TENDER DOCUMENT

Civil, Structural, Water supply, Sanitary, Road work and other miscellaneous works including Internal Electrification, Landscape for;

"Additional Infrastructure Buildings of Training Centre, Farmers Hostel, Canteen, Road work, Landscape works at Tugalakpur Village, Block Purkaji, Muzaffarnagar, Uttar Pradesh

IFB Reference No.: NDDBDS: RAH: PUR: LCB/CIVIL/2024-25/01

Issued By:
Rahuri Semen Station
(A Unit of NDDB Dairy Services)

CONTENTS

CHECKLIST TO BE SUBMITTED BY THE BIDDER ALONG WITH THEIR BID (*)

Sr. No.	Item	Submitted Yes/ No		Page No	Remarks if any
(*) Checklist is Mandatory to fill and attached with Bid.					
01	Earnest Money Deposit submitted (Bid security)				
02	Tender fee submitted, if the tender is downloaded from the website				
03	Following documents complying eligibility requirement submitted:				
	i) Certificate of incorporation of the firm (Company act/ Partnership etc.)				
	ii) Registration certificate of GSTIN, PAN, WCT, PF, ESI, Registration if any related to Labour.				
	iii) Profit & Loss Statement, Balance sheet for last 3 financial years including audit report				
	iv) Income tax return for the above three years				
	v) Certificate of completion of works from the client for works costing more than 80%, 50% & 40% of estimated value of contract				
	vi) Copy of work order for work done above 80%, 50% & 40% of estimated value of contract and TDS certificate (for work done for non govt. Organisation)				
04	Power of attorney submitted (If bid is signed by other than Director/MD				
05	Submitted form of bid				
06	Submitted original bidding document completed in all respect duly signed & sealed				
07	Forms given under schedule I to VIII of Section-VII have been filled and submitted				
08	Technical Deviation Appendix-III (Form of Bid) is to be filled and duly signed and submitted				
09	Bidding term Deviation Appendix-II (Form of Bid) is to be filled and duly signed and submitted				
10	Major similar nature of works successfully completed during the past five years as per format section VII, Schedule-IV. (PO, completion certificate with value of works executed, type of structure)				
11	Details of works in hand as per section VII-Schedule- VIII				

Sign. & Seal of the Bidder

SECTION – 0

INVITATION FOR BID

Rahuri Semen Station

(A Unit of NDDB Dairy Services)

Khadambe BK,Dalimb Phata, Post- MPKV, Rahuri, Taluka – Rahuri
District – Ahmednagar, Maharashtra (India) Pin code- 413722
Phone No. 02426-299001
Website: https://rahurisemenstation.com

INVITATION FOR BIDS (IFB)
LOCAL COMPETITIVE BIDDING (LCB)

IFB Reference No.: NDDBDS: RAH: PUR: LCB/CIVIL/2024-25/01

The Rahuri Semen Station having its Head Office at Rahuri, Maharashtra invites item rate bids from eligible bidders invites Offline bid from reputed eligible bidders for **Civil, Structural, Water supply, Sanitary, Road work and other miscellaneous works including Internal Electrification, Landscape for; "Additional Infrastructure Buildings of Training Centre, Farmers Hostel, Canteen, Road work, Landscape works at Tugalakpur Village, Block Purkaji, Muzaffarnagar, Uttar Pradesh** as per details given below:

Estimated cost	**Rs. 13,00,00,000.00** **(Rupees Thirteen Crore Only)**
Completion period	07 (Seven) Months (from the date of issuance of Purchase Order) for overall completion
Earnest Money Deposit (EMD)	**Rs. 13,00,000.00** **(Rupees Thirteen Lakh Only)**
Mode of Tender	**Manual Tendering. The bidders are required to purchase or Download the tender document from our Website and submit the same in person or through courier in hard prints form only.**

The intending bidders are required to submit their bid in person or through courier services at Rahuri Semen Station, Rahuri.

For further details or for downloading the bid documents, please visit web site https://rahurisemenstation.com or contact **Purchase, Rahuri Semen Station** (Email-purchase@nddbdairyservices.com) on any working day.

Issued by (Purchase),
Rahuri Semen Station
(A Unit of NDDB Dairy Services)

INVITATION FOR BID

IFB Reference No.: NDDBDS: RAH: PUR: LCB/CIVIL/2024-25/01

1.0 DESCRIPTION OF WORKS: Rahuri Semen Station (RSS) having its Head Office at Rahuri, Maharashtra invites item rate bids from eligible bidders for the construction & completion of the following works:

Civil, Structural, Water supply, Sanitary, Road work and other miscellaneous works including Internal Electrification, Landscape for; "Additional Infrastructure Buildings of Training Centre, Farmers Hostel, Canteen, Road work, Landscape works at Tugalakpur Village, Block Purkaji, Muzaffarnagar, Uttar Pradesh

ADDITIONAL INFORMATION: Interested eligible bidders may obtain further information from and inspect the bidding documents at the office of the RSS at the address given below or visit our Website given below:

RAHURI SEMEN STATION
(A UNIT OF NDDB DAIRY SERVICES)
Khadambe BK,Dalimb Phata,
Post- MPKV, Rahuri, Taluka – Rahuri
District – Ahmednagar
Maharashtra (India) Pin code- 413722
Phone No. 02426-299001
Website: https://rahurisemenstation.com
Email:Purchase@nddbdairyservices.com

2.0 REQUEST FOR BIDDING DOCUMENT:

A complete set of bidding documents may be Obtained by any interested eligible bidder on the submission of a written application in duplicate, to the RSS Bidders who wish to download the complete bidding document, can do so it from RSS website, free of charge & submit the same (without any alternation /modifications) along with their bid and a demand draft in favour of Rahuri Semen Station payable at Rahuri for value equal to price of bidding document as specified at clause No. 5(b) below.

(a) The bid documents will be available **Rahuri Semen Station (A Unit of NDDB Dairy Services)** Khadambe BK,Dalimb Phata, Post- MPKV, Rahuri, Taluka – Rahuri District –Ahmednagar, Maharashtra (India) Pin code- 413722

(b) It is hereby brought to the notice of all bidders that if any change/additions/ deletions/alterations are found to be made by them in the tender and the same is subsequently noticed at any stage, even after award of the contract, the bidders are liable for all consequences thereof and RSS shall be free to take suitable action as deemed necessary.

3.0 Minimum Eligibility Criteria: For the purpose of bidding, the bidder shall meet the following minimum qualifying criteria:

a) The Bidder, in the same name and style, should be in business at least for **five years** at time of bid opening. In case of change of name of bidder by merger / acquisition / change in status, the bidder may be eligible based on the documentary evidence.

b) The Bidder should have valid registration under various Acts that may be applicable for the contract proposed. This shall include but not limited to Income Tax, Companies Act, GST, the Building & other construction workers' welfare cess act, Employee State Insurance, Contract Labour, Provident fund etc.

c) The Bidder's financial turnover in the same name and style during each of the **last three financial year (2021-22; 2022-23; 2023-24)** ending 31st March should **not be less than 60% of the estimated cost indicated in IFB.**

d) The bidder should have positive net worth in **last two financial years.**

e) The bidder should have **cash profit** in any two financial years out of the last five financial years.

f) The Bidder in the same name & style shall have successfully executed /completed contract of **Similar nature of work**** during

the last five years ending last day of the month previous to the month in which bid is opened, as per the following:-

I. **One contract/work of similar nature costing not less than 80% of estimated cost.**

OR

II. **Two contracts/works of similar nature each costing not less than 50% of estimated cost.**

OR

III. **Three contracts/works of similar nature each costing not less than 40% of estimated cost**.

** **Similar nature of work means;** Reinforced Cement Concrete (RCC)/Road work/Bridge Work framework buildings having similar finishes including or excluding internal electrification works of Institutional / Hospital / Hostel / Residential / Commercial / Offices / Semen Station/ Animal Farm/Industrial Buildings.

Notes :

a) The contract means the work done against one work order on a single location.

b) Cost of contracts/works shall be considered for evaluation as per the clause 3(f) above excluding the cost/recovery of materials supplied by the purchaser.

Bidder shall submit the following details to support their claim for meeting the minimum eligibility requirement -

1. Name / Names of project to be considered for meeting minimum eligibility criteria
2. Nature of each project / work completed.
3. Value of work of each project / work completed.
4. Location of execution of each project/work completed. The copy of purchase order/work order, completion certificate and abstract sheet of final bill/invoice showing the cumulative value of work done should be submitted in order to support aforesaid details.

In case, the final bill/invoice, does not contain cumulative value of work done, copy of all the bills/invoices submitted prior to the final bill should be attached.

Note:
For evaluation and comparison of bids, the purchaser may, at its discretion, ask the bidder for clarification on the bid. The shortfall information / documents shall be sought only in case of historical documents which pre-exist at the time of tender opening and which have not under gone change since then.

So far as the submission of the documents is connected with regard to qualification criteria, after submission of the tender, only related shortfall documents shall be asked for the considered. For example, if the bidder has submitted a supply order without its completion / performance certificate, the certificate can be asked for and considered. However, no new supply order shall be asked for and considered so as to qualify the bidder.

g) In addition to the above, the following information/documents should also be submitted along with the bid by the bidders for evaluation/determination of their eligibility:

I. Copy of Income Tax Returns and audited balance sheet for **three** previous years in original or certified true copies, along with Permanent Account Number (PAN) for income tax purpose.

II. Copy of TDS certificate issued by the clients to substantiate the claim for the value of works executed in the private sector.

III. **Copy of Form 26 AS for the last 3 financial Years**

h) Even though the bidder meets the specified criteria, it may be disqualified if it has:

I. Made untrue or false declaration in the forms, statements and attachments submitted in proof of their qualification and / or

II. Record of poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completion or financial failure etc.

III. If the bidder is overbooked beyond his capacity to execute the work as per required schedules, the bidding capacity of the bidder will be worked out by following methodology. **The available bid capacity of the bidder shall be worked out on the basis of total completion time and total estimated cost (i.e. 100% of total estimated cost indicated in IFB).**

Assessed Available bid capacity = (A*N*1.5 - B)

Where,
A= Maximum turnover achieved in any one year during the last three years.
N = Number of years (number of months/12) prescribed for the completion of works for which bids are invited as specified in Invitation for bid (IFB).
B= Value of on-going works to be completed during the period of completion of the works for which bids are invited.

As a part of **Technical Bid** (part-I) the bidder shall also submit the following documents & credentials.

1. **The manpower deployment plan of bidder and the organisation chart.**

   However, the bidder shall deploy the following mandatory and minimum key manpower at project site;

   Project Manager: - **1** no. (BE/DCE- civil with minimum 8 years of experience).

   A. Supervisory Manpower Team.

   - Sr. Engineers:- **2** nos (BE – civil with minimum 4 years of experience)
   - Jr. engineers:- **3** nos (BE or DCE with minimum 4 years of experience) for billing and supervision.
   - Site supervisors:-**4** nos (Mix of DCE, ITI/diploma, Degree holders with 2 to 3 years of experience and Other suitable supervisors having more than 5 years of site experience in the civil engineering field). one supervisors will be exclusively for supervision of curing.
   - Electrical Engineer:- **1** no (BE/DCE- Electrical with minimum 5/8 years of experience)

   B. Safety Team (EHS)

   - Safety (EHS) Engineer and Assistant.

   C. Project Planning, Tracking & Billing Team (Exclusively assisting to Purchaser's/Owner's Engineer:-

- Billing cum planning cum data entry engineer: **1** no. (BE civil with minimum 5 years of experience) – including tracking of project activities, schedule, MIS reports, quantity survey, tracking of QAQC tests and processes on continuous basis including documentation and frequency reconciliation updation etc (experience of at least 5 years).
- Quality control engineer: **1** nos. - (BE civil with 5 years of experience or DCE with 7 years of experience).
- Assistant quality engineer: **1** no. - (DCE with 3 years of experience)

This above engineering staff/team shall assist in day to day various data handling, tracking of progress & schedule timelines, QAQC processes cum documentations, billing and bill data punching and so forth exclusively to the Engineer of Rahuri Semen Station.

2. **Technical capability of the firm including the equipment owned by them. They should deploy minimum one no. fully automated concrete batching plant with printing facility and accessories, Poclain, Excavator with Hydraulic Chisel/ Breaker arrangement & Back hoe, good quality new shuttering materials and other equipment and machineries as per project requirements and fully furnished QC laboratory for regular testing of materials at project site as per QAP.**

3. **QAP plan with method statement & schedule in MS Project.**

5.0 BID DETAILS: Detailed terms and conditions as well as the technical specifications for all the items of works as indicated in the invitation for bid are contained in one bidding document.

(a)	Bid reference	**NDDBDS: RAH: PUR: LCB/CIVIL/2024-25/01**
~~(b)~~	~~Price of bidding document (inclusive of GST)~~	~~: Nil~~
~~(c)~~	~~Incidental charges (in land) in case documents are to be sent by courier/post~~	~~: Nil~~
(d)	Event Start Date	: 11.11.2024
(e)	Event Close Date & time	: 02.12.2024 at 14:00 hrs.
(f)	Last Date and time for bid submission	: 02.12.2024 at 14:00 hrs.
(g)	Time and date of opening of bids Part I – Technical bid Part II – Price bid	**: 02.12.2024 at 14:30 hrs.** **:** Shall be communicated later to all eligible bidders
(h)	Place of opening of bids	: Rahuri Semen Station, Rahuri
(i)	Address for communication	**Purchase,Rahuri Semen Station** **(A Unit of NDDB Dairy Services)** Khadambe BK,Dalimb Phata, Post- MPKV, Rahuri, Taluka – Rahuri District – Ahmednagar Maharashtra (India) Pin code- 413722 Phone No. 02426-299001 Website: https://rahurisemenstation.com Email:Purchase@nddbdairyservices.com
(j)	Estimated Cost of works	: Rs 13,00,00,000.00 (Rupees Thirteen Crore only)

(k)	Time of completion	: 07 (Seven) Months for overall completion (from the date of issuance of Purchase Order)
(l)	Amount of Bid Security	: Rs 13,00,000.00 (Rupees Thirteen Lakh only)
(m)	Date and time for receipt of EMD. The EMD in original to be submitted to communication address as stated above in clause (i)	: **02/12/2024** **(up to 14:00 hrs.)**

6 PURCHASE OF BIDDING DOCUMENT IN PERSON: Bidders who desire to obtain bidding document in person by submitting written request and paying through demand draft may do so on any **working day from 14.00 hrs. to 16.00 hrs** only during the period of sale of bid documents as specified in **clause 5** hereof. Demand draft shall be prepared in favour of Rahuri Semen Station payable at Rahuri.

7 PURCHASE OF BIDDING DOCUMENT BY COURIER/POST :
Bidders may send request written request to Purchase, Rahuri Semen Station hereof to the address of communication during the period of sale of bid document. Rahuri Semen Station shall not take the responsibility for any delay in receipt of the bidding document if it is sent by courier /post.

8.0 EARNEST MONEY DEPOSIT (EMD):
All bids must be accompanied by a Earnest Money Deposit (EMD) in the acceptable form as specified in the bidding document and must be delivered to the address of communication as stated above in **clause 5.0 (i)** on or before the last date and time of receipt of bids as given in **clause 5.0 (m)** above.

9.0 PRE BID MEETING: (Not applicable for this work)

10.0 OPENING OF BIDS: All the bidders should submit their bids in Part I – Technical Bid and Part II – Price Bid. The technical bid (Part I) shall contain all the details EXCEPT FOR THE PRICE. Only technical bids of those bidders whose Original EMD, in acceptable form, have reached the office of Rahuri Semen Station as mentioned above in clause no. 5-Bid Details (m) of this Section shall be opened on the date and time specified above. The date and time of opening of Price Bid (Part II) shall be communicated later to all eligible bidders.

11.0 BID VALIDITY: The Bid shall remain valid for a period **of 120 (One Hundred Twenty) days** from the date of bid opening as mentioned above.

12.0 BID SECURITY VALIDITY: The bid security accompanying the bid shall be valid till **02/04/2025**.

13.0 TENDER DRAWINGS: Drawing(s) are attached with this bidding document and the same shall be available for reference at the office of the Rahuri Semen Station, at the address of communication on all working days.

14.0 RIGHTS RESERVED BY Rahuri Semen Station: The Rahuri Semen Station at its sole discretion & without assigning any reason thereof reserves the right to accept and / or reject any or all the bids.

Issued by (Purchase),
Rahuri Semen Station
(A Unit of NDDB Dairy Services)

SECTION – I

INSTRUCTIONS TO BIDDERS

SECTION 1
INSTRUCTIONS TO BIDDERS

Table of Clauses

SECTION - I - INSTRUCTIONS TO BIDDERS

A. GENERAL

1.0 General Information:

1.1(a) Description of Works : Civil, Structural, Water supply, Sanitary, Road work and other miscellaneous works including Internal Electrification, Landscape for; "Additional Infrastructure Buildings of Training Centre, Farmers Hostel, Canteen, Road work, Landscape works at Tugalakpur Village, Block Purkaji, Muzaffarnagar, Uttar Pradesh

(b) Project Owner : Rahuri Semen Station
(A unit of NDDB Dairy Services)

1.2 Location and Area:

(a) Project site : **Tugalakpur Village, Block Purkaji, Muzaffarnagar, Uttar Pradesh.**

(b) Nearest Railway Station : **Roorkee Railway Station / Muzaffarnagar Railway Station**

(c) Nearest Airport : **Dehradun / New Delhi.**

(d) Nearest Major Town : **Roorkee / Muzaffarnagar**

(e) Nearest Road : **Roorkee-Muzaffarnagar, NH-334/58**

1.3 Period of Completion:

The Period of completion shall be **07 (Seven) Months for overall completion** from the date of issuance of work order (WO), **which shall include the non-working periods during monsoon and festivals.**

2.0 Source of Funds:

The Service Recipient has arranged the funds and provided to the purchaser.

3.0 Eligibility and Qualification Requirements:

3.1 This invitation for bid is open to all bidders from all eligible sources.

3.2 All goods and services to be supplied under this Contract shall have their origin in eligible source and all expenditures made under the Contract will be limited to such goods and services.

3.3 For the purpose of this clause, "Origin" means the place where the goods are mined, grown or produced or from which the services are supplied. Goods are produced when, through manufacturing or processing or substantial and major assembling of components, a commercially recognised product results that is substantially different in basic characteristics or in purpose of utility from its components.

3.4 The origin of goods and services is distinct from the nationality of the bidder.

3.5 To be eligible for the award of Contract, bidders shall provide evidence satisfactory to the Rahuri Semen Station, of their eligibility under **sub-clause 3.1** above, and adequacy of resources to carry out the Contract effectively. To this end, all bids submitted shall include the following information:

(A) Copies of original documents or certified true copies, defining the constitution or legal status, place of registration and principal place of business of the company or firm or partnership.

(B) Power of Attorney or a true copy there of duly attested in case an authorised representative has signed the bid.

(C) ~~Sales tax/VAT (as applicable) clearance certificate for current financial year, copy duly attested.~~

(D) Details of the experience and past performance of the bidder on works of similar nature **within the past five years,** and details of current work in hand and other Contractual commitments shall be submitted as per formats given in **Schedule IV and Schedule VIII of Section VII respectively of this bidding document.**

(E) Major items of constructional plant proposed for use in carrying out the Contract in the format prescribed in **Schedule I** and the qualifications and experience of key personnel proposed for the administration and the execution of the Contract, both on and off site, in the format prescribed in **Schedule II of Section VII of this bidding document.**

(F) Proposals for sub-contracting elements of the works amounting to more than **10%** of the bid price for each element and shall be as listed in **Schedule III of Section VII of this bidding document.**

(G) Reports on the financial standing of the bidder such as profit and loss statements, balance sheets and auditor's reports for **the past three years,** an estimate of the financial projection for the **next two years** as prescribed in the **Schedule VII of Section VII of this bidding documents**, and an authority from the bidder to seek reference from the bidder's bankers; and

(H) Statement of arbitration/disputes in which the bidder is involved as prescribed in the **Schedule VI of Section VII of this bidding document.**

As a part of **Technical Bid** (part-I) the bidder shall also submit the following documents & credentials.

1. **The manpower deployment plan of bidder and the organisation chart.**

   However, the bidder shall deploy the following mandatory and minimum key manpower at project site

   Project Manager: - **1** no. (BE/DCE- civil with minimum 8 years of experience).

   A. Supervisory Manpower Team;
   - Sr. Engineers:- **2** nos (BE – civil with minimum 4 years of experience)
   - Jr. engineers:- **3** nos (BE or DCE with minimum 4 years of experience) for billing and supervision.
   - Site supervisors:-**4** nos (Mix of DCE, ITI/diploma, Degree holders with 2 to 3 years of experience and Other suitable supervisors having more than 5 years of site experience in the civil engineering field). one supervisors will be exclusively for supervision of curing.

- Electrical Engineer:- **1** no (BE/DCE- Electrical with minimum 5/8 years of experience)

B. Safety Team (EHS);
- Safety (EHS) Engineer and Assistant.

C. Project Planning, Tracking & Billing Team (Exclusively assisting to Purchaser's/Owner's Engineer;
- Billing cum planning cum data entry engineer: **1** no. (BE civil with minimum 5 years of experience) – including tracking of project activities, schedule, MIS reports, quantity survey, tracking of QAQC tests and processes on continuous basis including documentation and frequency reconciliation updation etc (experience of at least 5 years).
- Quality control engineer: **1** nos. - (BE civil with 5 years of experience or DCE with 7 years of experience).
- Assistant quality engineer: **1** no. - (DCE with 3 years of experience)

This above engineering staff/team shall assist in day to day various data handling, tracking of progress & schedule timelines, QAQC processes cum documentations, billing and bill data punching and so forth exclusively to the Engineer of Rahuri Semen Station.

2. **Technical capability of the firm including the equipment owned by them. They should deploy minimum one no. fully automated concrete batching plant with printing facility and accessories, Poclain, Excavator with Hydraulic Chisel/ Breaker arrangement & Back hoe, good quality new shuttering materials and other equipment and machineries as per project requirements and fully furnished QC laboratory for regular testing of materials at project site as per QAP.**

QAP plan with method statement & schedule in MS Project.

3.6 For the purposes of this particular Contract bidders shall meet the following qualifying criteria as minimum:

a) The Bidder, in the same name and style, should be in business at least for **five years** at time of bid opening. In case of change of name of bidder by merger / acquisition / change in status, the bidder may be eligible based on the documentary evidence.

b) The Bidder should have valid registration under various Acts that may be applicable for the contract proposed. This shall

include but not limited to Income Tax, Companies Act, GST, the building & other construction workers' welfare cess act , Employee State Insurance, Contract Labour, Provident fund etc.

c) The Bidder's financial turnover in the same name and style during each of the **last three financial year (2021-22; 2022-23; 2023-24)** ending 31st March should **not be less than 60% of the estimated contract value.**

d) The bidder should have positive net worth in any two financial years out of the last five financial years

e) The bidder should have cash profit in any two financial years out of the last five financial years

f) The Bidder in the same name & style shall have successfully executed /completed contract of **Similar nature of work**** during the last five years ending last day of the month previous to the month in which bid is opened, as per the following:-

I. One contract/work of similar nature costing not less than 80% of estimated value of the contract.

OR

II. Two contracts/works of similar nature each costing not less than 50% of estimated value of the contract.

OR

III. Three contracts/works of similar nature each costing not less than 40% of estimated value of the contract.

** **Similar nature of work means;** Reinforced Cement Concrete (RCC)/Road work/Bridge Work framework buildings having similar finishes including or excluding internal electrification works of Institutional / Hospital / Hostel / Residential / Commercial / Offices / Semen Station/ Animal Farm/Industrial Buildings.

Notes:

a) The contract means the work done against one work order on a single location.

b) Cost of contracts/works shall be considered for evaluation as per the clause 3.6 (f) above excluding the cost/recovery of materials supplied by the purchaser.

Bidder shall submit the following detail to support their claim for meeting the minimum eligibility requirement -

1. **Name / Names of project to be considered for meeting minimum eligibility criteria**
2. **Nature of each project / work completed.**

3. **Value of work of each project / work completed.**
4. **Location of execution of each project/work completed. The copy of purchase order/work order, completion certificate and abstract sheet of final bill/invoice showing the cumulative Value of work done should be submitted in order to support aforesaid details. In case, the final bill/invoice, does not contain cumulative value of work done, copy of all the bills/invoices submitted prior to the final bill should be attached.**

g) In addition to the above, the following information/documents should also be submitted along with the bid by the bidders for evaluation/determination of their eligibility:

I. Copy of Income Tax Returns and audited balance sheet for **three** previous years in original or certified true copies, along with Permanent Account Number (PAN) for income tax purpose.

II. Copy of TDS certificate issued by the clients to substantiate the claim for the value of works executed in the private sector.

III. **Copy of Form 26 AS for the last 3 financial Years**

h) Even though the bidder meets the specified criteria, it may be disqualified if it has:

I. Made untrue or false declaration in the forms, statements and attachments submitted in proof of their qualification and / or

II. Record of poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completion or financial failure etc.

III. If the bidder is overbooked beyond his capacity to execute the work as per required schedules, the bidding capacity of the bidder will be worked out by following methodology. **The available bid capacity of the bidder shall be worked out on the basis of total completion time and total estimated cost (i.e 100% of total estimated cost indicated in IFB).**

Assessed Available bid capacity = (A*N*1.5-B)
Where,

A= Maximum turnover achieved in any one year during the last three years.

N = Number of years (number of months/12) prescribed for the completion of works for which bids are invited as specified in Invitation for bid (IFB).

B= Value of on-going works to be completed during the period of completion of the works for which bids are invited.

4.0 Cost of Bidding:

The bidder shall bear all costs associated with the preparation and submission of his bid and the Rahuri Semen Station, hereinafter referred to as RSS will in no case be responsible or liable for these costs, regardless of the conduct or outcome of the bidding process.

5.0 Project Site Visit:

5.1 The bidder is advised to visit and examine the site of works and its surroundings and obtain for himself on his own responsibility all information that may be necessary for preparing the bid and entering into a Contract. The costs of visiting the site shall be at bidder's own expenses.

5.2 The bidder and any of his personnel or agent(s) will be granted permission by the RSS to enter upon the premises and lands for the purpose of such inspection but only upon the express condition that the bidder, his personnel and agent(s) from and against all liabilities in respect thereof and will be responsible for personal injury (whether fatal or otherwise), loss of or damage to property and any other loss or damage, costs and expenses however caused, which but for the exercise of such permission would not have arisen.

5.3 Each of the civil contracts, if executed at site under the circumstances of an operating plant which cannot be closed down for any reason, the site works of every nature has to be planned and executed with the knowledge of operational and processing routines at existing plant, as the plant will continue uninterrupted throughout the year. The execution of contract will be done with clear under-standing that their all staff and workers will have to strictly abide by the security rules and procedures that is followed by plant authorities during the concurrency of the contract.

B. BIDDING DOCUMENTS

6.0 Contents of Bidding Documents:

6.1 The set of Bidding documents issued for the purpose of bidding includes the number of copies as stated below, together with any addenda there to issued in accordance with **clause-8** & any minutes of the pre-bid meeting issued in accordance with **clause-16.**

Number of copies	Volume	Section	Description
1	I	0	Invitation for Bid
1	I	I	Instructions to bidders
1	I	II	General Conditions of Contract
1	I	III	Special Conditions of Contract
1	I	IV	Technical Specifications
1	I	V	Form of Bid
1	I	VI	Schedule of Materials to be issued by owner/
1	I	VII	Schedule of Supplementary Information
1	I	VIII	Form of Agreement
1	I	IX	Acceptable Forms of Bank Guarantees
1	II	X	Schedule of Quantities
1	II	XI	Sketches & Tender Drawings

6.2 The Bidder is expected to examine carefully all instructions, conditions, forms, terms, specifications and drawings in the bidding documents. Failure to comply with the requirements of bid submission will be at the bidder's own risk. Pursuant to **clause-25**, bids which are not substantially responsive to the requirements of the bidding documents will be rejected.

7.0 Clarification of Bidding Documents:

A prospective bidder requiring any clarification of the bidding documents may notify the RSS in writing at the address of communication indicated in the Invitation for bid. The RSS will respond in writing to any request for the clarification which is required earlier than **10 days** prior to the dead line for the submission of the bids. Written copies of the response of the RSS (including a description of the enquiry without identifying its

source) will be sent to all prospective bidders who purchased the bidding documents.

8.0 Amendment of Bidding Documents:

8.1 At any time prior to the deadline for the submission of bids, the RSS may for any reason whether at its own initiative or in response to a clarification requested by a prospective bidder, modify the bidding document by the issuance of amendment.

8.2 The amendment will be sent in writing to all prospective bidders who have purchased the bidding documents and will be binding upon them. The amendment will also be notified separately as Corrigendum for the respective bidding document on the RSS's website. Prospective bidders shall promptly acknowledge receipt thereof in writing to the RSS. However, the late receipt of the amendments by the prospective bidder due to postal delays shall not bind the RSS to extend the deadline for the submission of the bids. The amendment will be attached to the bidding document sold subsequently.

8.3 In order to afford prospective bidders reasonable time in which to take an amendment into account in preparing their bids, the RSS may, at its discretion, extend the deadline for the submission of bids in accordance with **clause-19.**

C. PREPARATION OF BIDS

9.0 Language of Bid:

The bid prepared by the bidder and all correspondence & documents relating to the bid exchanged by the bidder and the RSS shall be written in the **English language**. Supporting documents and the printed literature furnished by the bidder with the bid may be in another language provided if required an English translation of the same is provided. For the purpose of the interpretation of the bid, the **English language** shall prevail.

10.0 Documents Comprising the Bid:

The bid to be prepared by the bidder shall comprise the following:

(a) The form of bid along with Appendixes (**Refer Section V**) thereto duly filled;

(b) The bid Security;

(c) The Schedule of Quantities duly filled (**Refer Section X**);

(d) The Schedule of supplementary information (**Refer Section VII**), the information on eligibility and qualifications;

(e) The complete bidding document has to be returned along with bid as stated above.

(e) Alternative offers where invited, and any other materials required to be completed and submitted in accordance with the Instruction to Bidders (**Section I**) embodied in these bidding documents.

The forms, Schedule of quantities and Schedule provided in this bidding document shall be used without exception (subject to the extension of the Schedules in the same format and to the provisions of **sub-clause 14.2** regarding the alternative form of Bid Security)

Additional special instructions if bidding document is down loaded from Website & submitted:

1. The bidder shall mark the envelope containing the bidding document as **"DOWNLOADED BID".**

2. The complete bidding document downloaded has to be returned along with the bid without any modifications/alternations. In case of any discrepancy in downloaded and submitted bid and the bidding documents, the bidding documents preserved in original at RSS shall be taken as final and shall override the bid submitted by the bidders. In case, if the bidding document is detected, at any time, that any material alternations or changes or additions or deletions etc. have been made by the bidders, then notwithstanding the awarding of the contract to the bidders, it shall be lawful for RSS to forthwith rescind the contract entered into by such fraud and misrepresentation, seek damages against such unscrupulous party, black list such party and or initiate such other actions as may be available to RSS.

3. ~~Along with bid a non refundable demand draft in favour of Rahuri Semen Station for an amount equal to price of bidding document as specified in IFB, to be submitted in a separate envelope with marking on cover as **"PRICE FOR BIDDING DOCUMENT"**. Such bids not accompanied by bid document price shall be summarily rejected.~~

Before submission of their bid, the bidder should check the RSS's website for any Corrigendum/additional information on the bidding document, if any. However, non-information in changes/amendments put on website as Corrigendum to the prospective bidders shall not bind the RSS to extend the deadline for the submission of the bids and non-compliance to such Corrigendum by the bidder shall result to non-responsiveness of the bid leading to rejection.

11.0 Bid Prices:

11.1 Unless stated otherwise in the bidding documents, the Contract shall be for the whole works as described in the Invitation for bid based on the schedule of unit rates and prices submitted by the bidder. Bidder must quote for the schedules of quantity and for all the items (Section-X).

11.2 The bidder shall fill in rates and prices for all items of works described in the schedules of quantities. **Items against which no rate is entered by the bidder shall not be paid for by the RSS when executed and shall be deemed to have covered by the other rates in the schedule of quantities.**

11.3 All applicable Taxes (GST), levies, cess (including labour cess, seigniorage, royalty etc., as applicable to this contract) and duties shall be payable by the bidder under the Contract or for any other cause, and shall be included in the rates and the prices and total bid price submitted by the bidder and the evaluation and the comparisons of bids by the RSS shall be made accordingly.

11.4 Fixed Prices:

The rates and prices quoted by the bidder shall be fixed for the entire duration of the Contract and shall not be subjected to adjustment on any account except as defined in clause no. 11.5 below. A bid submitted with any price adjustment condition except as defined in clause no. 11.5 below shall be treated as non-responsive & rejected, pursuant to **clause 25 of this section.** Any variation in the taxation shall be subjected to the adjustment as per the detailed specified under clause 72 of section II of the bidding document.

11.5 Price Variation -Not applicable

~~**For construction materials other than cement & reinforcement steel:**~~

- ~~If a bidder intends to have price escalation/variation for material other than cement & reinforcement steel then he shall clearly indicate the maximum ceiling of this variation either in terms of percentage of net bid/offer value or a lump sum amount (which shall be converted into percentage of net bid). Such bids shall be evaluated and compared after loading the maximum variation offered by the bidder.~~

- ~~The aforesaid price escalation amount (calculated on the basis of final value of works executed excluding the value of extra items, if any) shall be paid to the bidder only upon successful completion of the work along with full and final settlement of final bill.~~

~~For construction materials cement & reinforcement steel only:~~

- ~~The price adjustment for Cement & Reinforcement Steel shall be worked out as detailed below. This adjustment shall be worked out on monthly basis & shall be paid/recovered along with running account bills.~~

~~The price adjustment amount for Cement shall be worked out on the basis of following formula:~~

~~VC = PC X QC X (CI – CIo) / CIo~~

~~Where,~~

~~VC: Variation in cement cost i.e. increase or decrease in the amount in rupees to be paid or recovered.~~

~~PC: Base price of cement- OPC (in rupees per bag of 50 Kg) for price adjustment purpose only shall be Rs. 365/- (Rupees Three hundred Forty Five only) inclusive of GST.~~

~~QC: Quantity of cement used (in bags of 50 Kg) during the month under consideration .The quantity of cement consumed shall be worked out on the basis theoretical consumption as per norms.~~ **~~Cement consumed more than the theoretical consumption norms shall not be considered for price adjustment.~~**

~~CIo: Index number of Wholesale Prices in India- by Groups and Sub-Groups (Averages) applicable for Cement & Lime published in RBI Monthly Bulletin for the month valid on the last stipulated date of receipt of bids including extensions, if any.~~

~~CI: Index number of Wholesale Prices in India- by Groups and Sub-Groups (Averages) applicable for Cement & Lime published in RBI Monthly Bulletin for the month price adjustment is under consideration.~~

~~The price adjustment amount for Reinforcement Steel shall be worked out on the basis of following formula:~~

~~VS = PS X QS X (SI –SIo) / SIo~~

~~Where,~~

~~VS: Variation in reinforcement steel cost i.e. increase or decrease in the amount in rupees to be paid or recovered.~~

~~**PS: Base price of reinforcement steel (in rupees per Kg) for price adjustment purpose only shall be Rs. 66/- (Rupees Seventy Three Only) inclusive of GST.**~~

~~QS: Quantity of reinforcement steel used in Kg during the month under consideration. The quantity of reinforcement steel consumed shall be worked out on the basis of linear measurements & standard unit weight coefficients.~~ ~~**The reinforcement steel consumed more than the theoretical consumption norms shall not be considered for price adjustment.**~~

~~SIo: Index number of Wholesale Prices in India- by Groups and Sub-Groups (Averages) applicable for steel long published in RBI Monthly Bulletin for the month valid on the last stipulated date of receipt of bids including extensions, if any.~~

~~SI: Index number of Wholesale Prices in India- by Groups and Sub-Groups (Averages) applicable for steel long published in RBI Monthly Bulletin for the month price adjustment is under consideration.”~~

~~(Indices are available on http://www.rbi.org.in/scripts/BS_ViewBulletin.aspx)~~

12.0 Currency of Bid & Payment:

The unit rates and prices shall be quoted by the bidder entirely in Indian currency and all payment shall be made in Indian currency only.

13.0 Bid Validity:

13.1 Bids submitted shall remain valid for acceptance for a period of **120 days** from the date of bid opening.

13.2 In exceptional circumstances, prior to expiry of the original bid validity period, the RSS may request the bidder for a specified extension in the period of validity. The request and the response thereto shall be made in writing. A bidder may refuse the request without forfeiting his bid security. A bidder agreeing to the request shall not be permitted to modify his bid, but shall be required to extend the validity of his bid security correspondingly. The provisions of **clause 14** shall continue to apply during the extended period of bid validity.

14.0 Bid Security:

14.1 The bidder shall furnish, as part of the bid, a bid security for each package separately of the amount as specified in **clause 5 (l)** in the **Invitation for bid, Section 0.**

14.2 The Earnest Money Deposit (EMD) shall be denominated in Indian Rupees only, and shall be in one of the following forms.

a) A Bank Guarantee issued by a Nationalized or a Foreign Bank having Branches in India, in the form Provided in Bidding Document and valid till 02/04/2025.

Or

b) A Demand Draft/ Bankers Cheque issued by a Nationalized Bank/Schedule Bank / Foreign Bank having branches in India, drawn in favour of NDDB DS RAHURI SS, payable at Rahuri.

14.3 Any bid not accompanied by an acceptable Earnest Money Deposit (EMD) pursuant to **clause 14.1 and 14.2** hereof shall be rejected by RSS as non-responsive.

14.4 The Earnest Money Deposit (EMD) of the unsuccessful bidders shall be refunded as promptly as possible, but not later than **30 days** after the expiry of the period of bid validity as prescribed in these documents.

14.5 The Earnest Money Deposit (EMD) of the successful bidder(s) shall be refunded when the bidder has signed the Agreement and furnished the required performance security.

14.6 No interest shall be paid by the RSS on the bid security furnished by the bidder.

14.7 The Earnest Money Deposit (EMD) may be forfeited
(a) If a bidder withdraws his bid during the period of bid validity; or
(b) In the case of a successful bidder, if he fails within the time limit to:
(i) Sign the agreement, or
(ii) Furnish the required performance security

15.0 Variation in Bidding Conditions:

15.1 The bidder shall submit offer which comply fully with the requirements of the bidding documents, including the basic technical design as indicated in the drawings and specifications. Conditional bids are liable to be considered as non-responsive in accordance with **clause-25.**

16.0 Pre-Bid Meeting: (Not Applicable for this work).

17.0 Format and Signing of Bids:

17.1 The bidder shall prepare and submit the original copy of the documents comprising the bidding documents purchased/downloaded by him

17.2 All pages of the bidding documents shall be signed & stamped by person(s) duly authorised, to bind the bidder to the Contract. Proof of authorisation shall be in the form of a written power of attorney which shall accompany the bid. All pages of the bid documents, where entries and amendments had been made, shall additionally be initialled by the person(s) signing the bids.

17.3 The complete bid shall be without alterations, interlineations or erasures except those in accordance with instructions issued by the RSS, or as necessary to correct errors made by the bidder in which case such corrections shall be initialled by the person(s) signing the bid. No over writing shall be permitted.

17.4 Only one bid may be submitted by each bidder. No bidder shall be allowed to participate in the bid in the name of another for the same Contract in any relation whatsoever.

17.5 The bidder shall quote the rate of each item both in figures and words.

D. SUBMISSION OF BIDS

18.0 Sealing and Marking of Bids:

18.1 **The bidder shall submit the bid in three envelops. The first envelope shall contain only the bid security with "BID SECURITY" clearly marked on the envelope whereas the second envelop shall contain the Technical Bid clearly marked on the envelope as "TECHNICAL BID". The third envelope shall contain the Price Bid clearly marked on the envelope as "PRICE BID". These three inner envelops shall be put in a Fourth outer envelope. The bidder shall seal the bid in inner and outer envelopes, duly marking all the envelopes as "ORIGINAL" and mention of the Bid reference number and other details clearly on the envelope".**

18.2 The inner and the outer envelopes shall be addressed to the address as given in the address for communication in **clause 5.0 (i)** of Invitation for Bid and shall bear the following identifications:

i) Name of the Contract-as stated in the **clause 1.0** of Invitation for Bid.
ii) Reference No. of the bid-as given in the Invitation for Bid.
iii) Words "**DO NOT OPEN BEFORE**" (Mention the date and time of opening of the bid as given in **clause 5.0 of Invitation for Bid.)**

18.3 The inner envelope shall indicate the name and the address of the bidder to enable the bid to be returned unopened in case it is declared late or is otherwise unacceptable.

If the outer envelope is not sealed and as marked as instructed above, the RSS shall not assume any responsibility for the misplacement or premature opening of the bid submitted. The bids received in open condition shall be recorded as "received open" and may be considered, provided it is received before the specified date and time.

19.0 Deadline for Submission of Bids:

19.1 Bids must be received by the RSS at the address of communication on or before the date and time of submission as stated in **clause 5.0 in the Invitation for Bid.**

19.2 The RSS may, at its discretion, extend the deadline for the submission of bids by issuing an amendment in accordance with **clause 8** hereof, in which case all rights and obligations of RSS and the bidders previously subject to the original deadline shall thereafter be subject to the new deadline as extended.

20.0 Late Bids:

20.1 Any bid received by the RSS later than the dead line for the submission of bids as prescribed by the RSS in accordance with **clause 19** shall be returned unopened to the bidder.

21.0 Modification and Withdrawal of Bids

21.1 The bidder may modify or withdraw his bid after bid submission provided that the modifications or notice of withdrawal is received in writing by the RSS prior to the prescribed dead line for the submission of bids.

21.2 The bidder's modification or notice of withdrawal shall be prepared sealed, marked and delivered in accordance with the provisions of **clause 18** for the submission of bids, with the inner envelope additionally marked "MODIFICATION" OR "WITHDRAWAL" as appropriate.

21.3 Subject to **clause 24**, no bid shall be modified subsequent to the deadline for the submission of bids.

21.2 Withdrawal of the bid during the interval between the deadline for the submission of bids & the expiry of the period of bid validity shall result in the forfeiture of the Earnest Money Deposit (EMD) pursuant to **clause 14.**

D. BID OPENING AND EVALUATION

22.0 Bid Opening

The RSS will open the bids, including submissions made pursuant to **clause 21** in the presence of bidder's representatives who choose to attend, at the office of the Rahuri Semen Station, Rahuri, in the address of the communication at the time and date stated in the **clause 5.0** in the Invitation for Bid. The bidder's representatives who are present shall sign a register evidencing their attendance.

22.2 Bids for which an acceptable notice of withdrawal has been submitted pursuant to **clause 21.0** shall not be opened. The RSS will examine the bids to determine whether they are complete, whether the requisite Earnest Money Deposit (EMD) have been furnished, whether the documents have been properly signed, and whether the bids are generally in order.

22.3 At the bid opening the RSS will announce the bidder's names, the bid prices, written notifications of bid modifications and withdrawals, if any, the presence of requisite bid security, and such other details as the RSS may consider appropriate.

22.4 The RSS shall prepare, for its own records, the minutes of the bid opening, including the information disclosed to those present in accordance with **sub-clause 22.3**

23.0 Process to be Confidential:

23.1 After the public opening of bids, information relating to the examination clarification, evaluation and comparison of bids and recommendations concerning the award of Contract shall not be disclosed to bidders or other persons not officially concerned with such process until the award of the Contract to the successful bidder has been announced.

23.2 Any effort by a bidder to influence the RSS in the process of examination, clarification, evaluation and comparison of bids and in the decision concerning the award of Contract may result in the rejection of the bidder's bid.

24.0 Clarification of Bids:

24.1 To assist in the examination, evaluation and comparison of bids, the RSS may ask the bidders individually for clarification of their bids, including break down of unit rates. The request for clarification and the response shall be in writing but no change 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 RSS during the evaluation of the bids in accordance with **clause 26.**

25.0 Determination of Responsiveness

25.1 Prior to the detailed evaluation of the bids the RSS will determine whether each bid is substantially responsive to the requirements of the bidding documents.

25.2 For the purpose of this clause, a substantially responsive bid is one which conforms to all terms, conditions and specifications of the bidding documents without material deviation or reservation. A material deviation or reservation is one which affects in any substantial way the scope, quality or the performance of the works or which limits in any substantial way, inconsistent with the bidding documents, the RSS's right or the bidder's obligations under the Contract, and the rectification of which deviation or reservation would affect unfairly the competitive position of other bidders presenting substantially responsive bids.

25.3 If a bid is not substantially responsive to the requirements of the bidding documents, it will be rejected by RSS and may not be subsequently made responsive by the bidder having corrected or withdrawn the non-conforming deviation or reservation.

26.0 Correction of Errors:

26.1 Bids determined to be substantially responsive will be checked by the RSS for any arithmetic errors in computation and summation. Errors will be corrected as follows:

"Where there is a difference between rates in figures and in words, the rates that corresponds to the amounts worked out by the bidders, shall be taken as correct. However, when the amount of an item is not worked out or it does not correspond with the rates written either in figures or words, then the rates quoted by the bidder in words shall be taken as correct. When the rates quoted by the bidders in figures and words tallies but the amount is not worked out correctly, the rate quoted by the bidders shall be taken as correct and not the amount."

26.2 The amount stated in the form of bid will be adjusted by the RSS in accordance with the above procedures 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 of bid his bid shall be rejected and the bid security (Earnest Money Deposit - EMD) shall be forfeited.

27.0 Conversion to Single Currency:

27.1 All bid prices shall be submitted in Indian currency only.

28.0 Evaluation and comparison of the Bids:

28.1 The RSS evaluate and compare only bids determined to be substantially responsive to the requirements of the bidding documents in accordance with **clause 25.**

28.2 In evaluating bids, the RSS will determine for each bid the evaluated price by adjusting the bid price making any correction for errors pursuant to **clause 26.0**

28.3 The RSS reserves the right to accept or reject any variation, deviation or alternative offers. Variations, deviations and alternative offers and other factors which are in excess of the requirement of the bidding documents or otherwise result in the accrual of unsolicited benefits to the RSS shall not be taken in to account in bid evaluation.

28.4 Price variation provisions of the Contract shall be taken in to account in bid evaluation pursuant to **clause 11.5**

28.5 Additional Performance Security:

- If the bid of the successful bidder is having ALR (Abnormally Low Rates i.e. the rates less than 60% of estimated rates) for prices of individual items or total bid price offered in relation to the RSS's item rates estimate or total price estimate of the real cost of the work to be performed under the Contract, the RSS may require that the amount of the performance security deposit set forth in the **clause 33.0** be increased at the expense of the successful bidder to a level sufficient to protect the RSS against financial loss in the event of subsequent performance of the successful bidder under the Contract. This additional security provided separately shall be termed as **Additional Performance Security** and shall be released on completion of all ALR (Abnormally Low Rates) items against which the additional performance security is obtained.

