag Box	KRONE, POUYET
➤	Low Tension Switchgear	L&T, ABB, SIEMENS, SCHNEIDER
➤	Cable Compression Glands	PEECO, LAPP KABEL, COMET, BRACKO

➤	Cable Lugs	LAPP KABEL, DOWELL'S, BRACKO, COMET
➤	Industrial type Metallic plug sockets	MDS (LEXIC), INDO KOPP, CUTTLER & HAMMER, ABB
➤	Selector Switches	KAYCEE, L&T SALZER, ABB
➤	Rising Mains	CONTROL & SWITCHGEAR, ZETA
➤	Power Capacitors	L&T, SIEMENS, EPCOS, MEHER, ASIAN
➤	Addressable smoke detectors	EDWARDS, NOTIFIER, CHUBB (UK)
➤	Manual pull stations	EDWARDS, NOTIFIER, CHUBB (UK)
➤	Addressable analogue main panel	EDWARDS, NOTIFIER, ZITON, CHUBB (UK)
➤	PA system speakers	PHILIPS, AHUJA
➤	PA system amplifier unit	PHILIPS, AHUJA
➤	PA System control desk	PHILIPS, AHUJA
➤	Twisted copper conductor FRLS wire	SKYLINE, NATIONAL
➤	Distribution Boards	L&T, ABB, SIEMENS, HAVELL'S, C&S, STANDARD, INDO ASIAN
➤	Change Over Switch	L&T, SIEMENS, ABB, C&S, HPL, HAVELL'S
➤	Indication Lamps (LED Type)	TEKNIC, ABB, ESBEE, SIEMENS
➤	Push Buttons	TEKNIC, SIEMENS, ABB, ESBEE
➤	APFC Relay	L&T, SIEMENS, EPCOS
➤	Capacitor Duty Contactors	L&T, ABB, EPCOS, SIEMENS
➤	Connectors	ELMEX, CONNECTWELL

NOTE :

- 1 ANY MAKE OR BRAND OF THE MATERIAL SPECIFIED IN THE SOQ/BOQ OR ABOVE FOR ALL THE ITEM WOULD ALSO ALLOW FOR OR EQUIVALENT MAKES AND BRAND ONLY IF ALL SPECIFICATIONS AND DURABILITY OF THE SAID MATERIAL IS PROVED BY THE BIDDER SUPPORTED WITH ALL TESTS, CERTIFICATES, GUARANTEES, PERFORMANCE OF THE WORK

ALREADY DONE AT OTHER PLACES, SAMPLES AND OTHER INSPECTIONS BY PROJECT MANAGER. CONTRACTOR SHALL BEAR ALL THE COST FOR PROVING THE EQUALITY.

2. FOR THE ITEMS NOT INDICATED ABOVE BUT TO BE USED IN CONSTRUCTION, SPECIFIC APPROVAL TO BE TAKEN BEFORE PROCUREMENT AND USE AFTER SUBMITTING SAMPLE, DETAIL OF MANUFACTURER, SOURCE OF SUPPLY ETC.
- 3 IF BIDDER IS UNABLE TO PROVIDE ANY MATERIAL REQUIRED FOR CONSTRUCTION AS PER SAMPLE APPROVED BY PROJECT MANAGER /PROJECT AUTHORITY, PROJECT AUTHORITY SHALL BE FREE WITHOUT ANY PREJUDICE TO PROCURE THE MATERIAL AND GET THE WORK EXECUTED AT RISK COST AND RESPONSIBILITY OF THE BIDDER.

WE HAVE NOTED THE ABOVE AND CONFIRM THAT OUR TENDER IS BASED ON ABOVE SUGGESTED MAKES.

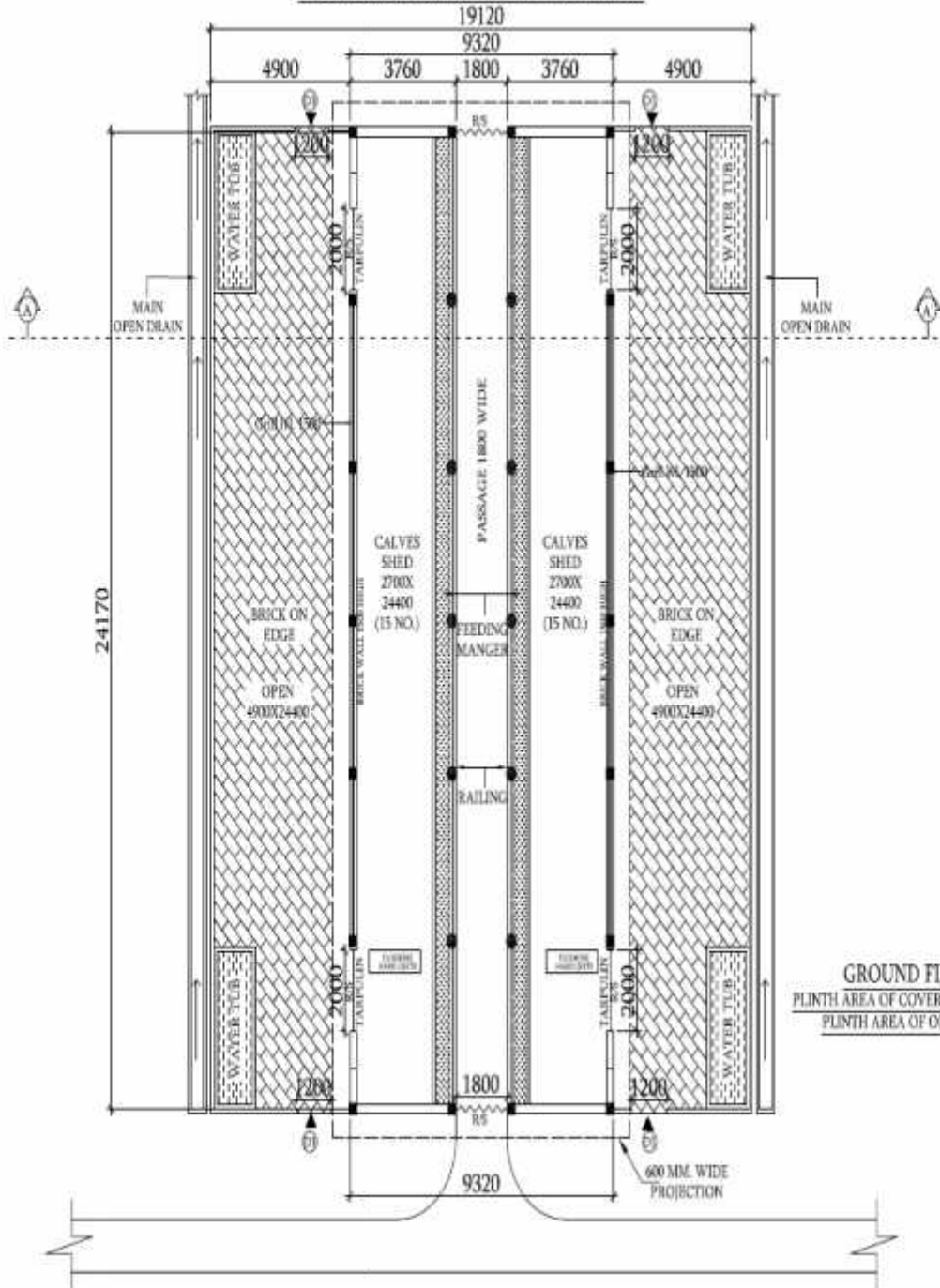
Date: _____

Signature and Seal of Bidder

Section IX. Drawings

The site layout drawings are attached with the tender as Annexure F. The detailed drawings are available at Implementation of Bull Production Through Imported Embryos of HF & New Jersey Under NDP-1 Vikas Khand – Kalsi, Distt. Dehradun.

PROPOSED CALVES SHED (30 NO.) (SMALL & BIG) FOR BULL PRODUCTION THROUGH IMPORTED EMBRYOS OF HF & NEW JERSEY UNDER NDP-1,VIKAS KHAND-KALSI, DISTT.DEHRADUN.



GROUND FLOOR PLAN
 PLINTH AREA OF COVERED SHED = 215.26 SQ.M.
 PLINTH AREA OF OPEN = 296.86 SQ.M.

Client Name

1. All dimensions are in mm.
 2. Dimensions are to be read out as measured.

No.	Revision	Date

ARCHITECT
AAKAR ARCHITECTS
 80/1 NO. 111 (FIRST FLOOR)
 BUDHSHYAM SHOPPING COMPLEX
 HARIJWAR ROAD, KASHI
 241012-220001

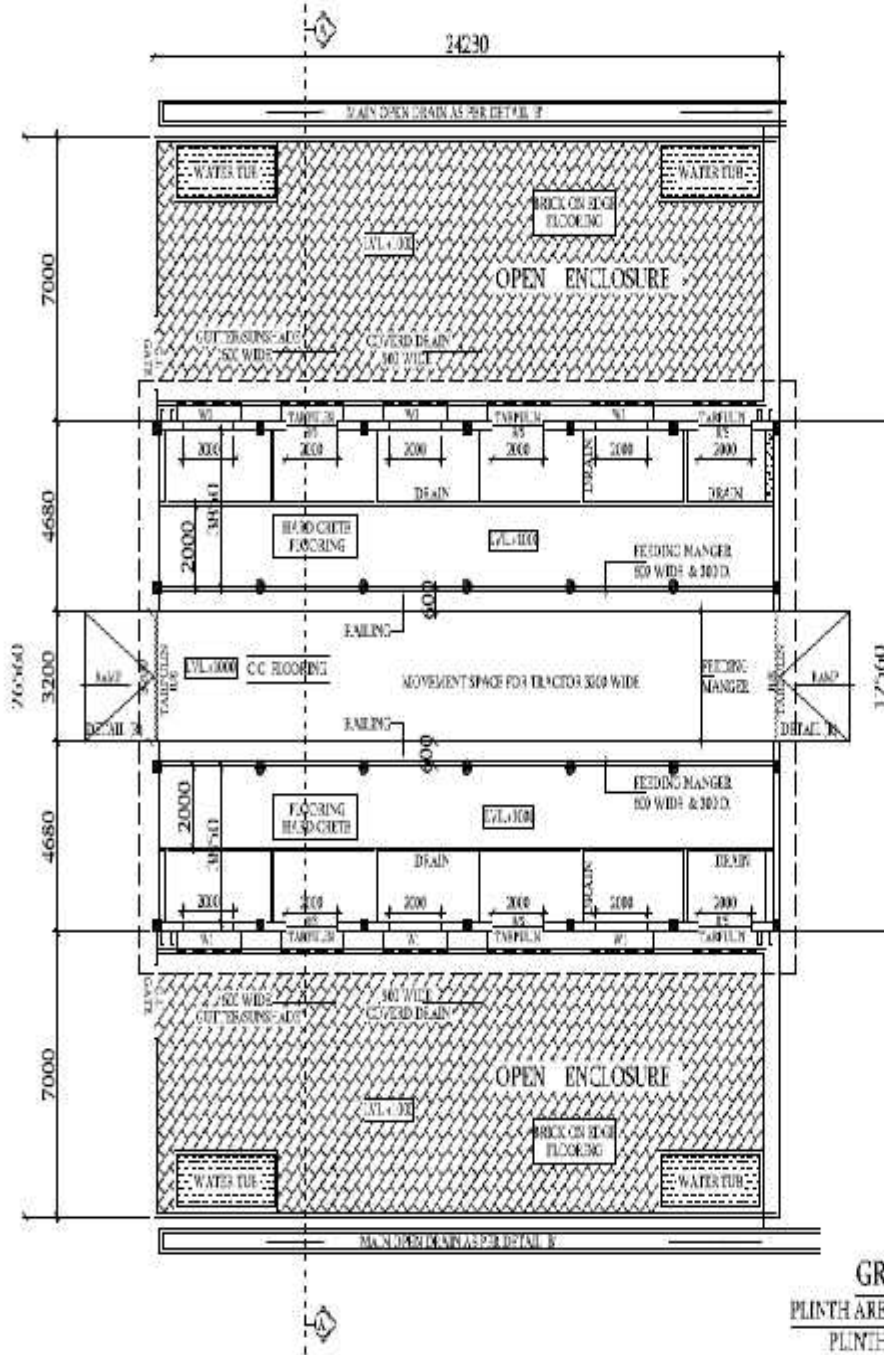
CONSTRUCTION AGENCY
 RURAL WORKS DEPARTMENT
 DEHRADUN

PROJECT
 PROPOSED CALVES SHED (30 NO.)
 SMALL & BIG FOR BULL
 PRODUCTION UNDER NDP-1
 IMPORTED EMBRYOS OF HF & NEW JERSEY UNDER
 NDP-1,VIKAS KHAND KALSI,
 DISTT.DEHRADUN.