- **The value of the Additional Performance Security** shall be worked out on the basis of differential rates **[(i.e. Additional Performance Security Amount = Quantity X (60% of estimated rate -ALR rate)].**

F. AWARD OF CONTRACT

29.0 Award Criteria:

29.1 Subject to **clause 30,** the RSS shall award the Contract to the bidder whose bid has been determined to be substantially responsive to the bidding documents, technically acceptable and who has offered the lowest Evaluated bid price pursuant to **clause 28,** and provided further that the bidder has the capability and the resources to carry out the Contract effectively and has adequate technical and financial competence including record of satisfactory performance.

30.0 RSS's Right to Accept any Bid and to Reject any or all bids.

30.1 Notwithstanding **clause 29** or any other clauses stated above, the Rahuri Semen Station reserves the right to accept or reject any bid and to annul the bidding process and reject all bids, at any time prior to the award of the Contract, without thereby incurring any liability to the affected bidder(s) or any obligation to inform the affected bidder(s) of the grounds for the RSS's action.

31.0 Notification of Award

31.1 Prior to the expiry of the period of bid validity prescribed in the bid documents, the RSS will notify the successful bidder in writing that his bid has been accepted. This letter (hereinafter and in the Conditions of Contract referred to as "**Letter of Acceptance**") shall name the sum which the RSS will pay to the Contractor in consideration of the execution, completion and the maintenance of the works by the Contractor as prescribed by the Contract (hereinafter and in the Conditions of the Contract referred to as the "**Contract price**")

31.2 The notification of the award will constitute the formation of the Contract.

31.3 Upon the furnishing by the successful bidder of a performance security in accordance with the **clause 33** the RSS may notify the unsuccessful bidders that their bids have been unsuccessful.

32.0 Signing of Agreement:

32.1 At the same time that the RSS notifies the successful bidder that his bid has been accepted, the RSS will send the bidder the Form

of Agreement provided in the bidding documents **(Section VIII),** incorporating all agreements between the parties.

32.2 Within **15 days** of the receipt of the Form of Agreement the successful bidder shall sign the Form and return it to RSS.

33.0 Performance Security:

33.1 Within **30 days** of the receipt of the notification of award from the RSS, the successful bidder shall furnish to the RSS a performance security for an amount of **5% (five percent)** of the Contract cost pursuant to **clause 10.0 of General Conditions of Contract (Section II).**

Failure of the successful bidder to comply with the requirements of the **clause 32 or 33** shall constitute sufficient grounds for the annulment of the award and forfeiture of the Earnest Money Deposit (EMD).

34.0 License and Permit for Goods/Services:

Unless stated otherwise, no license or permit shall be provided by Purchaser/Owner/Service Recipient for the Goods/Services being provided by contractor against this bid.

SECTION – II

GENERAL CONDITIONS OF CONTRACT

SECTION II GENERAL CONDITIONS OF CONTRACT

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GENERAL CONDITIONS OF CONTRACT

DEFINITIONS AND INTERPRETATIONS

1.0 DEFINATION AND INTERPRETATION: In the Contract, as hereinafter defined, the following words and expressions shall have the meanings hereby assigned to them, except where the context otherwise requires:-

1.1 OWNER/PROJECT AUTHORITY/ SERVICE RECIPIENT - shall mean the client on whose behalf the enquiry is issued by the Rahuri Semen Station and shall include its successors and assignees, as well as its authorised representatives.

1.2 PURE AGENT/ CONSULTANT shall mean the Rahuri Semen Station or the consultants appointed by the Owner for the Project.

1.3 RAHURI SEMEN STATION shall mean the Rahuri Semen Station (A Unit of NDDB Dairy Services).

1.4 ENGINEER shall mean the Engineer or any other authorised representative of the RAHURI SEMEN STATION.

1.5 Architect shall mean the architect appointed by the RAHURI SEMEN STATION/Owner.

1.6 Structural Consultants shall mean the Structural Consultants appointed by the RAHURI SEMEN STATION/Owner.

1.7 Bidder shall be the firm/party/individual who submits the bid against the Invitation for Bid.

1.8 Contractor shall mean the successful bidder whose Bid has been accepted by the Owner / RAHURI SEMEN STATION and on whom a work order has been placed and shall include his heirs, legal representatives and assignees.

1.9 Sub-Contractor shall mean the person/firm/ party named by the Contractor whom a part of the Contract has been sublet with the consent of owner /RAHURI SEMEN STATION and shall include his heirs, successors, legal representatives, and assignees.

1.10 Contract price/rate shall mean the prices/rates of the accepted Bid.

1.11 Contract shall mean the work order along-with articles of agreement, the conditions, the appendix, the schedule of quantities, and/or specifications attached herewith.

1.12 "Notice in writing" shall mean a notice in written, typed or printed characters sent (unless delivered personally or otherwise proved to

have been received) by courier/registered/ordinary post to the last known address or the registered office of the addressee and shall be deemed to have been received when in the ordinary course of post it would have been delivered.

1.13 **"Engineer –In-charge"** means the site engineer designated as such or other Engineer appointed from time to time by purchaser.

1.14 **Site** shall mean the actual place of the proposed project or any other place where work is to be executed under the Contract. It shall also include any other land allotted by the Owner/RAHURI SEMEN STATION for the Contractor's use.

1.15 **Month** shall mean from the beginning of a given date of a calendar month to the end of the preceding date of the next calendar month.

1.16 **Week** shall mean seven consecutive days.

1.17 **Day** shall mean a day from midnight to midnight.

1.18 **Building** shall mean the proposed building (s), roads, fencing, sanitary and water supply, underground/overhead water tank etc. under the Contract.

1.19 **Bid Security** shall mean the sum paid along with the bid as a token to bind the Contract.

1.20 **Award** shall mean the written acceptance of Bid by the RAHURI SEMEN STATION/owner given to the successful bidder.

1.21 **Performance Security** shall mean the amount pledged with the RAHURI SEMEN STATION while signing the agreement for faithful and satisfactory performance of the Contract.

1.22 **Constructional Plant** shall mean all appliances or things of whatsoever nature required in or about the execution and maintenance of the Works but does not include the materials or other things required /intended to form or forming part of the Works.

1.23 **Specifications** shall mean the specification referred to in the bid and any modification thereof or addition thereto as may from time to time be furnished or approved in writing by the RAHURI SEMEN STATION/Engineer.

1.24 **Drawings** shall mean drawings referred to in the specifications and any modification of such drawings approved in writing by the Engineer and such other drawings as may from time to time be furnished or

approved in writing by the RAHURI SEMEN STATION/Engineer / consultant.

1.25 Temporary Works shall mean temporary works of every kind required in or about the execution or maintenance of works.

1.26 Permanent Works shall mean the permanent works to be executed and maintained in accordance with the Contract.

1.27 Works shall include both temporary works and permanent works.

1.28 Approved/Approval shall mean approval in writing, including subsequent written confirmation of previous verbal or written approval.

1.29 I.S.S. shall mean Indian Standard Specifications

1.30 Government shall mean the Government of India or any other State Government.

1.31 Tender shall mean the Bid.

1.32 Headings and Marginal notes:
All headings of and notes to the clauses of these Conditions of Contract or of and to the Specifications or any other bid document are solely for the purpose of giving concise indication and not a summary of the contents thereof, and they shall never be deemed to be the part of or be used in the interpretation or construction thereof or of the Contract.

1.33 Singular and Plural.
In this Contract document unless otherwise stated specifically the singular shall include the plural and vice-versa wherever the context so requires.

1.34 Cost
The cost shall be deemed to include overhead costs whether on or off the site.

1.35 Purchaser
The organization who is purchasing the goods/services.

ENGINEER & ENGINEER'S REPRESENTATIVE

2.0 Duties and Powers of the Engineer and the Engineer's Representative:

2.1 The field management shall be the responsibility of the Engineer. The Engineer shall carry out such duties as taking decisions and issuing certificates and orders as specified in the Contract. The Engineer is empowered to take decisions on the following matters:

(a) Approval of subletting of any part of the works pursuant to **clause 4.0** hereof;

(b) Certification of additional sums under **sub-clause 53(2)** hereof;

(c) Determination of an extension of time pursuant to **clause 44.0** hereof;

(d) Issuance of a variation order pursuant to **clause 52.0** hereof;

(e) Fixing rates or prices for the additional works executed under the Contract pursuant to **clause 52.0** hereof.

2.2 The Engineer's Representative shall be responsible to the Engineer and his duties are to watch and supervise the works and to test and examine any materials to be used or workmanship employed with the works. The Contractor shall get the materials or the workmanship tested, as instructed by the Engineer's Representative, at his own cost. He shall have no authority to relieve the Contractor of any of his duties or obligations under the Contract nor, except as expressly provided hereunder or elsewhere in the Contract, to order any work involving delay or any extra payment by the Service Recipient/ RAHURI SEMEN STATION, nor to make any variation of or in the works.

2.3 The RAHURI SEMEN STATION may from time to time in writing delegate to the Engineer's Representative any of the powers and authorities vested in the Engineer. Any written instruction or approval given by the Engineer's Representative to the Contractor within the terms of such delegations, but not otherwise, shall bind the Contractor as though it had been given by the Engineer provided always as follows:

(a) Failure of the Engineer's Representative to disapprove any work or materials shall not prejudice the power of the Engineer thereafter to disapprove such work or materials and to order the pulling down, removal or breaking up thereof.

(b) If the Contractor shall be dissatisfied by reason of any decision of the Engineer's Representative he shall be entitled to refer the matter to the Engineer, who shall there upon confirm, reverse or vary such decision.

3.0 Inspection of Works:

3.1 The RAHURI SEMEN STATION and his representatives shall have full power and authority to inspect the works at any time wherever the work is in progress either on the site or at the Contractor's premises/ workshop wherever situated, premises/ workshop of any person, firm or corporation where the work in connection with the Contract may be in hand or where from materials are being produced or are to be supplied, and the Contractor shall afford or procure for the Engineer every facility and assistance to carry out such inspection. The Contractor shall at all times during usual working hours and at all other times at which reasonable notice of the intention of the Engineer or the Engineer's Representative to visit the works shall have been given to the Contractor, either himself be present to receive the orders and instructions, or have a responsible agent /representative duly accredited in writing present for the purpose. Orders given to the Contractor's agent/ representative shall be considered to have the same force as if they had been given to the Contractor himself. The Contractor shall give not less than **three days** notice in writing to the Engineer's Representative before covering up or otherwise placing beyond the reach of inspection and measurement any work in order that the same may be inspected and measured. In the event of breach of the above the same shall be uncovered at the Contractor's expenses for carrying out such measurement or inspection.

3.2 No materials shall be removed from the site before obtaining the approval in writing of the Engineer. The Contractor is to provide at all times during the progress of the work and the maintenance period proper means of access with ladders, gangways, etc. and the necessary attendance to move and adopt as directed for inspection or measurement of the works by the Engineer's Representative.

3.3 The Contractor shall make available to the Engineer's Representative free of cost all necessary instruments and assistance in checking of setting out of works and checking of any works made by the Contractor for the purpose of setting out and taking measurements of works.

3.4 Nothing in this clause shall in any way relieve the contractor from any warranty or other obligations under the contract.

4.0 Sub-letting of Work:

4.1 The Contractor shall not sub-let the whole of the works. Except where otherwise provided by the Contract, the Contractor shall not sub-let any part of the works without prior written consent of the Engineer,

which shall not be unreasonably withheld, and such consent, if given shall not relieve the Contractor from any liability or obligation under the Contract and he shall be responsible for the acts, defaults and negligence of any sub-contractor, his agents, servants or workmen as fully as if they were the acts, defaults or negligence of the Contractor, his agents, servants or workmen, provided always that the provision of labour on a piece work basis shall not be deemed to be a sub-letting under this clause.

CONTRACT DOCUMENT

5.0 Language and Law of Contract:

5.1 i) All written material and correspondence shall be in **English.**
ii) The law to which the Contract is to be subjected and according to which the Contract is construed, shall be the law being in force in India and/or the state where the Contract shall be performed.

5.2 Documents Mutually Explanatory:

Except if and to the extent otherwise provided by the Contract, the provisions of the General Conditions and Special Conditions of the Contract shall prevail over those of any other documents forming part of the Contract. Several documents forming the Contract are to be taken as mutually explanatory. Should there be any discrepancy, inconsistency, error or omission in the Contracts or any of them the matter may be referred to Engineer who shall give his decisions and issue to the Contractor instructions, directing in what manner the work is to be carried out. The decision of the Engineer shall be final and conclusive and the Contractor shall carry out the work in accordance with this decision.

5.3 Works shown upon the drawing but not mentioned in the specifications or described in the specifications without being shown on the drawings shall nevertheless be held to be included in the same manner as if they had been specifically shown upon the drawings and described in the specifications.

6.0 Drawings: their Purpose and the Custody:

6.1 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.

6.2 In case any feature of the work is not set forth in the drawings and specifications, the Contractor shall forthwith apply to the Engineer for further instructions, drawings or specifications.

6.3 The drawings shall remain in the sole custody of the Engineer, 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 Engineer or the Engineer's Representative and by any other person authorized by the Engineer in writing. At the completion of the Contract the Contractor shall return to the Engineer 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.

6.4 The Contractor shall give written notice to the Engineer whenever planning or progress of the works is likely to be delayed unless any further drawing or instruction is issued by the RAHURI SEMEN STATION/ Engineer 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.

6.5 The contractor shall submit the following information, in triplicate, to the Engineer for approval within the time stipulated against each item below:

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

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.

7.0 Further Drawings and Instructions:

7.1 The Engineer may also authorize his representatives to perform his duties and functions. The Contractor 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.

GENERAL OBLIGATIONS

8.0 Contractor's General Responsibilities:

8.1 The Contractor shall, subject to the provisions of the Contract, and with due care and diligence, execute and maintain the Works and provide all labour, including the supervision thereof, materials, Construction Plant and all other things, whether of a temporary or permanent nature, required in and for such execution and maintenance, so far as the necessity for providing the same is specified in or is reasonably to be inferred from the Contract.

8.2 The Contractor shall take full responsibility for the adequate stability and safety of all site operations and methods of construction, provided that the Contractor shall not be responsible, except as may be expressly provided in the Contract, for the design or specification of the Permanent Works, or for the design or specification of any Temporary Works prepared by the Engineer.

9.0 Contract Agreement:

9.1 The Contractor shall be called upon so to do enter into and execute a Contract Agreement, in the form provided at **Section VIII (Form of Agreement)** with such modification as may be necessary.

10.0 Performance Security:

10.1 Within **30 days** of the receipt of the notification of the Award of the Contract from the RAHURI SEMEN STATION the successful bidder shall furnish to the RAHURI SEMEN STATION a performance security for an amount **of 5% (five percent)** of the total Contract cost.

10.2 The proceeds of the performance e security shall be payable to the RAHURI SEMEN STATION as compensation for any loss resulting from the Contractor's failure to complete his obligation under the Contract.

10.3 The performance security shall be **denominated** in Indian Rupees and shall be in any of the following forms:

a) A Demand draft drawn in favour of the **NDDB DS RAHURI SS**, payable at the place mentioned in the address of communication stated in the Invitation for Bid **(Section O).**

b) A Bank Guarantee issued by a Nationalized Indian Bank or a foreign bank having branches in India. The acceptable form shall be strictly as provided in **Section IX (Acceptable Forms OF Bank Guarantees)** of the Bidding documents.

10.4 ~~The bank guarantee (B.G.) shall be valid for the entire period of Contract including the Period of Maintenance (defects liability period) **plus 45 days**. The B.G. can be initially accepted for a period as per Banking norms, on written undertaking of contractor/ bidder that the BG shall be extended before its expiry & shall be kept valid till Period of Maintenance (defects liability period) **plus 45 days**. The validity of the bank guarantee shall be suitably extended in the event of extension of time of the Contract pursuant **to clause no. 44** herein.~~

Bank Guarantee should be valid till final delivery of the material/completion of delivery/12 months from the date of successful commissioning/scheduled completion period stipulated in the contract/defect liability period/ warranty period etc. plus 3 months claim period

10.5 The performance security shall be released by the RAHURI SEMEN STATION not later than **60 days** following the date of delivery of the Maintenance certificate by the Engineer.

10.6 In the event of increase in the Contract cost, in actual execution, proportionate additional performance security shall be provided by the Contractor or recovered from the subsequent payments due to the contractor.

10.7 In the event of decrease in the Contract cost the performance security shall be proportionately adjusted on the completion of the work.

10.8 No interest shall be paid by RAHURI SEMEN STATION for the amount deposited as Performance security with the RAHURI SEMEN STATION.

11.0 Inspection of Site:

11.1 The Contractor shall be deemed to have inspected and examined the site 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.

12.0 Sufficiency of Tender:

12.1 The Contractor 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 proper execution and maintenance of the Works.

13.0 Work to be to the Satisfaction of Engineer:

13.1 The Contractor shall execute and maintain the Works in strict accordance with the Contract to the satisfaction of the Engineer and shall comply with and adhere strictly to the Engineer's instructions and directions on any matter whether mentioned in the Contract or not, touching or concerning the Works. The Contractor shall take instructions and directions only from the Engineer.

14.0 Programme to be furnished:

14.1 The Contractor shall, after the acceptance of his Tender, submit to the Engineer for his approval a program showing the order of procedure in which he proposes to carry out the Works. The Contractor shall whenever required by the Engineer, also provide in writing for his information a general description of the arrangements and methods which the Contractor proposes to adopt for the execution of Works.

14.2 If at any time it should appear to the Engineer that the actual progress of the Works does not conform to the approved program referred to in **sub-clause (1)** of this Clause, the Contractor shall produce, at the request of the Engineer, a revised programme showing the modifications to the approved programme necessary to ensure completion of the Works within the time for completion as defined in **Clause 43** hereof.

14.3 The submission to and approval by the Engineer of such programme or the furnishing of such particulars shall not relieve the Contractor of any of his duties or responsibilities under the Contract.

14.4 The programme shall be reviewed and revised if required at three monthly intervals and shall include a chart of the principal quantities of work forecast for execution monthly and a schedule of payments expected to be made to the Contractor by the RAHURI SEMEN STATION.

15.0 Contractor's Superintendence:

15.1 The Contractor shall give or provide all necessary superintendence during the execution of the Works and as long thereafter as the Engineer 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 Engineer, 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 Engineer, 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 Engineer. Such authorized agent or representative shall receive, on behalf of the Contractor, directions and instructions from the Engineer.

16.0 Contractor's Employees:

16.1 The Contractor shall provide and employ on the Site in connection with the execution and maintenance of the Works:

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

b) Such skilled, semi-skilled and unskilled labour as is necessary for the proper and timely execution and maintenance of the Works.

16.2 It shall be the liability of the Contractor to remove forthwith from the works any personnel engaged by the Contractor, in or about the execution or maintenance of the works, who, misconduct himself or is incompetent or negligent in the proper performance of his duties or whose engagement is otherwise considered to be undesirable and such person shall not be again engaged upon the work. Any person so removed, by the Contractor, from the works shall be replaced, by the Contractor, as soon as possible by a competent substitute.

17.0 Setting-out:

17.1 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 Engineer 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 Engineer shall, at his own cost, rectify such error to the satisfaction of the Engineer, unless such error is based on incorrect data supplied in writing by the Engineer in which case the expense of rectifying the same shall be borne by the RAHURI SEMEN STATION. The checking of any setting-out or of any line or level by the Engineer 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, sight-rails, pegs and other things used in setting- out the Works.

18.0 Boreholes and Exploratory Excavation:

18.1 If, at any time during the execution of the Works, the Engineer shall require the Contractor to make boreholes or to carry out exploratory excavation, such requirement shall be ordered in writing and shall be deemed to be an addition ordered under the provision of **Clause 52** hereof, unless a provisional sum in respect of such anticipated works shall have been included in Schedule of Quantities.

19.0 Watching and Lighting:

19.1 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 Engineer, for the protection of the Works, or for the safety and convenience of the public or others.

20.0 Care of Works:

20.1 From the commencement of the Works until the date stated in the Certificate of Completion for the whole of the Works pursuant to **Clause 49** hereof the Contractor shall take full responsibility for the care thereof. Provided that if the Engineer 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/ RAHURI SEMEN STATION. 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, save and except the excepted

risks as defined in **clause 20.3,** 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 Engineer's instructions. In the event of any such damage, loss or injury happening from any of the excepted risks, the Contractor shall, if and to the extent required by the Engineer and subject always to the provision of **Clause 66** hereof, repair and make good the same as aforesaid at the cost of the RAHURI SEMEN STATION. 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 under **Clause 50 or 51** hereof.

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

20.3 Excepted Risks:

The "excepted risks" are war, hostilities (whether war be declared or not), invasion, act of foreign enemies, rebellion, revolution insurrection or military or usurped power, civil war, or unless solely restricted to employees of the Contractor or of his sub-contractors and arising from the conduct of the Works, riot, commotion or disorder, or a cause solely due to the Engineer's design of the Works, or ionizing radiation or contamination by radio-activity from any nuclear fuel or from any nuclear waste from the combustion of nuclear fuel, radio-active toxic explosive, or other hazardous properties of any explosive, nuclear assembly or nuclear component thereof, pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds, or any such operation of the forces of nature as an experienced Contractor could not foresee, or reasonably make provisions for or insure against all of which are herein collectively referred to as "the excepted risks".

21.0 Insurance of Works, etc.:

21.1 Without limiting his obligations and responsibilities, the Contractor shall **prior to** the commencement of the Works **(as per appendix-I, Section-V / Maximum 15 days from the date of issuance of Work Order)** insure in the joint names of the Service Recipient and the Contractor by naming Service Recipient as the beneficiary against all losses or damages from whatever cause arising, other than the excepted risks, for which he is responsible under the terms of the Contract and in such manner that the Service Recipient and the

Contractor are covered for the period stipulated for loss or damage arising from a cause, occurring prior to the commencement of the Period of maintenance. The realized claim amount by Service Recipient shall be reimbursed to the contractor after making good of the damages by the contractor.

Copy of the insurance policies shall be submitted prior to commencement of the work.

a) The Works for the time being executed to the estimated current Contract cost thereof **plus 10 percent** thereon to allow for any additional costs and professional fees resulting from the loss or damage.

b) The Constructional Plant and other things brought on to the Site by the Contractor to the replacement value of such Constructional Plant and other things.

c) It shall be the responsibility of the Contractor to notify the insurer of any change in nature and extent of the Works and to ensure the adequacy of the insurance cover at all times in accordance with the provisions of this Clause.

d) The contractor shall provide insurance coverage for all such workers who are engaged by him at Offices, Workplace, Factories & Establishments for execution of the projects, insurance policy(ies) for Rs.50,000/- per worker for all the workers either individual or through group insurance which shall cover other diseases including pandemic/epidemic outbreak diseases viz. Corona Covid-19 and other novel diseases. In view of the Order No. 40-3/2020-DM-I(A), Ministry of Home Affairs, Government of India dated 15th April 2020 and the Consolidated Guidelines of Ministry of Home Affairs, GOI, its national directives & SOP thereunder, it shall be a mandatory liability effective from the date of the aforesaid Order. The Contractor shall submit copies of the insurance policies and renewals thereof to RAHURI SEMEN STATION from time to time.

Such insurance shall be effected with an insurer and the Contractor shall, produce to the Engineer/RAHURI SEMEN STATION the policy or policies of insurance and the receipts for payments of the current premiums.

22.0 Damage to Persons and Property:

22.1 The Contractor shall, except if and so far as the Contract provides otherwise, indemnify the RAHURI SEMEN STATION against all losses and claims in respect of injuries or damage to any person or material

or physical damage to any property whatsoever which may arise out of or in consequence of the execution and against all claims, proceedings, damages, costs, charges and expenses whatsoever in respect of or in relation thereto except any compensation or damages for or with respect to:-

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

b) The right of the RAHURI SEMEN STATION to execute the Works or any part thereof on, over, under, in or through any land.

c) Injuries or damage to persons or property which are the unavoidable result of the execution or maintenance of the Works in accordance with the Contract.

d) Injuries or damage to persons or property resulting from any act or neglect of the Engineer or other Contractors, not being employed by the Contractor, or for or in respect of any claims, proceedings, damages, costs, charges and expenses in respect thereof or in relation thereto or where the injury or damage was contributed to by the Contractor, his servants or agents such part of compensation as may be just and equitable having regard to the extent of the responsibility of the Engineer or other Contractors for the damage or injury.

22.2 The contractor shall indemnify the RAHURI SEMEN STATION/Purchaser/Owner against all claims, proceedings, damages, costs, charges and expenses in respect of the matters referred to in the provision to **sub-clause (1)** of this Clause.

23.0 Third Party Insurance:

23.1 Before commencing the execution of the Works the Contractor, but without limiting his obligations and responsibilities under **Clause 22** hereof, shall insure against his liability for any material or physical damage, loss or injury which may occur to any property, including that of the owner/ RAHURI SEMEN STATION, or to any person, including any employee of the owner/ RAHURI SEMEN STATION, or by arising out of the execution of Works or in the carrying out of the Contract, otherwise than due to the matters, referred to in the provision to **Clause 22.1** hereof.

23.2 Such insurance shall be effected with an insurer. The Contractor shall, produce to the Engineer/ RAHURI SEMEN STATION the policy

or policies of insurance and the receipts for payment of the current premiums.

23.3 The terms shall include a provision whereby, in the event of any claim in respect of which the Contractor would be entitled to receive indemnity under the policy being brought or made against the RAHURI SEMEN STATION, the insurer will indemnify the RAHURI SEMEN STATION against such claims and any costs, charges and expenses in respect thereof.

23.4 Such insurance shall be for 10 % of the value of works with number of occurrence unlimited.

24.0 Accident or Injury to Workmen:

24.1 The RAHURI SEMEN STATION shall not be liable for or in respect of any damages or compensation payable at law in respect or in consequence of any accident or injury to any workman or other person in the employment of the Contractor or any sub- Contractor. The Contractor shall indemnify and keep indemnified the RAHURI SEMEN STATION against all such damages and compensation, save and except as aforesaid, and against all claims, proceedings, costs, charges and expenses whatsoever in respect thereof or in relation thereto. Where any case is instituted against the RAHURI SEMEN STATION, the Contractor shall implead himself as a party as if the case has been instituted against the Contractor.

24.2 The Contractor shall insure against such liability with an insurer and shall continue such insurance during the whole of the time that any persons are employed by him on the Works and shall, produce to the Engineer/ RAHURI SEMEN STATION such policy of insurance and the receipts for the payment of the current premium. Provided always that, in respect of any persons employed by any sub-contractor, the Contractor's obligation to insure as aforesaid under this sub-clause shall be satisfied if the sub-contractor shall have insured against the liability in respect of such persons in such manner that the RAHURI SEMEN STATION is indemnified under the policy, but the Contractor shall require such sub-contractor to produce to the Engineer/ RAHURI SEMEN STATION such policy of insurance and receipt for the payment of the current premium.

24.3 Employee State Insurance (ESI) Act:

The Contractor shall accept full and exclusive liabilities for the compliance with all obligations imposed by the ESI Act 1948, and the Contractor shall further defend, indemnify and hold the Owner/RAHURI SEMEN STATION harmless from any liabilities or

penalties which may be imposed by the Central, State or local authorities by reason of any asserted violation by Contractor or sub-contractor of the ESI Act, 1948 and also from all claims, suits or proceedings that may be brought against the Owner/RAHURI SEMEN STATION arising under, growing up or by reason of the work provided for by this Contract whether brought by the employees of the Contractor, by the third parties, or by Central or State Govt. authorities or any political sub-division thereof. The Contractor shall fill in with the ESI the declaration form and all other forms which may be required in respect of the Contractor's or sub-contractor's employees and who are employed by for the works provided for or those covered by ESI from time to time under the agreement. The Contractor shall deduct and secure the agreement of the sub-contractor and deduct the employees contribution as per the first schedule of the ESI Act from wages and affix the employees' contribution cards at wages payment intervals. The Contractor shall remit and secure that agreement of the sub- contractor to remit, the employees contribution as required by the Act. The Contractor shall maintain all codes and records as required under Act in respect of the employees and payment and the Contractor shall secure the agreement of the sub-contractor to maintain such records. Any expense incurred for the contribution or maintaining records shall be to the Contractor's account.

The Owner/RAHURI SEMEN STATION shall retain such amount as may be necessary from the total Contract cost until the Contractor shall furnish satisfactory proof the whole contribution as required by the ESI Act have been paid.

25.0 Remedy on Contractor's Failure to Insure:

25.1 The contractor shall not start work at site without prior written consent/ permission accorded by the site engineer which shall not be accorded in absence of, inter-alia, the required insurance policies. However, if the contractor fails to effect and keep in force the required insurance policies and commences work without authorisation, the Contractor shall be solely responsible for any damage or loss.

In addition to this, the failure of the contractor in meeting the above requirements would result in the following penalties:

a) A penalty @ 0.50% of the contract value shall be imposed (by way of deductions from his bills) on the contractor if the contractor fails to submit the required insurance policy and starts work without due authorisation.

b) If the contractor fails to extend / renew any of the existing insurance policies before expiry, for every default in any of the insurance policy a penalty @ 0.50% of the contract value shall be imposed (by way of deductions from his bills) on the contractor. The maximum penalty for such defaults would be limited to 1.0% of the contract value.

26.0 Giving of Notices and Payment of Fees:

26.1 The Contractor shall give all notices and pay all fees required to be given or paid by any National or State Statute, Ordinance, or Law, or any regulation, or bye-law of any local or other duly constituted authority in relation to the execution of the Works and by the rules and regulations of all public bodies and companies whose property or rights are affected or may be affected in any way by the Works.

26.2 The Contractor shall conform in all respects with the provisions of any such Statute, Ordinance or Law as aforesaid and the regulations or bye-laws of any local or other duly constituted authority which may be applicable to the Works and with such rules and regulations of public bodies and companies as aforesaid and shall keep the RAHURI SEMEN STATION indemnified against all penalties and liability of every kind for breach of any such Statute, Ordinance or Law, regulation or bye-law.

26.3 The RAHURI SEMEN STATION will repay or allow to the Contractor all such sums as the Engineer/RAHURI SEMEN STATION shall certify to have been properly payable and paid by the Contractor in respect of such fees.

27.0 Fossils, etc.:

27.1 All fossils, coins, articles of value or antiquity and structures and other remains or things of geological or archaeological interest discovered on the site of the Works shall as between the RAHURI SEMEN STATION and the Contractor be deemed to be the absolute property of the RAHURI SEMEN STATION. The Contractor shall take precautions to prevent his workmen or any other persons from removing or damaging any such article or thing and shall immediately upon discovery thereof and, before removal, acquaint the Engineer of such discovery and carry out the Engineer's orders as to the disposal of the same.

28.0 Patent Rights and Royalties:

28.1 The Contractor shall save harmless and indemnify the RAHURI SEMEN STATION 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.

29.0 Interference with Traffic and Adjoining Properties:

29.1 All operations necessary for the execution of the Works shall, so far as compliance with the requirements of the Contract permits, be carried on so as not to interfere unnecessarily or improperly with the convenience of the public, or the access to, use and occupation of public or private roads and footpaths to or of properties whether in the possession of the RAHURI SEMEN STATION or of any other person. The Contractor shall save harmless and indemnify the RAHURI SEMEN STATION in respect of all claims, proceedings, damages, costs, charges and expenses whatsoever arising out of, or in relation to, any such matters in so far as the Contractor is responsible therefore.

30.0 Extraordinary Traffic:

30.1 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.

30.2 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 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.

30.3 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 RAHURI SEMEN STATION in respect thereof and in respect of all claims, proceedings, damages, costs, charges and expenses in relation thereto.

30.4 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.

31.0 Opportunities for other Contractors:

31.1 The Contractor shall, in accordance with the requirements of the Engineer, afford all reasonable opportunities for carrying out their work to any other Contractors employed by the RAHURI SEMEN STATION/owner and their workmen and to the workmen of the RAHURI SEMEN STATION/owner and of any other duly constituted authorities who may be employed in the execution on or near the Site of any work not included in the Contract or of any Contract which the RAHURI SEMEN STATION may enter into in connection with or ancillary to the Works. If, however, the Contractor shall, on the written request of the Engineer, make available to any such other Contractor, or to the RAHURI SEMEN STATION or any such authority, any roads or ways for the maintenance of which the Contractor is responsible, or permit the use by any such of the Contractor's scaffolding or other plant on the Site, or provide any other service of whatsoever nature for any such, the RAHURI SEMEN STATION shall pay to the Contractor in respect of such use or service such sum or sums as shall, in the opinion of the Engineer, be reasonable.

32.0 Contractor to Keep Site Clear:

32.1 During the progress of the Works 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.,

33.0 Clearance of Site on Completion:

33.1 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.

L A B O U R

34.0 Engagement of Labour:

34.1 The Contractor shall make his own arrangements for the engagements of all labour, local or otherwise, and, save insofar as the Contract otherwise provides, for the transport, housing feeding and payment thereof. The Contractor to the extent possible and reasonable to employ staff and labour with required qualifications and experience from source within India.

34.2 The Owner/RAHURI SEMEN STATION may at their own discretion and convenience make available at the site, land for Contractor's field office, godown, workshop and assembly yard required for the execution of the Contract. The Contractor shall at his own cost construct all these temporary buildings and provide suitable water supply and sanitary arrangement approved by the Engineer.

34.3 The personnel so engaged by the Contractor shall be the employees of the Contractor and there shall exist no probity of Contract between the personnel so engaged and the RAHURI SEMEN STATION/Owner.

34.4 On completion of the works undertaken by the Contractor, he shall remove all temporary buildings erected by him and have the site cleaned as directed by the Engineer. If the Contractor shall fail to comply with these requirements, the Engineer may at the expenses of the Contractor remove such surplus and rubbish materials and dispose off the same as he deems fit and get the site cleared as aforesaid; the Contractor shall forthwith pay the amount of all expenses so incurred and shall have no claim in respect of any such surplus material disposed off as aforesaid. The owner reserves the right to ask the Contractor any time during the tendency of the Contract to vacate the land by giving **7 days** notice without giving any reason.

34.5 Land for residential accommodation for staff and labour may be made available at the discretion of the RAHURI SEMEN STATION / Engineer.

34.6 The Contractor shall, so far as is reasonably practicable, having regard to local conditions, provide on the Site, to the satisfaction of the Engineer an adequate supply of drinking and other water for the use of the Contractor's staff and work people.

34.7 The Contractor shall not, otherwise than in accordance with the Statutes, Ordinances and Government Regulations or Orders for the time being in force, import, sell, give, barter or otherwise dispose of any alcoholic liquor, or drugs or permit any such importation, sale, gift, barter or disposal by his sub-contractors, agents or employees.

34.8 The Contractor shall not give, barter or otherwise dispose of to any person or person, any arms or ammunitions of any kind or permit the same as aforesaid.

34.9 The Contractor shall in all dealings with labour in his employment, have due regard to all recognised festivals, days of rest and religious or other customs.

34.10 In the event of any outbreak of illness of an epidemic nature, the Contractor shall comply with and carry out such regulations, orders and requirements as may be made by the Government, or the local medical or sanitary authorities for the purpose of dealing with and overcoming the same.

34.11 The Contractor shall at all times take all reasonable precautions to prevent any unlawful, riotous or disorderly conduct by or amongst his employees and for the preservation of peace and protection of persons and property in the neighbourhood of the Works against the same. The Contractor shall be responsible to comply with the various labour laws such as **Contract Labour (R&A) Act, 1970, Payment of Wages Act, Minimum Wages Act, Provident Fund Act & Rules etc. in respect of the persons engaged by him.**

34.12 The Contractor shall be responsible for observance by his sub-contractors of the foregoing provisions.

35.0 Returns of Labour, etc.:

35.1 The Contractor shall submit to the RAHURI SEMEN STATION/Owner copies of the licence under the Contract Labour Act, if required and obtained by the Contractor and his Provident Fund Number. The Contractor shall, if required by the Engineer, also deliver to the

Engineer a return in detail in such form and at such intervals as the Engineer may prescribe showing the supervisory staff and the numbers of the several classes of labour from time to time employed by the Contractor on the Site and such information respecting Constructional Plant as the Engineer may require.

35.2 The Contractor shall not employ in connection with the works any person who has not **completed fifteen years of age.**

35.3 The Contractor shall in respect of labour employed by him comply with or cause to be complied with the provision of the various **labour laws and rules and regulations such as Contract Labour Act(R&A) Act, 1970, Payment of Wages Act, Minimum Wages Act, Provident Fund Act & Rules etc.** applicable to them in regard to all matters provided therein and shall indemnify the RAHURI SEMEN STATION in respect of all claims that may be made against the RAHURI SEMEN STATION for non-compliance thereof by the Contractor.

35.4 Notwithstanding anything contained herein, the Engineer may take such actions as may be necessary for compliance of the various labour laws and recover the costs thereof from the Contractor.

35.5 In the event of the Contractor committing a default or breach of any of the provisions of labour laws and rules and regulations as applicable, shall pay penalties as imposed by the statutory Authorities and shall indemnify and keep indemnified the RAHURI SEMEN STATION/Owner all such penalties and compensations.

MATERIALS AND WORKMANSHIP

36.0 Materials and Workmanship:

36.1 All materials and workmanship shall be of the respective kinds described in the Contract and in accordance with the Engineer's instructions and shall be subjected from time to time to such tests as the Engineer 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.

36.2 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.

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

37.0 Inspection of Operations:

37.1 The Engineer 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.

38.0 Examination of Work before covering up:

38.1 No work shall be covered up or put out of view without the approval of the Engineer and the Contractor shall afford full opportunity for the Engineer 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 Engineer whenever such work or foundations is or are ready or about to be ready for examination and the Engineer 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.

38.2 The Contractor shall uncover any part or parts of the Works or make openings in or through the same as the Engineer may from time to time direct and shall reinstate and make good such part or parts to the satisfaction of the Engineer. If any such part or parts have been put out of view after compliance with the requirement of **clause 38.1** 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 RAHURI SEMEN STATION, but in any other case all costs shall be borne by the Contractor.

39.0 Removal of Improper Work and Materials:

39.1 The Engineer 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 Engineer, are not in accordance with the Contract.

b) The substitution of proper and suitable materials and

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 Engineer, in accordance with the Contract.

39.2 In case of default on the part of the Contractor in carrying out such order, the RAHURI SEMEN STATION shall be entitled to employ and pay other persons to carry out the same and all expenses consequent thereon or incidental thereto shall be recoverable from the Contractor by the RAHURI SEMEN STATION or may be deducted by the RAHURI SEMEN STATION from any payment due or which may become due to the Contractor.

40.0 Suspension of Work:

40.1 The Contractor shall, on the written order of the Engineer, suspend the progress of the Works or any part thereof for such time or times and in such manner as the Engineer may consider necessary and shall during such suspension properly protect and secure the work, so far as is necessary in the opinion of the Engineer. The extra cost incurred by the Contractor in giving effect to the Engineer's instructions under this Clause shall be borne and paid by the RAHURI SEMEN STATION unless such suspension is:

a) Otherwise provided for in the Contract, or
b) Necessary by reasons of some default on the part of the Contractor, or
c) Necessary by reason of climatic conditions on the Site, or
d) Necessary for the proper execution of the Works or for the safety of the Works or any part thereof insofar as such necessity does not arise from any act or default by the Engineer or the RAHURI SEMEN STATION or from any of the excepted risks defined in **Clause 20** hereof.

Provided that the Contractor shall not be entitled to recover any such extra cost unless he gives written notice of his intention to claim to the Engineer within **fifteen days** of the Engineer's order. The Engineer shall settle and determine such extra payment and/or extension of time under **Clause 44** hereof to be made to the Contractor in respect of such claim as shall, in the opinion of the Engineer, be fair and reasonable.

40.2 If the progress of the Works or any part thereof is suspended on the written order of the Engineer and if permission to resume work is not given by the Engineer within a period of **ninety days** from the date of suspension then, unless such suspension is within paragraph (a), (b), (c) or (d) of sub-clause (1) of this Clause, the Contractor may serve a

written notice on the Engineer requiring permission within **twenty-eight days** from the receipt thereof to proceed with the Works, or that part thereof in regard to which progress is suspended and, if such permission is not granted within the time, the Contractor by a further written notice so served may, but is bound to, elect or treat the suspension where it affects only part of the Works as an omission of such part under **Clause 52** hereof, or, where it affects the whole Works, as an abandonment of the Contract by the Service Recipient/ RAHURI SEMEN STATION.

COMMENCEMENT TIME AND DELAYS

41.0 Commencement of Works:

41.1 The Contractor shall commence the Works on Site within the period named in the **Appendix to the Tender (Form of Bid)** after the receipt by him of a written order to this effect from the Engineer and shall proceed with the same with due expedition and without delay, except as may be expressly sanctioned or ordered by the Engineer, or be wholly beyond the Contractor's control.

42.0 Possession of Site:

42.1 Save insofar as the Contract may prescribe, the extent of portions of the Site of which the Contractor is to be given possession from time to time and the order in which such portions shall be made available to him and, subject to any requirement in the Contract as to the order in which the Works shall be executed, the RAHURI SEMEN STATION will, with the Engineer's written order to commence the Works, give to the Contractor possession of so much of the Site as may be required to enable the Contractor to commence and proceed with the execution of the Works in accordance with the programme referred to in **Clause 14** hereof, if any, and otherwise in accordance with such reasonable proposals of the Contractor as he shall, by written notice to the Engineer, make and will, from time to time as the Work proceed, give to the Contractor possession of such further portions of the Site as may be required to enable the Contractor to proceed with the execution of the Works with due dispatch in accordance with the said programmes or proposals, as the case may be. If the Contractor suffers delay from the failure on the part of the RAHURI SEMEN STATION to give possession in accordance with the terms of this Clause, the Engineer shall grant an extension of time for the completion of the Works as, in his opinion shall be fair.

42.2 The Contractor shall bear all costs and charges for special or temporary way leaves required by him in connection with access to the

Site. The Contractor shall also provide at his own cost any additional accommodation outside the Site required by him for the purposes of the Works.

43.0 Time for Completion:

43.1 Subject to any requirement in the Contract as to completion of any section of the Works before completion of the whole, the whole of the Works shall be completed, in accordance with the provisions of **Clause 49** hereof, within the time stated in the Contract or such extended time as may be allowed under **Clause 44** hereof.

43.2 Upon acceptance of the bid, the contractor shall submit to the Purchaser/RAHURI SEMEN STATION for his approval a comprehensive work programme in the form of **Bar chart** indicating the critical activities as well. After approval by the Purchaser/RAHURI SEMEN STATION, the contractor shall strictly adhere to the sequence of activities stated therein. The contractor shall review the actual progress of work in each month, in relation to the approved programme and shall inform the Purchaser/RAHURI SEMEN STATION. The submission to and approval by the Purchaser/RAHURI SEMEN STATION of the programme shall not relieve the contractor of any of his duty and responsibility under the contract.

44.0 Extension of Time of Completion:

44.1 Should the amount of extra or additional work of any kind or any cause of delay referred to in these Conditions, or exceptional adverse climatic conditions, or other special circumstances of any kind whatsoever which may occur, other than through a default of the Contractor, be such as fairly to entitle the Contractor to an extension of time for the completion of the Works, the Engineer shall determine the amount of such extension and shall notify the RAHURI SEMEN STATION and the Contractor accordingly. Provided that the Engineer is not bound to take in account any extra or additional work or other special circumstances unless the Contractor has within thirty days after such work has been commenced, or such circumstances have arisen, or as soon thereafter as is practicable, submitted to the Engineer full and detailed particulars of any extension of time to which he may consider himself entitled in order that submission may be investigated at the time.

45.0 No Night Work:

45.1 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

Engineer 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 Engineer. 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.

46.0 Rate of Progress:

46.1 If for any reason, which does not entitle the Contractor to an extension of time, the rate of progress of the Works or any section is at any time, in the opinion of the Engineer, too slow to ensure completion by the prescribed time or extended time for completion, the Engineer shall so notify the Contractor in writing and the Contractor shall thereupon take such steps as are necessary and the Engineer may approve to expedite progress so as to complete the Works or such section by the prescribed time or extended time. The Contractor shall not be entitled to any additional payment for taking such steps. If, as a result of any notice given by the Engineer under this Clause, the Contractor shall seek the Engineer's permission to do any work at night, such permission shall not be unreasonably refused.

47.0 Liquidated Damages for Delay:

47.1 If the Contractor shall fail to achieve completion of the Works within the time prescribed in the **Appendix to the Form of Bid,** then the Contractor shall pay to the RAHURI SEMEN STATION the sum at the rate **of 0.5% (zero point five percent)** of the amended up-to date total contract cost as liquidated damages for such default and not as a penalty for **each completed week** (week comprising of **7 days** including holidays and any incomplete week shall be ignored for the calculation of liquidated damages) which shall elapse between the time prescribed by **clause 43** hereof and the date of certified completion of the particular Works. The RAHURI SEMEN STATION may without prejudice to any other method of recovery, deduct the amount of such damages from any payment in its hands, due or which may become due to the Contractor. The payment or deduction of such damages shall not relieve the Contractor from his obligation to complete the Works, or from any other of his obligations and liabilities under the Contract.

47.2 The aggregate maximum of the liquidated damages payable to the RAHURI SEMEN STATION under this clause shall be subject to a maximum **of 10**% **(ten percent) of the total order / Contract cost** (i.e. value indicated in letter of acceptance or any subsequent amendment, accepted by the contractor).

47.3 If, before the completion of the whole of the Works any part or section of the Works has been certified by the Engineer as completed, pursuant to **Clause 49** hereof, and occupied by the Owner/RAHURI SEMEN STATION, the liquidated damages for delay shall, for any period of delay after such certificate be reduced in the proportion which the value of the part or section so certified bears to the value of the whole of the Works.

47.4 The criteria for deriving the liquidated damage shall be the actual value of works executed and the amended time of completion.

48.0 Bonus For Early Completion: NOT APPLICABLE FOR THIS CONTRACT.

49.0 Certification of Completion of Works:

49.1 When the whole of the Works have been virtually completed and have satisfactorily passed any final test that may be prescribed by the Contract, the Contractor may give a notice to that effect to the Engineer accompanied by an undertaking to finish any outstanding work during the period of Maintenance. Such notice and undertaking shall be in writing and shall be deemed to be a request by the Contractor for the Engineer to issue a Certificate of Completion in respect of the Works. The Engineer shall, on receipt of such notice either issue to the Contractor, with a copy to the Service Recipient/RAHURI SEMEN STATION, a Certificate of Completion stating the date on which, in his opinion, the Works were virtually completed in accordance with the Contract or give instructions in writing to the Contractor specifying all the work which, in the Engineer's opinion, requires to be done by the Contractor before the issue of such Certificate. The Engineer shall also notify the Contractor of any defects in the Works affecting virtual completion that may appear after such instructions and before completion of the works specified therein. The Contractor shall be entitled to receive such Certificate of Completion, or on the completion, to the satisfaction of the Engineer, of the works so specified and making good any defects so notified.

49.2 Similarly, in accordance with the procedure set out in **sub- clause (1)** of this Clause, the Contractor may request and the Engineer shall issue a Certificate of Completion in respect of :-

a) Any section of the Permanent Works in respect of which a separate time for completion is provided in the Contract and

b) Any substantial part of the Permanent Works which has been both completed to the satisfaction of the Engineer and occupied by the RAHURI SEMEN STATION/ Owner.

49.3 If any part of the Permanent Works shall have been virtually completed and shall have satisfactorily passed any final test that may be prescribed by the Contract, the Engineer may issue a Certificate of Completion in respect of that part of the Permanent Works before completion of the whole of the Works and, upon the issue of such Certificate, the Contractor shall be deemed to have undertaken to complete any outstanding work in that part of the Works during the Period of Maintenance.

49.4 Provided always that a Certificate of Completion given in respect of any section or part of the Permanent Works before completion of the whole shall not be deemed to certify completion of any ground or surfaces requiring reinstatement, unless such Certificate shall expressly so state.

MAINTENANCE AND DEFECTS (DEFECT LIABILITY)

50.0 Definition of Period of Maintenance:

50.1 In these conditions the expressions the expression "Period of Maintenance" shall mean the period of maintenance named in the appendix to the tender, calculated from the date of completion of the works, certified by the engineer in accordance with the **clause 49** hereof, or, in the event of more than one certificate having been issued by the engineer under the said clause, the period of maintenance the expression the " the works" shall be constructed accordingly.

50.2 To the intent that the works shall at or as soon as practicable after the expiry of the period of maintenance be delivered to the RAHURI SEMEN STATION in the condition required by the contract, fair wear and tear expected, to the satisfactory of the engineer, the contractor shall finish the work, if any, outstanding at the date of completion , as certified under the **clause 49** hereof, as soon as practicable after which date and shall execute all such work of repair, amendment, reconstruction, rectification and making good defects, imperfections, shrinkage or other faults as may be required of the Contractor in writing by the Engineer during the Period of Maintenance, or **within fifteen days** after its expiry as a result of an inspection made by or on behalf of the Engineer prior to its expiry.

50.3 All such work shall be carried out by the Contractor at his own expense if the necessity thereof shall, in the opinion of the Engineer, be due to the use of materials or workmanship not in accordance with

the Contract, or to neglect or failure on the part of the Contractor to comply with any obligation, expressed or implied, on the Contractor's part under the Contract.

50.4 If the Contractor shall fail to do any such work as aforesaid required by the Engineer, the Service Recipient/ RAHURI SEMEN STATION shall be entitled to employ and pay other persons to carry out the same and if such work is work which in the opinion of the Engineer, the Contractor was liable to do at his own expense under the Contract, then all expenses consequent thereon or incidental thereto shall be recoverable from the Contractor by the Service Recipient/ RAHURI SEMEN STATION or may be deducted by the Service Recipient/ RAHURI SEMEN STATION from any payment due or which may become due to the Contractor.

51.0 Contractor to Search:

51.1 The Contractor shall, if required by the Engineer in writing, search under the direction of the Engineer for the cause of any defect, imperfection or fault appearing during the progress of the Works or in the Period of Maintenance. Unless such defect, imperfection or fault shall be one for which the Contractor is liable under the Contract, the cost of the work carried out by the Contractor in searching as aforesaid shall be borne by the Service Recipient/ RAHURI SEMEN STATION. If such defect, imperfection or fault shall be one for which the Contractor is liable as aforesaid, the cost of the work carried out in searching as aforesaid shall be borne by the Contractor and he shall in such case repair, rectify and make good such defect, imperfection or fault at his own expense in accordance with the provisions of **Clause 50** hereof.

ALTERATIONS, ADDITIONS AND OMISSIONS

52.0 Variations:

52.1 The Engineer shall make any variations of the form, quality or quantity of the Works or any part thereof that may, in his opinion, be necessary and for that purpose, or if for any other reason it shall, in his opinion be desirable, he shall have power to order the Contractor to do any of the following :-

a) Increase or decrease the quantity of any work included in the Contract,

b) Omit any such work,

c) Change the character or quality or kind of any such work,

d) Change the levels, lines, position and dimensions of any part of the Works, and

e) Execute additional work of any kind necessary for the completion of the Works,

f) Change any specified sequence, method or timing of construction of any part of the works,

No such variation shall in any way vitiate or invalidate the Contract, but the value, if any, of all such variations shall be taken into account in ascertaining the amount of the Contract Price.

52.2 No such variations shall be made by the Contractor without an order in writing of the Engineer. Provided that no order in writing shall be required for increase or decrease in the quantity of any work where such increase or decrease is not the result of an order given under this Clause, but is the result of the quantities exceeding or being less than those stated in the Schedule of Quantities. Provided also that if for any reason the Engineer shall consider it desirable to give any such order verbally, the Contractor shall comply with such order and any confirmation in writing of such verbal order given by the Engineer, whether before or after the carrying out of the order, shall be deemed to be an order in writing within the meaning of this clause. Provided further that if the Contractor shall within seven days confirm in writing to the Engineer and such confirmation shall not be contradicted in writing within fourteen days by the Engineer, it shall be deemed to be an order in writing by the Engineer.

53.0 Valuation of Variations:

53.1 All extra or additional work done or work omitted by order of the Engineer shall be valued at the rates and prices set out in the Contract if, in the opinion of the Engineer, the same shall be applicable. If the Contract does not contain any rates or prices applicable to the extra or additional work, then suitable rates or prices shall be agreed upon between the Engineer and the Contractor. For settling the rates of the extra items, the contractor's cost for overheads and profits shall be taken as **15% (fifteen percent)** of the materials, labour cost etc.. In the event of disagreement the Engineer shall fix such rates or prices as shall, in his opinion, be reasonable and proper.

53.2 Provided that if the nature or amount of any omission or addition relative to the nature or amount of the whole of the Works or to any part thereof shall be such that, in the opinion of the Engineer, the rate or price contained in the Contract for any item of the Works is, by

reason of such omission or addition, rendered inapplicable, then a suitable rate or price shall be agreed upon between the Engineer and the Contractor. In case of disagreement the Engineer shall work out and fix the rate or the price.

53.3 In case of any class of work for which there is not such specification supplied by the Owner/Service Recipient/RAHURI SEMEN STATION as is mentioned in the tender documents such work shall be carried out in accordance with Indian Standard Specifications and if the I.S.S. do not cover the same the work should be carried out as per the standard Engineering practice subject to the approval of the Engineer.

Provided also that no increase or decrease under **clause 53.1** or variation of rate or price under **clause 53.2** of shall be made unless, as soon after the date of the order as is practicable and, in the case of extra or additional work, before the commencement of the work or as soon thereafter as is practicable, notice shall have been given in writing:-

a) By the Contractor to the Engineer of his intention to claim extra payment or a varied rate or price or

b) By the Engineer to the Contractor of his intention to vary a rate or price.

53.4 If, on certified completion of the whole of the works, it shall be found that a reduction or increase greater than **25 (Twenty five) per cent** of the sum named in the Letter of Acceptance, results from:-

a) The aggregate effect of all Variation Orders, and

b) All adjustments upon measurement of the estimated quantities set out in the Schedule of Quantities,

But not from any other cause, the amount of the Contract Price shall be adjusted by such sum as may be agreed between the Contractor and the Engineer or, failing agreement, fixed by the Engineer having regard to all material and relevant factors, including the Contractor's site and general overhead costs of the Contract.

53.5 The Contractor shall send to the Engineer once in every month an account giving particulars, as full and detailed as possible, of all claims for any additional payment to which the Contractor may consider himself entitled and of all extra or additional work ordered by the Engineer which he has executed during the preceding month.

No final or interim claim for payment for any such work or expense will be considered which has not been included in such particulars. Provided always that the Engineer shall be entitled to authorise payment to be made for any such work or expense, notwithstanding the Contractor's failure to comply with this condition, if the Contractor has, at the earliest practicable opportunity, notified the Engineer in writing that he intends to make a claim for such work.

PLANT, TEMPORARY WORKS AND MATERIALS

54.0 Plant, etc., Exclusive Use for the Works:

54.1 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 Engineer, which shall not be unreasonably withheld..

54.2 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.

54.3 The Service Recipient/ RAHURI SEMEN STATION shall not at any time be liable for the loss of or damage to any of the said Constructional Plant, Temporary Works or materials save as mentioned in **Clauses 20 and 66** hereof.

55.0 Approval of Materials, etc., not Implied:

55.1 The operation of **Clause 54** hereof shall not be deemed to imply any approval by the Engineer of the materials or other matters referred to therein nor shall it prevent the rejection of any such materials at any time by the Engineer.

MEASUREMENT

56.0 Quantities:

56.1 The quantities set out in the Schedule of Quantities **for Civil & IE** 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 fulfilment of his obligations under the Contract.

57.0 Works to be measured:

57.1 The Engineer shall, except as otherwise stated, ascertain and determine by measurement the value in terms of the Contract of work done in accordance with the Contract. He shall, when he requires any part or parts of the Works to be measured, give notice to the Contractor's authorised agent or representative, who shall forthwith attend or send a qualified agent to assist the Engineer in making such measurement, and shall furnish all particulars required by either of them. Should the Contractor not attend, or neglect or omit to send such agent, then the measurement made by the Engineer or approved by him shall be taken to be the correct measurement of the work. For the purpose of measuring such permanent work as is to be measured by records and drawings, the Engineer shall prepare records and drawings month by month of such work and the Contractor, as and when called upon to do so in writing, shall, within fourteen days, attend to examine and agree such records and drawings with the Engineer and shall sign the same when so agreed. If the Contractor does not so attend to examine and agree such records and drawings, they shall be taken to be correct. If, after examination of such records and drawings, the Contractor does not agree the same or does not sign the same as agreed, they shall nevertheless be taken to be correct, unless the Contractor shall, within fourteen days of such examination, lodge with the Engineer, for decision by the Engineer, notice in writing of the respects in which such records and drawings are claimed by him to be incorrect.

58.0 Method of Measurement:

58.1 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 the Section IV of Technical Specifications**. Only the latest editions of all the codes of practices including all latest official amendments and revisions shall be applicable.

58.2 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.

NOMINATED SUB-CONTRACTORS

59.0 Definitions of "Nominated Sub-Contractors":

59.1 All specialists, merchants, tradesmen and others executing any work or supplying any goods, materials or services, who may have been or be nominated or selected or approved by the Service Recipient/ RAHURI SEMEN STATION or the Engineer, and all persons to whom by virtue of the provisions of the Contract the Contractor is required to sub-let any work shall, in the execution of such work or the supply of such goods, materials or services, be deemed to be sub-Contractors employed by the Contractor and are referred to in this Contract as "nominated Sub-Contractors".

59.2 The Contractor shall not be required by the Service Recipient/ RAHURI SEMEN STATION or the Engineer or be deemed to be under any obligation to employ any nominated Sub-Contractor against whom the Contractor may raise reasonable objection, or who shall decline to enter into a sub-contract with the Contractor containing provisions :-

a) That in respect of the work, goods, materials or services the subject of the sub-contract, the nominated Sub- Contractor will undertake towards the Contractor the like obligations and liabilities as are imposed on the Contractor towards the Service Recipient/ RAHURI SEMEN STATION by the terms of the Contract and will save harmless and indemnify the Contractor from and against the same and from all claims, proceedings, damages, costs, charges and expenses whatsoever arising out of or in connection therewith, or arising out of or in connection with any failure to perform such obligations or to fulfil such liabilities, and

b) That the nominated Sub-Contractor will save harmless and indemnify the Contractor from and against any negligence by the nominated Sub-Contractor, his agents, workmen and servants and from and against any misuse by him or them of any Constructional Plant or Temporary Works provided by the Contractor for the purposes of the Contractor and from all claims as aforesaid.

59.3 If in any connection with any Provisional Sum the services to be provided include any matter of design or specification of any part of the permanent works or of any equipment or plant to be incorporated therein, such requirement shall be expressly stated in the Contract and shall be included in any nominated Sub-Contract. The nominated Sub-Contract shall specify that the nominated Sub-Contractor providing such services will save harmless and indemnify the Contractor from and against the same and from all claims, proceedings, damages, costs, charges and expenses whatsoever arising

out of or in connection with any failure to perform such obligations or to fulfil such liabilities.

59.4 For all work executed or goods, materials, or services supplied by any nominated Sub-Contractor, there shall be included in the Contract Price:-

a) The actual price paid or due to be paid by the Contractor, on the direction of the Engineer, and in accordance with the Sub-Contract;

b) The sum, if any, entered in the Schedule of Quantities for labour supplied by the Contractor in connection therewith, or if ordered by the Engineer as may be determined in accordance with **Clause 53** hereof;

c) In respect of all other charges and profit, a sum being a percentage rate of the actual price paid or due to be paid calculated, where provision for such is made in a special item provided in the Schedule of Quantities for such purpose.

59.5 Before issuing, under **Clause 60** hereof, any certificate, which includes any payment in respect of work done or goods, materials or services supplied by any nominated Sub- Contractor, the Engineer shall be entitled to demand from the Contractor reasonable proof that all payments, less retention, included in previous certificates in respect of the work or goods, materials or services of such nominated Sub-Contractor have been paid or discharged by the Contractor, in default whereof unless the Contractor shall

a) Inform the Engineer in writing that he has reasonable cause for withholding or refusing to make such payments and

b) Produce to the Engineer reasonable proof that he has so informed such nominated sub-contractor in writing,

the Service Recipient/ RAHURI SEMEN STATION shall be entitled to pay to such nominated sub- contractor direct, upon the certificate of the Engineer, all payments, less retention, provided for in the sub-contract, which the Contractor has failed to make to such nominated sub-contractor and to deduct by way of set-off the amount so paid by the Service Recipient/ RAHURI SEMEN STATION from any sums due or which may become due from the Service Recipient/ RAHURI SEMEN STATION to the Contractor. Provided always that, where the Engineer has certified and the Service Recipient/ RAHURI SEMEN STATION has paid direct as aforesaid, the Engineer shall in issuing any further certificate in favour of the Contractor deduct from the amount thereof the amount so paid, direct as aforesaid, but shall not

withhold or delay the issue of the certificate itself when due to be issued under the terms of the Contract.

59.6 In the event of a nominated sub-contractor, as hereinbefore defined, having undertaken towards the Contractor in respect of the work executed, or the goods, materials or services supplied by such nominated sub-contractor, any continuing obligation extending for a period exceeding that of the Period of Maintenance under the Contract, the Contractor shall at any time, after the expiry if the Period of Maintenance, assign to the Service Recipient/ RAHURI SEMEN STATION, at its request and cost, the benefit of such obligation for the unexpired duration thereof.

CERTIFICATE AND PAYMENT

60.0 Interim Payment Certificate:

60.1(a) The Contractor shall submit a bill or shall submit measurement of works executed for the preparation of the bill on computer of Service Recipient/ RAHURI SEMEN STATION for interim payment in 3 copies to the Engineer on a specified date in each month in a form approved by the Engineer. The bill for interim payment shall include the following items, as applicable, which shall be taken in to account in the sequence listed:-

i) The estimated Contract cost of the Permanent Works executed since the submission of the last bill, obtained by applying the base unit rates and prices in the Schedule of Quantities measured by the Engineer pursuant to **clause 57.** Additional part payment of an item in respect of initial part certification shall be admissible in the interim payment bill.

ii) The estimated Contract cost of the Permanent Works as obtained above executed up to the previous bill;

iii) The cumulative estimated Contract cost at base unit rates and prices of the Permanent Works up to the bill in question obtained by adding (i) and (ii) ;

iv) The cumulative amounts approved in respect of extra items executed up to the bill in question, obtained by applying the rates approved.

v) An amount reflecting any changes in cost pursuant to **clause 71 (Refer Clause 11.5 of Vol I Section I of this bidding document)** hereof;

vi) Any amount to be withheld under the retention provisions of **clause 60.3;**

vii) Any credit or debit for the period in question in respect of materials on site intended for, but not yet incorporated in , the Permanent Works in the amount and under the conditions set forth in **clause 60.2;**

viii) Any amount to be deducted on account of the mobilisation advance under the provisions set forth in **clause 60.5.**

ix) Any other sum to which the Contractor may be entitled under the Contract.

x) Deductions of Income tax shall be made on the gross amount of each bill as per the provision of the Income tax Act.

xi) Any amount to be deducted on account of water charges and power supply, if any, pursuant to **clause 5.4 & 6.2 of Section III, Special Conditions of Contract.**

xii) Any amount to be deducted on account of materials issued to the Contractor pursuant to **clause 7.1 of section III, Special Conditions of Contract.**

60.1(b) Within a reasonable period or any other agreed period of the receipt of the said bill with all required supporting documents for interim payment, it shall be approved or amended such that, in the Engineer's opinion, the certificate reflects the amount due to the Contractor in accordance with the Contract. In cases where there is difference of opinion as to the value of any item, the Engineer's view shall prevail.

60.2 Secured Advance for Material:

The Contractor shall be entitled to such sum as the Engineer may consider proper in respect of materials intended for but not yet incorporated in the Permanent Works provided that:

a) The materials are in accordance with the specification for the Permanent Works;

b) Such materials have been delivered to the site, and are properly stored and protected against loss or damage or deterioration to the satisfaction of the Engineer;

c) The Contractor's records of the requirements, orders, receipts and the use of materials are kept in a form approved by the Engineer and such records shall be available for inspection by the Engineer;

d) The Contractor shall submit with his running bill, the estimated value of the materials on site together with such documents as may be required by the Engineer for the purpose of the valuation of materials and providing evidence of ownership and payment therefore ;

e) The ownership of such materials shall be deemed to vest in the Service Recipient; and

f) Secured advance, against an undertaking in the prescribed format can be paid upto 75% of value of the material (90% of value of the material in case of cement, Reinforcement steel & Structural steel) brought and physically available at site. The value of such secured advance shall be worked out on the basis of basic rate available in purchase order or invoice rate of building material. The lower value of the two shall be payable as secured advance against material available at site. In case basic rate of building material is not indicated/ available in the purchase order, the value of such secured advance shall be worked out on the basis of invoice rate of building material. However, such secured advance in any case, shall not exceed 75% (90% of value of the material in case of cement, Reinforcement steel & Structural steel) of cost of material component of the quoted rate for relevant tender items. No advance will be given for perishable material, like sand, window glass, wood etc. The advance on material shall be recovered as soon as material is used & billed for.

g) 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 Board 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 Board 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 Board.

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 Board 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 Board 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 Board 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"

60.3 Retention Money:

a) A retention amounting to **5.0%** of the amount included in any monthly interim payment certificate pursuant to **clause 60.1** due to the Contractor on account of the Permanent Works executed by him shall be made by the Engineer in the first and following

certificates until such time as the cumulative total of such deductions shall amount **to 5%** of the total actual value of Work to be done;

b) If the Contractor so requests, the Purchaser/Service Recipient/ RAHURI SEMEN STATION may pay the cumulative amount of retention money to the Contractor upon lodgement with the Service Recipient/ RAHURI SEMEN STATION of a Bank guarantee issued by a Nationalized Indian Bank/ other banks like IDBI Bank treated/approved by RBI to be at par with Nationalized Banks for the limited purpose of acceptance of guarantee, or a foreign bank having branches in India**.** The acceptable form of Bank guarantee shall be strictly as given in **Section IX** of the bidding document.

c) Retention money in full shall be released to the Contractor upon successful completion of works along with full and final settlement of the contract. Provided always that, if at such time there shall remain to be executed by the Contractor any works ordered during such period pursuant to **clause 50 and 51 hereof**, the Purchaser/Service Recipient/ RAHURI SEMEN STATION shall be entitled to withhold payment until the completion of such works of so much of the balance of the retention money as shall, in the opinion of the Engineer, represent the cost of the works so remaining to be executed; and

d) No interest shall be paid by the Purchaser/Service Recipient/ RAHURI SEMEN STATION to the Contractor for the amount withheld as Retention Money.

60.4 The Engineer may by any Interim Payment Certificate make any corrections or modifications in any previous bills (other than one purporting to be a Final payment certificate) which shall have been issued by him and shall have power to modify or withhold any Interim Payment Certificate if the works or any part thereof are not being carried out to his satisfaction.

60.5 Mobilisation Advance Loan:

a) The Service Recipient/ RAHURI SEMEN STATION, if requested for, will make an advance loan to the Contractor for the costs of mobilisation in respect of the works in a lump sum amount equivalent to **20%** of the Order/Contract price excluding the costs of the materials to be supplied by the Owner/Service Recipient/ RAHURI SEMEN STATION, always provided that the value of the Contract is more than **Rs.10 lakh**. Payment of the loan will be due under separate certification by the Engineer after;

i) Execution of the **Form of Agreement** by the parties thereto,

ii) Provision by the Contractor of the Performance Security in accordance with **clause 10** hereof, and

iii) Provision by the Contractor of a bank guarantee equivalent to 110% of advance amount, valid till the delivery period of contract issued by a Nationalized Indian Bank/ other banks like IDBI Bank treated/approved by RBI to be at par with Nationalized Banks for the limited purpose of acceptance of guarantee, or a foreign bank having branches in India. The acceptable form of Bank guarantee shall be strictly as given in **Section IX** of the bidding document. The bank guarantee shall remain effective until the advance loan has been completely repaid by the Contractor out of current earnings under the Contract and certified accordingly by the Engineer.

b) The acceptable form of bank guarantee shall be as given in **Section IX** of bid document. The mobilization advance loan shall bear an **interest of 7.50 % (Seven and half percent) per annum on the outstanding principal amount.**

c) Recovery towards mobilisation advance paid shall be made proportionately **starting from the first interim R A Bill in a manner so as to recover the entire mobilization advance by the time 80% work is completed**. **In case the scope/value of work is reduced the % rate of recovery shall be enhanced suitably.**

60.6 All interim payments shall be treated as advance payments. On completion of the entire work, the Contractor shall submit his final bill. After verifying the final bill, the Service Recipient/ RAHURI SEMEN STATION will issue to the Contractor a statement (hereinafter called as the Final Account statement). The Contractor shall return the Final Account Statement duly signed as an acknowledgement of full and final value of work performed under the Contract and full & final settlement of the payment. On receipt of this statement back from the Contractor, the final payment shall be released.

61.0 Approval only by Maintenance Certificate:

61.1 No certificate other than the Maintenance Certificate referred to in **Clause 62** hereof shall be deemed to constitute approval of the Works.

62.0 Maintenance Certificate:

62.1 The Contract shall not be considered as completed until a Maintenance Certificate shall have been signed by the Engineer and delivered to the Service Recipient/ RAHURI SEMEN STATION stating that the Works have been completed and maintained to his satisfaction. The Maintenance Certificate shall be given by the Engineer after the expiry of the Period of Maintenance, or, if different periods of maintenance shall become applicable to different sections or parts of the Works, the expiry of the latest such period, or as soon thereafter as any works ordered during such period, pursuant to **Clause 50 and 51 hereof,** shall have been completed to the satisfaction of the Engineer and full effect shall be given to this Clause, not withstanding any previous entry on the Works or the taking possession, working or using thereof or any part thereof by the Service Recipient/ RAHURI SEMEN STATION/Purchaser.

62.2 The Service Recipient/ RAHURI SEMEN STATION shall not be liable to the Contractor for any matter or thing arising out of or in connection with the Contract or the execution of the works, unless the Contractor shall have made a claim in writing in respect thereof before the issuance of the Maintenance Certificate under this Clause.

62.3 Notwithstanding the issue of the Maintenance Certificate the Contractor and, subject to **clause 62.2,** the Service Recipient/ RAHURI SEMEN STATION shall remain liable for the fulfilment of any obligation incurred under the provisions of the Contract prior to the issue of the Maintenance Certificate which remains unperformed at the time such Certificate is issued and, for the purposes of determining the nature and extent of any such obligation, the Contract shall be deemed to remain in force between the parties hereto.

REMEDIES AND POWERS

63.0 Default of Contractor:

63.1 If the Contractor shall become bankrupt, or have a receiving order made against him, or shall present his petition in execution levied on his goods, or if the Engineer shall certify in writing to the Service Recipient/ RAHURI SEMEN STATION that in his opinion the Contractor: -

a) Has abandoned the Contract, or

b) Without reasonable excuse has failed to commence the works or has suspended the progress of the works for **28 days** after receiving from the Engineer written notice to proceed, or

c) Has failed to remove materials from the site or pull down and replace work for **30 days** after receiving from the Engineer written notice that the said materials or work had been condemned and rejected by the Engineer under these conditions, or

d) Despite previous warnings by the Engineer, in writing, is not executing the works in accordance with the Contract, or is persistently neglecting to carry out his obligations under the Contract, or

e) Has, to the detriment of good workmanship, or in defiance of the Engineer's instructions to the contrary, sub-let any part of the Contract.

Then the Service Recipient/ RAHURI SEMEN STATION may, after giving **15 day's** notice in writing to the Contractor, enter upon the site and the works and expel the Contractor there from and without thereby voiding the Contract, or releasing the Contractor from any of his obligations or liabilities under the Contract, or affecting the rights and powers conferred on the Service Recipient/ RAHURI SEMEN STATION or the Engineer by the Contract, and may himself complete the works or may employ any other Contractor to complete the works. The Service Recipient/ RAHURI SEMEN STATION or such other Contractor may use for such completion so much of the constructional plant, temporary works and materials, which have deemed to be reserved exclusively for the execution of the works, under the provisions of the Contract, as he or they may think proper, and the Service Recipient/ RAHURI SEMEN STATION may at any time, sell any of the said Constructional Plant, temporary works and unused materials including invocation of bank guarantees and apply the proceeds of sale in or towards the satisfaction of any sum(s) due or which may become due to him from the Contractor under the Contract .

63.2 The Engineer shall, as soon as may be practicable after any such entry and expulsion by the Service Recipient/RAHURI SEMEN STATION, fix and determine **ex parte**, or by or after reference to the parties, or after such investigation or enquiries as he may think fit to make or institute, and shall certify what amount, if any, had at the time of such entry and expulsion been reasonably earned by or would reasonably accrue to the Contractor in respect of work than actually done by him under the Contract and the value of any of the said unused or partially used materials, any Constructional Plant and any temporary works.

63.3 If the Service Recipient/ RAHURI SEMEN STATION shall enter and expel the Contractor under this clause, it shall not be liable to pay to

the Contractor any money on account of the Contract until the expiry of Period of Maintenance and thereafter until the costs of execution and maintenance, damages for delay in completion, if any, and all other expenses incurred by the Service Recipient/ RAHURI SEMEN STATION have been ascertained and the amount thereof certified by the Engineer. The Contractor shall then be entitled to receive only such sum(s), if any, as the Engineer may certify would have been payable to him upon due completion by him after deducting the said amount. If such amount shall exceed the sum which would have been payable to the Contractor on due completion by him, then the Contractor shall, upon demand, pay to the Service Recipient/ RAHURI SEMEN STATION the amount of such excess and it shall be deemed a debt due by the Contractor to the Service Recipient/RAHURI SEMEN STATION and shall be recoverable accordingly.

63.4 In such event, the Service Recipient/ RAHURI SEMEN STATION shall charge **15%** overhead to cover the departmental charges and the same shall be recovered form the Contractor.

63.5 No credit shall be allowed to the Contractor in case the amount spent by the Service Recipient/ RAHURI SEMEN STATION for a particular item which shall be less than the amount payable as per the tender amount.

64.0 Urgent Repairs:

64.1 If, by reason of any accident, or failure, or other event occurring to in or in connection with the works, or any part thereof, either during the execution of the works, or during the Period of Maintenance, any remedial or other work or repair shall, in the opinion of the Engineer, be urgently necessary for the safety of the works and the Contractor is unable or unwilling at once to do such work or repair, the Service Recipient/ RAHURI SEMEN STATION may employ and pay other persons to carry out such work or repair as the Engineer may consider necessary. If the work or repair so done by the Service Recipient/ RAHURI SEMEN STATION is work which, in the opinion of the Engineer, the Contractor was liable to do at his own expense under the Contract, all expenses properly incurred by the Service Recipient/ RAHURI SEMEN STATION in so doing shall be recoverable from the Contractor by the Service Recipient/ RAHURI SEMEN STATION, or may become due from the Contractor. Provided always that the Engineer, as the case may be, shall, as soon after the occurrence of any such emergency as may be reasonably practicable, notify the Contractor thereof in writing.

SPECIAL RISKS

65.0 No Liability for War etc.:

65.1 Notwithstanding anything in the Contract contained:-

The Contractor shall be under no liability whatsoever whether by way of indemnity or otherwise for or in respect of destruction of or damage to the works, save to work condemned under the provisions **of Clause 39** hereof prior to the occurrence of any special risk hereinafter mentioned, or to property whether of the Service Recipient/ RAHURI SEMEN STATION or of third parties, or for or in respect of injury or loss of life which is the consequence of any special risk as hereinafter defined. The Service Recipient/ RAHURI SEMEN STATION shall indemnify and save harmless the Contractor against and from the same and against and from all claims, proceedings, damages, costs, charges and expenses whatsoever arising there out or in connection therewith.

65.2 If the works or any material on the site, or any other property of the Contractor used or intended to be used for the purposes of the works, shall sustain destruction or damage by reason of any of the said special risks the Contractor shall be entitled to payment for:-

a) Any permanent work and for any materials so destroyed or damaged, and, as so far as may be required by the Engineer, or as may be necessary for the completion of the works, on the basis of costs plus such profit as the Engineer may certify to be reasonable

b) Replacing or making good any such destruction or damage of the works:

c) Replacing or making good such materials or other property of the Contractor used or intended to be used for the purposes of works.

65.3 Destruction, damage, injury or loss of life caused by the explosion or impact whenever and wherever occurring of any mine, bomb, shell, grenade or other projectile, missile, munitions or explosive of war, shall be deemed to be a consequence of the said special risks.

65.4 The Service Recipient/RAHURI SEMEN STATION shall repay to the Contractor any increased cost of or incidental to the execution of the work, other than such as may be attributable to the cost of reconstruction work condemned under the provisions of **Clause 39** hereof, prior to the occurrence of any special risk, which is however, attributable to or consequent on or the result of or in any way whatsoever connected with the said special risks, subject however to the provisions in this clause hereinafter contained in regard to outbreak of war, but Contractor shall as soon as any such increase of

cost shall come to his knowledge forthwith notify the Engineer thereof in writing.

65.5 The Special Risks are unprecedented flood, earthquake or other convulsion of nature, war, hostilities (whether war be declared or not) invasion, act of foreign enemies, the nuclear and the pressure wave risk described in **clause 20** hereof, or in so far as it relates to the country in which the works are being or are to be executed or maintained, rebellion, revolution, insurrection, military or usurped power, civil work, or unless solely restricted to the employees of the Contractor or of his Sub-Contractors and arising from the conduct of the works, riot, commotion or disorder.

65.6 If, during the currency of the Contract, there shall be an outbreak of war, whether war is declared or not, in any part of the world which, whether financially or otherwise, materially affects the execution of the works, the Contractor shall, until and unless the Contract is terminated under the provision of this Clause, continue to use his best endeavours to complete the execution of the works. Provided always that the Service Recipient/ RAHURI SEMEN STATION shall be entitled at any time after such outbreak of war to terminate the Contract by giving written notice to the Contractor and, upon such notice being given, this Contract shall, except as to the rights of the parties under this clause and to the operation of **clause 65.8** hereof, terminate, but without prejudice to the right of either party in respect of any antecedent breach thereof.

65.7 If the Contract shall be terminated under the provisions of the last preceding sub-clause the Contractor shall, with all reasonable despatch, remove from the site all constructional plant and shall give similar facilities to his sub-Contractors to do so.

65.8 If the Contract shall be terminated as aforesaid, the Contractor shall be paid by the Service Recipient/ RAHURI SEMEN STATION, as in so far as much amount or items shall not have already been covered by payments on account made to the Contractor, for all works executed prior to the date of termination at the rates and prices provided in the Contract and in addition:-

a) The amounts payable in respect of any preliminary terms, so far as the works or service comprised therein has been carried out or performed, and a proper proportion as certified by the Engineer of any such items, the work or service comprise in which has been partially carried out or performed.

b) The cost of materials or goods reasonably ordered for the works which shall have been delivered to the Contractor, or of which the

Contractor is legally liable to accept delivery, such materials or goods becoming the property of the Service Recipient/ RAHURI SEMEN STATION upon such payments being made by him.

c) A sum to be certified by the Engineer, being the amount of any expenditure reasonably incurred by the Contractor in the expectation of completing the whole of the works insofar as such expenditure shall not have been covered by the payments in this sub-clause before mentioned.

d) Any additional sum payable under the provision of the **clauses 65.1, 65.2, and 65.4.**

e) The reasonable cost of removal of construction plant under **clause 65.7** and, if required by the Contractor, return thereof to the Contractor's main plant yard in his country of registration or to any other destination, at no greater cost.

f) The reasonable cost of repatriation of all the Contractor's staff and workmen employed in or in connection with the works at the time of such termination.

Provided always that against any payments due from the Service Recipient/ RAHURI SEMEN STATION under this sub-clause, the Service Recipient/ RAHURI SEMEN STATION shall be entitled to be credited with any outstanding balances due from the Contractor for advances in respect of constructional plant and materials and any other sums which at the date of termination were recoverable by the Service Recipient/ RAHURI SEMEN STATION from the Contractor under the terms of the Contract.

66.0 Payment in the Event of Frustration:

66.1 If a war or other circumstances outside the control of both parties, arises after the Contract is made so that either party is prevented from fulfilling his Contractual obligation, or under the law governing the Contract, the parties are released from further performance, then the sum payable by the Service Recipient/ RAHURI SEMEN STATION to the Contractor in respect of the work executed shall be the same as that which would have been payable under **clause 65** hereof if the Contract had been terminated under the provisions of **clause 65** hereof.

67.0 Settlement of Disputes:

67.1 If the Contractor considers any work demanded of him to be outside the requirements of the Contract, or considers any drawings, record or

ruling of the Engineer on any matter in connection with or arising out of the Contract or the carrying out of the work to be unacceptable, he shall promptly ask the Engineer in writing, for written instructions of decision. There upon the Engineer shall give his written instructions or decision within a period of **thirty days** of such request.

67.2 Upon the receipt of the written instructions or decisions the Contractor shall promptly proceed without delay to comply with such instructions or decisions.

67.3 If the Engineer fails to give his instructions or decisions in writing within a period of **thirty days** after being requested, or if the Contractor is dissatisfied with the instructions and decisions appeal to the Service Recipient/ RAHURI SEMEN STATION which shall afford an opportunity to the Contractor to be heard and to offer an evidence in support of his appeal. The Service Recipient/ RAHURI SEMEN STATION shall give a decision within a period of **thirty days** after the Contractor has given the said evidence in support of his appeal.

67.4 If the Contractor is dissatisfied with this decision, the Contractor within a period of **thirty days** from the receipt of the decision shall indicate his intention to refer the dispute to Arbitration, failing which the said decision shall be final and conclusive.

68.0 Arbitration:

In the event of any dispute in the interpretation of the terms and conditions of this order/ agreement or difference of opinion between the parties or any point in the order / contract arising out of or in connection with the agreement/ accepted order/ contract or with regard to performance of any obligation hereunder by either party, the parties hereto shall use their best efforts to settle such disputes or difference of opinion amicably by mutual negotiations. In case no agreement is reached, either party may forthwith give to the order, a notice in writing of the existence of such question, dispute or difference of opinion and the same shall be referred to the adjudication of **sole arbitrator** to be appointed by "RAHURI SEMEN STATION" whose decision in the matter shall be final and binding on the parties. The arbitration proceedings shall be governed under the provisions of the **Indian Arbitration and Conciliation Act of 1996** and the rules thereunder or any statutory notification thereof for the time being in force. In the order/ contract, the venue of such arbitration shall be New **Delhi** and courts at New Delhi alone shall have jurisdiction regarding any matter arising out of order/ contract.

69.0 Notices:

69.1 All certificates, notices or written orders to be given by the Service Recipient/ RAHURI SEMEN STATION or by the Engineer to the Contractor under the terms of the Contract shall be served by sending by post to or delivering the same to the Contractor's principal place of business, or such other address as the Contractor shall nominate for this purpose.

69.2 All notices to be given to the Service Recipient/ RAHURI SEMEN STATION or to the Engineer under the terms of the Contract shall be served by sending by post or delivering the same to the respective addresses nominated for that purpose.

69.3 Either party may change a nominated address to another address in the country where the works are being executed by prior written notice to the other party and the Engineer may do so by prior written notice to both parties.

70.0 Default of Service Recipient/ RAHURI SEMEN STATION:

70.1 In the event of the Service Recipient/ RAHURI SEMEN STATION:-

a) Failing to pay to the Contractor the amount due under any certificate of the Engineer within **60 days** after the same shall have become due under the terms of the Contract, subject to any deduction that the Service Recipient/ RAHURI SEMEN STATION is entitled to make under the Contract, or

b) Interfering with or obstructing or refusing any required approval to the issue of any such certificate, or

c) Giving to the Contractor a formal notice that for any unforeseen reasons, it is impossible for Service Recipient/ RAHURI SEMEN STATION to meet its Contractual obligations.

The Contractor shall be entitled to terminate his employment under the Contract after giving thirty days prior written notice to the Service Recipient/ RAHURI SEMEN STATION, with a copy to the Engineer.

70.2 Upon the expiry of the **fourteen days** notice referred to in **clause 70.1**, the Contractor shall, notwithstanding the provisions of **clause 54.1** hereof, with all reasonable despatch, remove from the site all constructional plant brought by him thereon.

70.3 In the event of such termination the Service Recipient/ RAHURI SEMEN STATION shall be under the obligations to the Contractor in regard to payment as if the Contract had been terminated under the provisions of **clause 65** hereof, but, in addition to the payments specified in **clause 65.8** hereof, the Service Recipient/ RAHURI

SEMEN STATION shall pay to the Contractor the amount of any loss or damage to the Contractor arising out of or in connection with or by consequence of such termination, as are deemed reasonable & fair.

71.0 Changes in Cost and Legislation: (Refer Clause 11.5 of Vol I Section I of this bidding document)

72.0 Taxation:

72.1 The prices quoted by the Contractor shall include all applicable Taxes (GST), levies, cess and duties that may be levied according to the laws and regulations on the constructional plant, material and supplies acquired for the purpose of the Contract and on the services performed under the Contract. Nothing in the contract shall relieve the Contractor from his responsibility to pay any tax that may be levied on profits made by him in respect of the Contract. Any variation after receipt of bids on account of change in rates of applicable Taxes, levies, cess and duties shall be considered for payment provided the price break up is submitted by the party in their bid. If, any altogether new Tax, levy, cess and duty is imposed on such contract after the bid opening date, the same shall be considered for payment / reimbursement upon documentary evidence.

GST Notification No. 20/2017 (Central Tax – Rate) dated 22 August, 2019 is not applicable for this Job.

Applicable GST for this job is @18%. However, the actual GST shall be paid as per the prevailing rate at the time of billing.

72.2 The Contractor's staff, personnel and labour will be liable to pay personnel income taxes in respect of such of their salaries and wages as are chargeable under the laws and regulations for the time being in force, and the Contractor thereof as may be imposed on him by such laws and regulations.

73.0 Bribery and Collusion:

73.1 The Service Recipient/RAHURI SEMEN STATION shall be entitled to terminate the Contract and recover from the Contractor the amount of any loss resulting from such termination if the Contractor shall have offered or given to any person any gift or consideration of any kind as an inducement or reward for doing, or for bearing to do any action in relation to obtaining, or in the execution of Contract or any other Contract with the Service Recipient/ RAHURI SEMEN STATION, or if

any of the like acts shall have been done by any person employed by the Contractor or acting on his behalf (whether with or without the knowledge of the Contractor), or if the Contractor shall have come in to any agreement with another Contractor(s) whereby an agreed quotation or estimate shall be offered as a bid to the Service Recipient/ RAHURI SEMEN STATION by one or more Contractors.

73.2 In the event of such termination, the Contractor shall:

a) Proceed as provided in sub **clause 65.7** hereof, and

b) Be paid by the Service Recipient/RAHURI SEMEN STATION as provided in sub **clause 65.8** hereof, provided that any loss referred herein shall first be deducted.

74.0 Termination of Contract for Service Recipient / RAHURI SEMEN STATION' Convenience:

74.1 The Service Recipient/RAHURI SEMEN STATION shall be entitled to terminate this Contract at any time for its own convenience after giving **60 days** prior notice to the Contractor, with a copy to the Engineer.

74.2 In the event of such termination the Contractor:

a) Shall proceed as provided in **sub clause 65.7** hereof, and

b) Shall be paid by the Service Recipient/ RAHURI SEMEN STATION as provided in sub **clause 65.8** hereof.

SECTION – III

SPECIAL CONDITIONS OF CONTRACT

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Section III

SPECIAL CONDITIONS OF CONTRACT

1.0 General:

The following Special conditions of Contract shall supplement the General conditions of Contract, given in **Section II.** Wherever there is a conflict the provision herein shall prevail over those in the General conditions of Contract.

2.0 Taxes:

2.1 The prices quoted by the Contractor shall include all applicable Taxes (GST), levies, cess and duties that may be levied according to the laws and regulations on the constructional plant, material and supplies acquired for the purpose of the Contract and on the services performed under the Contract. Nothing in the contract shall relieve the Contractor from his responsibility to pay any tax that may be levied on profits made by him in respect of the Contract. Any variation after receipt of bids on account of change in rates of applicable Taxes, levies, cess and duties shall be considered for payment provided the price break up is submitted by the party in their bid. If, any altogether new Tax, levy, cess and duty is imposed on such contract after the bid opening date, the same shall be considered for payment / reimbursement upon documentary evidence.

3.0 Time of Completion:

3.1 The Contractor shall execute the Contract up to **10% increase** in the value of the works within the specified completion period of the Contract and no extension of time shall be granted. In case the increase in the value **exceeds 10%** of the Contract amount, proportionate extension of time shall be granted, for the entire amount of increase over the original Contract value.

4.0 Engineer's Office Accommodation & Project's Name Board:

4.1 The Contractor shall at his own cost provide a temporary furnished office accommodation **at the project sites** in the form of either three nos. of containers (Portable Office Cabins) each **20 sqm** (with AC) or approx. **60 Sq.m building area at the approved locations and as per approved plan** along with AC and toilet facility with electrical and water

connection. Further 4 Nos. office tables, 3Nos Cupboards, 8Nos. Chairs etc shall also be provided by Contractor for RSS site officers. Contractor shall provide free electricity during the duration of contract and shall liable for regular maintenance of the facilities. 1No. **A3 multifunctional printer** to be provided for site engineer separately with replacement of cartridge on time to time basis. 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 estimated contract amount is more than **Rs. 100 lakh**.

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

5.0 Water for Construction and Other Use:

5.1 Unless otherwise specified the Contractor shall make his own arrangement for water for the work and nothing extra shall be paid for the same.

5.2 The water used by the Contractor shall be fit for drinking as well as construction purposes to the satisfaction of the Site Engineer/Project Authority.

5.3 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/Engineer. 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.

5.4 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.

2. The water shall be provided at one point in the site at the discretion of the Engineer. The Contractor shall make its own arrangement for water connection and distribution pipe lines in the construction area.

3. The Owner/Project Authority shall not guarantee the maintenance of uninterrupted water supply. It will be the responsibility of the Contractor to make alternative arrangements for water supply at his own cost in the event of any break down so that the progress of work is not affected for want of water. No claim or damage or refund of water charges shall be entertained on account of such break down.

6.0 Power (Electricity) Supply:

6.1 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.

6.2 In case the ELECTRIC power supply is provided by the Purchaser/Owner/project Authority, it shall be on the following conditions:-

1. Electricity charges shall be recovered from each RA bill @ **0.5%** of net amount of work done of such bill.

2. The supply shall be made at one point in the site at the direction of the Engineer. 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 Purchaser/owner / project authority shall not guarantee the maintenance of uninterrupted electricity supply and voltage fluctuations etc. It will be the responsibility of the contractor to make alternative arrangements for electricity supply at his own cost in the event of any breakdown so that the progress of work is not affected for want of electricity. No claim or damage or refund of electricity charges shall be entertained on account of the above.

4. 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.

7.0 Materials to be issued by the Purchaser/Owner/Project Authority:
(Not applicable for this contract)

7.1 If the specification of the work provides for the use of any material of special description to be supplied from the Purchaser/Owner/Project Authority's stores or is required that the Contractor shall use certain stores to be provided by the Engineer, such materials and stores, and price to be charged therefore, as hereinafter mentioned being as practicable for the convenience of the Contractor , but not so as in any way to control the meaning or the effect of the Contract, the Contractor shall bound to purchase and shall be supplied with such materials and stores as are from time to time required to be used by him for the purpose of the Contract only. The sum due from the Contractor for the value of materials supplied by the Project Authority/Owner **plus 5%** of its value towards wastage shall be recovered from the interim bill on the basis of the actual consumption of the materials in the works covered and for which the interim bill has been prepared. After the completion of the works, the Contractor shall account for full quantity of the material supplied to him as per relevant clauses herein.

7.2 The value of the materials as may be issued to the Contractor by Purchaser/Owner/Project Authority shall be debited to the Contractor's account at the rate shown in the Schedule of material given **in Section VI (Schedule of material to be issued by owner/RSS)**of this bidding document and if they are not entered in the schedule, they will be debited at cost price, which for the purpose of the Contract shall include the cost of carriage and all other expenses whatsoever such as normal storage, supervision charges which shall have been incurred in obtaining the same at the Owner/Project Authority's stores. All materials so supplied to the Contractor shall remain the absolute property of the Purchaser/Owner/ Project Authority and shall not be removed on any account from the site of work unless specifically approved by the Engineer and shall be at all times open for inspection to the Engineer. Any such serviceable material remaining unused at the time of the completion or termination of the Contract shall be returned to the Purchaser/Owner/ Project Authority stores at a place as directed by the Engineer in perfectly good condition.