PROJECT NO.	
DATE	
SCALE	

NO TO SCALE

PROPOSED COW SHED FOR BULL PRODUCTION THROUGH IMPORTED EMBRYOS OF HF & NEW JERSEY UNDER NDP-1,VIKAS KHAND-KALSI, DISTT.DEHRADUN.



GROUND FLOOR PLAN
 PLINTH AREA OF COVERED SHED = 304.32 SQ.M.
 PLINTH AREA OF OPEN = 339.22 SQ.M.

Scale 1/10

1. All dimensions in m.
 2. Dimensions given in mm are rounded up.

No.	Description	Qty.

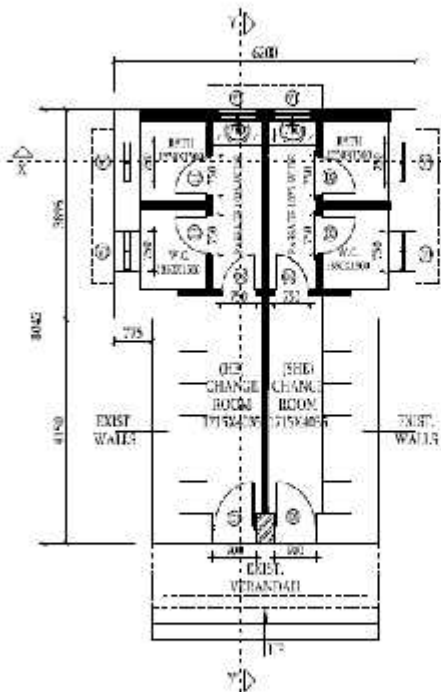
OFFICE
 JALPAKAWATE
 D-10/10, WEST GATE ROAD
 DEHRADUN-248001 (INDIA)
 RAIPALICAD@GMAIL.COM
 PH: 0512-260600

CONTRACT NO. 02/2014
 URBAL WORKS DEPARTMENT
 DEHRADUN

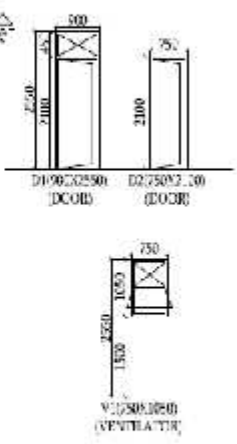
PROJECT
 PROPOSED COW SHED FOR BULL PRODUCTION THROUGH IMPORTED EMBRYOS OF HF AND NEW JERSEY UNDER NDP-1 VIKAS KHAND, DISTT. DEHRADUN

DATE	
DRWG. NO.	

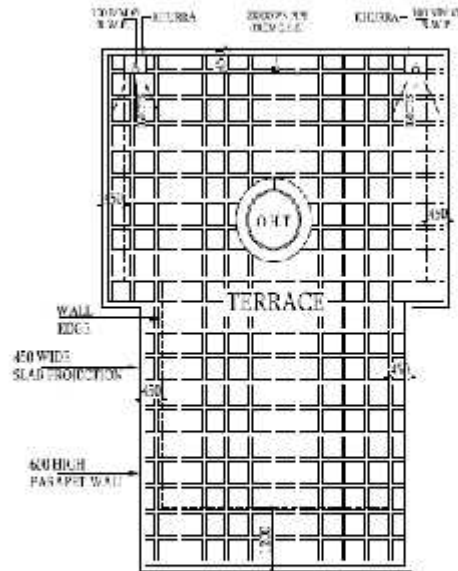
**PROPOSED CHANGING BLOCK FOR BULL PRODUCTION THROUGH IMPORTED EMBRYOS OF HF & NEW JERSEY UNDER
NDP-I,VIKAS KHAND-KALSI, DISTT.DEHRADUN.**



**EXIST./PROPOSED CHANGING BLOCK
GROUND FLOOR PLAN
MESH SCALE - 4:14 CM**



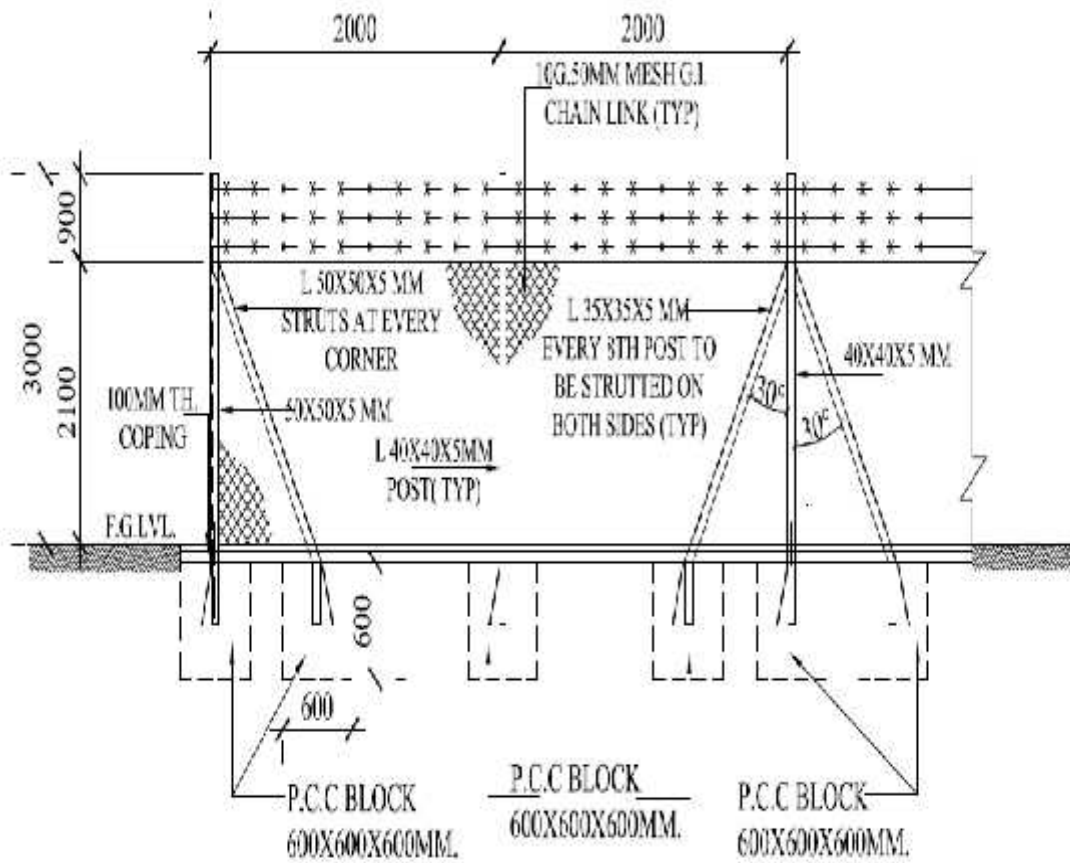
DOOR/WINDOW SCHEDULE



TERRACE PLAN

DRAWN BY S. K. SHARMA/10/10/2017	
CHECKED BY S. K. SHARMA/10/10/2017	
PROJECT NO. 10/10/2017	
PROJECT NAME BULL PRODUCTION THROUGH IMPORTED EMBRYOS OF HF & NEW JERSEY UNDER NDP-I,VIKAS KHAND-KALSI, DISTT.DEHRADUN.	
PROJECT LOCATION VIKAS KHAND-KALSI, DISTT.DEHRADUN.	
PROJECT SCALE 1:100	
PROJECT DATE 10/10/2017	
PROJECT STATUS APPROVED	
PROJECT VALUE 10000000	
PROJECT TYPE BULL PRODUCTION THROUGH IMPORTED EMBRYOS OF HF & NEW JERSEY UNDER NDP-I,VIKAS KHAND-KALSI, DISTT.DEHRADUN.	
PROJECT AREA 1000000	
PROJECT PERIOD 10/10/2017	

PROPOSED CHAIN LINK FENCING (65 MT.) DETAIL FOR BULL PRODUCTION THROUGH IMPORTED EMBRYOS OF HF & NEW JERSEY UNDER NDP-1,VIKAS KHAND-KALSI, DISTT.DEHRADUN.



ELEVATION

Contract

1. All dimensions in millimeters.
2. Dimensions in a bracket are nominal.

No.	Description	Qty.

OFFICE:
NAGA INDUSTRIES
DEHRA DUN, UTTARANCHAL
LEGHORN, LEGHORN BELL
INDUSTRIAL ROAD BELT
T-1 (NAGRI)

CONTRACTOR/AGENCY:
S.L. NARI SHARMA
DEHRA DUN

PROJECT:
DEPARTMENT OF ANIMALS & FISHERIES
DEHRA DUN, UTTARANCHAL
DEHRA DUN, UTTARANCHAL
DEHRA DUN, UTTARANCHAL
DEHRA DUN, UTTARANCHAL

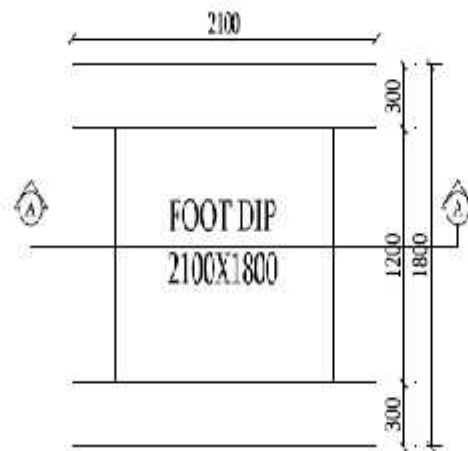
DATE: _____

BY: _____

FOR: _____

SCALE: _____

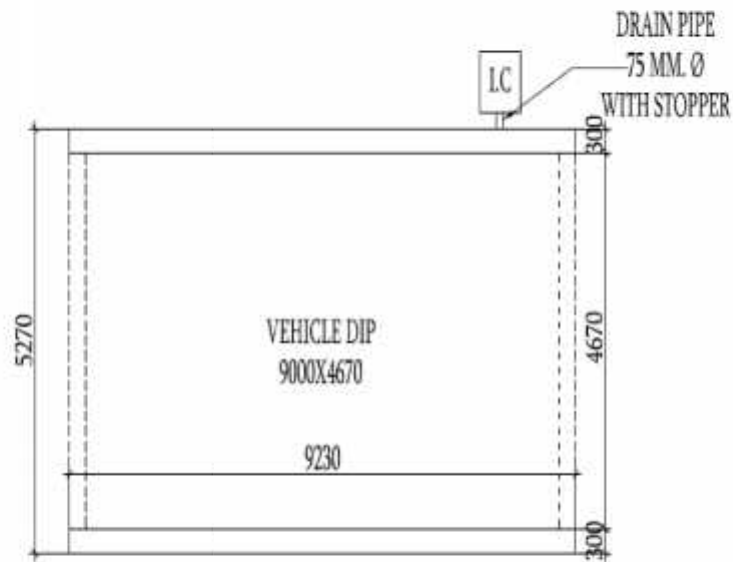
PROPOSED VEHICLE DIP FOR BULL PRODUCTION THROUGH IMPORTED EMBRYOS OF HF &
NEW JERSEY UNDER NDP-1,VIKAS KHAND-KALSI, DISTT.DEHRADUN.



PLAN OF FOOT DIP

General Note		
GENERAL NOTE 1. ONLY QUALITY APPROVED MATERIALS TO BE USED. 2. ALL DIMENSIONS SHALL BE IN METERS.		
No.	Description	Qty.
APPROVED ARCHITECT DR. VIJAY KUMAR H.NO. 10 PATEL NAGAR MUSKANO DEHRADUN UTTARANCHAL		
CONSTRUCTION AGENT H.L.V.K. DEHRA DUN DEHRADUN		
PROJECT PROPOSED BULL PRODUCTION THROUGH IMPORTED EMBRYOS OF HF & NEW JERSEY UNDER NDP-1,VIKAS KHAND-KALSI, DISTT.DEHRADUN.		
DATE	BY	
SIGNATURE		

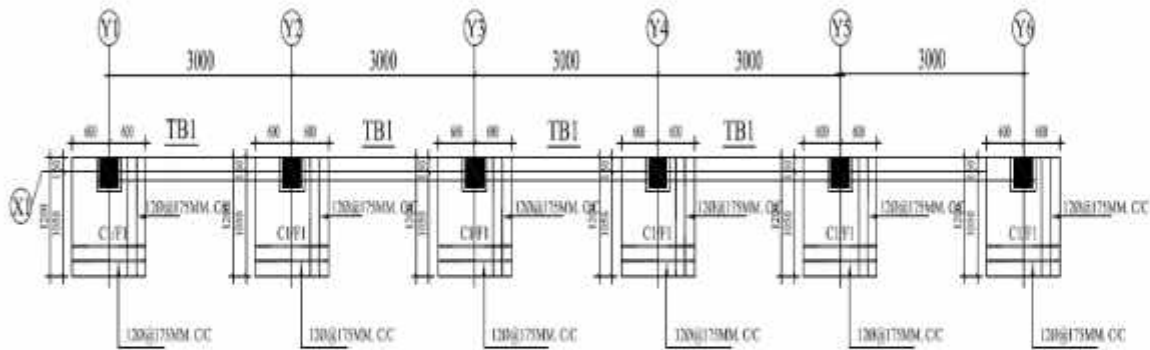
PROPOSED VEHICLE DIP FOR FROZEN SEMEN STATION (U.L.D.B) AT KALSI



PLAN OF VECHICLE DIP

Project Name		
1. All dimensions are in mm.		
2. Dimensions are in the end view or as shown.		
No.	Description	Qty.
APPROVED AGRAJ ARCHITECTS 8/17 P. NO. 107, 1ST FLOOR 100/1001 HOSPITAL CHURCH 100/1001 HALL BANGLORE 560 028 8000		
CONSTRUCTION AGENCY RURAL DEVELOPMENT SERVICE DEPARTMENT		
PROJECT PROPOSED VEHICLE DIP FOR FROZEN SEMEN STATION (U.L.D.B) AT KALSI		
DRAWN BY: NAME OF ENGINEER		
DATE:		
SCALE:		
DATE:		
BY:		
NOT TO SCALE		

PROPOSED GATE & BOUNDARY WALL (190 MT.) FOR BULL PRODUCTION THROUGH IMPORTED EMBRYOS OF HF & NEW JERSEY UNDER NDP-1,VIKAS KHAND-KALSI, DISTT.DEHRADUN.



FOUNDATION LAYOUT

FOOTING DETAIL:

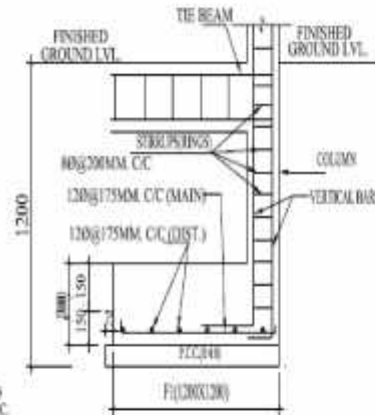
S.NO.	COLUMN	FOOTING BASE (A/R)	BASE REINFORCEMENT	D
1	F1	1200X1200	120MM Ø175MM C.C (MAIN) 12MM Ø175MM C.C (DIST.)	300

COLUMN DETAIL:

S.NO.	COLUMN	SECTION	VERTICLE REINFORCEMENT	TIES
1.	C1	300x300	4#16MM.Ø	8MM.Ø @200MM.C.C

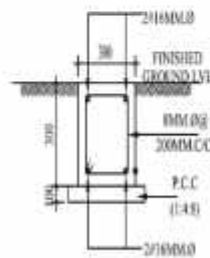


CROSS SECTIONS OF COLUMNS



1 - SECTION OF COLUMN WITH FOOTING DETAIL (F1)

S.NO.	PLINTH BEAM	SECTION	BOTTOM BARS	TOP BARS	CRANK BARS	RINGS (STIRRUPS)
1.	TB1	300X300	2#16MM.Ø	2#16MM.Ø	NIL.	8MM.Ø@200MM.C.C.



UNIFORM SECTION TB1 (300X300) SECTIONS OF THE BEAM

General Note

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE DRAWING AND TO BE FOLLOWED.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS SPECIFIED.

No.	Revision/Issue	Date

ARCHITECTS:

AARAV ARCHITECTS
SHOP NO. 10, 1ST FLOOR,
B-10, WOODEN COMPLEX, BAREILLY ROAD,
DEHRADUN-248001

CONSTRUCTION AGENCY:

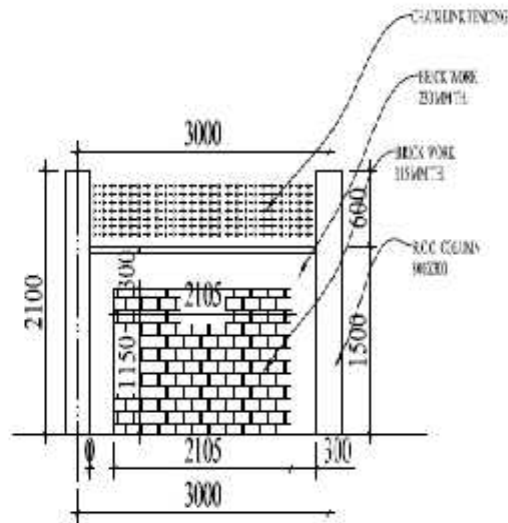
RURAL WORKS DEPARTMENT
DEHRADUN

PROJECT:

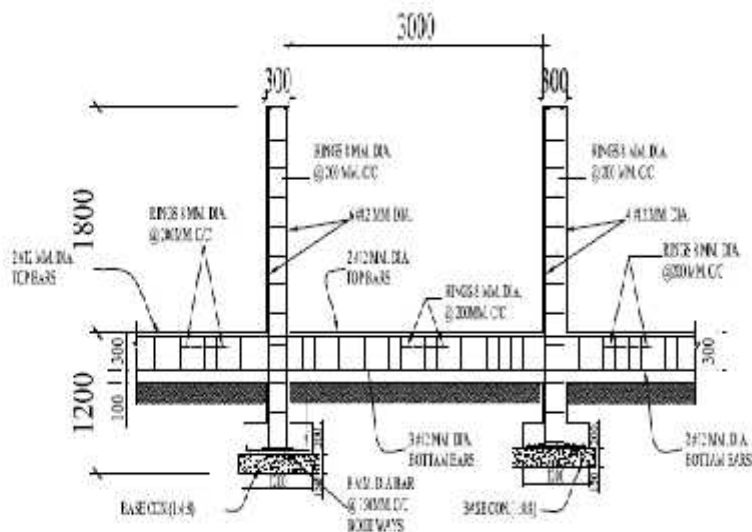
PROPOSED GATE & BOUNDARY WALL (190 MT.) FOR BULL PRODUCTION THROUGH IMPORTED EMBRYOS OF HF & NEW JERSEY UNDER NDP-1,VIKAS KHAND-KALSI, DISTT.DEHRADUN.

SHEET TITLE		Sheet
DATA RECORDING SHEET		AR/1
DATE		
Scale		

PROPOSED GATE & BOUNDARY WALL (190 MT.) FOR BULL PRODUCTION THROUGH IMPORTED EMBRYOS OF HF & NEW JERSEY UNDER NDP-I, VIKAS KHAND-KALSJ, DISTT. DEHRADUN.



ELEVATION OF BOUNDARY WALL



FOUNDATION OF BOUNDARY WALL

General Note

1. ALL MATERIALS TO BE USED SHOULD BE OF GOOD QUALITY.
2. ALL DIMENSIONS ARE IN MM UNLESS SPECIFIED OTHERWISE.

No.	Revised/Issued	Date
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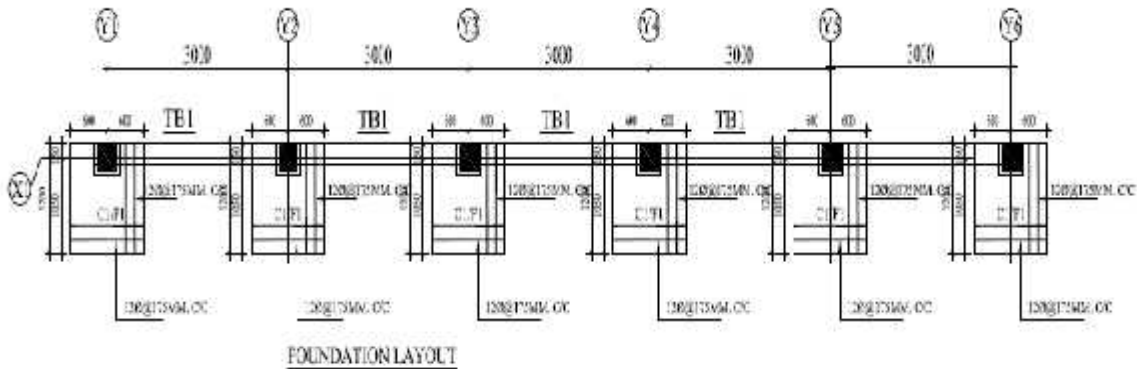
ARCHITECTS
AJAY ARCHITECTS
S-10, PHASE II, INDUSTRIAL AREA, GATE NO. 14, DEHRADUN.

CONSTRUCTION AGENCE
K. S. VERMA ENGINEERING DESIGN

PROJECT
PROPOSED GATE & BOUNDARY WALL FOR BULL PRODUCTION THROUGH IMPORTED EMBRYOS OF HF & NEW JERSEY UNDER NDP-I, VIKAS KHAND-KALSJ, DISTT. DEHRADUN.

SHEET NO.	Date
CUSTOMER/VENDOR	
DRAWN	Date
CHECKED	
SCALE	Date
NOT FINISHED	

PROPOSED GATE & BOUNDARY WALL (100 MT.) FOR BULL PRODUCTION THROUGH IMPORTED EMBRYOS OF HF & NEW JERSEY UNDER NDP-I,VIKAS KHAND-KALSI, DISTT DEHRADUN.

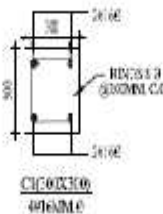


FOOTING DETAIL:-

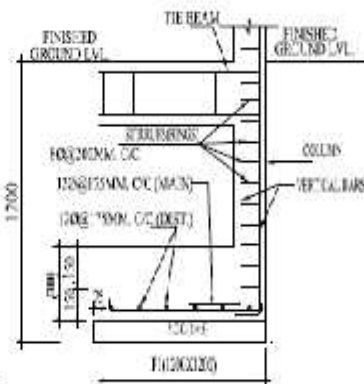
S.NO.	COLUMN	FOOTING BASE (AxB)	BASE REINFORCEMENT	D
1	T1	1200X300	12MM @ 150MM C/C (MAIN) 12MM @ 125MM C/C (D.SL)	300

COLUMN DETAIL:

S.NO.	COLUMN	SECTION	VERTICLE REINFORCEMENT	TIES
1.	C1	300X300	4@16MM @	8MM @ @200MM C.C.