7.3 Conditions for Issue of Materials:

i) Materials specified as to be issued by the Purchaser/Owner/Project Authority will be supplied to the Contractor by the Engineer from his stores as given in the **`Schedule of material to be supplied by the Owner/ RSS in Section VI** of this bidding document. It shall be the responsibility of the Contractor to take delivery of the materials and arrange for its loading, transport and unloading at the site of works at his own cost. The material shall be issued during the working hours and as per the rules of the Purchaser/Owner/ Project Authority as framed from time to time.

ii) The Contractor shall bear all incidental charges for the storage and safe custody of the materials at site after they have been issued to him.

iii) Materials as specified to be issued by the Purchaser/Owner/Project Authority shall be issued in standard sizes and quantities obtained from the manufacturers.

iv) The Contractor shall construct suitable godown wherever required at the site of works for storing the issued materials safely against damage by rain, dampness, fire, theft etc. He shall also employ necessary watch and ward establishment for the purpose.

v) It shall be the duty of the Contractor to inspect material supplied to him at the time of taking delivery and satisfy himself that they are in good condition. After the materials have been delivered by the Purchaser/Owner/Project Authority, it shall be the responsibility of the Contractor to keep these in good condition and if the materials are lost or damaged, at any time the value thereof shall be recovered from the Contractor pursuant to **clause 7.4** hereof and **clause 5.0 of Section VI.**

vi) The Purchaser/Owner/Project Authority shall not be liable for delay in supply or non-supply of any material which they have undertaken to supply, where such failure or delay is due to natural calamities, act of enemies, transport and procurement difficulties and any circumstances beyond the control of the Purchaser/Owner/Project Authority. In no case, the Contractor shall be entitled to claim any compensation or loss by him on this account.

vii) It shall be the responsibility of the Contractor to arrange in time all materials required for the works other than those supplied by the Purchaser/Owner/ Project Authority. If, however, in the opinion of the Engineer the execution of the works is likely to be delayed due to the Contractor's inability to make arrangements for supply of such materials which normally he has to arrange for the Engineer shall have the right at his own discretion to issue such material if available with the Purchaser/Owner/ Project Authority or procure such materials from the market or elsewhere and the Contractor will be bound to take such materials at the rates decided by the Engineer.

This, however, shall not absolve the Contractor from the responsibility of making arrangement for the supply of such materials in part or full, should such situation occur nor shall this constitute a reason for delay in the work.

vii) Unless specifically approved by the Engineer, none of the materials supplied to the Contractor shall be utilised by the Contractor for manufacturing the item which can be obtained as supplied from standard manufacturer in finished form.

ix) The Contractor shall, if desired by the Engineer, be required to execute an indemnity bond in the prescribed form, for safe custody and accounting all materials issued by the Purchaser/ Owner/Project Authority.

x) The Contractor shall furnish to the Engineer sufficiently in advance the statement showing his requirement of the quantities of the materials to be supplied by the Purchaser/Owner/Project Authority and the time when the same will be required by him for the works, so as to enable the Engineer to make necessary arrangement for procurement and supply of the material.

xi) A day account of the materials issued by the owner shall be maintained by the Contractor indicating the daily receipt, consumption and balance in hand. This account shall be maintained in a manner prescribed by the Engineer along with all connected paper viz. requisition, issues etc. and shall be always available for in the Contractor's office at site.

xii) The Contractor should see that only the required quantity of the materials is issued. The Contractor shall not be entitled to cartage

and incidental charges for returning the surplus materials, if any , to the store wherefrom they were issued or to the place as directed by the Engineer.

xiii) Materials/equipment supplied by the purchaser/Owner / Project Authority shall not be utilised for any other purpose other than issued for.

xiv) Completion of the works and the receipt of unutilised materials issued to the Contractor by the Owner/Project Authority/Purchaser pursuant to **clause 7.3** herein. The Contractor shall submit the reconciliation statement of materials received, utilised in the works and wastage thereon. The wastage of materials so determined shall be accounted for pursuant to **clause 5.0** of **Section VI,** and the value thereof shall be recovered from the Contractor.

7.4 Notwithstanding anything contained to the contrary in any or all clauses of this Contract where any materials for the execution of the Contract are procured with the assistance of the Owner/ Project Authority/ Purchaser either by issue from Owner' stock or purchase made under orders, or permits or licenses issued by the Govt., the Contractor shall hold the said materials as trustee for the owner and use such materials economically and solely for the purpose of the Contract and not dispose them off without the permission of the Owner/ Project Authority/ Purchaser and return, if required by the Engineer, all surplus or unserviceable materials that may be left with him after the completion of the Contract or at its termination for any reason whatsoever on his being paid or credited such price as Engineer shall determine having due regard to the condition of the materials. The price allowed to the Contractor, however, shall not exceed the amount charged to him excluding the storage charges, if any, shall be decided by the Engineer. In the event of the breach of the aforesaid condition, the Contractor shall, in terms of the licenses or permits and /or for criminal breach of trust, be liable to compensate the Owner/ Project Authority/ Purchaser at double the item rate or at double the prevailing market rate if the material was issued free of charge or any higher rate in the event of those materials at that time having higher rate or not being available in the market, than any other rate to be determined by the Engineer.

8.0 Works in Existing Plant:

In cases where the works against this contract have to be carried out by successful bidder in an 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 any shut down is required by the contractor to work in a operating plant, the same shall be taken through RSS site in-charge from Project authorities after providing details & it has to be ensured that work is completed within the agreed shutdown period.

Contractor have to provide and erect 3m height barricade using suitable New/ old colour coated MS/ GI sheet and supporting structure all around the proposed buildings as decided by the Engineer in charge and as per project requirement. No additional payment will be given for the barricade works. After completion of the project work the same need to be dismantled and taken back by the contractor as decided by the Engineer in charge.

8.1 CCTV REQUIREMENT DURING CONSTRUCTION:NOT APPLICABLE

~~The bidder shall supply, install & commission High Resolution Video Camera (connected through CCTV system) at site to capture the live images of site execution activities at all the time. The recording of the CCTV footage of the works which are being carried out at site will be made available for the last 15 days only. The older data (>15 days) would get automatically deleted. The cameras is to be kept at strategic locations such and should have adequate range of not less than 50m. The cameras should be fitted with infra-red devise to capture night vision.~~

~~There has to be system where in LIVE coverage access be given to the Engineer in charge at project site only. The locations of all camera will be changed at strategic locations as per directions of Engineer in charge. The bidder shall submit the methodology for the same. The methodology to include the approximate nos. of cameras type of Cameras, Approx. locations of the cameras, ensuring Continuous power supply connectivity, etc. at all times. All cost associated towards~~

~~hardware, software, networking, connectivity, power supply etc. is deemed to be included in the contract price.~~

9.0 Cement/steel Consumption, Reconciliation and Variation for Cement/Steel Arranged & Supplied by Contractor:

9.1 **Cement**: On completion of work, the theoretical cement consumption shall be worked out. Over the theoretical consumption**, a variation up to – 2.5% (minus two 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 average (for the contract duration) market rate of one cement bag**. **Nothing extra will be paid for over consumption of cement above the theoretical cement consumption.**

9.2 **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 I S 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 by site engineer of RSS.

10.0 Storage of Building Materials and Construction Equipment:

10.1 The contractor shall make suitable arrangement at project site for storage of all the construction material and construction equipment being supplied by him. Suitable watch and ward arrangement shall be made by the contractor. This arrangement has to be done by the contractor at his own cost.

10.2 Cement shall be stored in separate godown with pucca floor, weather proof walls and roof. The cement bags shall be stacked horizontally, continuous in each line. The stacks shall be in the rows of **12 bags** high with a minimum clearance space of **600mm** between stacks and

peripheral walls. The capacity of the godown/Silos shall be minimum **2000 bags** or above as per requirement of the project and decided by the Engineer In-charge. The cement godown shall be dismantled & site shall be cleared after completion of the works.

10.3 The Colorcoated/Pre-painted sheet roofing shall be stacked strictly as per manufacturers' guideline and stored in a covered shed.

10.4 The fabrication yard for MS sections shall have a levelled pucca floor, and should be maintained dust free at all times. The structural sections shall be stacked & stored orderly so as to avoid initial warping of the sections.

11.0 Rate of Progress - Contractor's Schedule:

The schedule prepared by the Contractor shall be based on the normal day of eight hours of working plus a break of one hour. All Sundays and local holidays should be considered as the day of rest. The schedule shall thus be prepared considering above working conditions. The contractor shall plan the resources adequately to meet the schedule date of completion.

12.0 Mode (Drawings/specifications) of Execution:

The bid drawings/tender drawings displayed/presented for inspection are liable to changes to any extent and the work shall be executed as per construction/execution drawings & details released for execution in accordance with technical specifications & schedule of quantities. The items not covered under technical specifications, if any, shall be executed as per latest applicable BIS code of practice.

13.0 Basic rate of material indicated in schedule of quantities:

In case of Cement and reinforcement steel price adjustment shall be governed by clause **11.5 of Section-I (Instruction to Bidders) of the tender.**

In case of **material other than cement and steel (for which basic price is indicated in schedule of quantities),** rate difference (of actual procurement rate and basic rate) shall be paid / recovered, to/from the contractor, for any variation on either side of the basic price. However, price variation (if opted by the bidder for materials other than cement & reinforcement steel) shall be applicable for the value of the items

executed excluding the value of material covered by basic rate. The basic rates of material indicated in schedule of quantities & procured by contractor are to be fixed as per basic rate of material indicated in original tax paid purchase bill / invoice including all applicable taxes & duties indicated in original tax paid purchase bill / invoice.

14.0 Quality Control Engineer & QA-QC Lab:

14.1 The Contractor shall at his own cost deploy a dedicated and full time qualified quality control engineer (Civil & Structural works) at site throughout the entire duration of the contract. The engineer shall be a B.Tech (Civil) with minimum 5 years of experience OR a Diploma (Civil) with minimum 7years of experience specifically in the field of quality assurance and control of similar type of civil works. The quality engineer should be conversant with relevant IS codes, material testing procedures, record keeping/documentation, in-situ testing, quality conformance of bought out materials & quality of workmanship in various construction activities at project site. The CV & experience certificates of the quality engineer are to be submitted along with the bid document.

Non deployment, delay in deployment and /or withdrawal of quality engineer from project site without prior written permission of RSS Engineer in charge shall invite permanent deduction of Rs. 60,000/- (Rupees Sixty thousand) per month from the running bills. Thereafter, RShiS will be selecting the quality control engineer to be appointed by the contractor on their rolls for the entire duration of their contract with RSS. Nothing extra shall be paid by RSS on this account.

Above conditions at clause no. 14.1 is generally applicable for civil works contract value of Rs. 5.0 Crore and above.

14.2 The Contractor shall at his own cost construct and maintain for the total duration of the contract an onsite quality control laboratory of size not less than 4m x 3m with white board of size 4feetx3feet, proper working platform, foundations for testing machines and hard levelled floor at the approved location within the project site and as per approved plan by engineer in charge. The laboratory is to be equipped with all required equipment's/machines /instruments , power points etc. required for carrying out testing of various construction materials, in-situ tests etc. to implement the quality assurance plan & quality control processes as directed by Engineer-in-charge.

SECTION – IV

TECHNICAL SPECIFICATIONS
(CIVIL WORKS)

SECTION IV, IV-A & IV-B
TECHNICAL SPECIFICATIONS
For Civil, Internal Electrification, Borewell works, Water Lifting, Landscape Signages & Furniture's
TRADE INDEX

General Notes applicable for the
Technical Specifications (Section-IV) and Schedule of Quantities (SOQ)

1.1 Item or specifications not covered under the Section-IV (Technical Specifications) the work shall be carried out as per specifications of the latest applicable Indian Standards (I.S. Codes) with latest amendments as applicable or as directed by Engineer-in-Charge.

1.2 Unless specifically otherwise mentioned, all the applicable codes and standards published by the Indian Standard Institution (BIS) and all other standards which may be published by them before the date of receipt of tenders, shall govern in all respects of design, workmanship, quality and properties of materials and methods of testing, method of measurements etc.

1.3 Wherever any reference to any Indian Standard Specification occurs in the documents relating to this contract, the same shall be inclusive of all amendments issued there to or revisions thereof, if any, up to the date of receipt of tenders. In case there is no I.S.I. specification for the particular work, such work shall be carried out in accordance with the instructions in all respects and requirements of the Engineer-in-Charge.

1.4 For the items not covered under any of the specifications stated above, the work shall be executed as per manufacturers specifications/General good engineering practice/or as per direction of Engineer in charge. For the proprietary items, work shall be carried out as per the manufacturer's specifications/recommendations or as per the direction of Engineer-in-Charge.

1.5 In case of discrepancy between the item specification and those referred in the I.S. codes, item specification shall prevail.

1.6 Architectural drawings shall take precedence over plumbing, structural or other services drawings as to all dimensions. Contractor shall verify all dimensions at site and bring to the notice of the Engineer-in-Charge all the discrepancies or deviations noticed. Engineer in Charge's decision shall be final.

1.7 The contractor carrying out the construction work shall take effective measures to carefully open out all existing channels, culverts, bridges, pipelines, conduits, water courses, sewer, drains, electrical cables, transmission lines and their supports and all works buried or otherwise where such services have to be interfered with the purpose of the construction of the works. The contractor shall provide and arrange all necessary temporary supports and diversions if necessary across/ under/ even through along sides of the trenches and all other parts of construction work for all such channels, culverts, bridges, pipe lines, conduits.

1.8 The contractor shall arrange to carry out all works with least interference practicable with vehicular traffic and with existing waste water or storm water drainage arrangements and provide all necessary road barriers, fences, notices, lights, gangways, access crossings, diversions for traffic, temporary drains, dewatering channels, chutes pumping or water lifting arrangements and all other facilities for the proper execution of the works to the approval and satisfaction in all respects of the Engineer-in-Charge. Any work carried out by the contractor in this connection shall be deemed as temporary works incidental to the construction work.

1.9 The contractor shall provide the industrial buildings ready for equipment installation as per the timelines stipulated. Once the equipment installation commences by the other Mechanical, Electrical, Services and Utility (**MESU**) contractors appointed by the Purchaser/Project Authority/Service Recipient, further civil works in those buildings and the areas around shall be carried out by the civil contractor in harmony to the equipment installation, services and utility works as the laying/installation works progress and in close co-ordination with the Engineer-In-Charge. Also, there shall be certain areas and activities kept on hold for further construction, for taking inside, shifting, and erecting the equipment and services/Utilities by these MESU contractors as and when required. These areas shall be maintained properly by the civil contractor and further civil works shall be carried out once the same(holds) are cleared to take up further civil works as per the directions of the Engineer-In-Charge. It may become so that the construction materials, supporting, scaffoldings, and other construction

tools and machinery etc may have to be fully or partly shifted/relocated temporarily and frequently owing to the Equipment and Service/Utility installation by the MESU contractors, the same shall be accommodated by the civil contractor as and when necessary and as directed by the Engineer-In-Charge without any cost. The remaining civil works to be executed after or simultaneous to the installation of services and equipment etc; shall be carried out by the civil contractor using all the means of protections, coverings and with due care of the services and equipment already installed without any kind of damage, dirt, dust, droppings of cement/paint, scratches, moisture, splashing etc on them. All the civil works and foundations etc requirements related to the equipment/services installation or testing or commissioning or all of them shall be taken up immediately by civil contractor immediately upon issuance of the drawings or as per the instructions of Engineer-In-Charge at any stage of the execution keeping it at the highest priority always.

1.10 The approved samples of materials shall be maintained at site till the completion of work.

1.11 For examination and testing of materials and works at the site, the contractor shall provide all the modern testing and gauging equipment necessary but not limited to the followings;

(a) Surveying equipment (b) Steel tapes (c) Plumb bobs, (d) spirit levels, (e) Hammers (f) Micrometers (g) Thermometers, (h) Hydraulic test machine (i) Smoke test machine.

All such equipment shall be tested for calibration at NABL approved laboratory, if required by the Engineer in Charge. All testing equipment shall be preferably located in special room meant for the purpose.

1.12 REFERENCE POINTS :- Contractor shall provide permanent bench marks, flag tops and other reference points for the proper execution of work and these shall be preserved till the end of the work. All such reference points shall be in relation to the levels and locations given in the Engineer in Charge and plumbing drawings.

1.13 Primarily, Ordinary Pozzolana Cement (OPC) shall be used for all the works. Other types of cement can also be allowed based on the approval of the Structural Consultant and Engineer-In-Charge however without admitting any extra or additional cost/claim/rate.

TECHNICAL SPECIFICATION

1.00 - EARTH WORK

Scope:

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

Applicable Codes:

The following Bureau of Indian Standard Codes, unless otherwise specified herein, shall be applicable.

The following codes, standards and specifications are made a part of this specification. All standards, specifications, codes of practices referred to herein shall be the latest edition including all applicable official amendments and revisions. In case of discrepancy between the item specification and those referred in the following codes herein, item specification shall prevail.

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 duly 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: (100024824)

a) **Classification:**

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

i) **All kinds of soils (Manual/Mechanical Excavators):**

These shall include all kinds containing kankar, sand, silt, murum and / or shingle, gravel, clay, loam peat, ash, shale, mud, black cotton, river or nallah bed boulders, siding of roads, paths, water bound macadam, 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) **Rock (Mechanical Excavators/ Heating, Blasting or any other approved method):**

This shall include all types of rocks (Soft/Weathered/Hard) which are to be excavated with picks, hammer, crow bars, wedges OR mechanical means such as excavators, hydraulic breakers etc. OR has to be blasted and where blasting is prohibited has to be either heated or excavated by any other approved method as directed. This shall also include excavation in macadam and tarred roads and pavements.

They shall be stacked separately as specified in relevant item of work.

b) 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.

c) In all kinds of 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.

d) For excavation for drain work, 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.

e) 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.

f) 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 1:4:8 (1 part cement; 4 part coarse sand and 8 part coarse aggregate of nominal size 20mm) 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.

g) The trenches which are ready for concreting shall be got approved by the Engineer.

h) The excavated stacked earth shall be refilled in the trenches and sides of foundation in well compcated150-200mm thick 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.

i) 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.

j) 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.

k) 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.

l) **Mode of Measurement for Earth Work in Excavation Including Back Filling:**

i) **Lead: The maximum lead for stacking and disposal of the earth shall be 1000 Metres within the project site/premises of the Service Recipient or as specified in Schedule of Quantities.** 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.

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. Contractor shall provide information of lead in their earth work plan cum drawings well in advance before carrying out the works and in writing for approval of engineer-in-charge.

Any extra lead claimed without prior written approval and submission of drawings or measurements post carrying out of the earth works shall not be considered for payment.

ii) All excavation shall be measured net. Dimensions for purpose of payment shall be reckoned on the horizontal area of the excavation at the base for 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 keeping in mind the nature of the soil and safety of excavation**. However, if the excavation is deeper than 2 meters, the size of the trenches shall be made bigger by allowing steps of 50 cm on either side so as to keep slope 0.25:1. This shall be paid as per original tender rate if

executed at site. 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.

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 pumping, dredging and 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.

No deduction shall be made from the rate if the operations as specified above such a backfilling, lead, excavation in slope, bailing out of water, shoring, strutting, etc. are not required wholly or partially during the excavation.

1.02 Earth Work in Excavation for Depth Exceeding 1.50 M but not Exceeding 3.0 M:
(100024825)
The general specification shall be same as for the item 1.01 given above.

Mode of Measurement: Same as item no. 1.01

1.03 Earth Work in Excavation for Depth Exceeding 3.0 M but not Exceeding 4.5 M:
(100024826)
The general specification shall be same as for the item 1.01 given above.

Mode of Measurement: Same as item no. 1.01

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

Rocks which cannot be easily excavated with pick-axes, hammer, crow bars, wedges, **mechanical means such as excavators, hydraulic breakers etc.** but has to be either heated where blasting is prohibited or has to be blasted. They shall be stacked separately.

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. These stacks shall then be transported to various locations at site for reuse in masonry if required and directed by Engineer-in charge.

The materials which are not usable for masonry shall be disposed off within the project site as decided by Engineer in charge. 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. (1:4:8) (1 part cement: 4 part coarse sand: 8 part stone aggregate).** It should be understood that the measurement shall be payable up to the formation level as specified in drawing only.

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 contractor shall also obtain a valid blasting license from the authorities concerned, any fees on this account to be borne by the contractor. If permission for blasting is refused by Engineer, the rock shall be removed by wedging, pick barring, heating and quenching or other approved means/method by engineer-in-charge. 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. For excavation for drain and all road works, the sides and the bottoms should be to the required slope, shape and gradient.

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

misfired hole (but not nearer than 600 mm from it) and by exploding a new charge. Before leaving the site of work, the blaster of one shift shall inform the another blaster relieving him for the next shift, of any case of misfire and each such location shall be jointly inspected and the action to be taken in the matter shall be explained to the relieving blaster. The Engineer shall also be informed by the blaster of all the cases of misfires, their causes and steps taken in that connection.

Precaution against Misfire:-

The safety fuse shall be cut in an oblique direction with a knife. All saw dust shall be cleared from inside of the detonator. This can be done by blowing the detonator and tapping the open end. No tools shall be inserted in to the detonator for this purpose.

If there is water present or if the bore hole is damp, the junction of the fuse and detonator shall be made watertight by means of tough grease or any other suitable material.

The detonator shall be inserted into the cartridge so that about one third of the copper tube is left exposed outside the explosive. The safety fuse just above the detonator shall be securely tied in position in the cartridge. Water proof fuse only shall be used in the damp bore hole or when water is present in the bore hole.

If a misfire has been found to be due to defective fuse, detonator or dynamite, the entire consignment from which the fuse detonator or dynamite was taken shall be got inspected by the Engineer before resuming the blasting or returning the consignment.

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 instruct-ed by Engineer, with concrete of strength not less than cement concrete of nominal mix with ratio 1:4:8 (1 part cement:4 part coarse sand:8 part aggregates). 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 as per item no. 1.01. **However working spaces and excavation for inside slopes shall not be paid for all depths. Contractor may make such allowances in his rates to provide for excavation in side slopes keeping in mind the nature of the rock and safety of excavation**. 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.
Volume of rock excavated shall be reckoned on the horizontal area of the excavation at the base for 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. No payment will be made for excavations / over break beyond payment line specified. 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 as specified in SOQ 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.

c) **Other details specified in item no. 1.01 are applicable if not stated herein.**

1.05 Earth Work in Excavation in Rocks Depth Exceeding 1.50 M but not Exceeding 3.00 M:

The general specification is same as item no. 1.04

Mode of Measurement: Same as item no. 1.04

1.06 Earth Work in Excavation in Rocks Depth Exceeding 3.00 M but not Exceeding 4.5 M:

The general specification is same as item no. 1.04

Mode of Measurement: Same as item no. 1.04

1.07 Filling in Plinth with Selected Excavated Earth:

a) Filling in plinth above existing grade (NGL), in layers of 15-30 cm or as specified, watered and compacted with mechanical compaction machines or by hand as specified. The base surface shall be cleared of vegetation by up-rooting or any organic matter, prior to commencement of filling operation. Earth shall be free from shrubs, rank vegetation, grass, brushwood, organic or other any other foreign matter and deleterious materials etc. When filling reaches the 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 trimmed to the level/slope 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 8/10/12 tonnes rollers smooth wheeled or mechanical vibro-roller or mechanical plate compactor as directed, as rolling proceeds water sprinkling shall be done to assist consolidation. Relevant field tests are to be carried out as per 14.0 (Technical Specification), Quality Control Process.

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 from/to anywhere within the project site.**

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

1.08 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 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. If the fill has to be compacted, it shall be placed in layers not exceeding 150-300 mm or as specified 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 rate shall include all operations such as lead and transport, filling, watering and consolidating as directed.

Mode of Measurement: It shall be measured in CuM.

1.09 Filling in Plinth and Ground for land development with Earth Brought from Outside:
(100024836)

a) Filling shall be carried out only with material from approved sources in layers of 15-30 cm or as specified, watered, levelled and compacted with mechanical compaction machines or by hand as specified. The material and source shall be subject to prior approval of Engineer. **Desired testing of fill material is to be carried out to ascertain the suitability as recommended by consultant and nothing extra to be paid on this account.**

b) 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 such access road does not exist, at his cost.

c) 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, nothing extra to be paid on this account.

d) The compaction shall be carried out as specified in the item no. 1.07 for filling in plinth and as per item 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, loading, lead and transport, unloading, filling, levelling, watering, compaction, testing etc. to the satisfaction of engineer-in-charge as specified. Actual quantity of consolidated filling shall be measured and paid.

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

1.10 Providing and Filling Local Sand in Trenches, Plinth and Surrounding Areas:
(100024838)

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. The sand shall be clean and free from dust organic and foreign matter and its grading shall be as specified. 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.**

1.11 Providing and Laying Rubble/Metal Soling:
(100024839)

a) Rubble/metal used for packing under floors, foundations etc. shall be hard, durable rock, free from veins, flaws and other defects and approved by Engineer-in-charge prior to use. 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 well compacted approved 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/sand as directed , well watered and rammed/consolidated mechanically to the satisfaction of engineer-in-charge.

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.

1.12 Providing & Laying Brick Soling:

a) Bricks of approved quality shall be laid on edge or flat as per the item specification/drawing. 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.

1.13 Providing and Laying Dry Stone Pitching:
(100000482)

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 **in with stones of proper size, well driven with crow bars to ensure tight packing and complete filling of interstices followed by the remaining voids of the joint filling** with good earth. The earth shall be got approved by the Engineer before filling. **Such filling shall be carried out simultaneously with the placing in position of the large stones and shall in no case be permitted to fall behind. Final wedging shall be done with the largest sized chip practicable, each chip being well driven home with hammer so that no chip is possible of being picked up or removed by hand.**

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

Mode of Measurement It shall be measured in Cu.M/SqM as specified in Schedule of quantities. No deductions for voids.

1.14 Providing and Laying Dry Stone Pitching with Cement Pointing:

a) The general specification shall be same as the item no. 1.13 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 No1.13

1.15 Providing and Filling Dry Brickbats at all Levels: (100024843)

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.

1.16 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 as specified) 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 no. 1.12 etc complete

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

1.17 Carting Away Earth out side the Site:

(100024845)

Carting away the excavated surplus earth /rock stuff/ debris generated out of dismantling of brick work / concrete as specified in the schedule of the quantities out side of the site as specified in SOQ 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.

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

(100024846)

Supplying the chemicals and carrying out pre-construction Anti- termite treatment with CHLOROPYRIPHOS 20 EC @ 1 % concentration in aqueous emulsion OR Imidacloprid 30.50SC with 0.075% concentration 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. This work is to be got executed through an approved specialized agency as per their specifications.

Stages of treatment:-

a) Treatment for RCC foundations and basement

After the backfilling up to GL, the peripheral walls shall be treated at its both side up to 500mm depth at the rate of 7.5 Ltr/SqM. The treatment shall start at a depth of 500 mm below the ground level except when such ground level is raised or lowered by by filling or cutting after the foundations have been cast. In such cases, the depth of 500 mm shall be determined from the new soil level resulting from the filling or cutting and soil.

b) Treatment at the junction of the wall and floor

After the plinth filling is completed, both the sides of the walls at the junction of the wall and filling to be treated at the rate of 7.5 Ltr/SqM for a depth up to the original ground level. A small channel 30 mm X 30 mm shall be made at all the junctions of wall and columns with floor (before laying the sub-grade PCC) and holes shall be made with the iron rod moved backward and forward to break-up the earth at 150mm apart and the chemical emulsion shall be poured.

c) Floor treatment

The top surface of the consolidated earth within plinth walls shall be treated with Chemical emulsion at the rate of 5 Ltr / SqM of the surface before the sub-grade is laid. If the filled earth has been well compacted and the surface does not allow the emulsion to seep through, holes up to 50 to 75 mm deep

at 150 mm centres both ways may be made with 12 mm dia MS rod on the surface to facilitate saturation of the soil with the chemical emulsion.

d) Treatment of soil along the external perimeter of building

After the building is complete, the earth along the external perimeter of the building shall be treated for a depth of minimum 300mm with Chemical emulsion at the rate of 7.5 Ltr/SqM. The earth along the external perimeter shall be rodded at interval of 150 mm up to 300 mm depth. The rods shall be moved backward and forward parallel to the wall to break-up the earth and chemical emulsion poured. After the treatment, the earth shall be tamped back in place. Should the earth outside the building be graded on completion of building, this treatment should be carried out on completion of such grading.

e) Treatment of Soil surrounding Pipes, Wastes and Conduits

When pipes, wastes and conduits enter the soil inside the area of the foundations, soil surrounding the point of entry shall be loosened around each pipe, waste or conduit for a distance of 150 mm and to a depth of 75 mm before treatment is commenced. When they enter the soil external to the foundations, they shall be similarly treated at a distance of over 300 mm unless they stand clear of the walls of the building by about 75mm.

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

1.19 Jungle Clearance :

Clearing jungle including up-rooting of rank vegetation, thorny bushes, saplings, trees of girth (circumference) up to 300mm measured at a height of 1 metre above ground level, other vegetation cover, jungle plants, shrubs, climbers etc all in order to get the clear land having its original top layer including stacking all the removed debris, rubbish, vegetation, trees, saplings etc at the place as directed anywhere within site

including loading, unloading, applying all machineries and equipment, etc all complete as directed.

All holes or hollows formed due to removal of roots shall be filled up with earth rammed/compacted and levelled. Trees, poles, fences, signs, monuments, pipelines, cable etc within or adjacent to the area which are not required to be disturbed during jungle clearance shall be properly protected by the contractor at his own cost and nothing extra shall be payable.

All useful materials obtained from clearing and grubbing operation shall be stacked in the manner within the site premises as directed. Trunks and branches of trees shall be cleared of limbs and tops and stacked neatly at places indicated by Engineer within the site premises.

Mode of measurement: The area cleared shall be measured in SqM/Acre or as specified.

1.20 Earth Work in Excavation for Depth Exceeding 4.5 M but not Exceeding 6.0 M:
(100021617)
The general specification shall be same as for the item 1.01 given above.

Mode of Measurement: Same as item no. 1.01

1.21 Supply & Filling of Fly Ash and Earth in Layers (100026497)

Supply and filling of Fly ash and earth in layers (each layer should not exceed 150mm) with intermediate layer of compacted earth (Soil density of 98%) after every four layers of compacted depth of fly ash as directed by engineer in charge, including compacting each layer by rolling, ramming and watering, all complete as per drawing and directions of engineer in charge.

Mode of measurement: The area cleared shall be measured in cum or as specified.

FOR THE SPECIFICATIONS AND MODE OF MEASUREMENT OF ALL OTHER ITEMS, PLEASE REFER THE SCHEDULE OF QUANTITY SINCE THEY ARE SELF EXPLANATORY.

TECHNICAL SPECIFICATION

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.

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 (Parts I to VIII) Methods of test for aggregates for concrete.

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.
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 (Part I to V) Code of practice for concrete structures for storage of liquids.

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 scaffolds 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 (OPC)** in 50 kg bags. The use of bulk cement will be permitted only with the approval of Engineer. In case of non-availability or shortage of OPC/PSC, Pozzolana Portland Cement (PPC) may be allowed.

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.

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) If the cement is supplied by the Rahuri Semen Station

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 Rahur Semen Station, 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 contract 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: **As per latest provision in IS 383**

		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	**Percentage passing for**

Designation	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, is 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: **As per latest provision in IS 383**

		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 form 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 H_2SO_4. 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 SO4 Alkali)	400 mg/L	IS 3025-1964 (part 24)
Chlorides (as Cl)	500 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 Cement Concrete 1:5:10 (1 part cement: 5 part coarse sand: 10 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

2.03 [AX Item No. 100024763]
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 [AX Item No. 100024764]
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 [AX Item No. 100024765]
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 COMPRESSIE 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. Concrete Admixtures may be allowed to be used as per the recommendations of RMC manufacturer which may be non- approved make after necessary testing. 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 1part 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 reminder 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 the to 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 vibrator used**	**When vibrator 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 minimum equipment with operator shall be made available at Engineer's request (all must be in serviceable condition):

i) One concrete cube testing 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) Forty Eight cast iron cube moulds of 15 cm size, for Mortar : 12 cube moulds
iii) One Lab. balance to weigh up to 20 kg with sensitivity of 10gm and one up to 100 kg with sensitivity of 10 grms or as directed
iv) One set of sieves each for coarse and fine aggregates & power driven Sieve shaker
v) Three sets of slump cone complete with tamping rod
vi) A set of measures from 5 litre to 0.10 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) Two Pyconometers
xii) Three calibrated glass jar of 1 litre capacity.
xiii) Two Modified proctor mould
xiv) Five nos. core cutters
xv) Digital vernier caliperse – 1 no.
xvi) Hydrometer
xvii) Thickness gauge
xviii) Electronic measuring tape – 2 nos., Steel tapes (5.0 mtrs, 15 mtrs, 30 mtrs)
xix) Film/paint thickness measuring equipment (DFT machine - electronic)
xx) Temperature gun (temperature measuring equipment – electronic)
xxi) Rapid moisture machine
xxii) Sampling trays, sampling equipment

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) **Acceptance criteria for the cement concrete cubes tested at project sites (as per IS 456-2000-Amendment-4 May 2013** - Value of standard deviation should be established on the basis of results of 30 samples as provided in Table 11 of the above Code. Accordingly acceptance criteria of mean of the group of 4 non-overlapping consecutive test specified in Table 11 should be followed.

The samples where individual variations are more than +/- 15 % of average of three specimens should be declared invalid as per the provisions of the Clause 15.4 of the Code.

Frequency of sampling of concrete of each grade and sampling procedure to be adopted shall be in accordance with clause no 15.2 of IS 456:2000.
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.

C) 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 Napthalene base/ Polycarboxylate ether 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 sound-ness (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) sieve test (ii) test for organic impurities (iii) decapitation test for determining clay and silt content (iv) specific gravity test (v) test for unit weight and bulkage factor. Tests on coarse aggregate shall include (i) test for sieve analysis (ii) specific gravity and unit weight of dry loose and rodded aggregate (iii) soundness and alkali aggregate reactivity (iv) pertrographic 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, 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 x 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 far 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 contract 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.

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 than 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.

iii) Curing of concrete made of high alumna 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 it 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 from 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 than 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. (AX ITEM NO- 100000508)

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 [AX ITEM NO. 100000509) –APPLICABLE FOR M-30 RCC STRUCTURE TO ALL HEIGHTS FROM RAFT TO HIGHEST LEVEL] 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 [AX ITEM NO. 100000510]
Providing and laying M 20 mix concrete in super structures to all 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 Providing and laying RCC of mix M25 for structures to all height from highest plinth level. (AX ITEM NO- 100000511)

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

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

2.10 Providing and laying RCC of M 35 mix for structures below & up to highest plinth level. (AX ITEM NO- 100000564)

The general specification is same as per Item spec. no. 2.05 except change in the design mix proportion for M35 grade of concrete.

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

2.11 Providing and laying RCC of mix M35 for structures to all height from highest plinth level. (AX ITEM NO- 100024163)

The general specification is same as per Item spec. no. 2.05 except change in the design mix for M35 grade of concrete and for the 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 [AX ITEM NO. 100000519 – for M20 & 100000561 – for M25] Providing & laying RCC for equipment / machine foundation

The general specification is same as Item spec. no. 2.05(for M20) & 2.06 (for M25) 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.

2.14A [AX ITEM NO. 100000573 – for M35 & 100000574 – for M35]
Providing & laying RCC for equipment / machine foundation

The general specification is same as Item spec. no. 2.05(for M20) & 2.06 (for M35) 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 [AX ITEM NO. 100024772- M-25 Precast Cement Concrete slab, 50 - 150mm thick]
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- (100000521)

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 form 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 spleens 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 abruption 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 wok 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.

iii) In normal circumstances (generally where temperatures are above 20 Deg. Cent.) forms may be removed after expiry of the following periods:-

Structural members	**Ordinary Portland cement concrete**
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, striping time recommended above shall be suitably modified in conformity with the relevant IS code of practice or recommended by structural consultant. Suitable precautions need to be taken by contractor for the stripping / de-shuttering time for different members as recommended by structural consultant.

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 to all heights above highest plinth level. (100000522)

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

2.17A

Providing and erecting Form Work in all heights from raft to highest plinth level of all structures for all concrete elements of any shape, size & direction. (100022280)

The general specification is same as per Item spec. no. 2.16 except for form work shuttering & boxing using steel/Marine densified plywood shuttering materials of approved quality and for in all heights from raft to highest plinth level of all structures for all concrete elements of any shape, size & direction .

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 (100000530)

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 2.16under 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 above 12 M from the 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- 25 at all heights above 12 M from 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 [AX ITEM NO. 100000533]
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 [AX ITEM NO. 100001421, 100001422, 100001423, 100001424, 100001425 & 100001426]
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 fibber 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 [AX ITEM NO. 100000535]
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 [AX ITEM NO. 100000536]
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 **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.

2.31 ANCHOR FASTENERS (100020232 TO 100020235 & 100023378& 100023379)

ANCHOR FASTENERS – 8,10, 12, 16,20 & 32 mm DIA – THE SCHEDULE OF QUANTITY IS SELF EXPLANATORY FOR THE ITEMS.

2.32 REBARRING (100000539 TO 100000543)

REBARRING – 8,10, 12, 16 & 20mm DIA – THE SCHEDULE OF QUANTITY IS SELF EXPLANATORY FOR THE ITEMS.

2.33 Water Stopper (100022281 TO 100022282)

Water Stopper – 230mm & 150mm dia – THE SCHEDULE OF QUANTITY IS SELF EXPLANATORY FOR THE ITEMS.

2.34 Providing & Laying Cement Concrete Screed in M20: (100024165)

Providing and laying concrete screed 1:1.5:3 (1 part cement, 1.5 parts coarse sand and 3 parts stone aggregate 20mm and downgraded) on horizontal and sloped RCC roof terraces/gutters at all levels finished smooth with integral cement water proofing compound of approved make including rounding off the junction and corners with floors and walls complete as directed (Water proofing compound shall be paid under relevant item code). This item is for maintaining the desired slope in terrace/ floors etc. Average depth of concreting shall be computed as executed as directed by engineer in-charge.

Mode of Measurement: This shall be measured in cubic meter.

2.35 Provding & Laying of Vata: (100000592)

Providing and laying 150mm X 150mm size cement concrete & cement finish vata in proportion 1:2:4 (1 cement: 2 course sand : 4 part 10mm or down graded stone aggregates) including making and finishing zaries in wall etc. finish with good surface as directed.

Mode of Measurement: This shall be measured in running meter.

2.36 Providing & Applying Bonding Agent: (100000583)

Providing and applying concrete bonding compound of approved or equivalent make to old / new concrete surfaces at all levels, in vertical and horizontal planes as directed by engineer after necessary chipping & cleaning surface dust free.

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

FOR THE SPECIFICATIONS AND MODE OF MEASUREMENT OF ALL OTHER ITEMS, PLEASE REFER THE SCHEDULE OF QUANTITY SINCE THEY ARE SELF EXPLAINATORY.

TECHNICAL SPECIFICATION

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 (Item: 100025263)

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 lying. 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. (Item: 100024803)

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

3.02(b) Providing and constructing "Fly Ash Brick Masonry" in foundation at all levels below and up to highest plinth level. (100024818)

The general specification is same as per Item spec. no. 3.01. But for Fly ash bricks masonry work using (230 /250 mm x 115/125 mm x 75 mm size) with minimum Crushing strength of 50 kg./sqcm & it includes scaffolding, staging etc as required.

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

3.02(c) Providing and constructing "Fly Ash Brick Masonry" in Super structure at all heights above highest plinth level. (100024819)

The general specification is same as per Item spec. no. 3.01. But for Fly ash bricks masonry work using (230 /250 mm x 115/125 mm x 75 mm size) with minimum Crushing strength of 50 kg./sqcm & it includes scaffolding, staging etc as required.

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

3.03 [AX ITEM NO. 100024804]
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.

3.03(b) [AX ITEM NO. 100000611]
Providing and constructing 115 mm "Fly ash bricks masonry" in partition at all levels CM in 1:4 (1 part of cement:4 part of coarse sand)

The general specification is same as per Item spec. no. 3.03. But for Fly ash bricks masonry work using (230 /250 mm x 115/125 mm x 75 mm size) with minimum Crushing strength of 50 kg./sqcm & it includes scaffolding, staging etc as required.
Mode of Measurement: Same as per Item spec. no. 3.03

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 (100000601)

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 racked 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 [AX ITEM NO. 10000603]
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 [AX ITEM NO. 100000604]
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 spauls 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 [AX ITEM NO. 100000605]

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 racked 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 [AX ITEM NO. 100000607]
Providing and constructing Coursed rubble masonry in superstructure

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

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

3.12 Providing and constructing of autoclaved cellular concrete (ACC) block masonry (100019485)

3.12.1 Terminology

For the purpose of this standard, the following definitions shall apply.

3.12.1.1 Bond Beam

a) Nominal Bond Beam - A beam made of reinforced concrete or of U-shaped precast concrete elements subsequently filled solid with reinforced concrete built integrally with a masonry wall, but intended only as a continuous tension member.

b) Structural Bond Beam - A reinforced concrete beam built integrally with a masonry wall as a structural member and designed in accordance with structural engineering practice, primarily to transmit lateral loading on the wall to other connecting structural elements.

3.12.1.2 Concrete Block: A precast concrete masonry unit either solid or hollow.

3.12.1.3 Drying shrinkage: The difference between the length of specimen which has been immersed in water and then subsequently dried to constant length, all under specified conditions, expressed as a percentage of the dry length of the specimen.

3.12.1.4 Joint reinforcement: The reinforcement embedded in mortar between masonry blocks normally as continuous horizontal element.

3.12.1.5 Moisture movement: The difference between the lengths of the specimen when dried to constant length and when subsequently immersed in water, all under specified conditions, expressed as a percentage of the dry length of the specimen.

3.12.2 Materials

3.12.2.1 Masonry Units - The masonry units shall be autoclaved cellular (aerated concrete blocks conforming to IS: 2185 (Part 3) – 1984.

3.12.2.2 Cement - Cement shall conform to IS: 269 - 19761 or IS: 455-1976 or IS: 1489 - 1976.

3.12.2.3 Lime - Lime shall conform to IS: 712 - 1984.The lime shall be of class C, unless otherwise specified. All lime other than dry hydrated lime shall be fully slaked in accordance with IS: 1635 - 1975.

3.12.2.4 Water - Water shall satisfy the requirements specified in IS: 456-1978.

3.12.2.5 Sand for mortar shall generally conform to the requirements of IS: 2116 - 1980 or to the requirements of IS: 383 - 1970 (except for particle size grading which shall conform to IS: 2116 - 1980).

3.12.2.6 Fly Ash - Fly ash shall conform to IS: 3812 – 1981.

3.12.2.7 Calcined Clay Pozzolana - Calcined clay pozzolana shall conform to IS: 1344 – 1981.

3.12.2.8 Reinforcement - Reinforcement used shall conform to the following:

a) Mild steel Grade 1 or Grade 2 bars conforming to IS: 432 (Part 1) – 1982.
b) Mild steel bars conforming to IS: 226 – 1975.
c) Hard drawn steel wire conforming to IS: 432 (Part 2) – 1982.
d) Mild steel wire conforming to IS: 280 - 1978.
e) Welded wire fabric conforming to IS: 1566 – 1982.
f) High strength deformed bars conforming to IS: 1786 – 1985.

3.12.2.9 Mortar

a) Cement-lime-sand mortar, cement-sand mortar or lime-pozzolana-sand mortar generally conforming to IS: 2250 - 1981 shall be used.

b) The blocks shall be embedded with a mortar, the strength of which is relatively lower than that of the mix used for making blocks in order to avoid the formation of cracks. 1: 6 cement-sand mortar shall be used.

c) All mortar shall be prepared in accordance with IS: 2250 - 1981. All mortar when mixed shall have a consistency value of 90 to 130 mm when determined in accordance with Appendix B of IS: 2250 – 1981.

d) As a substitute to lime mixed cement -sand paste, it is advisable to use chemical based mortar. Refer approved brand list for product's manufacture's name, code, etc.

3.12.3 Design considerations

3.12.3.1 Choice of type of walls: Autoclaved cellular concrete blocks may be employed for both load bearing and non-load bearing internal and external walls. The wall thickness shall be designed in accordance with the provisions of IS: 1905 – 1980.

Autoclaved cellular concrete blocks shall not be used in foundations and for masonry below damp-proof course.

3.12.3.2 Strength & stability: Autoclaved cellular concrete blocks may be employed for both load bearing and non-load bearing internal and external walls. The wall thickness shall be designed in accordance with the provisions of IS: 1905 – 1980.

3.12.3.3 Avoidance of crack formation

The major causes of cracks in the structures of the cellular concrete blocks or partitions and measures for their prevention are described below.

a) Structural Movements

Cracks may occur due to alterations in length, curvature or orientation of the structural members enclosing a wall or partition due to load settlement, thermal expansion or changes in moisture content. The precautions to be taken for prevention shall be as described below.

In the case of framed structures, erection of partitions and panel walls shall be delayed wherever possible until the frame has taken up, as much as possible, any deformation occurring due to structural movements.

Floor deformation and movement - The floor upon which a partition is built may deflect under load brought upon it after it is built. Where such deflections tend to create non-continuous bearing, the partition shall be strong enough to span between the points of least floor deflection or shall be capable of adapting itself to the altered conditions of support without cracking. This may be achieved by embedding wires of minimum 3 mm diameter mild steel or galvanized steel or welded wire fabric strip in bed joints in cement mortar 1: 2 after every 900 mm to 1200 mm height.

i. Ceiling deflection and movement - A ceiling above a partition wall may deflect under loads applied after its erection, or through thermal or other movements. To avoid cracking as a result of such deflection, the partition wall shall be separated from the ceiling by a gap or by a layer of resilient material or lean mortar. Where this cannot be done as in the case of plastered finishes, the risk of cracking may be diminished by forming a cut between the ceiling plaster and the wall plaster.

ii. Defection or movement of structural abutments - Walls, columns or other structural elements against which a wall or partition abuts may deflect or move because of load, settlement, shrinkage or thermal effects. In order to avoid cracking of walls or partitions as a result of such movements, a slip joint shall be provided where possible, preferably packed with a resilient material or lean mortar.

iii. Cracks in partition walls may occur at the corners of door frames and window frames at lintel level or sill level. It may, therefore, be desirable to provide a nominal reinforced concrete bond beam at sill level and vertical reinforced concrete stud at either side of vertical members of frames which may in addition provide sufficient anchorage for the holdfast.

b) Control of wall movement accompanying temperature and moisture changes

Cracking in concrete masonry walls is often due to tensile stresses which develop when wall movements accompanying temperature and moisture change are restrained by other elements of the building, or when concrete masonry places restraint on the movement of adjoining elements.

There are three methods of controlling cracking in concrete masonry structures:

i. Specifying a limit on the moisture content of masonry units at the time of delivery and construction

ii. Incorporating steel reinforcement either in the form of nominal bond beams or horizontal joint reinforcement

iii. Providing control joints to accommodate the movement

In all concrete masonry construction it is essential to employ only moisture-controlled units. Their use, combined with the provision of control joints, is generally adequate to prevent cracking in, concrete masonry walls. However, bond beams or joint reinforcement, or both in different locations as considered suitable, may also be used in addition to the above.

c) Nominal Bond Beams:

Bond beams, the use of which as structural members has been referred to in 3.12.3.4, also serve as a. means of crack control. Nominal bond

beams shall be built in the same manner as the structural bond beams with a minimum reinforcement of two 8 mm diameter mild steel bars or two 6 mm diameter high strength deformed bars. Their value for this purpose is due to the increased strength and stiffness they provide to a masonry wall. As a means of crack control, the area of influence of a bond beam shall normally be presumed to extend 600 mm above and below its location in the wall. In walls with-out openings they shall be spaced 1200 apart and may be of any length up to a maximum of 18 m (see Table 1).