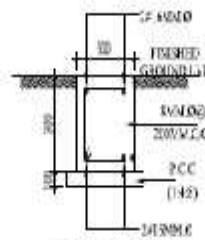


CROSS SECTION OF COLUMN



L-SECTION OF COLUMN WITH FOOTING DETAIL (F1)

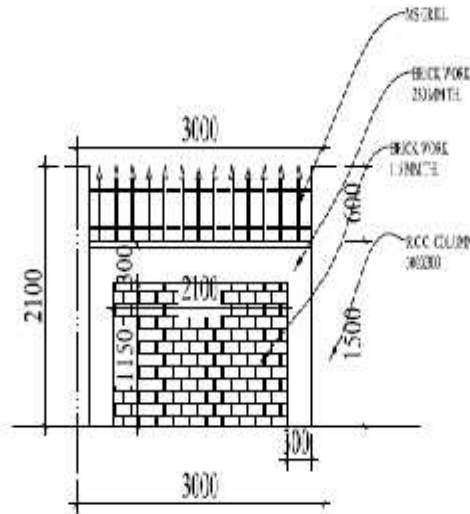
S.NO.	IN TH BEAM SECTION	SECTION	BOTTOM BARS	TOP BARS	CRANK BARS	RINGS (STIRRUPS)
1.	TB1	300X300	2@16MM @	2@16MM @	NIL	8MM @ @200MM C.C.



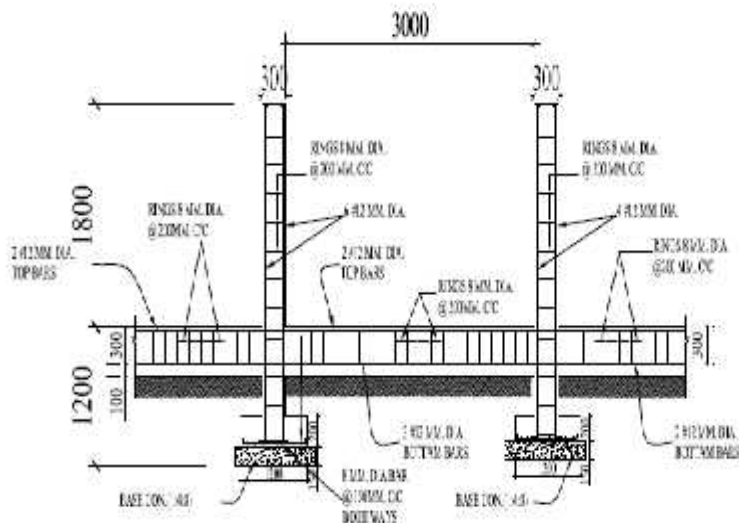
TYPICAL SECTION TB1 (300X300) SECTION OF TIE BEAM

Grand View GATE NO. 142 TO NH-101 WITH GROUND LEVEL, PILLAR, ALUMINIUM RAIL, RELATER-UMBER SHEDS		
No.	Revised/Issue	Date
ARCHITECTS:		
MAAR ARCHITECTS 107, CHANDRA SHEKHAR ROAD, DEHRADUN, UTTARANCHAL INDIA-248001		
CONSTRUCTION AGENCY:		
P. S. S. ENGINEERING DEHRADUN		
PROJECT:		
BOUNDARY WALL & GATE FOR BULL PRODUCTION THROUGH IMPORTED EMBRYOS OF HF & NEW JERSEY UNDER NDP-I, VIKAS KHAND-KALSI, DISTT DEHRADUN		
SHEET NO: INTERSECTION WALL SHEET	Sheet /R/W	
DATE: / /		
Scale: 1/100 TO SCALE		

PROPOSED GATE & BOUNDARY WALL (100 MT.) FOR BULL PRODUCTION THROUGH IMPORTED EMBRYOS OF HF & NEW JERSEY UNDER NDP-1, VIKAS KHAND-KALSI, DISTT. DEHRADUN.



ELEVATION OF BOUNDARY WALL.



FOUNDATION OF BOUNDARY WALL.

Governing Note		
TO VISUALISE BOUNDARY WALLS WITH MESHINGS WITH RE. POL., AND WALL THICKNESS IN INDICATED IN THIS SHEET.		
No.	Revised/Date.	Job.
ARCHITECTS		
AARARCHITECTS DIST. WORK PROJECT DR. ANISH KUMAR, P. 11, DEHRADUN, UTTARANCHAL		
CONSTRUCTION AGENCY:		
RURAL PURCHASE DEPARTMENT DEHRADUN		
PROJECT:		
PROPOSED GATE & BOUNDARY WALL (100MT) FOR BULL PRODUCTION THROUGH IMPORTED EMBRYOS OF HF & NEW JERSEY UNDER NDP-1, VIKAS KHAND-KALSI DISTT. DEHRADUN		
SHEET TITLE	Sheet	
BOUNDARY WALL DATA	09/21	
DATE		
Scale	NOT DIMENSIONALS	

Section X : BILL OF QUANTITIES

Section X. Bill of Quantities

Objectives

The objectives of the Bill of Quantities are:

- (a) to provide sufficient information on the quantities of Works to be performed to enable bids to be prepared efficiently and accurately; and*
- (b) when a Contract has been entered into, to provide a priced Bill of Quantities for use in the periodic valuation of Works executed.*

In order to attain these objectives, Works should be itemized in the Bill of Quantities in sufficient detail to distinguish between the different classes of Works, or between Works of the same nature carried out in different locations or in other circumstances which may give rise to different considerations of cost. Consistent with these requirements, the layout and contents of the Bill of Quantities should be as simple and brief as possible.

The estimated cost of specialized work to be carried out, or of special goods to be supplied, by other contractors (refer to GCC Clause 8) should be indicated in the relevant part of the Bill of Quantities as a particular provisional sum with an appropriate brief description. A separate procurement procedure is normally carried out by the Employer to select such specialized contractors. To provide an element of competition among the bidders in respect of any facilities, amenities, attendance, etc., to be provided by the successful Bidder as prime Contractor for the use and convenience of the specialist contractors, each related provisional sum should be followed by an item in the Bill of Quantities inviting the Bidder to quote a sum for such amenities, facilities, attendance, etc.

These Notes for Preparing a Bill of Quantities are intended only as information for the Employer or the person drafting the Bidding Documents. They should not be included in the final documents.

SCHEDULE OF QUANTITIES (SOQ) / BILL OF QUANTITIES (BOQ)

Sl.No.	Description	Quantity	Unit	Rate (In Rs.)	Amount (in Rs.)
	CIVIL WORK				
	DISMANTLING				
1	Demolishing brick work manually/ by mechanical means including stacking of serviceable material and disposal of unserviceable material within 50 metres lead as per direction of Engineer-in-charge.	11.94	Cum		
2	Dismantling doors, windows and clerestory windows (steel or wood) shutter including chowkhats, architrave, holdfasts etc. complete and stacking within 50 metres lead :	3.68	Nos		
3	Demolishing cement concrete manually/ by mechanical means including disposal of material within 50 metres lead as per direction of Engineer - in - charge. Nominal concrete 1:4:8 or leaner mix (i/c equivalent design mix)	2.83	Cum		
	EARTH WORK / NEW WORK				
4	Earth work in excavation by mechanical means (Hydraulic excavator) / manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift upto 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m. All kinds of soil.	856.04	Cum		
5	Earthwork in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30cm in depth, 1.5m in width as well as 10sqm on plan) i/c disposal of excavated earth, lead up to 50m and lift up to 1.5m, disposed earth to be levelled and neatly dressed. : Excavation in all kinds of soil	15.13	Cum		

6	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers not exceeding 20cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift upto 1.5 m.	401.95	Cum		
7	Diluting and injecting chemical emulsion (chlorpyriphos/Lindane E.C 20% with 1% concentration) at the rate of one litre per hole at 300 mm c/c to all the horizontal and vertical surface of the excavation made for the foundation of the building, soil under floor, apron, back fill material and along all the faces of the walls for PRE-CONSTRUCTIONAL anti-termite treatment (including the cost of chemical emulsion) as per IS:6313 Part-II. (Plinth area of building shall be measured for payment.)	573.02	Sqm		
8	Supplying and filling in plinth with Local sand under floors, including watering, ramming, consolidating and dressing complete.	174.17	Cum		
9	Construction of embankment with approved material obtained from borrow pits (including cost of compensation for earth taken from private land) with a lift upto 1.5 m, transporting to site, spreading, grading to required slope and compacting to meet requirement of Tables 300.1 and 300.2 as per Technical Specification Clause 301.5	580.56	Cum		
	CONCRETE WORK				
10	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level :1:4:8 (1 Cement : 4 coarse sand : 8 graded stone aggregate 40 mm nominal size)	200.20	Cum		

11	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level 1:2:4 (1 Cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size).	43.09	Cum		
12	Providing and laying in position cement concrete of specified grade excluding the cost of centring and shuttering - -All work upto plinth level. 1:5:10 (1 cement : 5 coarse sand : 10 graded stone aggregate 40mm nominal size)	2.75	Cum		
13	Providing and laying damp-proof course 40mm thick with cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 12.5mm nominal size).	72.02	Sqm		
14	Applying a coat of residual petroleum bitumen of grade of VG-10 of approved quality using 1.7 kg per square metre on damp proof course after cleaning the surface with brushes and finally with a piece of cloth lightly soaked in kerosene oil..	0.00	Sqm		
15	Making plinth protection 50 mm thick of cement concrete 1:3:6 (1 cement :3 coarse sand : 6 graded stone aggregate 20 mm nominal size) over 75 mm bed by dry brick ballast 40 mm nominal size well rammed and consolidated and grouted with fine sand including finishing the top smooth	27.95	Sqm		
	REINFORCED CEMENT CONCRETE WORK				
16	Reinforced cement concrete work in walls (any thickness), including attached pilasters, buttresses, plinth and string courses, fillets, columns, pillars, piers, abutments, posts and struts etc. up to floor five level, excluding cost of centering, shuttering, finishing and reinforcement :				
	1:1.5:3 (1 cement : 1.5 coarse sand : 3 graded stone aggregate	162.87	Cum		

	20 mm nominal size)				
17	Reinforced cement concrete work in walls (any thickness), including attached pilasters, buttresses, plinth and string courses, fillets, columns, pillars, piers, abutments, posts and struts etc. up to floor five level, excluding cost of centering, shuttering, finishing and reinforcement :1:1.5:3 (1 cement : 1.5 coarse sand : 3 graded stone aggregate 20 mm nominal size)	167.74	Cum		
18	Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete upto plinth level. Thermo Mechanically Treated bars	36350.93	kg		
19	Centering and shuttering including strutting, propping etc. and removal of form for :				
(a)	Foundations, footings, bases of columns, etc. for mass concrete	266.75	Sqm		
(b)	Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.	0.00	Sqm		
(c)	Lintels, beams, plinth beams, girders, bressumers and cantilevers.	469.27	Sqm		
(d)	Columns, Pillars, Piers, Abutments, Posts and Struts	796.44	Sqm		
(e)	Suspended floors, roofs, landings, balconies and access platform.	662.80	Sqm		
	BRICK WORK				
20	Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in foundation and plinth in: Cement mortar 1:6 (1 cement : 6 coarse sand)	77.87	Cum		
21	Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in foundation and plinth in: Cement mortar 1:4 (1 cement : 6 coarse sand)	16.49	Cum		
22	Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in superstructure above plinth level up to floor V level in all shapes and sizes in :Cement	158.27	Cum		

	mortar 1:6 (1 cement : 6 coarse sand)				
23	Half brick masonry with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in superstructure above plinth level up to floor V level.Cement mortar 1:4 (1 cement :4 coarse sand)	331.54	Sqm		
24	Extra for providing and placing in position 2 Nos. 6mm dia. M.S. bars at every third course of half brick masonry (with F.P.S. bricks).	43.54	Sqm		
25	Honey-comb brick work 10/11.4 cm thick with bricks of class designation 75 in cement mortar 1:4 (1 cement : 4 coarse sand). Rs. 277.2X2 For 23 cm thick wall	0.00	Sqm		
26	Random rubble masonry with hard stone in foundation and plinth including levelling up with cement concrete 1:6:12 (1 cement: 6 coarse sand : 12 graded stone aggregate 20mm nominal size) at plinth level with Cement mortar 1:6 (1 cement : 6 coarse sand)	10.77	Cum		
27	Coursed rubble masonry (first sort) with hard stone in foundation and plinth with Cement mortar 1:6 (1 cement: 6 coarse sand)	7.18	Cum		
	WOOD & P.V.C WORK				
28	Providing and fixing ISI marked flush door shutters conforming to IS : 2202 (Part I) non-decorative type, core of block board construction with frame of 1st class hard wood and well matched commercial 3 ply veneering with vertical grains or cross bands and face veneers on both faces of shutters: 35 mm thick including ISI marked Stainless Steel butt hinges with necessary screws	13.23	Sqm		
29	Providing and fixing chromium plated brass casement stays (straight peg type) with necessary screws etc. complete : 300 mm weighing not less than 330 gms	4.00	Nos		