Nominal bond beams shall be discontinuous at control joints, but practice here varies depending upon structural requirements. Dummy joints shall be formed when a bond beam is continuous at a control joint.

3.12.4 Storage and handling of materials

The blocks shall be stored in such a way as to avoid any contact with moisture on the site. They shall be stock piled on planks or other supports free from contact with the ground and covered to protect against wetting. The blocks shall be handled with care and damaged units shall be rejected.

Cement, lime, aggregates and other masonry materials shall be stored and hauled as laid down in the relevant Indian Standard specifications for these materials.

3.12.5 Preparatory Work

Wetting of Blocks - These blocks need not be wetted before or during the laying in the walls; in case the climatic condition so required, the top and the sides of the blocks may be slightly moistened so as to prevent absorption of water from the mortar and ensure the development of the required bond with the mortar.

3.12.6 Laying of ACC block masonry in super structure

a) Use of Mortar in Masonry:

Mortar shall not be spread so much ahead of the actual laying of the units that it tends to stiffen and loose its plasticity, thereby resulting in poor bond. For most of the work the joints, both horizontal and vertical, shall be 10 mm thick. Except in the case of extruded joint construction,

the mortar joints shall be struck off flush with wall surface and when the mortar has started stiffening, it shall be compressed with a rounded or U-shaped tool. This compaction is important, since mortar, while hardening has a tendency to shrink slightly and thus pull away from the edges of the block. The mortar shall be pressed against the units with a jointing tool after the mortar has stiffened to affect intimate contact between the mortar and the masonry unit and obtain a water-tight joint.

b) Operations for laying Block Masonry

i. First Course - The first course of cellular concrete block masonry shall be laid with greater care, making sure that it is properly aligned, levelled and plumbed, as this may assist the mason in laying succeeding courses to obtain a straight and truly vertical wall. The first layer of cellular concrete block masonry on plinth should preferably have groove/offset outside so that rain water coming down the wall falls out.

Before laying the first course, the alignment of the wall shall be marked on the damp-proof course. The blocks for this course shall first be laid dry, that is, without mortar along a string stretched between properly located corners of the wall in order to determine the correct position of the blocks including those of the cross walls jointing it and also adjust their spacing. When the blocks are set in proper position, the two corner blocks shall be removed, a mortar bed spread and these blocks laid back in place truly level and plumb. The string shall then be stretched tightly along the faces of two corner blocks and the faces of the intermediate ones adjusted to coincide with the line. Thereafter, each block shall be removed and relaid over a bed of mortar. After every three or four blocks have been laid, their correct alignment, level and verticality shall be carefully checked.

ii. The construction of walls may be started either at the corners first or started from one end proceeding in the other direction. If the corners of the wall are built first, they shall be built four or five courses higher than the centre of the wall. As each course is laid at the corner, it shall be checked for alignment and level and for being plumb. Each block shall be carefully checked with a level or straight-edge to make certain that the faces of the blocks are all in the same plane. This precaution is necessary to ensure truly straight and vertical walls.

The use of a storey rod or course pole which is simply a board with markings 200 mm apart provides an accurate method of finding the top of the masonry for each course. Each course, in building the corners, shall be stepped back by a half-block and the horizontal spacing of the block shall be checked by placing a mason's level diagonally across the corners of the blocks.

iii. When filling in the wall between the corners, a mason's line shall be stretched from corner to corner for each course and the top outside edge of each block shall be laid to this line. The manner of handling or gripping the block shall be such as to position the block properly with minimum adjustment.

To assure satisfactory bond, mortar shall not be spread too far ahead of actual laying of the block or it will stiffen and loose its plasticity. As each block is laid, excess mortar extruding from the joints shall be cut off with the trowel and thrown back on the mortar board to be reworked into the fresh mortar. If the work is progressing rapidly, the extruded mortar cut from the joints may be applied to the vertical face shells of the blocks just laid. If there be any delay long enough for the mortar to stiffen on the block, the mortar shall be removed to the mortar board and reworked. Dead mortar that has been picked up from the scaffold or from the floor shall not be used.

iv. **Closure Block** -When installing the closure block, all edges of the opening and all four edges of the closure block shall be buttered with mortar. The closure block shall be carefully lowered into place. If any mortar falls leaving an open joint, the closure block shall be removed, fresh mortar applied and the operation repeated.

3.12.7 Provision of Door and window frames

a) Door and window frames shall be attached to the surrounding masonry either by conventional method or with 200 mm flooring nails with screwed ends fixed directly into the block after the frame has been wedged into the opening at every nailing position. The number of nails to give adequate stability will be dependent on the dimensions of the frames. The nails should be spaced at maximum 400 mm and the first nail should not be farther than 200 mm from a corner.

Frames may be attached to the masonry by holdfasts anchored in the vertical reinforced concrete studs provided to the frames as per 3.12.3.3a (V).

b) **Provision for Lintels** - Lintels for doors, windows and other openings shall be made of either RCC cast in situ or precast units or shall conform to IS : 9893 - 1981; where openings occur close to one another, continuous lintels may be provided.

3.12.8 Provision for roof

The top of the roof course shall be finished smooth with a thin layer of 1: 3 cement mortar and covered with a coat of crude oil or craft or oil paper to ensure free movement of the roof.

Where the roof slab projects beyond the external wall face, it shall be provided with a drip.

3.12.9 Intersecting wall

All walls wherever they meet or intersect shall be bonded or tied securely in accordance with 3.12.9(a) and 3.12.9(b).

a) **Load Bearing Walls** - When two load bearing walls meet or intersect and the courses are to be laid up at the same time, a true masonry bond between at least 50 percent of the units at the intersection is necessary. When such intersecting bearing walls are laid up separately, pockets with 200 mm maximum vertical spacing shall be left in the first wall laid. The corresponding course of the second wall shall be built into these pockets.

b) **Non Load bearing walls –** Meeting ot intersecting non-load bearing wall shall be bonded by either of the two methods recommended for load bearing walls.

3.12.10 Pilasters & piers

Pilasters and piers shall be provided wherever necessary in a manner approved by the engineer-in-charge.

3.12.11 Rendering & other finishes

a) **External Renderings -** The exterior surface of all cellular concrete block walls shall be made waterproof by treating the walls with different types of renderings, depending upon the intensity of rainfall, nature of exposure, etc.

i. The renderings shall be applied in accordance with IS: 2402-1963. Renderings shall not be applied to the walls when these are wet or in monsoon. The walls shall be treated only after they are fully dried.

ii. Satisfactory performance of any rendering depends entirely on the efficiency of the bond developed between the rendering and the wall surface. Extreme care shall, therefore, be taken to ensure effective bond with the wall by preparing the surface, roughening it if necessary, cleaning the surface of all loose particles and dust, moistening it with water just prior to applying the rendering to prevent absorption of water from it. The sand used for the plaster finish shall be graded from 3 mm downwards. The plaster shall not be finished smooth but provided with a coarse finish by means of a wooden float.

iii. In localities where rainfall is heavy or the walls are exposed to sea weather, cellular concrete block masonry shall be rendered with two coats of plaster. First coat (backing coat) shall be of 15 mm thickness of 1: 1: 6 cement-lime-sand mortar or 1: 6 cement-sand mortar. Second coat (finishing coat) shall be of 5 to 10 mm thickness of 1: 1: 6 to 1: 2: 9 cement-lime-sand mortar.

iv. In moderate rainfall area, cellular concrete block masonry shall be rendered with at least one coat of 10 to 15 mm thickness of 1 : 1 : 6 cement-lime-sand mortar (or 1 : 6 cement-sand mortar) or two coats of cement paint may be applied directly on concrete block masonry to provide a reasonably impervious surface to withstand rain.

v. In areas of scarce rainfall, the exterior surface of concrete block masonry may only be pointed with 1: 3 cement mortar.

vi. Where for architectural or other reasons it is necessary to have the cellular concrete block surface exposed, the walls shall either be built with block having richer facing mixture or treated with two coats of approved quality cement based paint. In either case the walls in heavy or moderate rainfall areas shall be pointed with 1: 2 cement-sand mortar

b) Internal Renderings - As cellular concrete blocks are of uniform size, walls built with them provide an even surface. Where it is desired to have the block surface exposed, the walls may only be flush pointed and painted with an approved quality of cement paint, emulsion paint or chlorinated rubber paint. Oil based paints are liable to attack by alkali from the blocks and mortar. Otherwise the interior surface of walls may be plastered with one coat of 6 to 12 mm thickness of 1: 2: 9 cement-lime-sand mortar or 1: 6 cement-sand mortar. Where a very smooth

finish is desired, a second coat of 2 to 3 mm thickness of lime finish may be applied.

3.12.12 Maintenance

The exposed walls shall be inspected closely every year before monsoon, and cracks, if any shall be sealed properly with a cement grout and painted with two coats of cement paint.

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

3.15 Stone Pitching (100000619)

GOOD quality quarry dressed stones in cement mortar 1:6 (1 part of cement:6 part of coarse sand) in jointing / pointing, including dressing, breaking the clods– 230mm & 150mm dia. In foundation at all levels below and up to highest plinth level – THE SCHEDULE OF QUANTITY IS SELF EXPLANATORY FOR THE ITEMS.

TECHNICAL SPECIFICATION

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 of Quantities.

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 [AX ITEM NO. 100020236]
- 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 rate 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 minimum10 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 or 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
AX ITEM No. 100000637

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 SqM. 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
AX ITEM No. 100000639

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 (100000639)

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.(100000640)

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 toughened 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. (100000641)

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: (100000642)

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. (100000643)

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 clits 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) (100000645)

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.(100000646)

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. (100000647)

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.(100021633)

Providing and fixing in position anodized / powder coated Aluminium mosquito/ fly proof window **shutters** in sliding type track windows, fabricated out of extruded sections confirming 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.(100022283)

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 taping 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.(100019443)**

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.

4.33 Providing and fixing Aluminium Door Frame
AX ITEM No. 100000683
Supplying and fixing in plastered brick wall / RCC wall / granite or marble stone jamb in position 20-Micron Plain or powder coated or Colour anodized Aluminium Door frame 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, including supplying and fixing necessary holdfasts / self- tapping cadmium coated nut & bolts / screws for fixing, MS clits, 125 mm S.S. butt hinges (Heavy duty), filling the gap around the frame with exterior grade silicon (plain or colour) to ensure

the joint water tight, with all labour and materials complete as per drawings. The frame shall be placed in the opening and fastened to plumb and in true alignment.
All the junction of frame shall be done with MS cleat and nut/bolts, but not with aluminium cleats and self- threading screws.
MS flat of 5mm thickness shall be fixed within the aluminium section where hinges are to be received.
(This frame is fixed to receive wooden flush door. Wooden flush door is paid separately in respective item.)

Hardware Consumables
I) SS 304 Hinges - For shutter more than 900 mm with and 2000 height- 4 nos. SS hinges with 1.2 mm minimum plate thickness – 32mm x 125mm minimum plate width to be fixed with frame and shutter.
ii) –do- For shutter less than 900 mm with and 2000 height- 3 nos. SS hinges with 1.2 mm minimum plate thickness – 32mm x 125mm minimum plate width to be fixed with frame and shutter.

Aluminium Section (As per Approved make)

Mode of Measurement
It shall be measured in sqmt.

4.34 Supplying and fixing of powder coated/ anodized aluminium Fixed partition with 5 mm th. plain glass / 4 mm tk composite sheet/ both side laminated 8 mm plywood/ SS mosquito net

The specification shall be same as given in Item Spec. no.4.33 but for providing and fixing plain or powder coated or color anodized aluminium partition with fixed glass of 5mm thick plain float glass.
Aluminium Section (As per Approved make)

Mode of Measurement:
It shall be measured out to out of frame or sub-frame (if provided) in SQM.
Fixed partition from floor to lintel or ceiling level shall be considered in this item only. If door needs to be provided in the partition then door shall be paid in respective item of door.

4.35 Providing and fixing Aluminium anodized/powder coated framed Doors (both top & bottom panel shall be 5 mm thick plain float glass and/or 4mm thick composite sheet/ 8mm th. Plywood with

both side 1mmth. Laminate/ SS mosquito net (Single or Double shutter) (100000641)

Supplying and fixing in position glazed/panelled, open able, double or single leaf aluminium anodized/powder coated entrance doors with frame and sub frame if any, 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, including supplying and fixing necessary holdfasts / self-tapping cadmium coated screws for fixing, clits, anodized aluminium/ S.S handle of approved size and finish for each leaf on both sides, anodized aluminium tower bolt of 250 minimum length on top and bottom (if required), concealed lock, 125 mm SS butt hinges (Heavy duty) or pivots and all fixtures fastenings as per requirement, 6mm thick Reflective glass with EPDM gasket / felt and anodized aluminium beading, filling the gap around the frame with external grade silicon (plain or colour) to ensure the joint water tight, with all labor and materials complete as per drawings. The sub frame, if any, shall be placed in the masonry opening and fastened to plumb and in true alignment and plastered in level with sill sloped for water to drain off easily. After finishing external and internal plaster and painting main aluminium window outer frame shall be fixed to the sub frame with self-taping screws GKW make/stainless steel screws.

All the junction of door frames/ shutter shall be done with MS cleat and nut/bolts, but not with aluminium cleats and self -threading screws.

MS flat of 5mm thickness shall be fixed within the aluminium section where hinges are to be received.

Hardware/ Consumables

I) SS 304 Hinges - For shutter more than 900 mm with and 2000 height- 4 nos. SS hinges with 1.2 mm minimum plate thickness – 32mm x 125mm minimum plate width to be fixed with frame and shutter.

ii) –do- For shutter less than 900 mm with and 2000 height- 3 nos. SS hinges with 1.2 mm minimum plate thickness – 32mm x 125mm minimum plate width to be fixed with frame and shutter.

iii) Concealed type door lock with minimum three keys. This lock is made especially for Aluminium door sections. Company: Godrej or equivalent.

iv) S.S Handles.

v) Two surface mounted Anodized Aluminium Stopper (Tower bolt type) – 250mm minimum long

vi) Door stopper of Nylon to be fixed on wall and behind door to prevent door banging on wall.

Aluminium Sections (As per Approved make)
As per Fixed Aluminium Partition Works

Mode of Measurement

It shall be measured out to out of the frame or sub-frame (if provided) in SQM.

4.36 Supplying and fixing of powder coated /anodized aluminium 2 track sliding windows with 5mm th. plain float glass.(100000646)

Supply and fixing in position anodized aluminum/ powder coated windows 2 track sliding type, with frame and sub-frame if any, 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 color anodizing with approved shade, supplying and fixing necessary holding cadmium coated bolts/screws, handles, locking Arrangement (concealed handle cum locking arrangement of approved quality and make as per details) anodized aluminum fixtures and fastenings as per requirement and 5mm thick plain float glass fixed with EPDM gasket and anodized Aluminum beading, filling the gap around the frame with exterior grade silicon (plain or color) sealant to make it watertight as per drawing etc. complete as directed by the Engineer. The sub frame shall be placed in the masonry opening and fastened to plumb and in true alignment and plastered in level with sill sloped for water to drain off easily. After finishing external and internal plaster and painting main aluminum window outer frame shall be fixed to the sub frame with self- taping screws GKW make/stainless steel screws.
All the junction of window frames/ shutter shall be done with MS cleat and nut/bolts, but not with aluminum cleats and self -threading screws.

Hardware Consumables
I) Heavy duty roller for sliding shutter. Minimum 2nos. sets per shutter.
ii) Handle cum lock shutters.

Aluminum Sections (As per Approved make)

Mode of Measurement

It shall be measured out to out of frame or sub-frame (if provided) in SQM.

4.37 **Supplying and fixing of powder coated / anodized aluminum 3 track sliding windows with 5mm th plain float glass & Mosquito net (fly proof Shutter) Shutter.(100000647)**

The specification shall be same as given in Item Spec. no. 4.36 but for 3 track anodized aluminum/powder coated frame and shutters (2 shutters with 5mm th plain float glass and/or 1 shutter with S.S. Mosquito Net or glass as per 2 shutters).

Hardware Consumables

I) Heavy duty roller for sliding shutter. Minimum 2nos. sets per shutter.

ii) Handle cum lock shutters

Aluminum Sections (As per Approved make)

Mode of Measurement:

It shall be measured out to out of frame or sub-frame (if provided) in SQM.

4.38 Supplying and fixing of powder coated/ anodized aluminum 4 track sliding windows with 5mm th float glass/ SS mosquito net

The specification shall be same as given in Item Spec. no. 4.37 but for 4 track anodized aluminum/powder coated frame and shutters (2 or more shutters with 5mm th plain float glass and/or 2 or more shutter with S.S. Mosquito Net or glass as per 2 shutters).

Hardware Consumables

I) Heavy duty roller for sliding shutter. Minimum 2nos. sets per shutter.

ii) Handle cum lock shutters.

Aluminum Sections (As per Approved make)

Mode of Measurement

It shall be measured out to out of frame or sub-frame (if provided) in SQM.

4.39 Supplying and fixing of powder coated /anodized Aluminium Open-able windows with 5mm th plain float glass shutters and Mosquito net Shutter

Supply and fixing in position anodized aluminum/ powder coated windows Open able type with frame and sub-frame if any, 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 color anodizing with approved shade specified in schedule of quantities including, supplying and fixing necessary holding bolts/screws, S.S handles, anodized aluminum fixtures and fastenings as per requirement and 5mm thick plain float glass fixed with special EPDM gasket, filling the gap around the frame with exterior grade silicon (plain or color) sealant to make it watertight as per drawing etc. complete as directed by the Engineer.

Outer shutter shall be provided with glass and inner shutter shall be provided with SS mosquito net. MS bar of mentioned diameter shall be provided in between tow shutters as a protection grill by providing holes in aluminum frame sections. Cost of providing MS bar shall be paid as respective item of fabrication.

All the junction of window frames/ shutter shall be done with MS cleat and nut/bolts, but not with aluminum cleats and self- threading screws.

Hardware Consumables

1) SS 304 Hinges - For shutter more than 600 mm with and 1500 height- 3 nos. SS hinges with 1.2 mm minimum plate thickness – 25mm x 75mm minimum plate width to be fixed with frame and shutter.

2) –do- For shutter less than 600 mm with and 1500 height- 2 nos. SS hinges with 1.2 mm minimum plate thickness – 25mm x 75mm minimum plate width to be fixed with frame and shutter.

3) Gate hook (Pavan-Ankdi) of SS 304 with 5mm minimum rod thickness.

4) Two numbers of Handles (per leaf) – Aluminum handles with 20 micron minimum plain or color anodizing.

5) Two surface mounted aluminum stopper (Tower bolt type) – 150mm min. long –Anodized as per above.
6) 25mm long Shutter Magnet for each Shutter

Aluminum Sections (As per Approved make)

Mode of Measurement
It shall be measured out to out of frame or sub-frame (if provided) in SQM

4.40 Supplying and fixing of powder coated /anodized aluminum Double Glazed (5mm plain float glass +12mm gap + 5 mm th Plain float glass) 2 track sliding windows (100000646)

- Do - as per above item but for 2 track anodized aluminum/ powder coated Double Glazed (5mm reflective glass +12mm gap + 5 mm th Plain float glass) 2 track sliding windows with 1 shutter of Mosquito net (fly proof Shutter)

Hardware Consumables
I) Heavy duty roller for sliding shutter. Minimum 2nos. sets per shutter.
ii) Handle cum lock shutters.

Aluminum Sections: (As per Approved make)

Mode of Measurement
It shall be measured out to out of frame or sub-frame (if provided) in SQM.

4.41 Supplying and fixing of powder coated /anodized aluminum Double Glazed (5mm plain float glass + 12mm gap + 5 mm th Plain float glass) 3 track sliding windows with Mosquito net (fly proof Shutter) Shutter.(100000647)

The specification shall be same as given in Item Spec. no.4.40 but for 3 track anodized aluminum/powder coated Double Glazed (5mm reflective glass +12mm gap + 5 mm th Plain float glass) 3 track sliding windows with 1 shutter of Mosquito net (fly proof Shutter)

Hardware Consumables
I) Heavy duty roller for sliding shutter. Minimum 2nos. sets per shutter.

ii) Handle cum lock shutters.

Aluminum Sections: (As per Approved make)

Mode of Measurement
It shall be measured out to out of frame or sub-frame (if provided) in SQM.

4.42 **Supplying and fixing powder coated/anodized aluminium framed fixed glass/fixed mosquito net/ compact sheet with fixing provision of exhaust fan (100000645)**

Providing and fixing anodized aluminum/powder coated ventilators as per item of aluminum window but for providing and fixing 5mm th.textured glass with its fixing hardware and profile in accordance with the drawing etc complete as directed by the Engineer. Glass edges shall be well grounded. Fixing shall not be done by cutting edge of main frame.

Aluminum Section: (As per Approved make)

Mode of Measurement
It shall be measured out to out of the frame or sub-frame (if provided) in SQM.

4.43 Supplying and fixing powder coated /anodized aluminium framed fixed Aluminium louvers (100019443)

Providing and fixing anodized aluminum/powder coated ventilators as per item of aluminum window but for providing and fixing colour/plain fixed type (non-movables) anodised (20micron min) Aluminum louvers with main frame in accordance with the drawing etc complete as directed by the Engineer.

Aluminum Section: (As per Approved make)

Mode of Measurement
It shall be measured out to out of the frame or sub-frame (if provided) in SQM.

4.44: Providing and fixing GI flush doors using GI door frame.(100021321)

Hollow Insulated metal door and frame. Fabricated metal door and frame units to be rigid, neat in appearance and free from defects (warp or buckle). Wherever practicable, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory-assembled before shipment, to assure proper assembly at project site. The door will be flushed on one side with adjoining panels. All doors will have SS hinges, fixed D type handles, locks, kick plate and view glass of suitable size wherever required.

Technical Data sheet- GI Flush Door

Sr. No.	Description	Technical Specification
1	**Hollow Metal Doors for clean room application**	
a	Material Of Construction	Galvanized Steel Sheets: Zinc-coated carbon steel sheets of commercial quality, complying with ASTM A 526 with ASTM A 252 G-60 zinc-coating, mill phosphatized. Provide continuous type pressed metal frames and sheet, including glazing stops and reinforcement, of various profiles to suit conditions detailed on the drawings and be constructed of new prime quality, Galvanized sheet steel.
b	Sheet thickness	0.80 mm (21 SWG)
2	Surface Finish for Door Frame and Door Shutter	
a	Type of surface finish	Powder Coated (Make - Jotun, Akzo-nobel, Nerolac, Asian)
b	Type of Coating	Pure polyester
c	Film thickness	60-80 microns
d	Colour	Any colour
e	Chemical resistance	Resistance to Acid, Alkali & Detergent
f	Solvent Resistance	Resistance to MEK-50, IPA-40 , Ethyl Alcohol
3	Infill	
a	Infill Material	Polyurethane Foam
b	Density of insulation	40 kg/m³

	material	
4	Door Leaf	
a	Door Leaf thickness	45 - 50 mm
b	Sheet thickness	0.80 mm (21 SWG)
c	Maximum Single leaf Width	1200mm
d	Maximum Double leaf Width	2400mm
e	Maximum Height	3200mm
f	Rubber gasket at Door interlocking for Double Leaf	EPDM non-particle shredding
g	Protective peel-off film	25 microns
5	**Door Frame**	
a	Material of Construction	All frames shall be fabricated from Zinc-coated carbon steel sheets of commercial quality, complying with ASTM A 526 with ASTM A 252 G-60 zinc-coating, mill phosphatized. Chemically treated after fabrication for optimum paint adhesion. Fabricated hollow metal shutter with support frame of 1.6 mm thick pressed Galvanized steel sections. Galvanized sheet steel, free from rust, scale, pits and surface defects. **Alternatively Aluminium frame of 3.00mm thick can also be used.**
b	Frame sheet thickness	1.6mm GS or 3.0 mm Aluminium
c	Door frame thickness	80 to 100 thk and 50 to 60 mm wide
d	Rubber gasket	EPDM non-particle shredding
6	Vision Panels	
a	Type	Flush type
b	Sizes	As per drawing
c	Glass	Clear Glass
d	Type	Toughened
e	Glass thickness	4 mm
f	Moisture Removal	Provision of silica gel for moisture absorption
g	Silicone Sealant	Pharma grade (Make - Dow Corning / Walkar / Macoy)
h	Adhesive tape	12 x 1.1mm (Make - 3M / Norton / Avery Denison)
	Hardware	
7	Door closer	

a	Type	Clean room compatible (Make - Dorma - TS - 71)
b	Withstand to air pressure	Differential pressure – up to 20 Pa
8	Handle	
a	Type	D – Type (Make - Doorset / Enox)
b	MATERIAL OF CONSTRUCTION	SS 304
c	Length	200mm
d	Pipe Dia	19mm
9	Push plate	
a	MATERIAL OF CONSTRUCTION	SS 304
b	Sheet thickness	1.00 mm (19 SWG)
c	Dimensions	90 x 225 mm
10	Lock	
a	Type	Mortise dead Lock (Make - Doorset / Enox
11	Hinges	
a	Type	Ball bearing butt hinges (Make - Dorma / Magnum / Kich)
b	MATERIAL OF CONSTRUCTION	SS 304
c	No of Hingis up to 2100mm Ht	3 Nos per Leaf
12	Drop bottom seal	
a	Type	Movable drop seal (with Lockable arrangement)
b	Gasket	Non particle shredding –SILICON
c	Maximum Drop	12mm
13	Tower bolts	Clean room compatible Flush Type
a	Type	Concealed extended lever
b	MATERIAL OF CONSTRUCTION	SS 304
14	Kick plate	
a	MATERIAL OF CONSTRUCTION	SS - 304
b	Sheet thickness	3.00 mm

c	Height	300 mm
d	Installation by	With 3mm adhesive tape
15	Panic bar	
a	Type	PHA 2000 series single point for emergency door (Make - Dorma)
16	Door interlocking	Not Applicable

MATERIALS

- Hot-Rolled Steel Sheets and Strip: Commercial quality carbon steel, pickled and oiled, complying with ASTM A 569 and ASTM A 568.
- Cold-Rolled Steel Sheets: Commercial quality carbon steel, complying with ASTM A 366 and ASTM A 568.
- Galvanized Steel Sheets: Zinc-coated carbon steel sheets of commercial quality, complying with ASTM A 526 with ASTM A 252 G-60 zinc-coating, mill phosphatised.
- Aluminium extrusions: Confirming to ASTM 6063 T5/T6 duly powder coated.
- Reinforcement Steel: ASTM A 36.
- Core Material: Manufacturer's standard sound-deadening and heat-retardant material such as fibreglass, Honeycomb or Polyurethane as per requirement and application.
- Supports and Anchors: Fabricated of 1.25 mm thick, galvanized sheet steel.
- Inserts, Bolts and Fasteners: Manufacturer's standard units, except hot-dip galvanize items to be built into exterior walls, complying with ASTM A 153, Class C or D as applicable.
- Shop Applied Paint: Pure Polyester Powder coating of 60-80 microns.

FABRICATION - GENERAL

- Fabricated frame units to be rigid, neat in appearance and free from defects (warp or buckle). Wherever practicable, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory-assembled before shipment, to assure proper assembly at project site.

- Fabricate exposed faces of doors and view panels, including stiles and rails of non-flush units, from only Galvanized steel.

- Fabricated frames concealed stiffeners, reinforcement, edge channels, louvers and mouldings from Galvanized steel.

- Fabricate exterior doors, panels, and frames from galvanized sheet steel. Close top edges of all doors as an integral part of the door construction or by addition of inverted steel channel.

- Exposed Fasteners: Unless otherwise indicated, provide countersunk flat heads for exposed screws and bolts.

- Finish Hardware Preparation

- Prepare doors and frames to receive mortised and concealed finish hardware in accordance with Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A115 series specifications for door and frame preparation for hardware.

- Reinforce doors and frames to receive surface- applied hardware. Drilling and tapping for surface-applied finish hardware may be done at project site.

- Locate finish hardware as shown on final shop drawings or, if not shown, in accordance with Recommended Locations for Builder's Hardware, Published by Door and Hardware Institute.

PRESSED METAL FRAMES

- General: Provide continuous type pressed metal frames; including glazing stops and reinforcement, of various profiles to suit conditions detailed on the drawings and be constructed of new prime quality,

Galvanized steel sheet. All frames shall be fabricated from zinc-coated GI sheet chemically treated after fabrication for optimum paint adhesion. **Alternatively Aluminium frame of 3.00mm thick can also be used.**

- Materials: Provide pressed metal frame of the following minimum thickness:
- Exterior Frames: 1.6 mm thick for GS or 3.00 mm for Aluminium.
- Interior Frames: 1.6 mm thick for GS or 3.00 mm for Aluminium.
- Wall Anchors: Same thickness and material as frame.
- Frame Splines: Same thickness and material as frames.
- Hinge Reinforcement: Manufacturer's Standard unless recommended otherwise by the manufacturer.
- Strike Reinforcement: Manufacturer's Standard unless recommended otherwise by the manufacturer.
- Closer and Holder Reinforcement: 1.6 mm by the required length and width.

- Frames: Provide frames that have joints die-mitred with integral tabs for reinforcement and interlocking of the jambs to head. Frames shall be knockdown or equivalent, with self-aligning tabs and slots for securely locked core
- Construction: The finished work shall be strong and of rigid construction neat in appearance and free from warp, wave and buckle. Moulded members shall be clean cut, straight and true. Mitres shall be well formed and in true alignment. Fastenings shall be concealed where practicable.

- Door Silencers: Except on weather stripped frames, drill stops to receive 3 rubber silencers on strike jamb of single-swing frames and 4 silencers on heads of double-swing frames.

- Anchors: Unless otherwise indicated on drawings, anchor frame in concrete and masonry walls by means of galvanized expansion shields and flat-head machine screws. Screw heads shall be counter-sunk in soffit of jamb. Machine screws shall be approved type, 9 mm diameter by minimum 75mm long of zinc plated or dichromate steel with 9 mm diameter by minimum 44 mm long malleable iron or steel expansion shield. Reinforce jamb at each expansion screw location with 5 mm by 38 mm wide steel fitting into inside of stop and welded to backbends. Anchors shall be located not more than 150 mm from top and bottom of each jamb with intermediate anchors spaced at a maximum of 650 mm on centre. Anchors for plaster partitions with truss stud framing shall be Z-clip type, to be secured to studs and welded to back of frames above each hinge reinforcement and just below the top hinge reinforcement. Anchors on the strike side shall occur directly opposite to those on the hinge side. Provide at least 4 anchors for each jamb for frames up to 2.28 m in jamb height; 5 anchors up to 2.40m; and one additional anchor for each 0.6 m fraction thereof over 2.4m jamb height.
- Bottoms of frames shall have not less than 1.6 mm thick welded-on floor clips punched for two6.4 mm expansion bolts or shot pins. .

- Temporary channel or angle spreaders shall be tack-welded to bottom of Welded frames to prevent distortion during shipment and storage and shall hold the frames in proper position until adjacent construction has been completed.

Door Shutter

- Shutter: Fabricated hollow metal shutter with support frame of 1.6 mm thick pressed GS sections and 2 outer sheets, 0.8 mm thick .Galvanized sheet steel, free from rust, scale, pits and surface defects. Unless

otherwise indicated on Drawings, hollow metal door thickness shall be 45 mm.

SHOP FINISH

Carry out shop finishing of metal doors and frames as follows.

- Chemically treat non galvanized, non bonderized metal surfaces with a phosphate compound to assure maximum paint adherence.
- Thoroughly clean all metal surfaces of all rust, scale, grease, rough spots and other foreign matter which may prevent proper paint adhesion
- Carry out the powder coating procedure as per manufacturer's specifications such that the thickness of coating is 60-80 microns.

HARDWARE PREPARATION

- General: Hollow metal doors and pressed metal frames shall be prepared at the manufacturer's plant for all hardware in accordance with templates furnished and shall be drilled and tapped to receive hardware as indicated on the hardware templates. Preparation shall conform to the requirements of ANSI A115.
- Mortised and concealed hardware: Mortise, reinforce, drill and tap for mortised and concealed hardware.
- Locations: Locate hardware as shown on the drawings and conform to standards established by the National Builders Hardware Association, and ANSI standards as applicable.

INSPECTION

- Examine the substrates and the conditions under which hollow metal doors and view panels shall be installed and correct any unsatisfactory conditions.

- Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Engineer.

INSTALLATION

General: Install metal doors, frames, and accessories in accordance with final shop drawings and manufacturer's data.

ADJUST AND CLEAN

- Protection Removal: After the final painting of the adjacent walls and on the instruction of the site incharge, remove protective plastic wrappings from prefinished doors.
- Final Adjustments: Check and readjust operating finish hardware items leaving steel doors and frames undamaged and in complete and proper operating condition.

Mode of Measurement: The item is complete inclusive of supply, fixing all material and labour including fittings except door closer, kick plate, drop bottom seal which shall be measured and paid under separate item. The item shall be measured in **Sqm** by multiplying height and width of the opening where the door inclusive of frame is installed.

4.44a Providing & Fixing Galvanised Steel Door (100021321)

Providing and fixing in position Powder Coated Galvanised steel sheet openable single or double leaf doors of 46mm thick with galvanized steel sheet frame, as per architect's details and as detailed in the drawing of specified size and shape fabricated out of 1.0mm to 1.2mm thick galvanised steel sheets with infill as recommended by the manufacturer to make the shutter 46mm thick, including vision panel with 6mm thick toughened glass, Galvanised steel sheet frame of 100mm X 60mm X 1.2mm wall thickness including supplying and fixing ball bearing butt hinges of 100mm X 75mm X 4mm, screws, necessary holdfasts / screws for fixing, clits, Stainless Steel Tube Glass Door Pull Handles D-22x300 TPH- 301C a pair for each leaf in approved shape size and finish, for each leaf on both, Mortise dead lock with SS accessories, Euro profile 6 pin cylinder 70mm key, heavy duty leaf mounted door closer as per the recommendation of the manufacturer and all fixtures, fastenings and accessories as per requirement and recommended by manufacturer

including filling the gap if any between masonry/concrete/stone surface of soffit/jambs/cill and frame by approved gun grade suitable silicon sealant of matching color /transparent with all labour and materials complete as per drawings and as directed.

Mode of Measurement: The mode of measurement is out to out of door frame in square meter.

4.45: Providing and fixing GI flush doors using Aluminium door frame.

The general specification is same as for Item spec. no. 4.44 but for aluminium door frame. All complete etc.

Mode of Measurement: This shall be measured in Sqm.

4.46 a: Supplying and fixing kick plate of S.S -304. ~~(100021320)~~

The general specification is same as for Item spec. no. 4.44 bur extra for kick plate. All complete etc.

Mode of Measurement: The mode of measurement is in Nos and will include all the holdfast / anchor bolts, sealants, grouts, etc…).

4.46 b: Supplying and fixing drop bottom seal.

The general specification is same as for Item spec. no. 4.44 bur extra for kick plate. All complete etc.

Mode of Measurement: The mode of measurement is in Nos and will include all the holdfast / anchor bolts, sealants, grouts, etc…).

4.46 c: Supplying and fixing door closure.

The general specification is same as for Item spec. no. 4.44 bur extra for kick plate. All complete etc.

Mode of Measurement: The mode of measurement is in Nos and will include all the holdfast / anchor bolts, sealants, grouts, etc…).

4.46d Providing & Fixing In Stainless Steel Door With Frame (100021320)

Providing and fixing in position Stainless Steel (SS) 304 grade openable single or double leaf doors of 46mm thick with SS 304 grade frame, as per architect's details and as detailed in the drawing of specified size and shape fabricated out of 0.8 to 1.0 mm SS 304 grade sheets with infill as recommended by the manufacturer to make the shutter 46mm thick, including vision panel with 6mm thick toughened glass, SS frame of 100mm X 60mm X 1.2mm wall thickness including supplying and fixing SS 304 ball bearing butt hinges of 100mm X 75mm X 4mm, SS screws, necessary holdfasts / SS screws for fixing, clits, handles of SS 304 in approved shape size and finish, for each leaf on both, Mortise dead lock with SS accessories, Euro profile 6 pin cylinder 70mm key, Stainless Steel Tube Glass Door Pull Handles D-22x300 TPH- 301C a pair for each leaf, heavy duty leaf mounted door closer as per the recommendation of the manufacturer and all fixtures, fastenings and accessories as per requirement and recommended by manufacturer including filling the gap if any between masonry/concrete/stone surface of soffit/jambs/cill and frame by approved gun grade suitable silicon sealant of matching color /transparent with all labour and materials complete as per drawings and as directed.

Mode of Measurement: The mode of measurement is out to out of door frame in square meter.

4.47 Providing & Fixing of Frameless Glass Door From 12 mm Thick Fully Toughened Glass: (100022575)

Providing and fixing frameless glass doors made from 12mm thick fully toughened glass with patch fittings of stainless steel – 304 such as top pivot, top patch, bottom patch, corner lock cum lock keeper plate and floor springs of approved make including SS-304 pull handles 600 mm long etc complete as directed.

Mode of Measurement: The mode of measurement is square meter.

4.48 Providing & Fixing Powder Coated Aluminium Frame Work For Doors, Windows, Ventilators & Partitions etc.: (100000682)

Providing and fixing powder coated aluminium (minimum thickness of powder coating 50 micron) frame works for doors, windows, ventilators and partitions with extruded built-up standard tubular sections / appropriate Z sections and other sections of approved or equivalent make conforming to IS: 733 and IS: 1285, fixed with rawl plugs and screws or with fixing clips, or with expansion hold-fasteners including necessary filling up of gaps at junctions, at top, bottom and sides with

required PVC/Neoprene felt, Silicon sealant of approved make etc. Aluminium sections shall be smooth, rust free, straight, mitered and jointed mechanically wherever required including cleat angle, aluminium snap beading for glazing/paneling, CP Brass/stainless steel screws, all complete as per architectural drawings and the direction of the Engineer -in- charge, (Cost of glazing / paneling shall paid separately as per the respective items).

Mode of Measurement: The mode of measurement is kg.

4.49 Providing & Fixing Toughened Glass In Aluminum Works: (100024058)

Providing and fixing toughened glass of 5.50 mm thickness glazing in aluminium door, window, ventilator shutters and partitions with PVC/ neoprene gasket etc. complete as per the architectural drawings and as directed. (Cost of aluminium snap beading and aluminum sections shall be paid separately against the respective item).

Mode of Measurement: The mode of measurement is Sqmt.

Item Specifications for the Item Code No: 100027469

Providing and fixing of Hollow metal stainless steel doors & frames made of pressed stainless steel 304 grade with the following specification. Doors shall be **fully flush double skin door** with vision Panel (6 mm thick toughened glass) of size as per architectural drawings.
Door frame: Door frame shall be single rebate profile of size 125 x 60mm with or without architrave made out of minimum 1.60mm (16gauge) thick stainless steel sheet. Frames shall be mitred and field assembled with self-tabs. Frames should be provided with back plate bracket and anchor fasteners for installation on a finished wall opening including necessary 3mm/4.8 mm thick steel hinge reinforcement, 1.2 mm thick steel lock strike reinforcement with tapped holes welded to the frame and 1.2mm thick mortar guard at the back of all hardware cut-out in the frame. The frame will have a provision of anchor fasteners of size M8 x 80 suitable for fixing in the opening along with Factory made Template for SS Ball Bearing Hinges of approved Size. All provision should be mortised, drilled and tapped for receiving appropriate hardware all complete as per detailed Architectural Drawings, Manufacturer Technical Specification and as directed by Engineer-in charge.
Door Shutter : Door leaf shall be minimum 46mm thick fully flush double skin door with Stainless steel grade 304 grade ball bearing Butt hinges of size 4" X 3" x 3" self-tape with rubber silencer with or without vision lite. Door leaf shall be manufactured from minimum 1.2mm (18guage) thick stainless steel grade 304 sheet. The internal construction of the door should be rigid reinforcement pads for receiving appropriate hardware. The infill material shall be resin bonded honeycomb craft paper core. All doors shall be factory prepared for receiving

appropriate hardware and provided with necessary reinforcement for hinges, locks, and door closers. The edges should be interlocked with a bending radius of 1.4mm. For pair of doors integrated astragals has to be provided on the meeting stile for both active and inactive leaf. Vision panels with minimum 6 mm thick clear toughened glass wherever applicable of size as per architectural drawing should be provided as per manufacturers recommendation with a clip-on arrangement. (Rate is inclusive of door frame, door shutter as a complete assembly, Hinges, 6 mm clear toughened glass vision panels, fasteners, fitments etc complete as mentioned in items except door Hardware which shall be paid separately in their respective items).
Make : Shakti Hormann/ Iclean / approved equivalent make.

Item Specifications for the Item Code No: 100027470

Providing and fixing of Hollow metal stainless steel doors & frames made of pressed stainless steel 304 grade with the following specification. Doors shall be **Partly flush** double skin door panel & **Partly glazed** panel (6 mm thick toughened glass) as per details & size given in architectural drawings.
Door frame : Door frame shall be single rebate profile of size 125 x 60mm with or without architrave made out of minimum 1.60mm (16gauge) thick stainless steel sheet. Frames shall be mitred and field assembled with self tabs. Frames should be provided with back plate bracket and anchor fasteners for installation on a finished wall opening including necessary 3mm/4.8 mm thick steel hinge reinforcement, 1.2 mm thick steel lock strike reinforcement with tapped holes welded to the frame and 1.2mm thick mortar guard at the back of all hardware cut-out in the frame. The frame will have a provision of anchor fasteners of size M8 x 80 suitable for fixing in the opening along with Factory made Template for SS Ball Bearing Hinges of approved Size. All provision should be mortised, drilled and tapped for receiving appropriate hardware all complete as per detailed Architectural Drawings, Manufacturer Technical Specification and as directed by Engineer-in charge.
Door Shutter : Door leaf shall be minimum 46mm thick Partly flush double skin door panel & Partly glazed panel (6 mm thick clear toughened glass) as per details & size given in architectural drawings, with Stainless steel grade 304 grade ball bearing Butt hinges of size 4" X 3" x 3" self tape with rubber silencer. Door leaf shall be manufactured from minimum 1.2mm (18guage) thick stainless steel grade 304 sheet. The internal construction of the door should be rigid reinforcement pads for receiving appropriate hardware. The infill material shall be resin bonded honeycomb craft paper core. All doors shall be factory prepared for receiving appropriate hardware and provided with necessary reinforcement for hinges, locks, and door closers. The edges should be interlocked with a bending radius of 1.4mm. For pair of doors integrated astragals has to be provided on the meeting stile for both active and inactive leaf. (Rate is inclusive of door frame, door shutter as a complete assembly, Hinges, 6 mm clear toughened glass glazed panels, fasteners, fitments etc complete as mentioned in items except door Hardware which shall be paid separately in their respective items).
Make : Shakti Hormann/ Iclean / approved equivalent make.

Item Specifications for the Item Code No: 100027482

Providing and fixing Stainless steel 304 grade hollow metal **fire rated doors** as per IS 3614: 2021, for 120min integrity only. Recommended fire door shall be tested as per IS/ISO 3008 & IS/ ISO 834-1 from Exova/TBW/CBRI approved lab. Labelled fire doors shall be with fire rated hardware and vision panel all as a complete assembly. Proper lable confirming the type of door and the hourly rating is mandatory.

Door Frame : Door frame shall be single rebate profile of minimum size 125 mm X 60 mm made out of 1.60mm thick (16gauge) minimum thick stainless steel sheet of 304 grade suitable for 120 minute fire rating formed to required shape with groove to accommodate the Fire rated EPDM Seal . Frames shall be mitred jointed and field assembled with self-tabs. Frames should be provided with back plate bracket and anchor fasteners for installation on a finished plastered opening including necessary 3mm/4.8 mm thick steel hinge reinforcement, 1.2 mm thick steel lock strike reinforcement with tapped holes welded to the frame and 1.2mm thick mortar guard at the back of all hardware cut-out in the frame. The frame will have a provision of Anchor fasteners of size M8 x 80 suitable for fixing in the opening along with Factory made Template for SS Ball Bearing Hinges of approved Size. The frames should be provided with appropriate Fire rated EPDM seal. All provision should be mortised, drilled and tapped for receiving appropriate hardware all complete as per detailed Architectural Drawings, Manufacturer Technical Specification and as directed by Engineer-in charge. Frames shall be filled with fire rated puff.

Providing and fixing Hollow Metal minimum 46mm thick fire rated fully flush double skin door with Stainless steel grade 304 grade ball bearing Butt hinges of size 4" X 3" x 3" self-tape with rubber silencer. Door leaf shall be manufactured from 1.2 mm minimum thick Stainless steel sheet 304 grade reinforced on edges. The internal construction of the door should be rigid reinforcement pads for receiving appropriate hardware. The infill material shall be structural small cell resin bonded Honey comb craft paper treated with appropriate fire retardent paint. All doors shall be factory prepared for receiving appropriate hardware and provided with necessary reinforcement for hinges, locks, and door closers. The edges should be interlocked with a maximum bending radius of 1.4mm. For pair of doors integrated astragals will be provided on the meeting stile for both active and inactive leafs. 2 Hrs fire rated Vision panel clear glass minimum 6 mm thick of size (200mm x 300mm) wherever applicable should be provided as per manufacturer's recommendation with a clip-on arrangement as per detailed Architectural Drawings, Manufacturer Technical Specification and as directed by Engineer-in-charge. (Rate are inclusive of door frame, door shutter as a complete assembly, Hinges, 6 mm clear toughened glass vision panels, surface/Groove fixing smoke seal C421 Hormann or approved equivalent make of approved quality, fasteners, fitments etc all and complete as mentioned in items except only the door Hardware which shall be paid separately under respective items.

The fire Door along with frame and fittings etc must comply the 120 minutes fire rating as per IS 3614 (latest edition) and must have 2 hour fire rating test

certificate from CBRI Roorkee/ARAI pune. The testing (if required) must be done in CBRI Roorkee or ARAI pune.
Make : Shakti Hormann/ Iclean / approved equivalent make.

FOR THE SPECIFICATIONS AND MODE OF MEASUREMENT OF ALL OTHER ITEMS, PLEASE REFER THE SCHEDULE OF QUANTITY SINCE THEY ARE SELF EXPLAINATORY.

TECHNICAL SPECIFICATION

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 [AX ITEM NO. 100000699]
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 damping 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 [AX ITEM NO. 100000700]
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 [AX ITEM NO. 100000702]
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 [AX ITEM NO. 100000704]
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 no. 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 (100000705)

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 [AX ITEM NO. 100000708]
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 **[AX ITEM NO. 100000711]**
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 to10mm 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 be 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 b 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 (AX ITEM No.100000716)**

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 [AX ITEM NO. 100000722]

Providing and applying Acrylic based, Anti Fungus Exterior Paint Like APEX ULTIMA (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 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 [AX ITEM NO. 100000719]

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 (100000721)

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.