30	Providing and fixing aluminium sliding door bolts, ISI marked anodised anodic coating not less than grade AC 10 as per IS : 1868), transparent or dyed to required colour or shade, with nuts and screws etc. complete :				
(a)	300x16 mm	16.00	Nos		
31	300x16 mm	22.00	Nos		
32	Providing and fixing aluminium tower bolts, ISI marked, anodised (anodic coating not less than grade AC 10 as per IS : 1868) transparent or dyed to required colour or shade, with necessary screws etc. complete :				
(a)	250x10 mm	8.00	Nos		
(b)	150x10 mm	14.00	Nos		
33	Providing and fixing aluminium hanging floor door stopper, ISI marked, anodised (anodic coating not less than grade AC 10 as per IS : 1868) transparent or dyed to required colour and shade, with necessary screws etc. complete. Single rubber stopper	00	Nos		
34	Providing and fixing aluminium work for doors, windows, ventilators and partitions with extruded built up standard tubular sections/ appropriate Z sections and other sections of approved make conforming to IS: 733 and IS: 1285, fixing with dash fasteners of required dia and size, including necessary filling up the gaps at junctions, i.e. at top, bottom and sides with required EPDM rubber/ neoprene gasket etc. Aluminium sections shall be smooth, rust free, straight, mitred and jointed mechanically wherever required including cleat angle, Aluminium snap beading for glazing / paneling, C.P. brass / stainless steel screws, all complete as per architectural drawings and the directions of Engineer-in-charge. (Glazing,	0.00	kg		

	paneling and dash fasteners to be paid for separately) For fixed portion Anodised aluminium (anodised transparent or dyed to required shade according to IS: 1868, Minimum anodic coating of grade AC 15)				
35	Providing and fixing 12 mm thick frameless toughened glass door shutter of approved brand and manufacture, including providing and fixing top & bottom pivot & spring type fixing arrangement and making necessary holes etc. for fixing required door fittings, all complete as per direction of Engineer-in-charge (Door handle, lock and stopper etc.to be paid separately).	0.00	Sqm		
36	Providing and fixing fly proof galvanized M.S. wire gauge to windows and clerestory windows using wire gauge with average width of aperture 1.4 mm in both directions with wire of dia 0.63 mm all complete.With 12 mm mild steel U beading	5.54	Sqm		
37	Providing and fixing special quality bright finished brass cupboard or ward robe locks with four levers of approved quality including necessary screws etc. complete.	0.00	Nos		
38	Providing and fixing 25mm thick pre-laminated medium density fibre board exterior grade (Grade-I) IS:14587:1998 marked one side decorative and other side balancing lamination for cupboard shutters edges to be sealed with PVC edge bending tape 2.00 mm thick of approved brand including ISI marked nickeled plated bright finishing M.S. piano hinges IS:3818 marked with necessary screwed complete.	0.00	Sqm		

39	Providing and fixing 25mm thick pre laminated medium density fibre board exterior grade (Grade-I) IS:14587:1998 marked one side decorative and other side balancing lamination for cupboard shutters edges to be sealed with PVC edge bending tape 2.00 mm thick of approved brand including ISI marked nickeled plated bright finishing M.S. piano hinges IS:3818 marked with necessary screwed complete.	0.00	Nos		
	STEEL WORK				
40	Providing and fixing pressed steel door frames conforming to IS: 4351, manufactured from commercial mild steel sheet of 1.60 mm thickness, including hinges, jamb, lock jamb, bead and if required angle threshold of mild steel angle of section 50x25 mm, or base ties of 1.60 mm, pressed mild steel welded or rigidly fixed together by mechanical means, including M.S. pressed butt hinges 2.5 mm thick with mortar guards, lock strikeplate and shock absorbers as specified and applying a coat of approved steel primer after pre-treatment of the surface as directed by Engineer-in-charge:				
(b)	Profile 'B' (Single Pattam)	43.50	kg		
41	Providing and fixing factory made ISI marked steel glazed doors, windows and ventilators, side /top /centre hung, with beading and all members such as F7D, F4B, K11 B and K12 B etc. complete of standard rolled steel sections, joints mitred and flash butt welded and sash bars tenoned and riveted, including providing and fixing of hinges, pivots, including priming coat of approved steel primer, but excluding the cost of other fittings, complete all as per approved design, (sectional weight of only steel members shall be measured for payment). Fixing with 15x3 mm lugs 10 cm long embedded	94.50	kg		

	in cement concrete block 15x10x10 cm of C.C. 1:3:6 (1 Cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)				
42	Steel work welded in built up sections/ framed work, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer using structural steel etc. as required.				
(a)	In gratings, frames, guard bar, ladder, railings, brackets, gates and similar works.	1588.17	Kg		
43	Providing and fixing hand rail of approved size by welding etc. to steel ladder railing, balcony railing, staircase railing and similar works, including applying priming coat of approved steel primer. M.S. tube	0.00	kg		
44	Providing & fixing glass panes with putty and glazing clips in steel doors, windows, clerestory windows, all complete with :4.mm thick glass panes	5.54	sqm		
45	Providing and fixing G.I. pipes complete with G.I. fittings including trenching and refilling etc. (external work) Railing (G.I.Pipe 65 mm Nominal Bore)	1100.84	Rmt		
46	Providing and fixing M.S. grills of required pattern in frames of windows etc. with M.S. flats, square or round bars etc. including priming coat with approved steel primer all complete. Fixed to steel windows by welding	983.64	kg		

47	Supplying and fixing rolling shutters of approved make, made of required size M.S.laths interlocked together through their entire length and jointed together at the end by end locks mounted on specially designed pipe shaft with brackets, sideguides (80x1.25mm M.S. laths with 1.25 mm thick top cover)	85.50	Sqm		
48	Providing and fixing G.I. chain link fabric fencing of required width in mesh size 50x50 mm including strengthening with 2 mm dia wire or nuts, bolts and washers as required complete as per the direction of Engineer-incharge.	259.98	Sqm		
	ROOFING				
49	Providing gola 75x75 mm in cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 stone aggregate 10mm and down gauge) including finishing with cement mortar 1:3 (1 cement : 3 fine sand) as per standard design : In 75x75mm deep chase	33.54	Rmt		
50	Making khurras 45x45 cm with average minimum thickness of 5 cm cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate of 20 mm nominal size) over P.V.C. sheet 1mx1mx400micron, finished with 12mm cement plaster 1:3 (1 cement : 3 coarse sand) and a coat of neat cement rounding the edge sand making and finishing the outlet complete.	2.00	Nos		
51	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.				
	110 mm diameter	8.30	Rmt		

52	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.	4.00	Nos		
53	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.	2.00	Nos		
	110 mm bend				
54	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.	2.00	Nos		
	110 mm Shoe				
55	Providing and fixing unplasticised - PVC pipe clips of approved design to unplasticised - PVC rain water pipes by means of 50x50x50 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.	6.00	Nos		
	FLOORING				
56	62 mm thick cement concrete flooring with concrete hardener topping under sq.m layer 50 mm thick cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20mm nominal size) and top layer 12mm thick cement hardener consisting of mix 1:2 (1 cement hardener mix : 2 graded stone aggregate 6mm nominal size) by volume. Hardening compound is	317.76	Sqm		

	mixed @ 2 litre per 50 kg of cement or as per manufactures specifications. This includes cost of cement slurry, but excluding the cost of nosing of steps etc. complete.				
57	Brick on edge flooring with bricks of class designation 75 including cement slurry etc. complete in cement mortar with F.P.S. bricks 1:6 (1 cement : 6 coarse sand)	503.57	Sqm		
58	Cement concrete pavement with 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size), including finishing complete.	4.75	Sqm		
59	Cement concrete flooring 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate) finished with a floating coat of neat cement, including cement slurry, but excluding the cost of nosing of steps etc. complete. 40 mm thick with 20 mm nominal size stone aggregate	127.69	Sqm		
60	Cement plaster skirting up to 30 cm height, with cement mortar 1:3 (1 cement : 3 coarse sand), finished with a floating coat of neat cement. 18 mm thick	133.14	Sqm		
61	Kota stone slab flooring over 20 mm (average) thick base laid over and jointed with grey cement slurry mixed with pigment to match the shade of the slab including rubbing and polishing complete with base of cement mortar 1 : 4 (1 cement : 4 coarse sand) : 25 mm thick.	19.87	Sqm		

62	Kota stone slabs 20 mm thick in risers of steps, skirting, dado and pillars laid on 12 mm (average) thick cement mortar 1:3 (1 cement: 3 coarse sand) and jointed with grey cement slurry mixed with pigment to match the shade of the slabs, including rubbing and polishing complete.	0.00	Sqm		
63	Providing and laying Ceramic glazed floor tiles of size 300x300 mm (thickness to be specified by the manufacturer) of 1st quality conforming to IS : 15622 of approved make in colours such as White, Ivory, Grey, Fume Red Brown, laid on 20 mm thick cement mortar 1:4 (1 Cement : 4 Coarse sand), including pointing the joints with white cement and matching pigment etc, complete.	28.33	Sqm		
64	Providing and fixing Ist quality ceramic glazed wall tiles conforming to IS : 15622 (thickness to be specified by the manufacture) of approved make in all colours, shades except burgundy, bottle green, black of any size as approved by Engineer-in-Charge in skirting, risers of steps and dados over 12 mm thick bed of cement Mortar 1:3 (1 cement : 3 coarse sand) and jointing with grey cement slurry @ 3.3kg per sqm including pointing in white cement mixed with pigment of matching shade complete.	130.96	Sqm		
65	Providing and laying vitrified floor tiles in different sizes (thickness to be specified by the manufacturer) with water absorption less than 0.08% and conforming to IS : 15622, of approved make, in all colours and shades, laid on 20mm thick cement mortar 1:4 (1 cement : 4 coarse sand), including grouting the joints with white cement and matching pigments etc., complete. Size of Tile 600x600 mm	0.00	Sqm		