5.24 Providing & Fixing Decorative Tiles (100020707)

Providing and fixing of Glass Reinforced Concrete (G.R.C) Wall Cladding Tiles set in cement slurry (thick paste) over bedding of 19 mm thick cement mortar 1 : 3 (1 part cement : 3 part coarse sand) laid & tiles should be fixed with 1:1 ratio by volume (1Cement: 1 Fine sand) and mixed with polymix liquid cement admixture, which should be applied by notch trowel to requisite , line, level and plumb, either flush with the wall surface or uniformly projecting as per details / directed including cutting / making holes , raking cleaning the joints and filling with white / colored cement, curing and cleaning with mild acid etc complete as directed in approved make, design, size, texture, thickness, pattern and color as per manufactures specification. The thickness of the tiles should range between 12 to 18 mm (depending on the texture of the tile), allowing variance of ±2 mm in accordance with IS: 1237-1980.

Mode of Measurement: This will be measured in SqM.

5.25 Providing & Fixing Glass Reinforced Concrete (GRC) JALI (100020237)

Providing & fixing Glass fibre reinforced concrete "Jali" as a sun protector in position within brick or RCC opening. These jalis shall be fixed with S.S. Screw, fixture plug, anchor fastener bolt, MS Clamp, SDST bolt (self-tapping bolt/screw) as per requirement on MS fabrication/Wall/R.C.C and finished all joints with White cement/white putty/Epoxy Grout/Silica sand. Provide light reinforcement bars between two jalis (within cement mortar). GRC material shall be UV stabilized, durable & should withstand extreme weather condition, fire retardant, water repellent, etc. GRC jalis shall be made as per design provided by the Architect. Prototype of jali shall be made & get approved from Architect. The rate shall be including

fixing of grill, transportation, scaffolding. Rate of MS bars and MS Fabrication work shall be paid under relevant item. Curtain wall made from these jalis shall be in true line & level & plumb.

Mode of Measurement: This will be measured in SqM.

5.26 Providing, Laying & Fixing Bituminous Anti- Corrosive Coating (100022284)

Providing, laying, applying 200 micron Bituminous Anti-Corrosive Multi-Purpose Coating of approved make in two or three coats over waterproof cement finish smooth plaster for internal surface of water retaining structure.

Mode of Measurement: This will be measured in SqM.

5.27 Providing &Fixing Modular False Ceiling (100024215)

Providing and fixing 600x600X16mm modular False Ceiling with Pre-coated Silhouette (Black inside) suspension system in level at the required position at 600mm centers. G.I main frame is suspended from the soffit/RCC at 600mm centers apart with the help of soffit slab roll plug with special adjustable suspender. Pre- coated cross ties section snap fixed at the main section at 600 mm to from 600mm x 600mm. Ceiling panels with Bevelled edge, size 595 x 595mm are laid in to the grid to be placed in position on to the panels. Suspension system for grid ceiling should be standard make, which consist of hook clip with J wire, 2.5mm dia wire of required length and M6 Fastener as per the Architect drawing.GRID SUSPENSION SYSTEM, contractor shall provide suspension wires if required on four corner of the light. For round down lighter, AC grill cutting, etc. contractor shall make cut as per requirement without extra cost. 3mm commercial ply with light cut out shall be installed above tile where light is installed.

Mode of Measurement: This will be measured in SqM.

5.28 Providing & Fixing Metallic False Ceiling Perforated Lay-In Type (100021044)

Providing & Fixing of Lay-in Tile Perforated False Ceiling on 15 mm 'T' Framework/ 15mm Silhouette Grid/frame work of module 600mm x 600mm made out of 0.7mm thick Aluminium Alloy 3105 with Non-woven felt made of glass-reinforced fibre glued over the perforation for sound absorption. The perforations shall be 2.5mm dia 5.5mm c/c. The Tile shall be Polyester based, powder coated & colour as sugessted by Architect. Grid

system for fixing ceiling tiles shall comprise of Tees. The 15 mm main tee runners shall be suspended at an interval of 1200mm centre to centre. The 15 mm cross tee runner shall be suspended at 600mm centre to centre and further supported with 15 mm cross tee at 600mm centre to centre with interlocking arrangements to form grid of 600mm x 600mm. The main tee shall be supported by means of 4mm G.I. rod from slab/roof. The suspension shall be provided at 1200 to 1500mm centre to centre.

Mode of Measurement: This will be measured in SqM.

FOR THE SPECIFICATIONS AND MODE OF MEASUREMENT OF ALL OTHER ITEMS, PLEASE REFER THE SCHEDULE OF QUANTITY SINCE THEY ARE SELF EXPLAINATORY.

TECHNICAL SPECIFICATION

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 carboroundum 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.(100000737)

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 tan 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. (100000738)

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. (100000739)

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.(100000740)**

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 [AX ITEM NO. 100000744]
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(100000745)

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(100000746)

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.

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6.16 Providing & Laying acid and alkali proof, non-skid ceramic tile flooring. (100019997, 100024164)

Ceramic tiles of minimum 10 mm thick (preferably 15 mm & 20 mm thk.) and of size, shade & quality **as specified in the item description** shall be laid over average 37 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 stricking the joints all around of 6- 8 mm. The joins 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 racked 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. (100000814)

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.

6.19 [AX ITEM NO. 100000752]
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 out lets/ 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 confirming 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 care fully 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 (AX ITEM No. 100000756)

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.(100000762)

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. 100000763**

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 's 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 (AX ITEM No. 100000769)

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

6.39 [AX ITEM NO. 100000772]
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 (AX ITEM No. 100000773)
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 accommodated 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.(100000780)

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 **6mm X 12mm to 12mm X 25mm or as specified,** 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 SqM.

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 (I 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.

6.51 Providing And Laying Vitrified Tile (100000813)

Vitrified tiles of minimum 10mm thick and of size, shade & quality as specified in the item description in BOQ shall be laid over average 20mm thick cement mortar bedding in C:M 1:4 (1 part cement, 4 parts coarse sand). The base floor (minimum 40mm) shall be first made with bed mortar in CM 1:7. The base floor shall be watered for two days minimum and naturally dried for minimum 7 days. Then second and final bed of 20mm shall be laid to receive vitrified tiles. The tiles shall be laid in desired pattern in proper line, level and slope with cement slurry of honey like consistency stroking the joints all-around of 2 mm. The tiles shall be submerged in water till the bubbles cease. The joins shall be of even thickness and 10 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 neat cement slurry as directed after four days. It shall be cured for 7 days. After curing the floor to be dried and the joints should cleaned. All joints shall be finished neat and it shall be kept dry for at least for 48 hours. For putting in Dado/ skirting specification in BOQ to be followed along with the relevant IS codes.

Mode of Measurement:

It shall be measured in sq.m. The unit rate shall include the providing and fixing of tiles as specified above. The rate is for work at all levels. Cutting of tiles for electrical boxes, pipes, traps, etc. shall be done free of cost. 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.

6.52 Providing And Laying Non-Skid Vitrified Tiles Skirting / Dado

The vitrified tiles shall be of first class quality and approved make, size and shade of 10 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 C: M 1:3 (1 part cement: 3 parts sand) and be fixed with cement slurry of paste consistency (3 kg/ sq.). 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 to 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 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 out lets / 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 layers 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 without 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 is to be cured for 7 days. The tiles shall be cleaned after the work is complete and finally cleaned with mild acid.

Mode of Measurement:
This shall be measured in sqm. 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.

6.53 PROVIDING AND APPLYING WHITE COLOUR CHINA MOSAIC TILE FLOOR IN DESIGN WORK (100022457) Read along with 115mm thk brick bat water proofing for execution.

Providing and laying **China Mosaic Floor of Terraces** or rooms or chhajjas etc. in grey cement mortar in 1:4 proportions and joint sealing with neat white cement. Broken pieces of vitrified tiles (China chips) shall

be obtained from approved supplier and shall be uniformly thick, smooth finished, free from cracks & crevices on visible face and roughened or keyed on the bedding face. Color of the tiles shall be white. The tile chips shall be sound & hard as First quality virtified glazed tiles. The size of the chips shall not be more than 30mm in any direction.

Application: The surface on which china mosaic has to be applied shall be free from any loose or flaky material, grease, dirt, cement lumps, etc. If application surface is smooth, it shall be roughened to receive china mosaic with hammering or with any mechanical instrument as per direction of site engineer. Cement mortar bed in 1:4 proportions shall be laid in slope or flat as per drawing in true line and level. The thickness of the bed shall be 125mm maximum and 25mm minimum as per slope. Neat cement slurry shall be spread just before laying china chips over the bed. "Vatta" shall be made for minimum 150mm high on junction of parapet wall or any vertical surfaces. (Parapet plaster (inside) shall be applied after china mosaic only.) China chips shall be arranged in certain typical design and pattern. The joint between two chips should not be more then 5mm. This joint shall be filled with neat white cement after initial curing of the base. Curing shall be done after joint filling with ponding system only. The whole surface shall be cleaned with 'kitchen acid' to remove stain and cement lumps from the surface. 'Khurra' (typical hindi word for pocket / recessed area) shall be made of 450mm x 450mm minimum near rain water outlet with china mosaic tile.

Mode of Measurement: It shall be measured in Sq.mtrs. which includes all materials, labor, tools and tackles, instruments, etc. complete. Vatta, Khurra shall be measured & considered in sq.mtr. area only.

6.54 Providing And Applying Chemical Based Water Proofing

Providing and applying 2 coats of a 'Two Component', polymer modified, flexible, cement-based, Waterproofing Slurry **of SIKA / FOSROC** over RCC slab, plaster, etc. as per Manufacturer's specification and direction of the Engineer. The receiving surface shall be free from dirt, loose particles, greasy materials, water, etc. All Vatta (joint between Parapet Wall and Slab shall be treated with SIKA FAB (Woven Glass Fibre Mesh + **Sika Raintite**). The work is to be executed through approved agency with a guarantee of 5 years given on a prescribed Performa duly stamped on the name of owner.

Mode of Measurement:
It shall be measured in sq.mtr. either on wall or floor.

6.55 **Providing and laying 500 micron gauge polythene paper / Polythene sheet below Grade slab, P.C.C, Raft slab etc.(100000835,100000805)**

The general specification as specified in the item description in the schedule of quantity

Mode of Measurement: This shall be measured in SqM.

6.56 Providing & Laying App Modified Bitumen Membrane For Waterproofing (100021642)

Providing and laying at all heights and levels waterproofing treatment with 4mm thick Polymer-modified (APP modified) bitumen waterproofing membrane of approved make made by saturating and coating polyester carrier with water proofing compound made of a special grade of modified bitumen with APP polymers and laminated with polyethylene film or equivalent approved, nominal weight 4.92 Kg/SqM, woven polyester mat (reinforcement base) as 160G/SqM (GSM), Tensile strength (ASTM D 638) longitudinal as 600 N and transverse as 500 N, Elongation (ASTM D 638) 40%, tear resistance (ASTM D 5147) 170N for longitudinal and 190 N for transverse, softening point (ASTM D-36) as 150 Degree Centigrade, puncture resistance (ASTM D 4833/5494) as 550 N to be applied on the cement concrete terraces/surfaces in plain, facia and sloping. a) Surface for application to be cleaned by removing all dust, dirt, loose particles and unsound substrate using scrubbing and other mechanised equipment as recommended by the manufacturers, b) Providing and applying of one coat of solvent based (bitumen primer confirming to IS 3384 or as recommended by manufacturer) primer on cleaned surface at minimum rate of 1.0 liters per 2.0 SqM (coverage), c) Providing and applying of APP modified polymer- modified bitumen waterproofing membrane having thickness 4.0mm as specified after application of the primer, aligning the membrane in true line including providing overlaps of minimum 100 mm at all ends, torching using gas burners to heat the subtract and underside surfaces so as to reach to softening point, using of round tipped trowel to seal the overlaps, surface to be smoothened and pressed in to seam using hot trowel, sealing of edges in to grooves and protect with polysulphide sealants including cutting chases in brickwork / concrete for anchoring membrane in parapet and vertical fences and making good the chases, d) Providing guarantee bond for water tightness performance of the job as above from manufacturer as per their company policy, e) Job includes working at all heights and levels, all materials, labour, lead, lift, cleaning,

all safety measures etc complete as directed, (Measurement will be made for the plan finished net area. Wastage and overlaps shall not be paid). Work shall be carried out through an approved specialist agency/approved applicator of main manufacturers.

Mode of Measurement: This shall be measured in SqM.

6.57 Providing & Applying Self Levelling Poly Urethane (PU) Flooring System (100000831, 100024412)

Providing and applying **specified thickness of** ~~4mm Thk~~ Self Levelling Polyurethane Flooring System to form a Joint less, Matt Finish flooring, all including proper surface preparation to remove all dust, latience on the floor, mechanical grinding. Filling up of Cracks as per manufacturer's specifications, Cutting grooves in the Concrete at the periphery of walls, columns or for every 100 sqm area for anchoring. Application of 2-component Solvent less Epoxy primer, broadcast Silica Aggregate followed by ~~4mm thk~~ **specified thickness of** 3-Component Self Levelling Polyurethane Flooring in Red, Grey, Green, Yellow colour shade. With inter coat interval as per manufacturer's instruction.

Mode of Measurement: This shall be measured in SqM.

6.58 Providing And Applying Single Component Elestomeric Membrane Polyurethane Based Liquid Water Proofing Membrane System (100026495)

Providing and carry out waterproofing treatment to sound,moisture free concrete surface using Liquid applied single component pitch free polyurethane coating capable of bridging substrate cracks upto 2 mm . System includes proper surface preparation to remove loose dust, dirt, loose mortar, curing compound etc., carry out cementitious injection grouting at leakage points and construction joints using cement slurry modified with Plasticised expandive grout admixture , application of polymer modified vatta at slab-wall junction, filling of annular space around rain water outlet using Non-shrink cementitious grout and application of two coats of PU coating to achieve 1.5 mm thickness in two coats followed by laying of seperation layer of 120 gsm non-woven geotextile layer before carry out protection screed etc. complete including all tools and tackles as per manufacturer's specification.The

contractor to provide 10 years gaurantee for the water proofing works . The Concrete screed laid for proper slope and the filling of joints will be paid seperately under relevant item.

Mode of Measurement: This shall be measured in SqM.

6.59 Providing & Filling Resin Based Epoxy Grout between Tile joints (100021388)

Providing and filling acid and alkali proof hard wearing impervious resin based abrasion impact resistant epoxy grout in the joints of various sizes/types of tiles and stones by providing and fixing PVC readymade spacers between tiles as per architecture requirement (minimum spacing 100mm) and grouting the same, mixing the components of the grout using mechanical means etc complete as per manufacturer's specification. The rate shall include flush filling of grout, striking off the excess grout from the joints, cleaning of tile / stones surface and joints, joints shall be filled with masking taps at both the sides of joints, washing, colour shall be as per the recommendations by the architect, materials supplied shall be as manufactured & Packed, installation and laying procedure to be followed as per the recommendations of manufacturer. Size of joints shall be 4mm wide and 4mm deep in the vertical dado & skirting surface. It shall be measured in running meters of the joint filled.

Mode of Measurement: This shall be measured in running meter as per actual site measurement.

Item Specifications for the Item Code No: 100027497

Providing and applying the Terrace/Roof Waterproofing cum Thermal Insulation treatment as per the specifications as follows;
Surace preparation: Cleaning and making necessary surface preparation by compressed air/mechanical scarifier to remove any dust and laitance etc., chasing open the construction joints and sealing the same to form a V shaped groove of approximate 15 mm width and 15 mm depth, using polymer modified mortar/1:3 Cement Mortar having polymer @10% by weight of cement. Providing 75mmx75mm coving at H-V junctions using acrylic ploymer modified mortar. Also, cutting the the groove at height of 300mm/450mm on parapet wall for the purpose of terminating the extended waterproofing.
APPLICATION OF PRIMER: Over the well prepared surface, providing and applying 2(two) component solvent free epoxy based primer @ 4 to 6 SqM/Kg., covering the entire area uniformly. Allow the primer to dry.

PPLICATION OF WATERPROOFING LAYER: Over the dried primer layer, providing and applying 2(two) component solvent free plural spray applied elastomeric seamless hybrid polyurea polyurethane waterproofing coating and achieving a minimum system thickness of 1.5mm in two alternative coats using high pressure projection equipment for two components with heating arrangement and a 1:1 mixing by volume.
On the vertical parapet wall extend the waterproofing treatment up to 300 mm/450mm as per architectural drawing and terminate on the wall, and filling the groove (10mmX10mm) cut on the wall and filling with 1(one) component polyurethane sealant of shore A hardness 25.
The waterproof coating shall exhibit following properties;
(a) Elongation shall be minimum 400 %, (ASTM D412)
(b) Tensile Strength shall be inimum 13 N/Sqmm (ASTM D 412)
(c) Solid contents of 100% & Shore A Hardness shall be 70- 80. (ASTM D2240)
(d) crack bridging up to 3.0 mm
Flood test : (1) Ensure that the membrane is fully cured before conducting the flood test preferably the next day. (2) Flood the surface to a minimum depth of 50 mm of water for a period of 72 hours for check. (3) In case of leakage observed, empty the water, let the surface dry and treat the surface again and arrest the leakage. Repeat this step till there is no leakage (3) After successfully conducting flood test, remove water and let it air dry for 24 hrs before application of PU foam insulation.

APPLICATION OF THERMAL INSULATION LAYER: On the waterproofing layer, providing and applying spray applied 2(two) componenet CFC free, Polyurethane Foam using PUR spray equipment to build 50mm thickness. The applied foam must be covered with waterproofing coat within 7 days of application to avoid U.V. ray degradation.
The thermal insulation layer shall have:
(a) Core Density : 45 - 50 Kg./m3(as per ASTM D 1622)
(b) Compressive strength with rise of minimum 300kPa (as per ASTM D-1621)
(c) Tensile strength of minimum 350kPa as per ASTM D 1623
(d) Fire resistance property conforming to Class B2 as per DIN 4102
(e) Closed Cell Content, having apperent volume 90-98 % (as per ASTM D 2856)
(f) Thermal Conductivity of 0.023 W/m.k at 25°C mean temperature (as per ASTM C518/91)
APPLICATION OF SEALER COAT: Over the entire polyurethane foam, Providing and applying liquid-applied, a single component PU based seamless waterproofing membrane, coverage at the rate 2.3 - 2.5 kg/SqM in 3(three) coats to achieve DFT of 1.5 mm. The PU membrane shall be

terminated 300mm /450mm above FFL, self-curing for 5 days, then ponding with water for 24 Hrs. to check water tightness up to 50 mm. The Waterproofing material shall have solids minimum 85%, Tensile strength minimum 1.2 Mpa as per ASTM D 412, Elongation minimum 400% as per ASTM C 1305, crack bridging up to 2mm, Shore A Hardness minimum 50 as per ASTM D 2240, Puncture Resistance minimum 300 N as per ASTM E154-2013, Water Head Resistance 50M as per DIN 1048.
SEPARATION LAYER: Supplying & applying 200 GSM Geotextile (non-woven polyester) over the entire membrane maintaining proper overlaps of 100 mm at all the joints at ends and sides.
The entire treatment will be taken upto 300mm/450mm on parapet wall or upto parapet projection as per architectural drawing. For the purpose of measurement the entire treated surface will be measured.
The work shall be carried out by a specialist agency or an company authorized applicator in accordance with above specifications and shall carry a guarantee against leakage and seepages etc. for ten years.

Item Specifications for the Item Code No: 100027504

Providing and applying self-adhesive waterproofing membrane 1.5mm thick and of approved equivalent make consisting of cross laminated HDPE Polyethylene film and rubberised asphalt applied over RCC terrace as per specifications stipulated below and as per direction of engineer-in-charge;
1) Cleaning the Cement Concrete surfaces free from dust with brush. Make sure that there is no sharp protrusions on the surface to be applied with the membrane. Make the surface smooth by chipping or grinding by local treatments.
2) Making 25mm x 25mm chases on the Vertical parapet wall at the height of 300mm for termination of the membrane. Making 50mm X 50mm fillets in the corners between RCC slab and parapet wall, for membrane to be applied in curvature.
3) Providing and applying Oil based primer on the RCC and allow to dry.
4) Rolling out of membrane, cutting it to manageable lengths and stick it to the surface by peeling off the release paper on the back of the membrane. Pressing of membrane in place. Adjacent rolls shall be laid by providing minimum 50mm overlaps as per the lines printed on the membrane on the sides and ends. Rolling of the laps and joints shall be done by hand rollers.
5) Rolling out of membranes shall be the continuous operation till the entire area is covered. The elongation of membrane shall be minimum 200%, puncture resistance shall be minimum 220N, lap adhesion shall be of minimum 680 N/m, tear resistance shall be of minimum 20 N/mm and

resistance to Hydrostatic head shall be of minimum 60m. The membrane shall be of resistant to acidic, alkaline and salty soil conditions.
6) The membrane after laying in position shall be covered with minimum 25mm screed for protection and slope before laying of Tiles etc. (Screed concrete shall be paid separately under the relevant item.)
The work shall be carried out through a specialist agency in accordance with above specifications and a guarantee against leakage, seepage etc shall be submitted for ten years.

Item Specifications for the Item Code No: 100027505

Providing & laying Heavy Duty Cementitious Polyurethane Screed (PU concrete), Flow/Trowel applied Topping in average thickness of 6 mm (1mm Scratch Coat + 5 mm Top Coat) of the properties as follows;
Surface Preparation : Concrete substrates must be mechanically prepared by using Surface Grinder, Scarifier, Grit or Shot Blasting, so that the large aggregate of the concrete is exposed, The dust and debris shall be removed by Industrial Vacuum Cleaner.
Anchor Grooves : May be provided along the perimeter of floor area, around columns, open drains, along construction joints, cable trenches, etc. if recommended by the manufacturer. To be cut in size of 1.5 to 2 times the thickness of the floor topping at approximately 100 mm away parallel from wall and adjacent to doorways, covering not more than 20 Sqm. Opening up of all the cracks in the anchor grooves. Filling all the anchor grooves with R70CP (Ardex Endura)/Ucrete HF60RT (Master Builders)/equivalent approved make, mixed with heavy duty slow speed drilling machine fixed with mixing paddle, prior to application of scratch coat.
Scratch Coat : After 12 to 24 hours of Anchor Grooves filling, apply average 1mm thick scratch coat of four-component, Cementitious Polyurethane Screed topping (R70CP (Ardex Endura)/Ucrete HF60RT (Master Builders))/equivalent approved make using flat trowel by mixing all components and colour pigment in mixing vessel using heavy duty slow speed drilling machine fixed with mixing paddle, etc and complete as per manufacturer's specification.
Top Coat : After 12-24 hours of the scratch coat laid, apply an average 5mm thick top coat of heavy duty, four component Polyurethane concrete floor topping (R90CP (Ardex Endura) /Ucrete HF60RT (Master Builders))//equivalent approved make using flat trowel by mixing all components and colour pigment in mixing vessel using heavy duty slow speed drilling machine fixed with mixing paddle, etc and complete as per manufacturer's specification. Allow to cure for the necessary period, normally-24-48 hours as per manufactures Instructions.

The work shall be carried out only through the authorised applicators of manufacturers.

FOR THE SPECIFICATIONS AND MODE OF MEASUREMENT OF ALL OTHER ITEMS, PLEASE REFER THE SCHEDULE OF QUANTITY SINCE THEY ARE SELF EXPLAINATORY.

TECHNICAL SPECIFICATION

7.00 STEEL WORK

Applicable Codes

IS:4351 - Steel door frames

IS:1038 - Steel door, windows and ventilators.

IS: 814 - Metal arc welding
815 and 816

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 confirm 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.

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Mode of Measurement: Same as per Item spec. no. 7.08.

7.10 [AX ITEM NO. 100000858]
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.(100000859)

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 [AX ITEM NO. 100000861]
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 (100000863)

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	2.24	75	1000	934	1066
2.5	2.24	150	1134	1066	1200
2.24	2.24	75	1576	1490	1668
2.24	2.24	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 openable

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 openable

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.(100000879)

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. (100000877)

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.

7.30 **Providing, fabricating and fixing in position SS railing. (100000883)**

Providing , fabricating and fixing in position of S.S 304 Grade hand rail 900mm height and as per drawing details including cutting welding, grinding to smooth surface etc. complete as per direction of engineer in charge.

Mode of Measurement: All the pipe members of the railing shall be measured in unit lengths/area and the same shall be converted in to weight using standard steel tables and paid for in Kilogram. Nothing extra shall be paid for wastages / rolling margins in case of overweight. However in case of underweight, actuals shall be paid for.

7.13 [AX ITEM NO. 100022285]
Providing & Fixing SS inserts in RCC and Brick work

MS inserts shall be using SS-304 rolled sections like Channels, angles, "T", "I" sections, plates, flats, rungs, inserts, puddle pipes, plates etc 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 SS members used in the respective SOQ items, beyond the requirements as detailed in the relevant item shall also be paid under this item.

Mode of Measurement: Same as per Item spec. no. 7.12.

FOR THE SPECIFICATIONS AND MODE OF MEASUREMENT OF ALL OTHER ITEMS, PLEASE REFER THE SCHEDULE OF QUANTITY SINCE THEY ARE SELF EXPLAINATORY.

TECHNICAL SPECIFICATION

8.0 ROOFING, MS STEEL STRUCTURE BUILDINGS & STRUCTURAL CLADDINGS, BARRICADES ETC WORKS

8.01 Providing, fabricating and erecting MS structural steel work for trusses, purlins, girders, columns, rafters, runners, struts, wind ties, bracings, sag rods, etc.(100000893)

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. (100000895)

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. (100000896)

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 facia 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 [AX ITEM NO. 100022069]
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 and 5 microns back-up epoxy coating at the bottom having 1015/1080mm cover width with

28.5 to 32 mm high crest at 195/200mm 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 Buildiex (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 should 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 directed by the engineer.

The rates shall include all materials, tool / tackles, labour, scaffolding including handling and storage of the materials etc complete for all heights.

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.

8.10 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.

FOR THE SPECIFICATIONS AND MODE OF MEASUREMENT OF ALL OTHER ITEMS, PLEASE REFER THE SCHEDULE OF QUANTITY SINCE THEY ARE SELF EXPLAINATORY.

Item Specifications for the Item Code No: 100027514

Providing and fixing Multicell/Multi-layered standing seam Polycarbonate Panel System 16mm thick (minimum) including all standard fixing accessories on top of the supporting structure (supporting structure shall be paid extra in their respective items) complete as directed and confirming to specifications as follows;

The polycarbonate system shall consist of:

Panel shall be 16mm thick (min.) single panel and shall have minimum 6 layers. Panel width shall be minimum 900mm to ensure best performance for wind uplift, vibration, oil canning and visual appearance. It shall be in a single length of 16 metre. Panels shall be manufactured with Vertical Standing Seam at both sides of the panel. Welding or gluing of up stands or standing seam shall not be allowed.

Panels shall be fixed on purlin with Snap-On connector (with or without Aluminium spacer) with grip-lock double tooth locking mechanism (to ensure maximum uplift capability) with heavy duty SS fasteners of SS 304 grade and double tooth polycarbonate connector for best stability. SS 304 Fasteners shall have a pull-out load capacity of minimum 7000N (7KN) tested as per ISO 6892:1998 and IS 1608: 2005.

Panel shall be sealed with additional End-cap/Aluminium U-Profile/Glazing Bar (all mill finish) for ends to secure and making it leak-proof system from the end.

Panels shall be co-extruded UV protected. UV protected side shall always face the sun/top of the roofing system. "U" value shall not be more than 1.9 W/m2K as per EN ISO 10077-2:2018.

Panel shall be soft light/Anti-glare to prevent glare.

The full system shall be fitted on MS purlins perpendicular to direction of sheeting with purlin spacing as specified/recommended by the panel Manufacturer.

Item Specifications for the Item Code No: 100027515

Providing & fixing false ceiling at all height including providing & fixing of framework made of special section, power pressed from M.S. sheets and galvanised with zinc coating of 120 gms/sqm (both side inclusive) as per IS : 277 and consisting of angle cleat of size 25mm wide x 1.6mm thick with flanges of 27mm and 37mm, at 1200mm c/c, one flange fixed to the ceiling with dash fastener 12.5mm dia x 50mm long with 6mm dia bolts, other flange of cleat fixed to the angle hangers of 25 x10 x0.50mm of required length with nuts & bolts of required size and other end of angle hanger fixed with intermediate G.I channels 45 x15 x 0.90mm running at the spacing of 1200 mm c/c, to which the ceiling section 0.5mm thick bottom wedge of 80mm with tapered flanges of 26 mm each having lips of 10.5mm, at 450mm c/c, shall be fixed in a direction perpendicular to G.I intermediate channel with connecting clip made out of 2.64mm dia x 230mm long G.I wire at every junction, including fixing perimeter channels 0.50mm thick 27mm high having flanges of 20mm and 30mm long, the perimeter of ceiling fixed to wall/ partitions with the help of Rawl plugs at 450mm centre, with 25mm long dry wall screws @ 230mm interval, including fixing of Calcium Silicate Board to ceiling section and perimeter channels with the help of dry wall screws of size 3.5 x25mm at 230mm c/c, including jointing & finishing to a flush finish of tapered and square edges of the board with recommended jointing compounds, jointing tapes, finishing with jointing compounds in three layers covering up to 150mm on both sides of joints and two coats of primer suitable for boards, all as per manufacture's specification and also including the cost of making opening for light fittings, grills, diffusers, cut outs made with frame of perimeter channels suitably fixed etc all complete as per drawings, specification and direction of the Engineer in charge but excluding the cost of painting for 12mm thick Calcium Silicate Board made with Calcareous & Siliceous materials reinforced with cellulose fibre manufactured through autoclaving process.

TECHNICAL SPECIFICATION

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. (100000924)

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 [AX ITEM NO. 100000927]

Dismantling brick masonry walls and partitions, plastered or un-plastered 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 [AX ITEM NO. 100000928]

Dismantling the RCC beams, slabs, lintels, columns, pardi 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 /RSS 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 in all size & shape in RCC or Brick 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. Actual area shall be measured for payment.

Mode of Measurement This shall be measured in Cum.

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 (100022282) 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 slump 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 measure 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. (100000938)

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/RSS 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/scrapping 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 approved make and grade (including gun grade) silicon sealant in construction / expansion joints of concrete floor or the gaps between windows/ door/ventilators with the walls including fixing masking tape backing with polysterene / thermocol or filling appropriate filler for larger gaps and finishing the surface smooth etc complete as directed. Payment will be made per cm width per cm depth of sealant filled or proportionate depending on the cross section of the groove filled, (Rates to be quoted for 10mm wide and 10 mm deep groove).

Mode of Measurement: This shall be measured in RM.

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 RSS / 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.

9.31 Design, manufacture, supply, installation, testing, commissioning and handing over in satisfactory working condition of lift including the cost of providing free comprehensive maintenance for one years after handing over complete as per technical specifications attached (Ref. Annexure - 1 to Technical Specifications, Section –IV, Trade no. 09 Miscellaneous work, passenger and goods lift) and as required below.

Passenger and goods lift of make JOHNSON/OMEGA/OTIS/KONE (with machine room) capacity of 1500 kg, 1.0 mtr/second speed, 2 stops (Ground Floor + 1st Floor) all on same side with 2 openings, travel 6.5 M approx. etc complete as per the detailed technical specification and as directed.

Notes:

1. Bidders to quote strictly as per the detail technical specification /schedule of quantities attached with the tender document.

2. Failure to comply with above may lead to disqualification of bidders.

Sl No	Items	Requirement as per tender	Item wise confirmation/comment to be filled in by tenderers
A	**FREIGHT LIFT**	Gearless	
	General		
1.1	Number of Lifts	1 Nos.	
1.2	Capacity	1.5 Ton	
1.3	Speed	1 mps	
1.4	Number of Landings	2 (Gr Floor + 1st Floor)	
1.5	Number of openings	2 on the same side	
1.6	Travel	6.5 M	

	Machine, Hoistway and Pit		
1.7	***Machine room location***	Top of Hoist Way	
1.8	***Machine details***		
-	***Control***	AC VVVF	
-	***Operation***	Simplex Selective Collective	
1.9	***Hoistway dimensions***		
-	Width (along door)	2650 mm	
-	Depth (90° to door)	2450 mm	
1.10	Head room above last landing	4800 mm approx.	
1.11	Pit depth	1600 mm approx	
1.12	Sill projection	6mm MS angle	
	Car		
1.13	Car Enclosure	S/S Vandal Resistant	
1.14	***Car ceiling***	S/S hair line Finish	
1.15	***Car floor***	5 mm thick aluminium chequred plate	
1.16	***Car and landing doors***	Automatic power operated Centre opening, horizontal sliding doors, 1100W x 2200 H SS hairline finish. (Inside car 2200 mm H)	
1.17	Car size	1700x2400 mm as per IS	
1.18	Car Operating Panel	Stainless Steel hairline / mirror finish Car Operating Panel inside car.	
B	**Passenger Lift**	Gearless	

	General		
1.1	Number of Lifts	1 no	
1.2	Capacity	6 Passenger /408 Kg	
1.3	Speed	1.0 mps	
1.4	Number of Landings	5 (G+4)	
1.5	Number of openings	5 on the same side	
1.6	Travel	32.0 M (Approx.)	
	Machine, Hoistway and Pit		
1.7	***Machine room location***	TOP of the Lift Shaft	
1.8	***Machine details***		
-	***Control***	AC VVVF	
-	***Operation***	Simplex collective selective	
1.9	***Hoistway dimensions***		
-	Width (along door)	1950 mm	
-	Depth (90^{o} to door)	2150 mm	
1.10	Head room above last landing	4800 mm approx .	
1.11	Pit depth	1600 mm approx .	
1.12	Sill projection	6mm MS angle	
	Car		
1.13	Car Enclosure	S/S Vandal Resistant	
1.14	***Car ceiling***	S/S hair line Finish	
1.15	***Car floor***	5 mm thick aluminium chequred plate	

1.16	***Car and landing doors***	Automatic power operated Centre opening, horizontal sliding doors, 800 W x 2100 H (Vandal proof centre opening S/S doors). Lift landing & Car doors shall be not less than 1 hour fire rating	
1.17	Car size	1300 mm W X 1350mm D x 2300mm H as per IS	
1.18	Car Operating Panel	Stainless Steel hairline / mirror finish Car Operating Panel inside car	
C	**PARAMETERS COMMON TO ALL LIFTS**		
1.0	**Machine**		
1.1	Power Supply	415V/240V, 50 Hz	
1.2	Acceptable voltage fluctuation	+10 to - 20%	
1.3	Rate of acceleration / deceleration (m/sec^2)	0.6 - 1.5 (adjustable at site)	
1.4	Jerk (m/sec^2)	0.7 - 1.5 (adjustable at site)	
1.5	Vibrations in car horizontal/ vertical	20/18 MG maximum	
1.6	Noise level in car	45 dBA maximum	
1.7	Noise level in machine room at 1 mtr from machine	52 dBA maximum	
1.8	Door noise level while closing and opening at a distance of 1 mtr from car door and 1.5 mtr from floor level	52dBA maximum	

2.0	**Fixtures / signals inside car**		
2.1	Normal lighting	LED recessed type	
2.2	Emergency light and alarm bell (to security room)	With SMF battery operated with charger rated for 30 minute	
2.3	Ventilation	Blower Fan(Two speed and concealed vents)	
2.4	Operating buttons and indications	Stainless steel operating panel with following buttons and indications.	
		Illuminated push buttons of micro pressure type corresponding to the floors served	
		Door open button	
		Emergency stop button	
		Emergency alarm button	
		Two position key operated switch for 'with attendant' and 'without attendant' operation.	
		Ventilation fan ON/OFF switch with auto OFF when there is no call after 120 seconds.	
		Built in intercom of the hands free type.	
		Dynamic car direction display	
		Digital position indicators	
		Visual overload warning indicator	
2.5	Music(Music Speaker)	Trailing cable	

3.0	**Landing signals**		
3.1	Hall buttons	Self-illuminating micro-push type in hair line stainless steel facia plates	
3.2	Car Position	Digital position indicators along with direction of travel (with audible signal in each elevator lobby)	
3.3	Hall gong	Up/down indicator with single stroke gong/chime at all landing	
4.0	**Safety features**		
4.1	Door safety	Tamper proof infrared curtain covering the entire height of the door should be provided in the lift doors. (Passenger Lifts)	
4.2	Buffer	Spring Buffer to be provided	
4.3	Overload protection	Overload protective device Overload non starter.	
4.4	Over travel protection	Terminal and final limit switches to be provided	
4.5	Motor protection	Trip devices for : Over current Under voltage Over voltage Single phasing Earth leakage Phase reversal	
4.6	Interlocking of car and hoist way doors	To be provided as per specifications.	
4.7	ARD	To be provided	
4.8	Guard Railing	To be provided as buffer to avoid impact of hand pallet trolley on the lift panel at two levels (three sides) with cross round bars.	

5.0	**Associated Civil and structural items**	All civil and structural items of work associated with erection and operation of lifts shall be provided by the Contractor at his cost including (but not restricted to) the following.	
		Temporary Scaffolding and safety barricades for erection in and around lift hoist ways	
		Bearing plates	
		Buffer supports	
		Facia plates	
		Ladder in pits	
		Safety railing on top of car	
		Channels, separators, stretchers etc.	
6.0	**Fireman's switch**	To be provided at GF/ Lobby level	
7.0	**Free Comprehensive Maintenance Period**	**ONE YEAR** after completion of work and handing over of the Lifts in satisfactory operating condition.	

9.32 Supply, Installation, Testing and Commissioning of Boom Barrier of Securo Plus 6C - Italian Make - High speed Electro mechanical barrier for Continuous Use. Opening Time - 7 s/90°, 100% frequency for vehicular span of 5 mtr.

European Boom Barrier comprising of; CE European Certification.

- White spray painted aluminium boom with end caps & passive rubber safety edges and fixed support.
- LED Lighting system with variable flashing that illuminates it in whatever position it finds itself.
- Robust spring balanced gear system
- Encoder controlled movement.
- External manual release system with key operation.
- Pair of Photocells with anodised aluminium vertical mountings.
- Three station push button

Boom Barrier Technical Features as follows:-

- Overall Dimensions - 230 x 305 x 1180 mm

- Mains Power Supply - 230 Vac
- Motor power supply - 24 Vdc
- Nominal electrical input - 1.5 A
- Motor Nominal electrical input - 4.5 A
- Power input - 350 W
- Max Power yield of motor - 300 W
- Integrated lights - Yes
- Max Torque - 750 Nm
- Working Cycle - 70%
- Protection Rating - IP 54
- Operating Temperature -20°C/+55°C
- Travel control system - encode
- Item rate inclusive of all above accessories.
- Free Comprehensive Maintenance Period of one year after completion of work and handing over of the boom barrier in satisfactory operating condition.

FOR THE SPECIFICATIONS AND MODE OF MEASUREMENT OF ALL OTHER ITEMS, PLEASE REFER THE SCHEDULE OF QUANTITY SINCE THEY ARE SELF EXPLAINATORY.

TECHNICAL SPECIFICATION

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.(100000979)

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.

Cutting the concrete with concrete cutting machine for contraction/ expansion joints of size 10mm wide x 15mm deep 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.(100000988)

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 finishing with Vacuum De-watering in all grades of concrete (100023459)

Providing and finishing with Vacuum De-watering in all grades of concrete pavements, roads over prepared sub-base in alternate panels above all thickness for required sizes in line level maintaining slope levelling with trimix , surface vibrator, Vacuum De-watering with trimix vacuum pump, floating and further compaction with trimix skin floater equipped with floating disc, providing stripped / broom finish evenly, curing, **cutting the concrete for all types of construction, contraction and expansion joints of size** 6mm X 12mm to 12mm X 25mm or as specified 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 Sqm

10.12 [AX ITEM NO. 100016405]
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 (100000986)

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 [AX ITEM NO. 100000992]
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 Shalitex 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 shalitex primer should be applied as per manufacturers recommendation. The Shalitex 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 paver finished 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. (100000996)

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 [AX ITEM NO. 100000997]

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 the requirements 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 (100001002)

Providing and laying water bound macadam 75 mm compacted thickness in first layer using 63 mm to 45 mm grading sound road metal confirming 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.

FOR THE SPECIFICATIONS AND MODE OF MEASUREMENT OF ALL OTHER ITEMS, PLEASE REFER THE SCHEDULE OF QUANTITY SINCE THEY ARE SELF EXPLAINATORY.

TECHNICAL SPECIFICATION

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 under ground 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 [AX ITEM NO. 100006748]
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(a) CPVC pipes work

For internal work and external work only where specified CPVC pipes tubes conforming to Specific Gravity ASTM D 792 at 23oC should be 1.55 as specified. With Tensile Strength as per ASTM D 638 at 23oC should be 55N/mm2.

All special fittings and accessories like internally or externally threaded brass adaptors, ball valves, globe valves, unions, diaphragm valves, butterfly valves, etc. shall be made of CPVC by licensee.

The CPVC solvent cement used for installing CPVC piping systems shall conform to ASTM F493. Pipes from 15 mm up to 50 mm pipes and fittings, single step medium bodied CPVC solvent cement should be used. For CPVC pipes and fittings upwards of 50 mm, a primer shall be used followed by heavy bodied solvent cement conforming to ASTM F493. PVC solvent cement should not be used.

Concealed Plumbing:

All internal concealed plumbing for water supply shall be done with CPVC pipes. The pipes & fittings shall conform to CTS (Copper Tube

Size) SDR-11 as per ASTM D2846 OR SDR-13.5. All pipes and fittings from 15 mm up to 50 mm shall come under this category. Medium body CPVC solvent cement conforming to ASTM F493 should be used for joining pipes to fittings.

External Plumbing:

The CPVC pipes above 50 mm for external water supply lines shall conform to ASTM F441 CPVC Schedule 40 & 80 pipe and will be the CPVC brand. The fittings above 50 mm size shall conform to ASTM F438 for Schedule 40 CPVC fittings and ASTM F 439 for Schedule 80 CPVC fittings. All threaded CPVC fittings shall conform to ASTM F437 (threaded CPVC fittings schedule). Heavy bodied CPVC solvent cement shall be used along with a primer. IPS brand primer and heavy bodied CPVC solvent cement only should be used conforming to ASTM F493. All external CPVC pipes shall be coated with water based acrylic paint emulsion for enhanced UV protection.

Installation procedure:

All parameters pertaining to the installation of CPVC plumbing system such as cutting, joining, support spacing, expansion loops, insulation, type of support, special connections, etc. shall be as per the manufacturer's specifications.

All pipes shall be fixed in accordance with layout and alignment shown on the drawings. Care shall be taken to avoid air pockets.

Trenches:

All water supply pipes below ground shall be laid in trenches with a minimum cover of 60 cms. The width and depth of the trenches shall be as follows:-

Dia. of pipe	Width of trench	Depth of trench
15 mm to 50 mm	30 cms	75 cms
65 mm to 100 mm	45 cms	100 cms

Pipe Insulation for Hot Water Pipes:

Hot Water Pipes fixed in wall chase shall be insulated by using 9mm thick rubberised insulation sleeve of material shall be closed cell Elastomeric Nitrile Rubber or closed cell cross linked polyethylene foam.

Thermal conductivity of elastomeric nitrile rubber shall not exceed 0.038 W/m OK or 0.0313 K.Cal/M.hr OC at an average temperature of 30°C. Density of the material shall not be less than 0.06 gm/cm3.

Testing:

After laying and jointing, the pipes and fittings shall be inspected under working condition of pressure and flow. Any joint found leaking shall be redone and all leaking pipes removed and replaced without extra cost. Use of any compound or stop leak compound will not be permitted.

The pipes and fittings after they are laid shall be tested to hydraulic pressure of 1.5 times the working pressure or 7.5 Kg/Sq.cm whichever is more. The pipes shall be slowly and carefully charged with water allowing all air to escape and avoiding all shock or water hammer. The draw of taps 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 be maintained without loss for at least two hours. The pipes and fittings shall be tested in sections as the work of laying proceeds, having the joints exposed for inspection during the testing.

Measurements: - The Specification same as Item No. 11.01.

11.19(b) UPVC pipes Work (100001139 to 100001144)

Providing and fixing open UPVC threaded pipes (schedule 80 / 40 as specified in BOQ) of approved make, complete, including making airtight joints, with necessary specials, couplers, elbow, equal tees, tail piece, adapter (both male and female), reducer (single stage, double stage and triple stage), end cap, fabricated bend, etc., in proper line and level including necessary support like clamps, brackets to wall, ceiling and floor, approved quality, and lubricant or jointing material, including testing, cutting, making good the wall, ceiling and floor etc,

Materials:

The threaded pipe (schedule 80 / 40 as specified in BOQ) of specified diameter with working pressure shall conform to ASTM-D-1785. The specials and fittings required shall be of best quality and UV stabilized so as to facilitate open fixation, conforming to IS: 4985 or ASTM D-2467 schedule 80 and relevant specifications of plumbing materials.

Workmanship:

1. The UPVC pipes of specified diameter shall be fixed as directed. Due to thermal expansion of UPVC pipes due allowances about of 10 mm of thermal gap shall be made particularly in case of over the ground pipe lines for any change in length of pipe line which may occur during installation or when pipe line is in serve stress developing from thermal expansion.
2. Generally, in horizontal runs, UPVC pipes shall be supported at an interval of not more than ten times the outside diameter of the pipe. In vertical lines, UPVC pipes shall be supported at an interval of 1 m. to a maximum of 2 m. Closer support spacing shall be provided, if approved by the manufacture.
3. The guide line indicated by the manufacture regarding handling, transporting, storage, laying and jointing of pipes shall be kept in view during execution. Provision for expansion joints, air vents and proper anchorage shall be made. UPVC pipes shall be fixed on wall with wooden plugs and suitable clamps.

Jointing the pipes

1. The pipes and sockets shall be accurately cut. Care shall be taken to cut the pipe square. The shortened pipe end shall be chamfered to an angle of 15^{O} with a medium file. The ends of the pipes and fittings should be absolutely free from dirt and dust. The outside surface of the pipes and the inside of the fittings shall then be roughened with emery paper and then solvent cement shall be applied to the matching surface i.e. , to the spigot end and the sealing ring and then push the spigot end in to the socket containing the sealing ring until pushed home fully and joined. Mark the position of the socket edge on the pipe and then withdraw the pipe from the socket for the necessary thermal gap. Since solvent cement is aggressive to UPVC, care must be taken to avoid applying excessive cement to the inside of pipe sockets as any surplus cement cannot be wiped off after jointing. Very old, hard, dense solvent cement shall not be used. Empty solvent cement tins, brushes, rags of paper impregnated with cement should not be buried in the

trenches. They should be gathered, not left scattered about, as they can prove to be a hazard to animals, which may chew them.

2. Threaded UPVC pipe-fittings shall not be over tightened, as the threads may get damaged. The pipes shall never be threaded but suitable threaded fittings shall be used.
3. If any manufacturer recommends its own methods of jointing, the same shall be adopted after necessary approval from the Engineer-in-charge.

Laying the pipes in trench:

The pipes shall be laid over uniform relatively soft fine-grained soil, found to be free from presence of hard objects such as large flints, rocky projections, large tree roots, etc., While laying the pipes underground, care shall be taken so that the trench shall be as narrow as possible as required for working and its bottom shall be free of stones, sharp objects etc.

The pipes laid underground shall not be less than 1 meter from the ground level. The pipe shall be positioned in the trenches so as to avoid any induced stresses due to deflection. Any deviation required shall be obtained by using proper type of rubber ring joints.

Mode of Measurements and payment: - The Specifications same as Item No. 11.01.

11.20 Full way lever operated forged brass ball valve (100001110 to 100001113)

The ball valve shall be of Brass or Gunmetal as specified conforming to IS: 1703.The ball valve shall be as given below:

High Pressure:

High pressure is indicated by the abbreviation 'HP' for use on mains having pressure. These shall remain closed at a test pressure of 10.5 Kg/Sq.cm.

	Nominal Size of Ball Valve					
Dia. of spherical float (mm)						
High Pressure	127	152	203	229	254	305
Low Pressure	114	127	178	203	203	254
Minimum weight of ball	283	446	823	1149	1589	1852

valve including back nut, body and piston (gms)						

The ball valves shall be of following nominal sizes 15mm, 20mm, 25mm, 32mm, 40mm, 50mm and 80 mm. The nominal size shall correspond with the nominal bore of the inlet shanks.

Mode of Measurement: All valves shall be measured by numbers.

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 [AX ITEM NO. 100001063]

Providing & Fixing Bib cock for 15mm dia pipe line

A bibcock (foam flow) is a draw off tap with horizontal inlet and free outlet .It shall 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 [AX ITEM NO. 100001064]
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.

11.33(a) C.P. brass pillar cock (100001087)

Materials:

15mm dia CP brass screw down shall conform to IS: 781, as per relevant specification of plumbing materials. The bib-tap shall be of 1st quality.

Workmanship:

The screw down bib-tap of 15mm dia as specified above shall be fixed as directed. The threaded portion shall be smeared with white or red lead and provided with a few turns of fine spun yarn round the screwed end of the pipe or the joint shall be done with a Teflon tape. The bib-tap shall be then screwed and fixed water tight.

Mode of Measurements and Payment:

The rate shall be for a unit of one number and include cost of all labour, materials, tools and plant, etc., required for satisfactory completion of this item.

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 rate 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 rate 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 dia line

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 (100001071)

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 (100001075)

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 (100001076)

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 (100001082)

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 [AX ITEM NO. 100020245]
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.

11.54 Fixing HDPE/PVC Water Tank- 500 Ltr. capacity

The general specification is same as per Item spec. no. 11.52.

Mode of Measurement: This shall be measured in Number

11.55

Providing and fixing Valves of various diameters complete

General - Brass or gunmetal valves shall be heavy quality, of approved manufacturer & pattern and with screwed or flanged ends as specified. The valves shall in all respects comply with IS.778-1984 & IS.781-1984. The standard size of brass or gunmetal valves shall be designated by the nominal bore of the pipe outlet to which they are to be connected. A sample of each kind of valve shall be got approved from the Project Manager & all supplies made according to the approved samples.

All cast valves shall be round & free from blow holes. Both internal & external surfaces shall be clean, smooth & free from sand etc. Burning, plugging, stopping or patching of the casting shall not be permissible. The bonnet, spindles & other parts shall be truly machined so that when assembled the parts shall be axial, parallel & cylindrical with surface smoothly finished. The area of the water way of the valve shall not be less than the area of nominal bore.

The valve shall be thoroughly examined & cleaned of all foreign matter before being fixed. The valves shall be fixed in the line in a workmanlike manner. The joints between fittings & pipes shall be made leak proof When Tested as described in paragraph 5.12 & the defective fittings & joints shall be replaced or redone.

Mode of Measurement

It shall be measured in numbers

11.56 Providing and fixing insulation to small pipes embedded in walls, with 9 mm thick Nitrile rubber tube , on cPVC pipe lines for hot water supply, etc. complete, as directed of

1) 150 mm. n.b.
2) 100 mm. n.b.
3) 80 mm. n.b.
4) 65 mm. n.b.
5) 50 mm. n.b.
6) 40 mm. n.b.
7) 32 mm. n.b.
8) 25 mm. n.b.
9) 20 mm. n.b.
10) 15 mm. n.b.

Materials:
The insulation shall be provided as under 9 mm. thick Nitrile rubber tube.
The insulation shall be fire inhibiting 9 mm. thick Nitrile rubber tube, Highly – flexible closed - cell insulation material high vapour diffusion resistance and Low thermal conductivity value of not more than 0.035 w/(m . k), FM Approved. It shall be fire inhibited (TF quality) and solvent resistant and shall be of close cellular structure and hence of negligible vapour permeability.

Workmanship:
Application:
The pipe surface shall be thoroughly cleaned with a wire brush to remove all rust and other foreign matter.
The cleaned surface shall be applied with a coat of industrial bitumen 85/40 or 85/25. The insulation slab shall then be stuck over this with staggered joints. The joints shall be sealed with a vapour barrier of Bitumen. The insulation shall be held in position with 1 mm. G.I. wire at 600 mm. C/C. A coat of bitumen shall then be applied over the insulated surface.
Finish: The insulated surface shall be cladded all around with 24 gauge aluminium sheet.
Mode of Measurement
It shall be measured in installed running meter; The Cost shall including installation of Insulation.

11.57 Providing and fixing, testing & commissioning of health faucet with regulator

The general specification as specified in the item description in the schedule of quantity.

Mode of Measurement: This shall be measured in Number.

11.58 Providing **& Fixing C.P. brass exposed type flush valve for Urinal Pressmatic**

It shall be 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 confirming to relevant specification. .

Mode of Measurement: This shall be measured in Number.

11.59 Providing and Fixing, testing & commissioning of Concealed type flush valve."

The general specification as specified in the item description in the schedule of quantity.

Mode of Measurement: This shall be measured in Number.

11.60 Providing and fixing Recessed type Stainless Steel soap dish

The general specification as specified in the item description in the schedule of quantity.

Mode of Measurement: This shall be measured in Number**.**

11.61 Providing and fixing ABS plastic body liquid soap dispenser

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.

11.62 Providing & fixing stainless steel toilet paper holder

The general specification as specified in the item description in the schedule of quantity.

Mode of Measurement: This shall be measured in Number**.**

11.63 Providing & Fixing HDPE pipe (100001132 to 100001136)

Providing & Fixing HDPE pipe of diameter as specified in SOQ 4 kg pressure 4984 PE 80 with welding, all fitting such as bend, tee, reducer etc complete.

Mode of Measurement: This shall be measured in running meter**.**

FOR THE SPECIFICATIONS AND MODE OF MEASUREMENT OF ALL OTHER ITEMS, PLEASE REFER THE SCHEDULE OF QUANTITY SINCE THEY ARE SELF EXPLAINATORY.

Item Specifications for the Item Code No: 100027553

Sump Pumps for Lifting Effluent
Providing and fixing compact monoblock dry motor submersible pumps for suitable rating, with non-clog free flow open impeller, minimum solid handling capacity of 46mm suitable for operation on 400 volts (+ 10% , -15%), 50 HZ three phase supply, speed 1430 RPM including oil chamber, guide wire for lifting & lowering of pump, M.S. galvanized lifting chain, duck foot bend with following specifications:
Pump casing, casing motor, impeller shall be SS CF8M Material
Pump shaft shall be SS 410, Impeller bolts shall be AISI 316, Body, NICI
The above pump sets must be supplied complete with following accessories.
Piping of 100mm dia for individual pump delivery line and 150mm dia for common delivery line, to be terminated outside the sump. (The pipe material should be SS 316) -- 1 Set
100mm dia Butterfly valve.-- 2 Nos
100 mm dia reflux valve.-- 2 Nos
Necessary cables from pump set to control panel (position of panel marked in enclosed layout in plant room).-- 1 Set

Electrical switch panel with DOL starter having all necessary accessories & safety devices of standard specifications. (Panels with sump pumps near each sump as per site conditions). --1 No.
Automatic built-up water level controller with necessary length of cable upto control panel.
No. of Pumps : 2 nos (1 working + 1 stand by)
Discharge - 200 LPM Each
Total head - 15 m

TECHNICAL SPECIFICATION

12.00 SANITARY WORKS

12.01 Providing & laying various 300 mm diameter (internal diameter) non-pressure Hume pipes class NP2 (100001173)

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:

Pipe thickness	Spun pipe	Pipe other than Spun pipe
	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 up-stream. 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 suitably 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 (100001174)

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. (100001175)

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 reminder 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

farming 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 token 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 [AX ITEM NO. 100021367]
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 [AX ITEM NO. 100001192]
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 (100001193)

The general specifications shall be same as item 12.19.

Mode of Measurement: Same as per Item spec. no. 12.19

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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 (100001197)

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 (100001198)

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(100001199)

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 (100021363)

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:

Types	**Size**
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 [AX ITEM NO. 100001202]
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

610x460x225 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(100001126)

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 confirming to relevant specification. .

Mode of Measurement: This shall be measured in Number.

12.36 Providing & Fixing HCI Nahani trap (100006755)

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 (100001207)

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 (100001253)

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. (100001209)

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 in 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.(100001212)

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.(100001213)

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.

12.56 Providing & Fixing Toilet Set For Handicap Persons (100026496)

Providing and Fixing set for Handicap Persons including all accessories as per the recommendation of manufacturer, with connector pipe & bend 110 dia, connector ring and Lip ring 110 dia etc. with cutting and making good the walls and floors, silicon joint sealing etc complete as directed.

Mode of Measurement: This shall be measured in Number.

12.57 Providing & Fixing SFRC Cover (100020291)

Providing and fixing heavy duty HD-20 grade designation SFRC manhole covers and frame of 560mm internal diameter confirming to IS:12592, total weight of cover and frame to be not less than 182 kg. fixed in cement concrete 1:2:4 mix (1 cement : 2 course sand : 4 graded stone aggregate 20mm nominal size) including centering and shuttering all complete.

Mode of Measurement: This shall be measured in Number.

12.58 Providing & Fixing "Foamcore" Upvc Pipe (100021374, 100021375 & 100024080)

Providing and laying different dia (Nominal Diameter) uPVC, FOAMCORE, SN8 pipe of approved make including all necessary fittings, excavation of trenches in soil/murum/rock up to 1500mm depth, providing & laying 150 mm thick BBCC 1:5:10 (1 part cement, 5 part coarse sand, 10 part brickbat) as bedding, laying and jointing the pipe in required line, level and as per manufacturer's specification, encasing the pipe by providing & laying with 100mm thick PCC 1:5:10 (1 part cement, 5 part coarse sand, 10 part stone aggregate) at all the three sides around of the pipe, refilling of the trenches, watering, compacting and testing before concealing the pipe etc. complete as directed.

Mode of Measurement: This shall be measured in running meter.

12.59 SEWERAGE TREATMENT PLANT PREFAB TYPE (100020290)

1. The job of STP has to be done on a Turnkey basis, therefore the contractor shall be fully responsible for designing, preparation of drawings and design calculations, supply of material, installation, testing and commissioning, getting final certifications related to the final quality of treated effluent, from all the concerned Pollution & Environmental

Authorities & Operation and Maintenance of the system for the mentioned period.

2. Proposed Capacity of STP is 5 m3/day.

3. Generally but not limited to the following main activities are expected from the Executing Agency in a sequential manner.

Preparation of scheme based on the design data, statutory guidelines, P & I , flow diagram, and getting it approved from the consultant.

Preparation of detailed Shop drawings, Technical Documents and getting it approved from the consultant.

Makes of all Electro – Mechanical equipment /components shall also get approved from .

4. Design Data

(The data as provided below are only for guideline purposes and are to be verified by the Executing Agency with respect to state PCB norms/ CPCB norms.)

4.1 Site Location: The site is located in Barauni, Begusarai, Bihar.

4.2 Air Temperatures

(a) Annual mean Max. : 42°C

4.3 Rainfall

Normally rains occur between June to September.

(a) No. of rainy days : 55.9 days

(b) Average Annual rainfall : 1130 mm

4.4 Wind

From May to September the wind direction is prevalently from the East & from October to April it is mainly from the West direction.

4.5 Ground Water

To be verified from the site. Very High Water table level is encountered at site at about 0.50m below NGL. .

4.6 Soil Characteristics

To be verified from the site. Predominantly Silty Clay (CI)

4.7 Accessibility of Site

The site is well connected by all-weather roads from all directions.

4.8 Construction Material Available

As the site is well connected by all-weather roads construction material can easily be available at site. Skilled and unskilled laborers are available.

5. Influent Characteristics

5.1 Type of Waste Water: The influent is the product of the wastewaters from different activities such as:

Domestic sewage from the toilets & bathrooms.

Oil, Grease and food waste etc.

5.2 Characteristics of Untreated & Treated Effluent

Waste Water Characteristics

Duration of flow to STP	:	24 hours
Peak Factor	:	3
Temperature	:	Maximum 32.8 ^{O}C
pH	:	6.5 to 7.5
Color	:	Mild
T.S.S (mg/l)	:	200 to 250 mg/l
BOD(5) (mg/l)	:	250 to 300 mg/l
COD (mg/l)	:	400 mg/l
Oil and grease	:	50 mg/l

Treated Effluent Characteristics after Secondary treatment

pH	:	6.5 – 8.5
B.O.D.	:	Less than 30 mg/l
C.O.D.	:	Less than 80 mg/l
Total suspended solids	:	15 – 30 mg/l
Oil and grease	:	< 10 mg/l

Final Effluent Characteristics after Tertiary Treatment

pH	:	6.5 – 8.5 mg/l
B.O.D.	:	Less than 10 mg/l
C.O.D.	:	Less than 50 mg/l
Total suspended solids	:	Less than 10 mg/l
Oil & grease	:	<2 mg/l
Ammonical Nitrogen	:	< 5 mg/l
Total Nitrogen	:	< 5 mg/lit
Fecal Coliform	:	< 100 MPN/100 ml.

5.3 It may clearly be understood that the client wants to make re-use of treated effluent. The water after above treatment shall go for horticulture/ Gardening purposes. The water from the tertiary treatment shall be re-used. Hence, it is imperative that the contractor ensures that the effluent is usable for above purposes.

Description of Treatment Process & Units

6.1 Without restricting to the generality of the foregoing, the work shall consist of:-

The civil works for the Sewage collection tank, pump and skid civil Foundation for the Packaged STP units will be paid under respective Civil works items.

6.2 Design , Supply , Installation & commissioning of all MS components (3 mm FRP linning inside and epoxy painting outside) , to consist of:-

Bar screen & Fine screen- SS304
Anoxic tank
MBBR tank

Tube Settler
Clarified water tank/ Filter feed tank
Treated water tank
Sludge holding tank

6.3 Mechanical Equipment

Design, supply, erection, commissioning and testing of all mechanical equipment, as discussed in the proceeding sections, generally comprising of:

Bar Screen- 1 lot.
Root Air blowers with motor and acoustic enclosure related accessories – 2 nos.
Air Diffusers (Fine bubble – Silicon MOC) – 1 lot..
Raw effluent re-lift pumps- 2 nos.
Sludge return pump- 2 nos.
Filter feed pumps- 2 nos .
Agitator in Anoxic tank- 1 no.
Basket type Centrifuge & Sludge handling arrangements- 1 lot
Treated water pump- 2 nos
All interconnecting Pipe-lines, valves, NRV's . Guages, instrumentation and accessories- 1 lot
Chlorine dosing pump with dosing tank 1 no.
Pressure Sand Filter- 1 no.
Activated carbon Filter- 1 no.
Ozone treatment system- 1 lot
Bio-media for MBBR Tank- 1 lot
Tube settler Media- 1 lot.
Any other equipment required for functioning of STP or as per Clients' / as per approved design / statutory requirements.

The makes and the capacities of the units to be got approved from as per design requirements.

6.4 Electrical Equipment

Design, Supply, Erection, Commissioning and Testing of all Electrical equipment generally comprising of:

Electric motors for all equipment as required.

Motor control centre completes with all internal wiring and accessories.
Electrical cables from approved panel (Non compartment type) to all electric motors and units.
Electric earthing stations as per I.E.E. rules.
All internal lighting & exhaust system etc.

6.5 Piping Work

Laying of all piping work as per detailed designs and generally for:

All above mentioned civil structure and tanks.
For the interconnection of the various equipments, sludge sump, pump house and control room.
All interconnecting piping between various units bypass etc.
Effluent piping within limits as shown on the drawings.
Piping required for providing water supply & drainage for the Testing Laboratory.

6.6 Treatment Process

The sewage from the last manhole of the Toilets shall be collected into collection/ Equilisation sump .

The sewage shall be pumped and passed through the Fine Screen . After Screening the effluent shall be led to Anoxic tank & MBBR reactor where it is subjected to biological treatment. In this process aerobic microorganism brings out the oxidation of organic matter in suspension and attached form. The Bio-media itself is in Fluidized state offering greater contact between Microorganism and sewage thereby increasing the BOD removal efficiency. Air Blowers with fine bubble silicon Membrane diffusers supply the required oxygen. The mixed liquor shall be taken in the Clarifier (tube Settler unit). The settled sludge from the clarifier shall be re-circulated to MBBR Reactor for the maintenance of required micro biological population and the balance is pumped to the sludge de-watering system . The filtrate from the sludge dewatering system shall be taken into the equalization tank.

The clarified sewage then shall be subjected to chlorination to disinfect the biomass as well as eliminate the residual organics. The chlorination shall be carried out in Filter feed tank . The water shall be pump to Tertiary treatment system - Multi Graded Filter followed by Activated Carbon Filter and finally pumped through Ozonator The effluent after treatment shall be

pass through Ozonator will be fit for reuse in gardening. The dried sludge from the sludge de watering can be used as manure. The treated effluent shall meet all the Pollution Control Board Norms and could be used for gardening within the premises by the client.

APPROVALS FROM STATUTORY AUTHORITIES

Obtaining approval & Consent (Consent to Operate) from relevant authorities like State Pollution Control Board etc. However, any statutory fees paid by the contractor shall be reimbursed against submission of documentary proof.

Test-run of the plant:

After stabilization of STP Plant , a one month **guarantee test run** shall be provided by the Contractor during which daily monitoring of raw and treated effluent quality and effluent throughput shall be done and log sheets to be maintained duly signed by the representative of project authority .

Over and above the daily monitoring of effluent quality, the Contractor shall arrange at his own cost, **analysis of the composite raw and treated Waste water samples for 7 consecutive days for all the effluent parameters specified in the consent note at an external laboratory approved/ recognised by the State Pollution Control Board / NABL / Engineering collage. The results shall conform to the performance guarantee for the plant which shall be a pre-requisite for the takeover of the plant.** In case of non-compliance to the guaranteed treated effluent quality for given design input conditions, the Contractor shall take necessary measures to bring the plant to the desired performance.

Less effluent flow condition

In case during the guarantee test run, the effluent flow or organic load shall be found to be less than the rate input, the contractor shall undertake that as and when rated throughput and organic load conditions are available, the contractor shall extend necessary assistance to achieve the guaranteed output quality, through re-deputation of his personnel at a later date at mutually agreed terms.

Training

The Contractor shall train the plant personnel in the Operation & Maintenance practice for the Sewage Treatment Plant units during the guarantee test run.

Operation Manual

The scope of services shall include the Preparation and Submission of Operation & Maintenance Manual (One soft copy and 3 sets of hard copies) prior to plant commissioning. The Manual shall cover the following aspects:

Brief process description & flow sheet. Unit wise function and description, equipment details with sizes and as build drawings, operational instructions, maintenance procedures. Plant start-up, commissioning, normal operations, effluent parameters testing procedures, emergency operation steps etc. required for smooth operation & maintenance of STP units.

BATTERY LIMITS FOR THE STP WORK

- For Raw Sewage: the pipeline from Last manhole near the STP.
- For Disposal of treated water: Pumping/ Disposal of STP treated water from STP final treated water tank shall be arranged by Project authority.
- For service water pipeline to be tapped from Toilet Building.
- Disposal of sludge is to be arranged and done by project authority.

FOR THE SPECIFICATIONS AND MODE OF MEASUREMENT OF ALL OTHER ITEMS, PLEASE REFER THE SCHEDULE OF QUANTITY SINCE THEY ARE SELF EXPLAINATORY.

Supplementary Specifications for Sanitary & Plumbing

(12a)

SANITARY AND PLUMBING ENGINEERING

SANITARY FIXTURES

1. **SCOPE OF WORK**

1.1 Work under this section shall consist of furnishing all Material and labour as necessary and required to completely install all Sanitary Fixtures, brass and Chromium Plated fittings and accessories as required by the drawings and specified hereinafter or given in the Schedule of Quantities.

1.2 Without restricting to the generally of the foregoing the Sanitary Fixtures shall include all Sanitary Fixtures, C.P. fittings and Accessories etc. necessary and required for the Building.

1.3 Whether specifically mentioned or not all Fixtures and appliances shall be provided with all fixing devices, nuts, bolts, screws, hangers as required.

2. **GENERAL REQUIREMENTS**

2.1 All Fixtures and fittings shall be provided with all such accessories as are required to complete the item in working condition whether specifically mentioned or not in the Schedule of Quantities, Specifications and Drawings.

2.2 All Fixtures and accessories shall be fixed in accordance with a set pattern matching the tiles or interior finish as per Architectural/ Interior designer's requirements. Wherever necessary the fittings shall be centered to dimensions and pattern desired.

2.3 Fixing screws shall be half round head Chromium Plated brass with C.P. washers wherever required as per directions of Engineer-in-Charge.

2.4 All Fittings and Fixtures shall be fixed in a neat workmanlike manner true to Levels and Heights shows on the drawings and in accordance with the manufacturers' recommendations. Care shall be taken to fix all Inlet and Outlet Pipes at correct positions. Faulty locations shall be made good and any damage to the finished floor, tiling or terrace shall be made good at Contractors cost.

2.5 Contractor shall install Fixtures and accessories in a mock-up room for the approval of the Engineer-in-Charge. Sample room Fixtures may be reused on

the works if undamaged, but no additional payment for fixing or dismantling shall be admissible.

3.0 **EUROPEAN W.C.**

3.1 European W.C. shall be wash down, single or double siphonic type, wall mounted set, flushed by means of exposed or concealed type Flush Valve, as specified in Schedule of Quantities. Flush pipe/bend shall be connected to the W.C. by means of suitable rubber adapter. Wall hung W.C. shall be supported by C.I. floor mounted chair.

3.2 Each W.C. seat shall be so fixed that it remains absolutely stationary in vertical position without falling down on the W.C.

4. **INDIAN W.C.**

4.1 Indian W.C. pan shall be Orissa pattern of size as specified in the Schedule of Quantities. Each W.C. shall be provided with a 100 mm dia cast iron or porcelain P or S trap with or without vent horn.

4.2 W.C. shall be flushed by means of an exposed or concealed type cistern / Flush Valve or as specified in Schedule of Quantities.

4.3 The W.C. shall be fixed in level in a neat workmanlike manner. The W.C. and trap shall be set in cement concrete 1:2:4 mix (1 cement: 2 coarse sand: 4 stone aggregate 20 mm nominal size) joints between W.C. and flush pipe shall be made with a putty or white lead and linseed oil and caulked well or with an approved rubber joint.

5.0 **URINALS**

5.1 Urinals shall be white glazed Vitreous China flat back half stall or lip type or as specified in Schedule of Quantities.

5.2 Half stall Urinals shall be provided with 15 mm dia C.P. spreader, 40 mm dia C.P. domical waste and C.P. cast brass bottle trap with pipe and wall flange, and shall be fixed to wall by one C.I. bracket and two C.I. wall clips as recommended by manufacturers complete and as directed by Engineer-in-Charge.

5.3 Half stall urinals shall be fixed with C.P. Brass screws and shall be provided with 40 mm dia Domical Waste leading to Urinal trap.

5.4 Urinals shall be flushed by means of automatically sensor operated flushing system as specified in Schedule of Quantities.

5.5 Waste pipes for urinals shall be of the following:

(a) cPVC Pipes

Waste pipes may be exposed on wall or concealed in chase as directed by the Engineer-in-Charge. Specifications for waste pipes shall be same as given in Sub Section.

5.6 **SINKS**

5.7 Sinks shall be of precast Terrazzo marble or White Glazed fire clay or vitreous china or stainless steel or any other material as specified in the Schedule of Quantities.

5.8 Hand Wash Sinks and Process Sinks shall be of stainless steel.

5.9 Each sink shall be provided with R.S. or C.I. brackets and clips and securely fixed. Counter top sinks shall be fixed with suitable angle iron clips or brackets as recommended by the manufacturer. Each sink shall be provided with 40 mm dia C.P. waste with chain and plug or P.V.C. waste. Fixing shall be done as directed by Engineer-in-Charge.

5.10 Supply fittings for sinks shall be mixing fittings or C.P. Censor Operated (Battery/Electrical) taps as specified in the Schedule of Quantities.

6.0 **MIRRORS**

6.1 Mirrors shall be electro coated copper 6 mm thick of guaranteed reputed make. The size shall be as specified in the Schedule of Quantities or shown on the drawings. The image shall be clear and without waviness at all angles of vision.

6.2 Mirrors shall be C.P. brass semi-round headed screws and cup Washers or C.P. Brass Clamps as specified or as per the Schedule of Quantities or instructed by Engineer-in-Charge.

7.0 **SHOWER SET**

7.1 Shower set shall comprise of single lever mixer or four way diverter with two C.P. brass concealed stop cocks, with bath spout or as given in the Schedule of Quantities.

7.2 Each shower set shall also be provided with C.P. shower arm with wall flange and shower head of approved quality as specified in the Schedule of Quantities.

7.3 Concealed stopcocks shall be so fixed as to keep the wall flange clear off the finished wall. Wall flanges embedded in the finishing shall not be accepted.

8.0 **ACCESSORIES**

8.1 Contractor shall install all Chromium Plated and porcelain accessories as shown on the drawings or directed by Engineer-in-Charge, and given in the Schedule of Quantities.

8.2 All C.P. Accessories shall be fixed with C.P. brass half round head screws and cup washers in wall with rawl plugs or nylon sleeves and shall include cutting and making good as required or directed by Engineer-in-Charge.

8.3 Porcelain accessories shall be fixed in walls and set in cement mortar 1:2 (1 cement: 2 coarse sand) and fixed in relation to the tiling work.

9.0 **URINAL PARTITIONS**

9.1 Urinal partitions shall be as specified in the Schedule of Quantities.

10.0 **MEASUREMENT**

10.1 Rates for fixing of Sanitary Fixtures Accessories, urinal partitions shall include all items and operations stated in the respective specifications and Schedule of Quantities and nothing extra is payable.

10.2 Rates for all items under specifications above shall be inclusive of cutting holes and chases and making good the same, C.P. screws, nuts, bolts and any fixing arrangements required and recommended by Manufacturers, Testing and Commissioning.

SOIL, WASTE & VENT PIPES

1. **SCOPE OF WORK**

1.1 Work under this section shall consist of furnishing all labour, materials, equipment and appliances necessary and required to completely install all soil, waste, vent and rainwater pipes as required by the drawings, specified hereinafter and given in the Schedule of Quantities.

1.2 Without restricting to the generally of the foregoing, the soil, waste, vent and rainwater pipes system shall include the followings:-

a) Vertical and horizontal Soil, Waste and Vent Pipes, Rainwater Pipes and Fittings, Joints Clamps and connections to Fixtures.

b) Connection of pipes to Gully Traps & Manholes etc.

c) Floor and urinal traps, cleanout plugs, inlet fittings and rainwater heads as specified.

d) Waste pipes connections from all Fixtures e.g. wash basins, sinks, urinals and kitchen equipments.

e) Testing of all pipes.

2. GENERAL REQUIREMENTS

2.1 All materials shall be new of the best quality conforming to specifications and subject to the approval of Engineer-in-Charge.

2.2 Pipes and fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workmanlike manner.

2.3 Pipes shall be fixed in a manner as to provide easy accessibility for repair and maintenance and shall not cause obstruction in shafts, passages etc.

2.4 Pipes shall be securely fixed to walls and ceilings by suitable clamps at intervals specified.

2.5 Access doors for fittings and cleanouts shall be so located that they are easily accessible for repair and maintenance.

2.6 All works shall be executed as directed by Engineer-in-Charge.

3 Not Applicable

4 TRAPS

4.1 Floor traps shall be with an effective seal of 50 mm. The trap and waste pipes shall be set in cement concrete blocks firmly supported on the structural floor. The blocks shall be in 1:2:4 mix (1 cement: 2 coarse sand: 4 stone aggregate 20 mm nominal size) and extended to 40 mm below finished floor level. Contractor shall provide all necessary shuttering and centering for the blocks. Size of the block shall be 30x30 cm of the required depth. Where traps are suspended below ceilings, they shall be provided with proper structural supporting arrangements.

4.4 **C.P./Stainless Steel Gratings**

Floor and Urinal Traps shall be provided with 100-150 mm square or round C.P/Stainless steel grating, with rim of approved design and shape. Minimum thickness shall be 4-5 mm or as specified in the Schedule of Quantities.

5.0 CLEANOUT PLUGS

Contractor shall provide brass cleanout plugs as required. Cleanout plugs shall be threaded and provided with key holes for opening. Cleanout plugs shall be fixed to the pipe by a male threaded adaptor.

6.0 WASTE PIPE FROM APPLIANCES

6.1 Waste pipe from appliances e.g. wash basins, sinks, urinals, bathtubs, water coolers shall be of cPVC pipes as given in the Schedule of Quantities or as shown on the drawings.

6.2 All pipes shall be fixed in gradient towards the outfalls of drains. Pipes inside a toilet room shall be in chase unless otherwise shown on drawings. Where required pipes may be run at ceiling level in suitable gradient and supported on structural clamps at approved spacing.

7.0 CUTTING AND MAKING GOOD

Pipes shall be fixed and tested as buildings proceeds. Contractor shall provide all necessary holes cutouts and chases in structural members as building work proceeds. Wherever holes are cut or left originally, they shall be made good with cement concrete 1:2:4 (1 cement: 2 coarse sand: 4 stone aggregate 20 mm nominal size) or cement mortar 1:2 (1 cement: 2 coarse sand) and the surface restored as in original condition.

8 INSPECTION & TESTING

Inspection

Work should be inspected during installation and tests applied on completion, care being taken that, all work which is to be encased for concealed is tested before it is finally enclosed.

Inspection should be carried out to ensure the following:

(a) Work accords with the drawing and specifications.

(b) All pipe brackets, clips etc. are securely fixed.

(c) Fixtures are correctly spaced.

(d) Pipe is protected where necessary by Thermal Insulation.

(e) Embedded pipe work is properly protected before sealing-in

(f) All access covers, caps or plugs.

- Are accessible
- Are so made that the internal faces truly complete in internal bore.
- Cause no obstruction in the pipe bore
- Are well joined.

Testing

The soil, waste piping system and rain water should be tested after installation as follows:

Water Test

The pipes shall be tested after installation & before the appliances are connected, preferably in sections so as to limit the static head of 4.5m. The pipe shall be filled with water for at least 10 minutes. After filling, pipes shall be struck with a hammer and inspected for blow holes and cracks. Then it will be necessary to seal all openings and leaks at joints immediately as observed during the test and all defective pipes shall be rejected and removed from the site. Pipes with minor sweating shall be accepted at the discretion of the Airport Authority of India /Engineer-in-Charge.

A test register shall be maintained and all entries shall be signed and dated by Contractors and Airport Authority of India /Engineer-in-Charge.

9 MEASUREMENTS

General

(a) Rates for all items quoted shall be inclusive of all work and items given in the above mentioned specifications and Schedule of Quantities and applicable for the work under floor, in shafts or at ceiling level at all heights and depths.

(b) All rates are inclusive of cutting holes and chases in RCC and masonry work and making good the same.

(c) All rates are inclusive of pre-testing and on site testing of the installations, materials and commissioning.

Pipes (Unit of measurement. Linear meter to the nearest centimeter)

Pipes shall be measured along the center line when fixed, correct to a centimeter including all fittings, joints and as specified along its length.

Structural Clamps: Rates shall be inclusive of all U clamps, MS holder bats, nuts, bolts, dash fasteners, drilling, cutting, welding etc all.

WATER SUPPLY SYSTEM

1.0 SCOPE OF WORK

1.1. Work under this section consists of furnishing all labour, materials equipment and appliances necessary and required to completely install the water supply system as required by the drawings, specified hereinafter and given in the Schedule of Quantities.

1.2 Without restricting to the generality of the foregoing, the water supply system shall include the following:-

a) All water lines to different parts of building and making connection from source etc.

b) Pipe protection and painting.

c) Providing Hot water supply lines and insulation of hot water pipe lines.

d) Control valves, masonry chambers and other appurtenances.

e) Connections to all toilets, kitchen equipment, storage tanks and appliances.

f) Excavation and refilling of pipe trenches, wherever required.

g) Trenches for taking pipe lines for these services.

2.0 GENERAL REQUIREMENTS

2.1 All materials shall be new of the best quality conforming to specifications. All works executed shall be to the satisfaction of the Engineer-in-Charge.

2.2. Pipes and Fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workmanlike manner.

2.3 Short or Long bends shall be used on all main pipe lines as far as possible. Use of Elbows shall be restricted for short connections.

2.4 Pipes shall be fixed in a manner so as to provide easy accessibility for repair and maintenance and shall not cause obstruction in shafts, passages etc.

2.5 Pipes shall be securely fixed to walls and ceilings by suitable clamps at intervals specified.

2.6 Valves and other appurtenances shall be so located as to provide easy accessibility for operations, maintenance and repairs.

3.0 **G.I. PIPES & FITTINGS**

3.1 All pipes inside the buildings and where specified, outside the building shall be galvanized steel tubes conforming to I.S. 1239-1979 of class specified. When class is not specified they shall be medium class.

3.2 Fittings shall be malleable iron galvanized fittings, of approved make. All fittings shall have manufacturer's trade mark stamped on it. Fittings for G.I. pipes shall include Couplings, Bends, Tees, Reducers, Nipples, Unions, Bushes. Fittings shall be of I.S:1879 - (part I to X) 1975.

3.3 Pipes and fittings shall be jointed with screwed fittings. Care shall be taken to remove burr from the end of the pipe after cutting by a round file. Genuine red lead with grumet and a few strands of fine hemp shall be applied. All pipes shall be fixed in accordance with layout and alignment shown on the drawings. Care shall be taken to avoid air pockets. G.I. pipes inside toilets shall be fixed in wall chases well above the floor. No pipes shall be run inside a sunken floor as far as possible. Pipes may be run under the ceiling or floors and other as shown on drawings.

4.0 **CLAMPS**

G.I. pipes in shafts and other locations shall be supported by MS/GI. clamps of design approved by Engineer-in-Charge. Pipe in wall chases shall be anchored by iron hooks. Pipes at ceiling level shall be supported on structural clamps fabricated from MS/GI structural. Pipes in typical shafts shall be supported on Slotted Angles/Channels as specified.

5.0 **UNIONS**

Contractor shall provide adequate number of unions on all pipes to enable dismantling later. Unions shall be provided near each Gunmetal Valve, Stop Cocks, or Check Valves and on straight runs as necessary at appropriate locations as required and/or directed by Engineer-in-Charge.

6.0 **FLANGES**

Flanged connections shall be provided on pipes where shown on the drawings, all equipment connections as necessary and required or as directed by Engineer-in-Charge. Connections shall be made by the correct number and size of the bolts and made with 3 mm thick insertion rubber washer. Where hot water or steam connections are made insertion gasket shall be of suitable high temperature grade and quality approved by Engineer-in-Charge. Bolt hole dia for flanges shall conform to match the specification for C.I. Sluice Valve to I.S. 780.

7.0 **TRENCHES**

The galvanized iron pipes and fittings shall be laid in trenches.

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 earthwork in trenches.

When excavation is done in rock, it shall be cut deep enough to permit the pipes to be laid on a cushion of sand minimum 7.5 cm deep.

8.0 **PAINTING**

8.1 All pipes above ground shall be painted with one coat of Red Lead and two coats of Synthetic Enamel paint of approved shade and quality. Pipes shall be painted to standard colour code specified by Engineer-in-Charge.

8.2 All pipes in chases and below floor shall be provided Anti-corrosive treatment.

9.0 **PIPE PROTECTION**

Where specified in the Schedule of Quantities all pipes below ground shall be protected against corrosion by wrapping 100mm wide and 4mm thick layer of PYPKOTE/MAKPOLYKOTE over the pipe.

10. **VALVES**

All Valves shall be approved by the Engineer-in-Charge before they are allowed to be used on work.

11 to 17.0 (Not Applicable)

18.0 **TESTING**

18.1 All pipes, fittings and valves shall be tested by hydrostatic pressure of min. 1.5 times, the working pressure and subject to minimum of 7 kg/cm_2 in any case and with the consent of Engineer-in-Charge.

Pressure shall be maintained for a period of at least two hours without appreciable drop in the pressure after fixing at site. ($\pm$10 %). A test register shall be maintained and all entries shall be signed and dated by Contractor(s) and Engineer.

18.2 In addition to the sectional testing carried out during the construction, Contractor shall test the entire installation after connections to the overhead tanks or pumping system or mains. He shall rectify all leakages, and shall replace all defective materials in the system. Any damage done due to carelessness, open or burst pipes or failure of fittings, to the building, furniture

and Fixtures shall be made good during the defects liability period without any extra cost.

18.3 After completion of the water supply system, Contractor shall test each valve by closing and opening it a number of times to observe if it is working efficiently. Valves which do not effectively operate shall be replaced by new ones at no extra cost and the same shall be tested as above.

19.0 **MEASUREMENT**

19.1 **Pipes**

Pipes shall be measured per linear metre (to the nearest cm) and shall be inclusive of all fittings e.g. couplings, tees, bends, flanges, elbows, unions, deduction for valves shall be made, cutting holes chases and making good the same and all other items mentioned in the specifications and Schedule of Quantities.

20.0 Not Applicable

21.0 **PRE COMMISSIONING:**

21.1 Ensure that all pipes are free from debris and obstructions.

21.2 Check all valves and fire hydrant for effective opening and closing action. Defects should be rectified or valves replaced.

21.3 Ensure that all Connections to Branches has been made.

21.4 Ensure that mains have been connected to the respective pumps, underground and overhead tanks.

21.5 Water supply should be available at main Underground tank.

21.6 All main line Valves should be closed.

22.0 **COMMISSIONING**

22.1 Fill Underground tank with water. Add 1kg fresh bleaching powder after making a solution to be added near inlet.

22.2 Start Water Supply Pump and allow water to fill main Underground tank. Water will first fill the fire tank and then overflow to the Raw Water tanks.

22.3 After filling Overhead Reservoir drain the same to its one forth capacity through tank scour valve. (This is to ensure removal of all mud, debris etc. from the tank).

22.4 Fill Overhead tank to full.

22.5 Release water in the main lines by opening Valves in each circuit. Drain out water in the system through scour valves or fire hydrant in lower regions. Ensure clean water is now coming out of the system.

22.6 Open valves for individual clusters. Observe for leakages or malfunctions, check pressure & flow at end of line by opening Hydrants etc. Remove and rectify defects noticed.

22.7 Check all outlet points for proper operation by opening each valve and allowing water to flow for a few minutes. Also check for effective closure of valve.

22.8 The entire water supply system should be disinfected with bleaching powder and system flush cleaned.

22.9 Send four samples of water drawn from four extreme locations for testing for bacteriological test in sterilized bottles obtained from the concerned laboratory. (Laboratory personal may collect the samples themselves).

23.0 RESPONSIBILITY

Responsibility for various activities in pre-commissioning and commissioning procedures will rest with the Contractor.

TECHNICAL SPECIFICATION

13. ADDITIONAL NOTE TO TECHNICAL SPECIFICATION TO BE IMPLEMENTED/ ENSURED AT SITE

1. **Documentation for ancillary consumable items used in the works**

Formal records for the consumable materials used in execution of various item of works listed below should be maintained in "**Material Receipt Register" and Reconciliation statement** for all such materials should be prepared & submitted along with the contractor's work bill to ensure that actual consumption of materials is in line with the theoretical requirement/manufacturer's specifications:

i) Chemicals for Anti-termite treatment

ii) Admixtures (used in concrete mix)

iii)Water proofing chemicals/membranes/coatings

iv)Sealants/ Boards used for expansion/construction/contraction joints

v) Observation register for actual unit weight of reinforcement steel, structural steel, Aluminium sections, roofing sheets for which unit weights/ gauges were specified in SOQ/ approved manufacturer's specifications.

vi)All type of painting materials (external/internal/special) including primers

vii) Floor hardener/ special flooring joint materials

viii)All type of coatings (Epoxy, PU etc)

ix)All type of piping material (MS, SS,GI, PVC, uPVC, CPVC, HDPE etc)

x) All types of roof sheeting material

xi)Bitumen 80/100

Contractor to submit a copy of invoice for all the aforementioned consumable materials supplied to project site as directed by Engineer - in-charge.

2. In case of materials supplied of approved makes, contractor to submit manufacture's test certificates (MTC) for each lot of materials supply of material for physical verification (Batch number & Shelf life) by Engineer - in-charge before put to use .

3. All Flooring, Dado materials should be put in use only after physical verification by Engineer -in-charge as specified in Item specification and quality parameters.

4. In case of Cement & reinforcement steel, in addition to manufacturer's tests certificate periodical tests from the approved laboratories should also be carried out as specified in quality control section.

13 (a). ADDITIONAL NOTES FOR CIVIL WORKS

EARTH WORK

All royalties to be paid by contractor and receipts to be submitted to the client for records.

Excavation to be generally carried out using Mechanical /Hydraulic equipment.

Manual excavation shall be done in area where such excavation is extremely difficult or not to be done due to constraints. Decision of Engineer in charge shall be final & binding on such matter.

CONCRETE

In case there is bulging / minor honey combing the contractor will have to rectify the work at his own cost.

The Contractor is entirely responsible for the design of concrete mixes. The design is however, to be approved by the Engineer in charge.

~~Only River Sand should be used. However if silt content is more than permissible limit, washing of sand in rotary screw type washing machines is a must.~~

MASONRY WORK

Top junction of masonry and RCC member to fill by mortar with pebble dash to avoid cracks.

Incase Through stones are not available, than Header blocks of M10 grade concrete of minimum size of 150 x 150 x wall thk should be precast and laid as per specification at no extra cost.

No extra rate will be paid for any curved shape in PLAN for any type of masonry

FINISHING

For cement plaster, gypsum plaster, POP punning if any excess thickness occurs due to the irregularity of the brick or RCC work, than the same should be made up by applying single coat of rough plaster in the affected for which no extra rates will be paid.

If the silt content is more than 3% by volume, all sand used for plastering to be washed using automatic sand washing machine only.

Wherever Stone / Tile Cladding / Skirting / Dado Jambs / Risers is to be done, Cement plaster will not be Paid & It will be done as per relevant item specification.

All painting work is supposed to be completed in two coats so as to give good finish. In case the finish is not good the contractor will have to rectify the work by additional coat of paint at his own cost. Nothing extra is payable for painting work carried out on rough or sand face plaster.

No extra rate shall be paid for any curved shape in PLAN for any type of plaster, painting, false ceiling, wall cladding etc.

Flooring work

All stone samples to be approved by Arch/RSS

Granites with oil or wax, etc. finish will be rejected tolerance in thickness of Granite/Baroda green/ Marble will be ± 0.5mm.

Stones coated with coloured polish would be rejected. Usage of car patch is not allowed.

The Araldite and size zero marble chips/grit to be applied on stone minimum 12 hours before laying in place.

Rates for double scaffolding to be included in all works wherever required for any height.

All floorings, staircases to be covered with pop laid on PVC sheet to protect the work done by the contractor at his own cost and expense and he is responsible to maintain the same until handover.

All tiles have to be of 'a' grade best quality.

All exposed edges of the cills / jambs / treads etc. to be polished at no extra cost.

All stones to be crack free.
No extra rate shall be paid for any curved shape in plan/ elevation for any type of flooring, skirting, dado, cills, covings etc.

TECHNICAL SPECIFICATION (SECTION : IV-A)
(INTERNAL ELECTRIFICATION)

CONTENTS

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 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 (0.D.) FOR ELECTRICAL WIRING - 25 MM

2.1 (A) Hot DIP Galvanized Steel Conduits specification & size

2.1.1. (A) Steel Conduits: These shall be hot dip galvanized steel of wall thickness 16 SWG (1.6 mm thick) up to 32 mm and 14 SWG (2 mm thick) for sizes above 32 mm. These shall be heavy duty, electric resistance welded, electric thread type, having perfectly circular tubing and capable of being cleaned and tight fitting joints.

2.1.2 (A) Steel Conduit Connection: Connections between steel conduits shall be with screwed couplers ensuring screwed metal to metal contact. Length of the threads in all cases of joints shall be between **13 to 19 mm**. Connections between screwed conduits & sheet metal boxes shall be by means GI hexagon check nuts fixed inside the box. Joints in conduit and termination shall be free of burrs to avoid damage to insulation of conductors while pulling through the conduits.

2.1.3 (A) Conduit Bends: Conduit bends shall of **16 SWG**. As far as possible the conduit system shall be so laid out that it will alleviate the use of tees, elbows and sharp bends. Bending of conduit with large radius while laying at site to minimize use of readymade bends shall be adopted as far as possible. No length of conduit shall have more than the equivalent of two-quarter bends from inlet to outlet.

2.1.4 (A) 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 (0.D.) FOR ELECTRICAL WIRING - 25 MM

2.1 (B) Metallic Conduits specification & size

2.1.1. (B) Steel Conduits: These shall be Mild steel of wall thickness 16 SWG (1.6 mm thick) up to 32 mm and 14 SWG (2 mm thick) for sizes above 32 mm, heavy duty, electric resistance welded, electric thread type, having perfectly circular tubing and capable of being cleaned and tight fitting joints. The conduit shall be protected from rust by two coats of primer and one coat of black enamel paint applied inside and outside in its manufactured form.

2.1.2 (B) Steel Conduit Connection: Connections between steel conduits shall be with screwed couplers ensuring screwed metal to metal contact. Length of the threads in all cases of joints shall be between **13 to 19 mm**. Connections between screwed conduits & sheet metal boxes shall be by means MS hexagon check nuts fixed inside the box. Joints in conduit and termination shall be free of burrs to avoid damage to insulation of conductors while pulling through the conduits.

2.1.3 (B) Conduit Bends: Conduit bends shall of **16 SWG**. As far as possible the conduit system shall be so laid out that it will alleviate the use of tees, elbows and sharp bends. Bending of conduit with large radius while laying at site to minimize use of readymade bends shall be adopted as far as possible. No length of conduit

shall have more than the equivalent of two-quarter bends from inlet to outlet.