66	Providing and laying Vitrified tiles in differen sizes (thickness to be specified by the manufacturer), with water absorption less than 0.08% and conforming to IS: 15622, of approved brand & manufacturer, in all colours and shade, in skirting, riser of steps, laid with cement based high polymer modified quick set tile adhesive (water based) conforming to IS: 15477, in average 6 mm thickness, including grouting of joints (Payment for grouting of joints to be made separately).	0.00	Sqm		
67	Providing and fixing 10 mm thick acid and/or alkali resistant tiles of approved make and colour using acid and/or alkali resisting mortar bedding, and joints filled with acid and/or alkali resisting cement as per IS :4457, complete as per the direction of Engineer-in- Charge. In flooring on a bed of 10 mm thick mortar 1:4 (1 acid proof cement : 4 coarse sand	0.00	Sqm		
	FINISHING				
68	6 mm cement plaster of mix : 1:3 (1 cement : 3 fine sand)	695.48	sqm		
69	12 mm cement plaster of mix : 1:6 (1 cement: 6 fine sand)	830.37	sqm		
70	12 mm cement plaster of mix : 1:4 (1 cement:4fine sand)	0.00	Sqm		
71	15 mm cement plaster on the rough side of single or half brick wall of mix : 1:6 (1 cement: 6 fine sand)	1596.38	Sqm		
72	15 mm cement plaster on the rough side of single or half brick wall of mix : 1:4 (1 cement: 4 fine sand)	71.69	Sqm		
73	Cement plaster 1:3 (1 cement: 3 coarse sand) finished with a floating coat of neat cement.20 mm cement plaster	675.07	Sqm		
74	12 mm cement plaster finished with a floating coat of neat cement of mix : 1:3 (1 cement: 3 fine sand)	33.17	Sqm		

75	Providing and applying white cement based putty of average thickness 1 mm, of approved brand and manufacturer, over the plastered wall surface to prepare the surface even and smooth complete.	0.00	sqm		
76	Distempering with oil bound washable distemper of approved brand and manufacture to give an even shade :New work (two or more coats) over and including water tinnable priming coat with cement primer	1244.03	sqm		
77	Finishing walls with Premium Acrylic Smooth exterior paint with Silicone additives of required shade : New work (Two or more coats applied @ 1.43 ltr/ 10 sqm over and including priming coat of exterior primer applied @ 2.20 kg/ 10 sqm)	2225.82	sqm		
78	Finishing with Deluxe Multi surface paint system for interiors and exteriors using Primer as per manufacturers specifications : Painting wood work with Deluxe Multi Surface Paint of required shade. Two or more coat applied @ 0.90 ltr/10 sqm over an under coat of primer applied @0.75 ltr/ 10 sqm of approved brand and manufacture	31.75	sqm		
79	Finishing with Deluxe Multi surface paint system for interiors and exteriors using Primer as per manufacturers specifications : Painting Steel work with Deluxe Multi Surface Paint to give an even shade. Two or more coat applied @ 0.90 ltr/ 10 sqm over an under coat of primer applied @ 0.80 ltr/ 10 sqm of approved brand and manufacture	532.59	sqm		
	Water Proofing				
80	Grading roof for water proofing treatment with Cement mortar 1:3 (1 cement : 3 coarse sand)	50.36	Cum		

81	<p>Providing and laying integral cement based water proofing treatment including preparation of surface as required for treatment of roofs, balconies, terraces etc consisting of following operations: (a) Applying a slurry coat of neat cement using 2.75 kg/sqm. of cement admixed with water proofing compound conforming to IS. 2645 and approved by Engineer-in-charge over the RCC slab including adjoining walls upto 300mm height including cleaning the surface before treatment.</p>	61.24	Sqm		
a	<p>b) Laying brick bats with mortar using broken bricks/brick bats 25 mm to 115mm size with 50% of cement mortar 1:5 (1 cement : 5 coarse sand) admixed with water proofing compound conforming to IS : 2645 and approved by Engineer-in-charge over 20 mm thick layer of cement mortar of mix 1:5 (1 cement :5 coarse sand) admixed with water proofing compound conforming to IS : 2645 and approved by Engineer-in-charge to required slope and treating similarly the adjoining walls upto 300 mm height including rounding of junctions of walls and slabs . (c) After two days of proper curing applying a second coat of cement slurry</p>				

b	<p>using 2.75kg/ sqm of cement admixed with water proofing compound conforming to IS : 2645 and approved by Engineer-in-charge. (d) Finishing the surface with 20 mm thick jointless cement mortar of mix 1:4 (1 cement :4 coarse sand) admixed with water proofing compound conforming to IS : 2645 and approved by Engineer-in-charge including laying glass fibre cloth of approved quality in top layer of plaster and finally finishing the surface with trowel with neat cement slurry and making pattern of 300x300 mm square 3mm deep. (e) The whole terrace so finished shall be flooded with water for a minimum period of two weeks for curing and for final test. All above operations to be done in order and as directed and specified by the Engineer-in-Charge : With average thickness of 120mm and minimum thickness at khurra as 65 mm</p>				
82	<p>Cleaning And Preparation The Surface And Repairing Of All Construction Joint P.P.M.(Polymer Modify Mortar With Polydiee S.G. Injection Grouting Mixed With Cement Slury ,Water ,Poly Plaste H.W.(I.S 9103-1999), (Polydee F.S.P.) (Polydee S.G.) WATER PROOFING COATING One Coat Of Poyldee S.G. 2 Component Co-Polymer Flexible Coating Liquid And Powder And Coated And Two Coat Polydee Tank 2 Component Black Colour Hi Gloss Superior Coasting Anti Bacterial Polymer Coating Food Grade One Coat Of Poyldee S.G. 2 Component Co-Polymer Flexible Coating Liquid And Powder And Two Coat Polydee -11 2 Component Grey Colour Hi Gloss Superior Coating Gives Glossing Surface Easy To Clean .Does Not Support Bacterial Growth In Potable Water Anti Corrosion Properties ,Sustains Harsh Disinfecting Chemicals</p>	0.00	Sqm		

	(Transport And Taxes Extra)				
83	Construction of embankment with approved material obtained from borrow pits (including cost of compensation for earth taken from private land) with a lift upto 1.5 m, transporting to site, spreading, grading to required slope and compacting to meet requirement of Tables 300.1 and 300.2 as per Technical Specification Clause 301.5	8.00	Cum		
84	Water Bound Macadam with Crushable Screenings WBM Grading 1 Providing, laying, spreading and compacting stone aggregates of specific sizes to water bound macadam specification including spreading in uniform thickness, hand packing, rolling with three wheel 80-100 kN static roller in stages to proper grade and camber, applying and brooming, crushable screening to fill-up the interstices of coarse aggregate, watering and compacting to the required density Grading 1 as per Technical Specification Clause 405.	8.00	Cum		
85	Concrete with cement, coarse sand and 40 mm gauge stone ballast in proportion 1:4:8 in foundations and floors including supply of all material, labour and T&P etc. required for proper completion of the work.(Based on PWD specifications)	6.00	Cum		
86	Interlocking Concrete Block Pavement Providing and Laying of Interlocking Concrete Block Pavements having thickness 80 mm as per drawings and Technical Specification Clause 1504.	40.00	Sqm		
	Water supply				
87	Providing and fixing G.I. pipes complete with G.I. fittings and clamps, including cutting and making good the walls etc. linternal work - Exposed on wall 20 mm dia nominal bore				
a	15 mm dia nominal bore	7.00	Rmt		

b	20 mm dia nominal bore	170.00	Rmt		
88	Providing and fixing G.I. pipes complete with G.I. fittings including trenching and refilling etc. (external work)(25mm dia nominal bore)	220.00	Rmt		
89	Providing and fixing G.I. pipes complete with G.I. fittings including trenching and refilling etc. External work	0.00	Rmt		
90	Providing and fixing ball valve (brass) of approved quality, 25mm dia nominal bore	8.00	Nos		
91	Providing and fixing gun metal non-return valve of approved quality (screwed end) 25 mm nominal bore (Horizontal)	2.00	Nos		
92	Providing and fixing C.P. brass bib cock of approved quality 15 mm nominal bore 15 mm nominal bore.	6.00	Nos		
93	Providing and fixing C.P. brass long body bib cock of approved quality conforming to IS standards and weighing not less than 690 gms. 15 mm nominal bore	2.00	Nos		
94	Providing and fixing C.P. brass stop cock (concealed) of standard design and of approved quality .15 mm nominal bore 15 mm nominal bore.	6.00	Nos		
95	Providing and fixing uplasticised PVC connection pipe with brass unions 30 cm length 15 mm nominal bore	8.00	Nos		
96	Providing and fixing gun metal non-return valve of approved quality (screwed end) 25 mm nominal bore (Horizontal)	1.00	Nos		
97	Providing and placing on terrace (at all floor levels) polyethylene water storage tank, ISI : 12701 marked, with cover and suitable locking arrangement and making necessary holes for inlet, outlet and overflow pipes but without fittings and the base support for tank.	2000.00	Ltr		
	SANITARY & DRAINAGE WORK				

98	Providing and fixing white vitreous china pedestal type water closet (Indian type W.C. pan) with seat and lid, 10 litre low level white P.V.C. flushing cistern, including flush pipe, with manually controlled device (handle lever), conforming to IS : 7231, with all fittings and fixtures complete, including cutting and making good the walls and floors wherever required : W.C. pan with ISI marked white solid plastic seat and lid	2.00	Nos		
99	Providing and fixing white vitreous china pedestal type water closet (European type W.C. pan) with seat and lid, 10 litre low level white P.V.C. flushing cistern, including flush pipe, with manually controlled device (handle lever), conforming to IS : 7231, with all fittings and fixtures complete, including cutting and making good the walls and floors wherever required :	0.00	Nos		
100	Providing and fixing wash basin with C.I. brackets, 15 mm C.P. brass pillar taps, 32 mm C.P. brass waste of standard pattern, including paintingM of fittings and brackets, cutting and making good the walls wherever require:White Vitreous China Wash basin size 630x450 mm with a pair of 15 mm C.P. brass pillar taps	2.00	Nos		
101	Providing and fixing white vitreous china pedestal for wash basin completely recessed at the back for the reception of pipes and fittings.	0.00	Nos		
102	Providing and fixing mirror of superior glass (of approved quality) and of required shape and size with plastic moulded frame of approved make and shade with 6 mm thick hard board backing :Rectangular shape 1500x450 mm				
a	Rectangular shape 1500x450 mm	2.00	Nos		

103	Providing and fixing 600x120x5 mm glass shelf with edges round off, supported on anodised aluminium angle frame with C.P. brass brackets and guard rail complete fixed with 40 mm long screws, rawl plugs etc., complete.	0.00	Nos		
104	Providing and fixing toilet paper holder C.P. brass	0.00	Nos		
105	Providing and fixing soil, waste and vent pipes :				
(a)	100 mm dia.	12.00	Nos		
(b)	75 mm dia	10.00	Nos		
106	Providing and fixing M.S. holder-bat clamps of approved design to Sand Cast iron/cast iron (spun) pipe embedded in and including cement concrete blocks 10x10x10 cm of 1:2:4 mix (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size), including cost of cutting holes and making good the walls etc. :				
(a)	100 mm dia.	4.00	Nos		
(b)	75 mm	4.00	Nos		
107	Providing and fixing bend of required degree with access door, insertion rubber washer 3 mm thick, bolts and nuts complete.				
(a)	100 mm dia.	4.00	Nos		
(b)	75 mm dia	2.00	Nos		
108	Providing and fixing 100 mm sand cast iron S&S plain bend of required degree.				
(a)	100 mm dia.	5.00	Nos		
(b)	75 mm dia	4.00	Nos		
109	Providing and fixing 100 mm sand cast iron S&S heel rest sanitary bend of required degree.				
(a)	100 mm SCI S&S heel rest sanitary bend	4.00	Nos		
(b)	75 mm dia	4.00	Nos		
110	Providing and fixing single equal plain junction of required degree with access door, insertion rubber washer 3 mm thick, bolts and nuts complete.				
a	100x100x100 mm	0.00	Nos		
b	75x75x75mm	0.00	Nos		

111	Providing and fixing 100 mm sand cast iron s&s terminal guard				
(a)	100mm	2.00	Nos		
112	Providing and fixing 100 mm sand cast iron S&S collar S.C.I S&S pipe as per IS:1729				
(a)	100mm	6.00	Nos		
(b)	75mm	5.00	Nos		
113	Providing and fixing 100 mm M.S stays and clamps for sand cast iron /centrifugally cast (squn) iron pipes of diameter:				
(a)	100 mm dia.	2.00	Nos		
114	Providing and fixing trap of self cleansing design with screwed down or hinged grating with or without vent arm complete, including cost of cutting and making good the walls and floors:				
(a)	100 mm inlet and 75 mm outlet SCI tarp	4.00	Nos		
	DRAINAGE				
115	Excavating trenches of required width for pipes, cables, etc including excavation for sockets, and dressing of sides, ramming of bottoms, depth upto 1.5 m, including getting out the excavated soil, and then returning the soil as required, in layers not exceeding 20 cm in depth, including consolidating each deposited layer by ramming, watering, etc. and disposing of surplus excavated soil as directed, within a lead of 50 m :	113.00	Rmt		
116	Providing, laying and jointing glazed stoneware pipes grade 'A' with stiff mixture				
a	150 mm diameter	15.00	Rmt		
117	Providing and laying cement concrete 1:5:10 (1 cement : 5 coarse sand : 10 graded	15.00	Rmt		
118	Providing and fixing square-mouth S.W. gully trap grade 'A' complete with C.I.				
a	With F.P.S Brick class designation 75	3.00	Rmt		

119	Constructing brick masonry manhole in cement mortar 1:4 (1 cement : 4 coarse sand) with R.C.C. top slab with 1:2:4 mix (1 cement : 2 coarse, sand : 4 graded stone aggregate 20 mm nominal size), foundation concrete 1:4:8 mix (1 cement : 4 coarse sand : 8 graded stone aggregate 40 mm nominal size), inside plastering 12 mm thick with cement mortar 1:3 (1 cement : 3 coarse sand) finished with floating coat of neat cement and making channels in cement concrete 1:2:4 (1 cement : 2 coarse sand : graded stone aggregate 20 mm nominal size) finished with a floating coat of neat cement complete as per standard design :				
	Inside size 90x80 cm and 45 cm deep including C.I. cover with frame (light duty) 455x610 mm internal dimensions, total weight of cover and frame to be not less than 38 kg (weight of cover 23 kg and weight of frame 15 kg) :	5.00	Nos		
120	Extra depth for manholes				
	Size 90x80 cm				
	With F.P.S brick class designation 75	1.50	Rmt		
121	Providing and fixing in position pre-cast R.C.C. manhole cover and frame of required shape and approved quality 19.19.1 L D- 2.5 Rectangular shape 600x450 mm internal dimensions	2.00	Nos		
122	Supplying and fixing C.I. cover 300x300 mm without frame for gully trap (standard pattern) the weight of cover to be not less than 4.5 kg	0.00	Nos		
123	Making soak pit 2.5 m diameter 3.0 metre deep with 45 x 45 cm dry brick honey comb shaft with bricks and S.W. drain pipe 100 mm diameter, 1.8 m long complete as per standard design. With common burnt clay F.P.S. (non modular) bricks of class designation 7.5	1.00	Nos		

124	Constructing masonry chamber 30x30x50 cm, inside with 75 class designation brick work in cement mortar 1:4 (1cement :4 coarse sand) with C.c 1:2:4 floor over C.C 1:5:10 Finished with a floating coat of neat cement complete .	0.00	Nos		
a	With F.P.S. bricks				
	TRUSS (STEEL WORK)				
125	Structrural steel work riveted, bolted or welded in built up sections, trusses and framed work, including cutting, hoisting fixing in position and applying a priming coat of approved steel primer all complete.	0.00	Kg		
126	Structural steel works in single section fixed with or without connecting plate including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete (wind ties-40x6 mm@1.89 kg/mt.)	47.10	Kg		
127	Providing ridges or hips of width 60 cm over all width plain G.S sheet fixed with polymer coated J. or L hooks, bolts and nuts 8mm dia. G.I limpet and bitumen washers complete. 0.80 mm thick with zinc coating not less than 275gm/sqm.	0.00	Rmt		
128	Supply & installation of precoated galvanised iron profile sheets (size, shape and pitch of corrugation as approved by Engineer-in-charge) 0.50 mm +/- 5% total coated thickness (TCT) thick Zinc coating 120gsm as per IS: 277 in 240mpa steel grade, 5-7 microns epoxy primer on both side of the sheet and polyester top coat 15-18 microns. Sheet should have protective guard film of 25 microns minimum to avoid scratches while transportation and should be supplied in single length upto 12 metre or as desired by Engineer-in-charge. The sheet shall be fixed using self drilling /self tapping	0.00	sqm.		

	screws of size (5.5x 55mm) with EPDM seal or with polymer coated J or L hooks, bolts and nuts 8mm diameter with bitumen and G.I. limpet washers or with G.I. limpet washers filled with white lead complete upto any pitch in horizontal/ vertical or curved surfaces excluding the cost of purlins, rafters and trusses and including cutting to size and shape wherever required.				
129	Painting on G.S. sheet with synthetic enamel paint of approved brand and manufacture of required colour to give an even shade : New work (two or more coats) including a coat of approved steel primer but excluding a coat of mordant solution	0.00	sqm.		
130	Providing and fixing pre-coated galvanised steel sheet roofing accessories 0.50 mm (+ 0.05 %) total coated thickness, Zinc coating 120 grams per sqm as per IS: 277, in 240 mpa steel grade, 5-7 microns epoxy primer on both side of the sheet and polyester top coat 15-18 microns using self drilling/ self tapping screws complete : Gutter .(600 mm over all girth)	0.00	Rm		
131	Painting with synthetic enamel paint of approved brand and manufacture of required colour to give an even shade Two or more coats on new work over an under coat of suitable shade with ordinary paint of approved brand and manufacture	0.00	sqm.		

- Note : The Work to be carried out at all the heights. The individual rates shall be inclusive of all lifts, lead and handling of materials, necessary scaffolding and staging.

2. Rates shall be inclusive of the slopes to be provided in all the above flooring items as directed and as per the drawings.

INTERNAL & EXTERNAL ELECTRIFICATION WORK

Sl.No.	Description	Quantity	Unit	Rate	Amount
	SUB HEAD - I SCHEDULED ITEMS				
	WIRING				
1	WGSTLPT Point wiring in PVC conduit, with piano type switch.				
	Wiring for light point/fan point/exhaust fan point/call bell point with 1.5 sqmm. FR PVC insulated copper conductor single core cable in surface/recessed PVC conduit, with piano type switch, phenolic, laminated sheet, suitable size MS Box and earthing the point with 1.5 sq.mm FR PVC insulated copper conductor single core cable etc as required.				
	Group C	27.00	Point		
2	WGSTLSB Circuit/ submain wiring in PVC conduit:				
	Wiring fir curcuit/ submain wiring alongwith earth wire the following sizes of FR PVC insulated copper conductor, single core cable in surface/				

	recessed steel conduit as required.				
(a)	2x1.5 sq. mm + 1 x 1.5 sq.mm earth wire	55.00	Metre		
(b)	2x2.5 sq. mm + 2x1.5 sq.mm earth wire @30m/Ckt.)	90.00	Mtr.		
3	PVCCON S/F PVC conduit:	0.00			
	Supplying and fixing of following sizes of medium class PVC conduit along with accessories in surface/recess including cutting the wall and making good the same in case of recessed conduit as required.	0.00			
	20mm	70.00	Mtr.		
4	PTSWEB S/F piano type switch/ socket:	0.00			
	Supplying and fixing following piano type switch/ socket on the existing switch box/ cover including connections etc. as required.	0.00			
(a)	5/6 amps switch	13.00	Each		
(b)	3 pin 5/6 amp socket outlet	13.00	Each		
5	LPACCPT S/F light plug point piano type accessories:	0.00			
	Supplying and fixing metal box of 150mm X 75mm X 60mm deep (nominal size) on surface or in recess with suitable size of phenolic laminated sheet cover in front including providing and fixing 3 pin 5/6 amps socket outlet and 5/6 amps piano type switch, connection, painting etc. as re	13.00	Each		
6	MCBC S/F 'C' series, SP MCB	0.00			
	Supplying and fixing brass batten/angle holder including connection etc. as required	9.00	Nos		
7	ITCFFSUR ITC fluorescent fitting directly on surface:	0.00			

	Installation, testing and commissioning of pre-wired, fluorescent fitting / compact fluorescent fitting of all types, complete with all accessories and tube etc. directly on ceiling/ wall, including connection with 1.5 sq. mm FRLS PVC insulated, copper conductor, single core cable and earthing etc. as required.	6.00	Each		
8	MCBC S/F 'C' series, SP MCB	0.00			
	Supplying and fixing 5 amps to 32 amps rating, 240 volts, 'C' series, miniature circuit breaker suitable for inductive load of following poles in the existing MCB DB complete with connections, testing and commissioning etc. as required.	0.00			
	Single pole	6.00	Each		
	EARTHING	0.00			
9	EARGIPL G.I earth plate electrode:	0.00			
	Earthing with G.I. earth plate 600 mm X 600 mm X 6 mm thick including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe of 2.7 metre long etc. (but without charcoal/ coke and salt) as required.	3.00	Set		
10	EARCOKPL Salt/ coke for plate earth electrode:	0.00			
	Extra for using salt and coke for G.I or copper plate earth electrode as required.	3.00	Each		
11	EARG125X6 S/L 25 mm x 6 mm G.I. earth strip in ground:	0.00			
	Supplying and laying 25 mm x 6 mm G.I. strip at 0.50 metre below ground as strip earth electrode, including soldering etc. as required.	19.00	Mtr.		
12	ITCEF450 ITC exhaust fan upto 450 mm sweep:	0.00			

	Installation of exhaust fan upto 450 mm sweep in the existing opening, including making the hole to suit the size of the above fan, making good the damage, connection, testing, commissioning etc. as required.	2.00	Each		
13	LOUSHEF Fixing louvers/shutters for exhaust fan:	0.00			
	Extra for fixing louvers/shutters complete with frame for a exhaust fan of all sizes.	2.00	Each		
		0.00			
	TOTAL OF SUB HEAD - I	0.00			
		0.00			
	SUB HEAD - II (NON SCHEDULED/EXTRA ITEMS)	0.00			
14	Supply and fixing of LED Tube Light -Wall mounted LED batten , extruded aluminium Heat sink provided for efficient heat dissipation & integrated electronic driver. (1X18W LED)complete in all aspects as per direction of Engineer in Charge	4.00	Nos		
15	Supply and fixing of Flourocet Tube Light -Powder coated Batten Type luminaire with electronic ballast (suitable for home & office application) 230 V, 50 Hz. Supply including lamp (1X 36 Watt 78) , general spread.of standard make (Havell's / Bajaj) complete in all aspects as per direction of Engineer in Charge	2.00	Nos		
16	Supply and fixing of halozen light (150 Watt) ,of standard make (Havell's / Bajaj) complete in all aspects as per direction of Engineer in Charge	6.00	Nos		
17	Supply and fixing of CFL lamp 15 w , 230/250 Volts, 50 Hz etc. complete . required.	9.00	Each		
18	Supply of AC 230/250 volts, 50 HZ exhaust fans including providing nuts, bolts, mounting frame and other accessories etc. complete Model- Ventil Air - DS	0.00			

	(Make : Bajaj /Compton / Havells)	0.00			
	300 mm sweep 900 rpm	2.00	Nos		
19	CEILING FAN	0.00			
	Supply of AC 230/250 volts, 50 HZ energy efficient ceiling fan with standard down rod, blades, 2 nos. caps etc. complete	0.00			
	(Make : Bajaj /Compton / Havells)	0.00			
	900 mm sweep	2.00	Nos		
		0.00			
	EARTHING	0.00			
20	EARGIPL G.I earth plate elctrode:	0.00			
	Earthing with G.I. earth plate 600 mm X 600 mm X 6 mm thick including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe of 2.7 metre long etc. (but without charcoal/ coke and salt) as required.	4.00	Set		
21	EARCOKPL Salt/ coke for plate earth eletorde:	0.00			
	Extra for using salt and coke for G.I or copper plate earth electrode as required.	4.00	Each		
22	EARG125X6 S/L 25 mm x 6 mm G.I. earth strip in ground:	0.00			
	Supplying and laying 25 mm x 6 mm G.I. strip at 0.50 metre below ground as strip earth electrode, including soldering etc. as required.	40.00	Mtr.		
23	SUB HEAD - II (NON SCHEDULED / EXTRA ITEMS)	0.00			
	LT XLPE CABLES	0.00			
	Supply,of following sizes of PVC sheathed LT XLPE armoured, aluminium 1.1KV grade, as required of the following sizes.	0.00			
	3.5c x 95 sq. mm cable	100.00	Rmt.		
	3.5c x 50 sq. mm cable	100.00	Rmt.		
24	Supply &Installation of Decorative pole 3.5 Mtr. long having following diamension, approved by Engineer in charge with making connection complete	5.00	Nos		

	in all respect.				
25	Supply & fixing of LED Street light luminaire(1x70W) single piece die cast aluminium housing with pot optics & flat toughned glass on IP-66, including Housing , Ballast , Lamps, Connecting Wire etc. of standard make (Havell's / Bajaj) complete in all aspects as per direction of Engineer in Charge.	5.00	Nos		

Note:

1. "PVC" to be considered as per the same specification of "uPVC" for all PVC pipes and specials mentioned under items of the Schedule of Quantity.
2. "Dia." or "Diameter" refers to Nominal bore size of the pipes and specials mentioned under items of Schedule of Quantity.
3. Scaffolding, staging at all required levels, lift, lead, transportation, loading, unloading, all wastages, rolling margins, works at all the heights and levels etc. are inclusive for all the items required to be executed under the Schedule of Quantities of this contract even if not mentioned in an item.
4. Plinth level of the buildings shall be finished floor level of the Ground Floor.

5. Item for which no rate or price has been entered in will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities.
6. Unit rates and prices shall be quoted by the bidder in Indian Rupees.
7. Where there is a discrepancy between the rate in figures and words, the rates in words will govern.
8. Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by quantity, the unit rate quoted shall govern.
9. Any make or brand of the material or methodology if specified in the SOQ/BOQ above for all the item of (A), (B), (C), (D) and (E) would also allow for or equivalent makes and brand if all specifications and durability is proved by the bidder supported with all tests, certificate, guarantees, performance of the work already done at other places, samples and other inspections if required by Project Manager.

TRADEWISE SUMMARY SHEET		
TRADE CODE	SECTION	TOTAL IN (RS)
1.0	EARTHWORK	
2.0	CONCRETE	
3.0	MASONRY WORK	
4.0	WOOD & ALUMINIUM WORKS	
5.0	FINISHING WORK	
6.0	FLOORING WORK	
7.0	STEEL WORK	
8.0	ROOFING	
9.0	MISCELLANEOUS WORKS	
10.0	ROAD WORK	
11.0	WATER SUPPLY WORK	
12.0	SANITARY WORK	
	INTERNAL ELECTRIFICATION WORK	
TOTAL PRICE		
DISCOUNT @ _____ %		
NET TOTAL PRICE		

NET TOTAL PRICE IN WORD _____

Signature & Seal of Bidder

Section XI. Security Forms

Samples of acceptable forms of Bid, Performance, and Advance Payment Securities are provided in this Section XI. Bidders shall not complete the Performance and Advance Payment Security forms at this stage of the procurement process. Only the successful Bidder shall be required to provide these two securities.

Forms of Securities

Acceptable forms of securities are annexed. Bidders should not complete the Performance and Advance Payment Security forms at the time. Only the successful Bidder will be required to provide Performance and Advance Payment Securities in accordance with one of the forms, or in a similar form acceptable to the Employer.

Annex A :	Bid Security (Bank Guarantee)
Annex B :	Performance Bank Guarantee
Annex B1 :	Performance Bank Guarantee for unbalanced items
Annex C :	Bank Guarantee for Advance Payment

Form of Bid Security (Bank Guarantee)-Annexure A

WHEREAS, _____ [name of Bidder] (hereinafter called “the Bidder”) has submitted his Bid dated _____ [date] for the construction of _____ [name of Contract] (hereinafter called “the Bid”).

KNOW ALL PEOPLE by these presents that We _____ [name of bank] of _____ [name of country] having our registered office at _____ (hereinafter called “the Bank”) are bound unto _____ [name of Employer] (hereinafter called “the Employer”) in the sum of _____²⁴ for which payment well and truly to be made to the said Employer the Bank binds itself, his successors and assigns by these presents.

SEALED with the Common Seal of the said Bank this _____ day of _____ 19____.

THE CONDITIONS of this obligation are:

- (1) If after bid opening the Bidder withdraws his bid during the period of Bid validity specified in the Form of Bid;
- Or
- (2) If the Bidder having been notified of the acceptance of his bid by the Employer during the period of Bid validity:
 - (a) fails or refuses to execute the Form of Agreement in accordance with the Instructions of Bidders, if required; or
 - (b) fails or refuses to furnish the Performance Security, in accordance with the Instruction to bidders; or
 - (c) does not accept the correction of the Bid Price pursuant to Clause 28.

We undertake to pay to the Employer up to the above amount upon receipt of his first written demand, without the Employer having to substantiate his demand, provided that in his demand the Employer will note that the amount claimed by him is due to him owing to the occurrence of one or any of the three conditions, specifying the occurred condition or conditions.

This Guarantee will remain in force up to and including the date _____²⁵ days after the deadline for submission of Bids as such deadline is stated in the Instructions to Bidders or as it may be extended by the Employer, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this guarantee should reach the Bank not later than the above date.

DATE _____ SIGNATURE OF THE BANK _____

WITNESS _____ SEAL _____

 [Signature, name and address]

²⁴ The Bidder should insert the amount of the guarantee in words and figures denominated in Indian Rupees. This figure should be the same as shown in Clause 16.1 of the Instructions of Bidders.

²⁵ 45 days after the end of the validity period of the Bid.

Performance Bank Guarantee ANNEXURE B

To: _____ [name of Employer]
 _____ [address of Employer]

WHEREAS _____ [name and address of Contractor] (hereinafter called "the Contractor") has undertaken, in pursuance of Contract No. _____ dated _____ to execute _____ [name of Contract and brief description of Works] (hereinafter called "the Contract");

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligations in accordance with the contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of _____ [amount of guarantee]²⁶ _____ [in words], such sum being payable in the types and proportions of currencies in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of _____ [amount of guarantee] as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the contract or of the Works to be performed thereunder or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until.....(i.e.) 28 days from the date of expiry of the Defects Liability Period.

Signature and seal of the guarantor _____
 Name of Bank _____
 Address _____
 Date _____

²⁶ An amount shall be inserted by the Guarantor, representing the percentage of the Contract Price specified in the Contract and denominated in Indian Rupees.

PERFORMANCE BANK GUARANTEE (for unbalanced items)-ANNEXURE B1

To: _____ [name of Employer]
 _____ [address of Employer]

WHEREAS _____ [name and address of Contract] (hereinafter called “the Contractor”) has undertaken, in pursuance of Contract No. _____ dated _____ to execute _____ [name of Contract and brief description of Works] (hereinafter called “the Contract”);

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligations in accordance with the contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of _____ [amount of guarantee]²⁷ _____ [in words], such sum being payable in the types and proportions of currencies in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of _____ [amount of guarantee] as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the contract or of the Works to be performed thereunder or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until.....(i.e.) 28 days from the date of issue of the certificate of completion of works.

Signature and seal of the guarantor _____
 Name of Bank _____
 Address _____
 Date _____

²⁷ An amount shall be inserted by the Guarantor, representing the percentage of the Contract Price specified in the Contract and denominated in Indian Rupees.

BANK GUARANTEE FOR ADVANCE PAYMENT-ANNEXURE C

To: _____ [*name of Employer*]
 _____ [*address of Employer*]
 _____ [*name of Contract*]

Gentlemen:

In accordance with the provisions of the Conditions of Contract, sub clause 51.1 (“Advance Payment”) of the above-mentioned Contract, _____ [*name and address of Contractor*] (hereinafter called “the Contractor”) shall deposit with _____ [*name of Employer*] a bank guarantee to guarantee his proper and faithful performance under the said Clause of the Contract in an amount of _____ [*amount of guarantee*]²⁸ _____ [*in words*].

We, the _____ [*bank or financial institution*], as instructed by the Contractor, agree unconditionally and irrevocably to guarantee as primary obligator and not as Surety merely, the payment to _____ [*name of Employer*] on his first demand without whatsoever right of objection on our part and without his first claim to the Contractor, in the amount not exceeding _____ [*amount of guarantee*] _____ [*in words*].

We further agree that no change or addition to or other modification of the terms of the Contract or of Works to be performed thereunder or of any of the Contract documents which may be made between _____ [*name of Employer*] and the Contractor, shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall remain valid and in full effect from the date of the advance payment under the Contract until _____ [*name of Employer*] receives full repayment of the same amount from the Contractor.

Yours truly,

Signature and seal of the guarantor _____
 Name of Bank/Financial Institution _____
 Address _____
 Date _____

²⁸ An amount shall be inserted by the bank representing the amount of the Advance Payment, and denominated in Indian Rupees.

Annexure – D

Indemnify Bond (For secured Advance against materials/equipment)

The contractor shall have to sign & give the undertaking given below for obtaining secured advance for material on site:

“Certified that the above material I/We have actually brought at the site and I/We have not previously received any advance on the same material. These materials are of imperishable nature and are actually required for use or work in connection with items for which rates for finished work have been agreed upon and agreement has been signed and executed. The above materials on which secured advance is applied are our own property and free from encumbrances of any kind and I/We will indemnify the Implementation of Bull Production Through Imported Embryos of HF & New Jersey Under NDP-1 Vikas Khand – Kalsi. Distt. Dehradun against all claims to any material in respect of which an advance has been made as aforesaid.

I/We shall made at my/our own cost all necessary and adequate arrangements for proper watch, safe custody and protection against all risks of the said materials and that until used in construction as per contract.

The said material shall remain at the site of the said work in the contractor’s custody and on his own responsibility and shall at all times be open to inspection by the Implementation of Bull Production Through Imported Embryos of HF & New Jersey Under NDP-1 Vikas Khand – Kalsi. Distt. Dehradun or any Officer authorised by them. In the event of the materials or any part thereof being stolen, destroyed or damaged or becoming deteriorated. I/We will forthwith replace same with other materials of like quality or repair and made good, the same as required by the Implementation of Bull Production Through Imported Embryos of HF & New Jersey Under NDP-1 Vikas Khand – Kalsi. Distt. Dehradun

It is hereby agreed and declared that notwithstanding anything in the contract agreement and without prejudice to the power contained therein if and whenever the convenient for payment and repayment herein before contained shall become enforceable and the money owing shall not be paid in accordance with the Implementation of Bull Production Through Imported Embryos of HF & New Jersey Under NDP-1 Vikas Khand – Kalsi. Distt. Dehradun may at any time thereafter adopt all or any of the following courses as they 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 Contractor in accordance with the provisions in that behalf contained in the said agreement debiting the Contractors with the actual cost of effecting such completion and the amount due in respect of advances under these presents and crediting the Contractor with the value of work done as if he had carried it out in accordance with the said agreement and the rates thereby provided. If the balance is against the Contractor he is to pay same to the Implementation of Bull Production Through Imported Embryos of HF & New Jersey Under NDP-1 Vikas Khand – Kalsi. Distt. Dehradun on demand.
- b) Remove and sell by public auction the seized materials or any part thereof and out of the money arising from the sale retain all the sums aforesaid repayable or

payable to the Implementation of Bull Production Through Imported Embryos of HF & New Jersey Under NDP-1 Vikas Khand – Kalsi. Distt. Dehradun, Under these present and pay over the Surplus (if any) to the Contractor.

- c) Deduct all or any part of the money owing out of the security deposit or any sum due to the Contractor under the said agreement.

Signature of the Contractor