2.1.4 (B) 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 (0.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 NDS.

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 / raw 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 NDS. 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 confirming 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 CONDUTING 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 chemical 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.** 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 :

6.3 Lightening Protection System

For lightening protective system IS 2309-1989 ”Code of practice for the protection of building & allied structures against lightning" shall be followed.

6.3.1 Lightening Arrestor/Vertical Air Termination

Vertical air terminations shall comprise of Lightining Arrestor with five pointer. Four small 100 mm length with 8mm dia. Center spike with 16mm dia with length 300 mm having pointed radius 2 mm at tip. collector of five spike should have dia more than 30 mm. Connection terminal 12mm hole should be provided. Insulator bush made of polypropylene material to be used between for base of Lightining arrestor and desired pole for fitting. Pole:- GI pipe OD=48mm with height of 1mtr with base plate(100 x100x 6mm) /clamp for wall mounted. (25x6mm L=150 mm) Including supply & Installation of Guying kit 5mm gauge wire with pvc coated as per length , u clip bolt, eye bolt and two way stud

with one side hook anchor bolt and fastener etc accessory for fitting 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 25x6 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 lighting 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

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. However, the Supply of High Volume Low Speed Fan as per SOQ & Technical Specification is in the scope of the bidder.

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 NDS Site Engineer in satisfactory working order.

8.0 STREET LIGHTING

8.1 Street Light Poles Specification

These shall be of hot dip galvanized polygonal/octagonal type with suitable arrangement at the top of the pole for fixing the lighting fixture. The Material for Pole Shaft as per IS 5986 Grade - Fe 510 or Equivalent, Material for Base Plate - As per IS 2062 Grade -Fe 410, Metal protection - Hot Dip Galvanisation as per IS 4759 or equivalent, The minimum zinc coating required is 75 to 80 microns uniform thickness all around the surface of poles, brackets and foundation bolts. Poles will have one bracket arm/two brackets arm radially equidistant/three brackets arm radially equidistant as specified in schedule of quantities for

fixing one/two/three lighting fixtures. Each pole would have in-built water tight box 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 and GI High tensile suitable size foundation bolts, Nuts washer etc. refer the attached drawing of street light poles. 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.

DETAILS FOR HOT DIP GALVANIZED POLYGONAL / OCTAGONAL STREET LIGHT POLE SIZE 6.5 METER

H	Total Height	6.50 METER
T1	Sheet Thickness	Min. 3.0 mm
D	Door Opening	Standard
L	Foundation Bolts Length	600MM min.
D	Foundation Bolts Diameter	M20
N	No. Of Bolts	4
P	P.C.D. Of Bolts	250 mm
S	Size Of Base Plate	260 X 260 mm
T1	Thickness Of Base Plate	16 MM min.
BL	Length Of Bracket Arm	1.5 METER
TA/F	Top Across Flat (Out Side)	90 mm
BA/F	Bottom Across Flat (Out Side)	160 mm
	RCC Foundation nominal reinforcement steel (Min size 450X450X1500mm)	

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 erection of street light poles includes excavation, refilling and RCC 1:2:4 foundation with nominal reinforcement steel (Min size 450X450X1000MM) as per attached Drawing , The foundation bolts shall be grouted in RCC Foundation. Special care shall be taken in erecting poles so that these are not strained or damaged during erection and are firmly stayed. 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. The pole shall be installed only after foundation are secured. Before placement of concrete for pole foundation 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. 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 NDS 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 inter-locking 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 disconnector fuse switches:

The load break switches shall confirm 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 of 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 SOQ** (in standard size/ capacity) of reputed make, as approved by the purchaser, **with double metal door (16/18 G sheets)** complete with Tinned copper bus bars, neutral link, earth bus, DIN rail, detachable gland plate and all interconnections 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.

9.2.11 TECHNICAL SPECIFICATION OF HVLS FAN

A	GENERAL	
1	Make	RR/GOLDEN/BRAYAN
2	Fan Diameter (Ft./Meter)	16 Feet(4.9m)
3	No. Of Blades	5 Nos
4	Width of Blade	240mm
5	Blade Design	Cambered Air Foil
6	Blade Coating	Anodized 15 micron
7	Fan Weight (Not More than)	128 Kgs
8	Air Volume (Not less than)	185650 CFM
9	Fan Blade Material	Aluminium Alloy T6063 Thickness minimum 2mm
10	Fan hub material (Single Piece)	8mm Single Piece Industrial Grade Steel Hub with no welds or joints making it the safest blade support system. Antifall protection for all parts of the fan
11	Blade end winglets	Polypropylene(Engineering Plastic)

12	Controller	Variable Frequency Drive
13	Controller Make	Danfoss/ABB/
14	Rotation Direction (Forward/ Reverse / Both)	Both
B	FAN DATA	
17	Fan Speed (Maximum)	70 RPM
18	Fan Velocity (Maximum)	3.6m/s
20	Fan absorbed Power (Not more than)	1.1Kw
21	Fan Motor rating(Not more than)	1.1Kw
22	Mounting Type	Universal Mount
23	Sound Level @ 3m (Not more than)	60 dB
24	Warranty	Min. 2 year comprehensive replacement warranty
	Paint	Paint to be suitable for outdoor environment (PP Type).Color shade as per requirement
25		
C	FAN GEAR MOTOR	
1	Gear motor make	NORD/SEW
2	Motor KW	1.1Kw
3	Gear box output Shaft bearing	Reinforced Bearing/Taper Roller Bearing
4	Power supply (V-Ph-Hz)	415V-3 phase-50Hz
5	Gearbox Oil	Synthetic Oil suitable for 20000 Hours service life
6	Control Panel Switchgear make	Schneider /ABB/SIEMENS
D	SAFETY FEATURES	
1	Single piece Hub with antifall system	8mm Single Piece Industrial Steel Grade Hub with no welds or

		joints making it the safest blade support system
2	Safety cable with mounting bracket	Stainless Steel 304 Guy Wires/Safety cable
3	MS Support With Existing Structre	Scope Include all required Accessories like 250mmX250mmX12mm thk baseplate to fix fan with Structure and required Suspender MS Pipe for fixing of fan
4	Bird Protection Frame	Fan Cover From Front and back side with MS Powder coated frame

9.2.12 TECHNICAL SPECIFICATION OF Voltage Stabiliser

1	Capacity	10 KVA
2	General	Three Phase Servo Voltage Stabilizer, suitable for indoor use, withstand ambient temp up to 55 degree C, oil cooled immersed in tank, control circuit for correction, suitable for balanced/ Unbalanced supply & load, Continuous duty Solid State Static control, Burn proof AC Synchronous motor
3	Winding	Copper
4	Input Voltage & Frequency	380-450V & 50Hz +/- 5%
5	Output Voltage	415 V +/- 1 %
6	First Oil Fill	In the scope of the bidder
7	Cooling	ONAN
8	Mounting	Floor type
9	Indication, Meters &	Voltmeter, Ammeter, Main ON

	operation	indication, Auto /Manual facility
10	Efficiency	More than 98.6 %
11	Response Time	Less than 10 milli Second
12	Warranty	One-year Manufacturer warranty

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 1st 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 to 17	Each computer outlet shall be measured as one no.

18 to 20	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 to 29	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 to 34	Each tag block shall be measured as one no.
35 to 38	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 to 41	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 to 47 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, High Mast & flood light towers (80% of the item rate)
- Installation of street light poles, High Mast & 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)

TECHNICAL SPECIFICATION

LANDSCAPE WORKS

1) **Work Description:** Water pumping system works including piping, valves, control panels, electrical cables etc. for landscaping cum gardening works.

2) **Address of Project sites:**

Establishment of Cow Sanctuary at Chandan Village, Block Purkaji, Muzaffarnagar, Uttar Pradesh.

3) **Scope of Work:**

The work includes landscape development of grass lawn and Hedge, planting of Ornamental foliage and flowering shrubs, ground cover plants, tree planting, specimen plants etc., as per details furnished in the schedule of quantity. The agency shall provide all horticultural services as agreed upon, schedule of quantities as specified herein or both, including Labour, Equipment, Services and Transport for all plant material, Top soil, Plants, preparation of final planting locations, planting, spraying before planting, maintenance for the period of one year from the date of virtual completion of works. Specifically, the scope includes supplying suitable quantity of soil for filling, compacting etc, to achieve slopes / gradient towards road edge etc.
Apart from the scope mentioned above the following shall be followed by the contractor:

- Bidder Should design Landscape works, submit shop drawings of complete Site plan incorporating all irrigation works, Landscape works, 3D render images of developed plantation, design basis of plantation (tree/Shrub etc..) for approval prior to work commencement.

- All irrigation works including drip irrigation system, for trees,shrubs,ground covers,creepers,climbers & pop up sprinklers for lawn area and wherever required. The contractor to submit the design drawing with brief report & design calculation of the system for

approval of RSS/Client. Design to be done for both manual and auto working of entire irrigation network. The approved system will be installed and certified after successful commissioning at site.

- All materials, labour, tools & tackles required for satisfactory execution of the work is included in the scope of work.
- Arrange suitable accommodation for staff, labour etc.
- Clear the site of all surplus material after completion of job to the satisfaction of Site Engineer.
- Obtain approval of sample of materials as mentioned in specifications from Site Engineer before execution.
- Prepare necessary approach to point of work for movement of manpower, material, equipment, tools & tackles, without any extra payment.

4) **Detailed Specifications:**

The work shall consist of developing and there after maintain the gardens including Lawns, edges, hedges, trees, flower beds, shrubberies etc. by watering, holing, manuring, mowing, weeding, rolling, trimming, sweeping etc. and keeping the gardens in good shape and lively condition and upto the standards stipulated by the Institute from time to time. The Agency shall provide and maintain all tools, Lawn movers, hose pipe, Sprayers, dusters, rollers insecticides, fungicides and any other tool or machineries etc. required for satisfactory development and maintenance during the period of Contract. The agency will be provided with open space at the site of work for Storage of tools, equipment's etc. and has to make his own security arrangements for storing the same. The agency shall carry out the work expeditiously, judiciously, economically and According to the instruction given to the satisfaction of the officer-in-charge or his authorized representative. The measurements of the work shall be taken in respect of the actual areas under the operation during the period of contact.

a. **PREPRATION OF LAWNS :**
Preparation of ground by filling back the ground with soil and 10cm of farm yard manure duly mixed, rough dressing the areas, watering, and fine dressing and planting of grass at 7.5cm c/c. After preparing the carpet lawn and planting of grass

the area are to be maintained properly by regular watering, weeding, holing, filling of gaps etc. all as directed by the officer-in-charge or his authorized representative.

b. **PLANTING OF SHRUBS EDGES, HEDGES AND GROUND COVERS:**

Preparation of ground for planting of shrubs, edges, hedges and ground covers by soil and 10 cm of Farm Yard manure duly mixed, rough dressing of the area and planting of shrubs, edges, hedges and ground covers as per design and maintaining them in proper shape and condition as directed by the officer-in-charge or his authorized representative.

c. **PLANTING OF TREES:**

For planting of trees the 450x450x450mm/ 1000x1000x300mm pits should be dug at specified places as per drawing, removal of stones, roots debris and unsuitable soil, filling back of the pits with 5:1 red garden soil and farm yard manure mixture and planting of tree saplings, staking them with bamboo stick and maintain them properly by watering, hosing etc all as directed by the officer-in-charge or his authorized representative.

5) **Maintenance of Landscape works:**

Maintenance of 12 months after completion of civil works & Land Development works.

a. **Special Conditions**

Quantity of plantation may vary according to site condition and final number of plants positioned only will be taken into account for billing.

While executing the work, the agency shall ensure that existing cables / pipelines, structures fittings are not damaged, the same shall be set right at no extra cost to the owner if it is damaged.

6) **DETAILS OF PERIODIC MAINTENANCE ACTIVITIES**

Operation Frequency (Times) Period/Duration after Handing Over

1) Irrigation As per Demand or as specified under:
   a. In Summer -Every Alternate Day
   b. In rainy Season 5 to 7 days in month or as per climatic condition
   c. In winter 10 days in month
2) Weeding- twice in a month
3) Forking of the Plants & Shrubs- twice in a month
4) Edging- Once in a month
5) Grass Cutting- twice in a month
6) Trimming of Shrubs/Ground Covers: Once in a month or as per instruction of the site in-charge
7) Pruning of Big Trees –Twice in a year
8) Mulching i.e., 50mm thick layer fine powdered FYM or Cocopit /vermin-compost Once in a month

9) Fertilizing

(a)Lawn –tree planting with enough watering - Once in Quarter/Half Year as instructed by Site-In-Charge.
(b)Shrubs & Ground Covers enough watering - once in Quarter/Half Year as instructed by Site-In-Charge
(c) Trees @ 50 grams per Tree - Once in Quarter/Half Year as instructed by Site- in- Charge
d) Gypsum+ Sulfur for maintaining pH Value at 7 to 7.5 @ 200 grm/sq.mt or as instructed by Site-In-Charge Once Yearly
e) Site Cleaning & maintenance of General Appeal of the Site Daily As & When required but site should be maintained clean.

7) **General terms and conditions**

The rates quoted shall be inclusive of a minimum maintenance period of 12 months which shall include all kinds of necessary and daily watering of plants, re-plantation at no extra cost if instructed by the Engineer in charge in case of mortality of plants/bushes/shrubs/ trees etc., changing of soil if desired, racking up of soil periodically, removal of weeds, spraying of insecticides etc.

LIST OF APPROVED MAKES OF BOUGHT OUT ITEMS:

Description	Makes

Submersible Bore well pump	KIRLOSKAR/KSB / CRI/ TEXMO
Dial type Pressure Gauges	FIEBIG / H GURU / PRICOL / WAREE
GI Pipe	TATA/JINDAL/BST/ SURYA ROSHNI
Valves/ NRV	L & T/ INTERVALVE/ BDK/ SAUNDERS/ LEADER
Water flow meter (Mechanical)	IOTAFLOW/INNOVATIVE FLUID SOLUTIONS/BASE ELECTRONICS & SYSTEMS
PVC Pipes and Fittings	JAIN/FINOLEX/SUPREME/ASTRAL/PRINCE/BIRLA AERCON/AJAY
PPC (Ordinary Portland Cement)	ULTRATECH/ACC/ZUARI/BINANI/JK LAXMI/VIKRAM/BIRLS/GUJARAT AMBUJA/LAFARGE/GRASIM
Reinforcement steel	SAIL/TATA STEEL/ESSAR/VIZAG (RINL)/ JINDAL
MS Pipe	TATA/JINDAL/BST/QST/PRAKASH SURYA
ELECTRICAL ITEMS	
Electric Motors	SIEMENS / BHARAT BIJLEE / ABB / KIRLOSKAR / LEROY SOMER/CROMPTON GREAVES
MPCB	L&T / SIEMENS / ABB / SCHNEIDER
Contactors	L&T / SIEMENS / ABB / SCHNEIDER
Starter Overload Relays	L&T / SIEMENS / ABB / SCHNEIDER
Timers Electronic	L&T / SIEMENS / ABB / SCHNEIDER
Switch Fuse Units	L&T / SIEMENS / ABB / SCHNEIDER
MCBs	LEGRAND / SIEMENS / HAGER/ SCHNEIDER
Push Buttons	SIEMENS / ABB / SCHNEIDER / GE / L & T / TEKNIC
Indicating Lamps	L&T / SIEMENS / ABB / SCHNEIDER / BINAY / TEKNIC
Analog Ammeter & Voltmeter	RISHABH / IMP / MECO / AE
PVC Conduit & accessories	PRECISION / CLIPSAL / POLYCAB/P-PLAST
Current Transformer	KAPPA / BHARATI / L&T / NEWTEK / PRECISE/AE
LT armoured Power Cables	KEC(RPG)/FINOLEX/RR KABEL/POLYCAB/SBEE/UNIVERSAL
LT armoured Copper Control Cables	KEC(RPG)/FINOLEX/RR KABEL/POLYCAB/SBEE/UNIVERSAL
Signal & Instrument cable	LAPP KABEL/ FINOLEX / POLYCAB/RR KABEL
Isolating Switches	SIEMENS / L&T / ABB / SCHNEIDER
Plug & Socket	LEGRAND / CLIPSAL / BCH
Terminal Blocks	WAGO / LAPP INDIA / CONNECT WELL / ELMEX
Rotary Selector Switch	KAYCEE / SALZER / L&T / SIEMENS
Cable Glands	LAPP KABEL/ COMET/DOWELS / BRACKO
Cable Lugs	LAPP KABEL / DOWELS/ COMET

Sl.No	Description	Approved Make
	Irrigation work	
1	PVC/ uPVC PIPES AND FITTINGS	JAIN/FINOLEX/

		SUPREME/ ASTRAL
1 a	HDPE PIPE (IS 4984)	RIL, NOBLE JAIN, Dutron, Hasti, Supreme.
2	**Landscape Drip line & Accessories**	
2.1	Supply, Fixing & commissioning of flexible, kink resistant 16mm /30 cm inline tubing with pressure compensating, self-flushing mechanism, Flat emitter and resistance to UV damage, algae growth brown in colour, Longer lateral run length with flow rate 2 lph, pressure rating 0.58 to 4.1 bar wall thickness 1.2mm XFD with Dripper.	RIVULIS (ISRAEL)/JAIN/NETAFIM(ISRAEL)
2.2	Sprinklers & Accessories (Providing & fixing sprinkler system with all necessary fixtures, fitting etc. complete.	TORO/NELSON/ RAINBIRD
2.3 a	Pop up sprinkler 10-12 m radius ,with all fittings/accessories etc complete	TORO/NELSON/ RAINBIRD
2.3 b	Pop up sprinkler 8-9 m radius, with all fittings/accessories etc. Complete.	TORO/NELSON/ RAINBIRD
2.3 c	Pop up connecting assembly 3/4 x12 x1/2" with all necessary fittings, accessories etc. complete	TORO/NELSON/ RAINBIRD
2.3 d	Pop up spray head with VAN nozzle with all fittings/accessories etc. complete	TORO/NELSON/ RAINBIRD
2.3 e	P.P Saddle Tee 50 x1/2" with all fittings/accessories etc complete	ASTORE/HIDRO TEN/HARIT
2.3 f	P.P Saddle Tee 40 x1/2" with all fittings/accessories etc complete.	ASTORE/HIDRO TEN/HARIT
2.4	**Valves & Filtration Unit**	
2.4 a	Lateral line PVC Ball valve 63 mm	ASTORE/HIDRO TEN/HARIT
2.4 b	Lateral line PVC Ball valve 50 mm	ASTORE/HIDRO TEN/HARIT
2.4 c	Lateral line PVC Ball valve 40 mm	ASTORE/HIDRO TEN/HARIT
2.4 d	Disc Filter 2" (30 m3/hour)	AZUD/AMIAD/HARIT
2.4 e	Pressure Gauge-glycerine filled	HARIT/RAINBIRD /TORO
2.4 c	Air Release valve 2"	BERMAD/AZUD/ HARIT
2.4 f	6" round valve box with cover	HARIT/RAINBIRD /TORO
2.4 g	12" rectangular valve box with cover	HARIT/RAINBIRD /TORO

2.4 h	Pressure release valve 2" with bypass outlet	OMEGA/ZOLOTO /HARIT
2.5	**Pumping Unit**	
2.5 a	Mon block of desired rating HP, Pump with discharge of 5lps at 50 mt head or as specified	KILOSKAR/LUBI /CROMPTON
2.5 b	Panel with DOL Starter,MCB,Voltmeter,Ammeter,Single phase preventer etc	L & T /BALAJI/LOTUS
2.6	Non return valve 1.5" (Gun metal)	BERMAD/ PITMAS / ZOLOTO
2.7	Air Release valve 2"	BERMAD/AZUD/ HARIT

List of Plants & Trees for landscaping works.

1. Champion Palm

2. Wild hibiscus

3. Vichia merillii green palm

4. Junipers Palm

5. Furcaria Plant

6. Bougainvillea Mix variety

7. Tecoma new pink

8. Foxtail Palm Plant

9. Nerium

10. Crinum lily

11. Ixora mix

12. Pandanus variegated

13. Eugenia Plant

14. Ixora mix Bushy

15. Lagerstroemia speciosa

TECHNICAL SPECIFICATION

Quality Control Process

QUALITY CONTROL PROCESS TO BE FOLLOWED

Quality Control is an essential part of any construction process for ensuring Quality. All materials to be used, all methods adopted and all works performed are strictly to be in accordance with the requirements of the specifications and approved drawings. Quality Control measures leads to construction of improved quality, conformity and ensures utilization of better quality of materials.

The **main objective** of Quality Control (QC) is to obtain independent & objective assessment of the technical quality of all the civil, structural, electrical and all ancillary miscellaneous construction works at different stages of construction and to ensure that the buildings and structures are constructed as per desired standards and in accordance to the specifications.

The Construction contractor is responsible for implementing and supplementing a quality control procedure to ensure that all aspects of work meet the standards set forth in the specifications and is of acceptable quality. The Construction contractor is totally responsible for quality throughout and is to take all necessary measures to ensure quality by adopting correct construction practices to produce the end products of acceptable quality.

Ensuring execution of quality work of durability and uniform performance by the Contractor is the most important aspect of the Quality Control.

The basic concept of this process is that the construction Contractor constructs & performs testing as per the following format and requirement as minimum at his risk and cost to ensure a quality product.

Sr. No.	Name of Test	Testing Method	Frequency of Test	Specification Requirement	Remarks
(A)	**EARTH FILLING (Soil)**				
1	Density of compacted layer	IS:2720 Part 8, Part 28,	1 test per 400 Sqm area per 600 mm depth of filling or part thereof	Compaction 95 % of max dry density with moisture content differing not more than 4 % of the optimum content.	Tests to be performed at site Laboratory / external laboratory.

Sr. No.	Name of Test	Testing Method	Frequency of Test	Specification Requirement	Remarks
(B)	**CONCRETE WORK**				
1	Compressive Strength test (M20 to M55)	IS: 516 (Concrete cube compressive strength test)	Upto 5m3- 1Set, >5-15m3-2 Sets, >15-30m3-3Sets >30-50m3-4Sets Above 50m_3 - 4+one additional sample for each 50m_3 part thereof.	Acceptance criteria Specified as per IS 456:2000.	Tests to be performed at site Laboratory and periodically, once in a month minimum 1 set of six cubes to be sent at the external laboratory for 28 days strength.
2	Slump Test	IS 456: 2000, IS 1199: 1959	Nil up to 10 Cum. 1 test for every 50 Cum or part thereof per day	As per design mix /IS code	Site laboratory
3	Non Destructive Test (NDT)	IS:13311 Part 2			If required/ suggested by Structural consultant/ RSS.
4	Core Cutting	IS:516			Same as 3

Sr. No.	Name of Test	Testing Method	Frequency of Test	Specification Requirement	Remarks
(C)	**BRICKS**				
1	Water Absorption	IS: 3495 Part-2	One test per every 50000 Nos of bricks or part thereof for make/source. One external lab test per month must be ensured during supply period at site.	Max. 20%	Site test/ External laboratory test MTC to be obtained if available.
2	Compressive Strength	IS: 3495 Part-1		As per PO specification	
3	Efflorescence test	IS:3495 Part-3		Shall not be more than Moderate	
4	Dimension Tolerances (Limits per 20 bricks)	IS13757: 1993, IS 1077: 1992	**a) For modular** size **Length** 3720 to 3880 mm (3800 ± 80 rom) **Width** 1760 to 1840 mm (1800 ± 40 rom) **Height** (for 90mm) 1760 to 1840 mm (1800 ± 40 rom) Height (for 40mm) 760 to 840 mm (800 ± 40 rom)	b) **For non-modular** size **Length** 4520 to 4680 mm (4600 ± 80 rom) **Width** 2240 to 2160 mm (2200 ± 40 rom) **Height** (for 70mm) 1440 to 1360 mm (1400 ± 40 rom) Height (for 30mm) 640 to 560 rom (600 ± 40 rom)	
5	Physical verification	IS: 3495 1992	For each supply day	Free from cracks & flaws	

Sr. No.	Name of Test	Testing Method	Frequency of Test	Specification Requirement	Remarks
(D)	**CEMENT**				
1	Fineness – Specific surface sqm/kg	IS 4031 Part-2	Each Consignment if MTC is not produced. & 1 test per 50 MT supplies of one Make/Grade/Type & Test per change of Make/Grade/Type subject to only 1 (one) test for each week's production of cement even if supplies are more than 50 MT	100 to 700 Based on type of cement	External lab/site lab test MTC must be obtained for each consignment
2	Setting time	IS: 4031 Part-5		Initial 30min, Final 600min.	
3	Compressive strength	IS: 4031 Part-6		Min. 43 MPa	
4	Consistency	IS: 4031 Part-4		10 % to 50 %	
5	Soundness test	IS: 4031 Part-3		Max.10mm/ 0.8 %	

Sr. No.	Name of Test	Testing Method	Frequency of Test	Specification Requirement	Remarks
(E)	**WATER**				
1	Chloride as CL	IS: 3025 Part-32, IS: 456	Water from each source shall be got tested before the commencement of work and thereafter once in every three months till the completion of the work	500 mg/litre max.	External lab test.
2	Inorganic matter	IS: 3025 Part-18, IS: 456		3000 mg/litre max.	
3	Organic matter	IS: 3025 Part-18, IS: 456		200 mg/litre max.	
4	Suspended solids	IS: 3025 Part-17, IS: 456		2000 mg/litre max.	
5	Sulphates (As SO_3	IS: 3025 Part-24		400 mg/litre max.	
6	PH value	IS: 3025 Part-11		6 to 8	
7	Limits of Acidity	IS: 3025 (P-22)		0.1ml to 100 ml	
8	Limits of Alkalinity	IS: 3025 P-23)		0.1ml to 100 ml	

Sr. No.	Name of Test	Testing Method	Frequency of Test	Specification Requirement	Remarks
(F)	**REINFORCEMENT STEEL**				
1	C/S area	IS: 1786	Minimum Quantity for testing requirement shall be 8 MT per size (Dia) of reinforcement steel **A)For consignment below 100 MT** i)under 10 mm dia, one sample for each 25 MT or part thereof ii) 10mm to 16mm dia one sample for each 35 MT or part thereof iii) Over 16mm dia one sample for each 45 MT or part thereof **B)For consignment over 100 MT** i)under 10 mm dia, one sample for each 40 MT or part thereof ii) 10mm to 16mm dia one sample for each 45 MT or part thereof	As per respective diameter	External/ Site lab test and MTC must be obtained for each consignment
2	0.2% Proof Strength	IS: 1786		Min. 500 N/mm2	
3	Ultimate tensile strength	IS: 1786		Min. 8% more than actual 0.2% proof stress & > 545 N/mm2	
4	% Elongation	IS: 1786		12.0% Min.	
5	Weight per meter	IS: 1786		As per IS Code	
6	Bend Test	IS: 1599		No cracks	
7	Re-bend Test	IS:1599, IS1786		No cracks	

Sr. No.	Name of Test	Testing Method	Frequency of Test	Specification Requirement	Remarks
(G)	**COARSE AGGREGATE**				
1	Sieve Analysis	IS: 2386 Part-1,IS: 383	For each supply day		
2	Moisture Content	IS2386 Part-III	One test per concrete day		
3	Water Absorption	IS: 2386 Part-3,IS: 383		Max. 2%	
4	Specific Gravity	IS: 2386 Part-3,IS: 383		Min. 2.5	
5	Impact Value	IS: 2386 Part-4,IS: 383		As per IS Code	
6	Crushing Value	IS: 2386 Part-4, IS: 383: 2016	1 test per three months OR change of source whichever is earlier	Max. 30%. If it exceeds then test for ten percent fines should be conducted & min. load for ten percent fines should be 50kN	Site test / External lab test
7	Soundness	IS: 2386 Part-5, IS: 383: 2016		In IS:383 Max 12% by Na2SO4 Max 18% by MgSO4	
8	Elongation & Flakiness Index	IS: 2386 Part-1, IS:383: 2016	For each supply day	Max. 40%	
9	Deleterious Contents	IS: 383, IS: 2386 Part-2	One test per change of source	Should be Nil	

Sr. No.	Name of Test	Testing Method	Frequency of Test	Specification Requirement	Remarks
(H)	**FINE AGGREGATE**				
1	Gradation (Fineness modulus)	IS: 2386 Part-II	For each supply day	As per IS: 383, FM=2.2-3.20	Site test / External lab test
2	Zone of sand	IS :383		Grading should be fall within zone II, III.	
3	Silt Content (% finer than75 µ)	IS :383:2016, IS:2386 part1		Uncrushed sand-Max. 3%, Crushed sand-Max. 15%, Mixed sand-Max. 12%,	
4	Water absorption	IS:2386 Part-3	1 test per three months OR change of source whichever is earlier	Max. 2%	
5	Moisture content	IS: 2386 Part- 3	One test per concrete day		
6	Specific gravity	IS: 2386 Part- 3	1 test per Source	2.42 to 2.64	

Sr. No.	Name of Test	Testing Method	Frequency of Test	Specification Requirement	Remarks
(I)	**ADMIXTURE**				
1	Chemical Tests	IS: 9103	Every Six Month/ Change of source whichever is earlier. **	Chemical test as per IS **(If MTC is not produced, test for each batch)	External lab test. MTC must be obtained for each batch.
(J)	**PAVER BLOCKS**				
1	Water Absorption	IS: 15658 - Annex C	1 test per 10000 No. or part thereof	Average shall not be more than 6% & individual restricted to 7%	External lab test. MTC to be obtained if available for each consignment
2	Compressive Strength	IS: 15658 - Annex D		As per PO	
(K)	**SOLID/HOLLOW CONCRETE BLOCKS**				
1	Water Absorption	IS: 2185 Part-1&2	1 test per 5000 No. or part thereof	Max. 10 %	External lab test and MTC to be obtained if available for each Consignment
2	Compressive Strength	IS: 2185 Part-1		As per PO	

Sr. No.	Name of Test	Testing Method	Frequency of Test	Specification Requirement	Remarks
(L)	**CERAMIC, GLAZED VITRIFIED, INDUSTRIAL VITRIFIED TILES FOR FLOOR, WALL & DADO**				
1	Dimensions &surface quality	IS13630 (P-1) IS15622	No test up to 3000 Nos. Thereafter, 1 (one) test for every 3000 nos of each category per consignment	PO/ Manufacturer Specs.	External lab test and MTC must be obtained for each batch. Site lab test/ External Lab test & MTC.
2	Water Absorption	IS13630 (P-2)		PO/ Manufacturer Specs.	
3	Scratch hardness (Moh's Hardness)	IS13630 (P-13)		PO/ Manufacturer specifications.	
4	Breaking Strength	IS 13630 (P-6)		PO/ Manufacturer specifications.	
5	Bulk Density	IS 13630 (P-2)		PO/ Manufacturer specifications.	
6	Modulus of Rupture	IS 13630 (P-6)		PO/ Manufacturer specifications.	

Sr. No.	Name of Test	Testing Method	Frequency of Test	Specification Requirement	Remarks
(M)	**TEAK WOOD**				
1	Physical Verification		No test up to 1 Cum. Thereafter, 1 test for every one Cum or part thereof	Well-seasoned by a suitable process & shall be free from decay, Fungal growth, Splits etc.	External lab test. Density for approval of consultant.
2	Moisture Content & Dry density.	IS:4021 & 287		10 % To 12 %	
(N)	**MILD (STRUCTURAL) STEELs**				
1	Unit Weight	IS:2062, IS4923	No test up to 8 MT. Thereafter, 1 test for every 8 MT of each category per consignment	As per IS	External lab test. MTC must be obtained.
2	Yield stress			250 N/Sqmm,	
3	Ultimate tensile strength			410 N/Sqmm	
4	Elongation (%)			23 % Min.	
5	Bend test				

Sr. No.	Name of Test	Testing Method	Frequency of Test	Specification Requirement	Remarks
(O)	**FLUSH DOOR SHUTTER**				
1	End immersion test	IS 2202-1999 (Part-I), IS 4020 (part-13)	No test up to 25 Shutter. Thereafter, 1 test for every 50 Shutter or part thereof	There should not be any delamination	External lab test. MTC must be obtained.
2	Knife test	IS 2202-1983 (Part-II), Procedure IS 4020 (part-14)		Reported as 'Pass standard', 'excellent' or 'poor'.	
3	Moisture	IS 2202 (P-1)		2% to15%	
4	Glue adhesion test	IS 4020 (P-15)		As per IS Code	

(P)	**ALUMINIUM DOOR /WINDOW MEMBERS**				
1	Thickness of anodic coating	IS 5523-1983	Per Category/ Per Source/ Make	As per PO/ manufacturers specification	External lab /Site lab test. MTC must be obtained.
2	Wall Thickness & Sizes of Aluminium members	MTC from Approved Manufacturer			
3	Weight per meter	MTC from Approved Manufacturer			

Sr. No.	Name of Test	Testing Method	Frequency of Test	Specification Requirement	Remarks
(Q)	**ROOFING (GALVALUME) SHEETING**				
1	Thickness of sheet	IS 5523-1983 MTC from Approved	Per Category/ Per Source/ Make	As per PO/ manufacturers specification	External lab test. MTC must be obtained.
2	Coating thickness	MTC from Approved Manufacturer			
3	Standard weight of sheet	IS 1608:2005			
4	% elongation	IS 1608:2005			
5	Yield strength (N/mm2)	IS 1608:2005			
6	Ultimate tensile strength (N/mm2)	IS 1608:2005			
(R)	**ROOFING SHEET INSULATION**				
1	Chemical for Resin Bonded fibre glass wool	IS 8183-1993	Per Category/ Per Source/ Make	As per PO/ manufacturers specification	External lab test. MTC must be obtained.
2	Bulk density	IS 3144; IS 8183 IS 8183			
3	Recovery after Compression	IS 3144; IS 8183 IS 8183			
4	Moisture Absorption	IS 3144; IS 8183 IS 8183			

Sr. No.	Name of Test	Testing Method	Frequency of Test	Specification Requirement	Remarks
(S)	**ROAD/PAVEMENT**				
(1)	**Aggregate**				
I	Impact Value	IS: 2386 (Part 4), IS: 383	1 test per 200 cum or change of source whichever is earlier	Max. 30%	Site test / External Lab test
II	Crushing Value	IS: 2386 (Part 4), IS: 383	1 test per source	Max. 30%	
III	Loss angles abrasion value	IS: 2386 (Part 4), IS: 383	1 test per source	Max. 30%	
IV	Flakiness Index & Elongation Index	IS: 2386 (Part 1) IS: 383	1 test per 100 cum	Max. 35%	
V	Water Absorption	IS: 2386 (Part 3), IS: 383	1 test per 100 cum	Max. 2%	
VI	Specific Gravity	IS: 2386 (Part 3), IS: 383	1 test per source	Min. 2.5	
VII	Soundness	IS: 2386 (Part 4), IS: 383	1 test per source	Max. 12%	

Sr. No.	Name of Test	Testing Method	Frequency of Test	Specification Requirement	Remarks
(2)	**BITUMEN**				
I	Softening point	IS: 73, IS: 1205	1 test per Source/ Make		External lab test. MTC must be obtained.
II	Penetration	IS: 73, IS: 1203			
III	Elongation	IS: 73			
IV	Flash/Fire point test	IS:1209, IS 1448(P-69)			
V	Ductility	IS: 73, IS: 1208			
(3)	**SUB-GRADE / SUB-BASE**				
I	Density	IS: 2720 (Part 28)	1 test per 250 sqm.	More than 95%	Site laboratory
II	CBR Test	IS: 2720 (Part 16)	As required.		External lab

Sr. No.	Name of Test	Testing Method	Frequency of Test	Specification Requirement	Remarks
(T)	**SOIL/GOOD EARTH/ EXCAVATED EARTH**				
1	pH value	IS 2720 (P-26)	1 test per Source or change of source whichever is earlier	4 to 10	External laboratory
2	Organic Matter	IS 2720 (P-22)		0.1% to 5%	
3	Grain size analysis	IS 2720 (P-4)		Upto 100%	
4	Free Swell Index	IS 2720 (P-40)		1% to 500%	
5	Atterberg's Limit Liquid Limit, Plastic Limit	IS 2720 (P-5)		15% to 50%Upto 50%	
6	Proctor Compaction Test OMC MDD	IS 2720 (P-8) IS 2720 (P-7)		1 g/cc to 5 g/cc 5% to 30%	
7	Shrinkage Limit	IS 2720 (P-6)		0.1% to 20%	
8	Specific gravity	IS 2720 (P-3)		1 to 3	
9	Moisture content	IS 2720 (P-2)		0.1% to 50%	
(U)	**GRANITE STONE**				
1	Water Absorption	IS 14223 (Part 1)	No test for quantity up to 50 Sqm	Max. 0.5%	External laboratory
2	Compressive Strength	IS 14223 (Part 1)		Min. 1300 kg/cm2	
3	Hardness (mohs Scale)	IS 14223 (Part 1)	1 test per 100 Sqm or part thereof	6 to 7	

(V)	**PVC-U PIPES PRODUCED FROM UNPLASTICIZED POLYVINYL CHLORIDE FOR WATER SUPPLY.**				
1	Measurement of dimensions Vicat softening temperature Test for opacity	IS: 4985	Per Category/ Consignment		MTC must be obtained
2	Detrimental effect on water Density Sulphated Ash content Resistance to internal hydrostatic pressure	IS: 4985			

(W)	**PILE CONCRETE**				
1	Initial Load Test	IS: 2911 (Part 4)	Min. 2 nos. or as specified in contract		Integrity tests are recommended for 100% bored cast in situ piles cast by remix method for piles longer than 10m
2	Routine Load Test	IS: 2911 (Part 4)	As required		

Sr. No.	Name of Test	Testing Method	Frequency of Test	Specification Requirement	Remarks
(X)	**RMC CONCRETE**				
1	Ready Mix Concrete	IS:4926	Proportion of all its constituents & their relevant test must be checked & approved from structural consultant.		

Y	**GI PIPES (Potable Water)**			
1	Chemical Analysis	IS: 1239	Per Category/ Consignment	MTC must be obtained
2	Nominal mass, Thickness and Galvanizing	IS:1239		
Z	**PVC-U PIPES PRODUCED FROM UNPLASTICIZED POLYVINYL CHLORIDE FOR BORE/TUBE-WELLS FOR WATER SUPPLY.**			
1	Dia of pipe, Density of material, Resistance to external blows	IS: 12818	Per Category/ Consignment	MTC must be obtained
2	Tensile Strength, Vicat Softening Temperature & Effect on water.	IS: 12818		

Notes:-

1. External laboratory means any government engineering college/laboratory or any other laboratory having National Accreditation Board for Testing and Calibration Laboratories (**NABL**) accreditation.
2. MTC: - Manufacturers Test Certificate.
3. ASTM-American Society for Testing and Materials
4. Technical specification (Section-IV) shall also be followed.

SECTION- V

FORM OF BID

SECTION V
FORM OF BID

The Appendices (I to IV) of Form of Bid is a part of the bid. Bidders are required to fill up all the blank spaces in this Form of Bid and Appendices.

Bid Reference No. : **NDDBDS: RAH: PUR: LCB/CIVIL/2024-25/01**

Name and address of
Project Authority / Employer :

RAHURI SEMEN STATION
(A UNIT OF NDDB DAIRY SERVICES)
Khadambe BK,Dalimb Phata,
Post- MPKV, Rahuri, Taluka – Rahuri
District – Ahmednagar
Maharashtra (India) Pin code- 413722
Phone No. 02426-299001
Website: https://rahurisemenstation.com
Email:Purchase@nddbdairyservices.com

Description of Works : Civil, Structural, Water supply, Sanitary, Road work and other miscellaneous works including Internal Electrification, Landscape for; "Additional Infrastructure Buildings of Training Centre, Farmers Hostel, Canteen, Road work, Landscape works at Tugalakpur Village, Block Purkaji, Muzaffarnagar, Uttar Pradesh

Dear Sirs,

1.0 Having examined the Drawings, Terms & Conditions of Contract, Technical Specifications and Schedule of Quantities for the execution of above mentioned works, we, the undersigned offer to execute, complete and maintain the whole of the said works in conformity with the said Drawings, Terms & Conditions of Contract, Technical Specifications and Schedule of quantities in accordance with the said conditions.

2.0 We undertake, if our bid is accepted, to commence the Works **within_____days** of receipt of the Letter of Acceptance, and to complete and deliver the whole of the above said works comprised in the Contract **within** _____ **(**_____ **) months** calculated from the last day of the aforesaid period in which the Works are to be commenced.

3.0 If our bid is accepted, we will furnish a performance security in the form of a bank guarantee (to be approved by you) / Demand draft, to be jointly and severally bound with us in **amount of 5%** of the above named sum in accordance with the Conditions of Contract.

4.0 We agree to abide by this bid for the period of **120 days** from the date of bid opening as prescribed in **clause 13** of the Instruction to Bidders, and it shall remain binding upon us and may be accepted at any time before the expiry of that period.

5.0 Unless and until an Agreement is prepared and executed, this Bid, together with your written acceptance thereof, shall constitute a binding Contract between us.

6.0 We understand that you are not bound to accept the lowest or any Bid you may receive.

Date _____ **Signature of bidder with seal**

Place _____

Witnesses:

1. Signature:

   Name:

   Address:

2. Signature:

   Name:

   Address:

APPENDIX – I (FORM OF BID)

Important Conditions of Contract

Sl. No.	Description	Vol-I SEC-II Clause No.	Remarks
1.	Amount of Performance Security	10	**5 (Five)** percent of Total contract value
2.	Minimum amount of Third Party Insurance	23	**Such insurance shall be for 10% of the value of works with number of occurrence unlimited.**
3.	Minimum amount of insurance of work	21	**110 (Hundred & ten)** percent of contract value
4.	Period for Commencement, from the Date of Letter of Acceptance	41	**Immediately**.
5.	Time for Completion	43	**7 (Seven) Months for overall completion.**
6.	Rate of Liquidated Damages	47	**0.5 (Zero point five)** percent per week of total contract value
7.	Maximum Limit of Liquidated Damages	47	**10 (Ten)** percent of total contract value
8.	Rate of Bonus	48	**NOT APPLICABLE**
9.	Period of Maintenance (Defects Liability Period)	50	**12 (Twelve)** Months
10.	Percentage Recovery of Retention	60.3	**5 (Five)** percent

Sl. No.	Description	Vol-I SEC-II Clause No.	Remarks
11	Maximum limit of Retention money	60.3	**5 (Five)** percent
12.	Maximum amount of Secured Advance	60.2	**Applicable, 90 (Ninety)** percent for cement, Structural Steel & Reinforcement steel and **75 (Seventy-Five)** percent for other materials.
13.	Maximum amount of Mobilisation Advance	60.5	**Applicable**, **20 (Twenty)** percent
14.	Time within which the payment would be made after submission of measurement / bill	60	**30 (Thirty)** days
15.	Price Variation ie Escalation	71	**Not applicable- Refer Clause 11.5 of Section I of this bidding document**
16.	Contractor's Profit & Overhead Cost for settling extra items	53.1	**15 (fifteen)** percent

Date: _____ **Signature of Bidder with Seal**

Place: _____

APPENDIX – II (FORM OF BID)

BIDDING TERMS DEVIATION STATEMENT FORM
IFB Reference No.: NDDBDS: RAH: PUR: LCB/CIVIL/2024-25/01

1.) The following are the particulars of deviations from the requirements of the bidding conditions/ terms :

CLAUSE	DEVIATION	REMARKS (INCLUDING JUSTIFICATION)

The terms and conditions prescribed in the bidding document shall prevail over those of any other document forming a part of our bid, except only to the extent of deviations furnished in this statement.

Dated: _____ **Signature and Seal of Bidder**

Place: _____

Note:-
Where there is no deviation, the statement should be returned duly signed with an endorsement indicating "NO DEVIATIONS".

APPENDIX – III (FORM OF BID)

TECHNICAL DEVIATION STATEMENT
IFB Reference No.: NDDBDS: RAH: PUR: LCB/CIVIL/2024-25/01

1.) The following are the particulars of deviations from the requirements of the tender technical specifications:

CLAUSE	DEVIATION	REMARKS (INCLUDING JUSTIFICATION)

The technical specification furnished in the bidding document shall prevail over those of any other document forming a part of our bid, except only to the extent of deviations furnished in this statement.

Dated: _____ **Signature and Seal of Bidder**

Place: _____

Note:-
Where there is no deviation, the statement should be returned duly signed with an endorsement indicating "NO DEVIATIONS".

APPENDIX - IV (FORM OF BID)

LIST OF APPROVED MAKES

The following is the approved list of products and name of the manufacturer against each product. The contractor shall quote rates for the various items of works such that their rates should be valid for all makes approved hereunder. It will be prerogative of RSS to approve any make out of this list or any other equivalent make. The makes specified in schedule of quantities shall have preference over the makes Approved hereunder. Wherever make is not approved, the material should be as per relevant BIS specification.

Sl.	ITEM DESCRIPTION	APPROVED MAKES / MANUFACTURES
1	Termite Treatment of Buildings	M/s PCI PEST CONTROL PVT. LTD. (PPCPL), GODREJ PEST CONTROL, OR APPROVED EQUIVALENT
2	Grey Cement Ordinary Portland Cement (OPC)	ULTRATECH CEMENT LIMITED / JAYPEE GROUP /ACC / BINANI CEMENT / JK CEMENT LTD/ BIRLA / AMBUJA CEMENTS/ NUVOCO VISTAS (LAFARGE)/ GRASIM/ WONDER CEMENT/ ZUARI CEMENT / JSW CEMENT/ THE RAMCO CEMENTS LTD/ CHETTINAD /DALMIA CEMENT/THE INDIA CEMENTS LTD / SHREE CEMENT/ JK LAKSHMI CEMENT LTD
3	White Cement, Putty, Primer to be applied with putty.	BIRLA CORPORATION LIMITED / JK CEMENT LTD / ASIAN PAINTS / BERGER PAINTS / NEROLAC / GOLDSIZE / SHALIMAR PAINTS LTD
4	Cementation Grout / Non Shrink Cementious Precision (anchoring) grout	FOSROC/ SIKA/SHRINKOMP / BASF / ARDEX ENDURA / PIDILITE / STP/ MYK LATICRETE/MAPEI

Sl.	ITEM DESCRIPTION	APPROVED MAKES / MANUFACTURES
5	Anti-Corrosive Primer	APPROVED PAINT MANUFACTURERS (CONFORMING TO IS – 2074)
6	Water Proofing Compound / Self Adhesive Water Proofing Membrane	FOSROC/SIKA/CICO/PIDILITE/MYK SCHAUMBURG/ STP / MAPEI/ HENKEL / TIKIDAN / GRACE CONSTRUCTION PRODUCTS
7	Construction Chemicals, Concrete admixtures of all types, Epoxy and Resin materials, polymer based materials etc.	FOSROC/SIKA/CICO/PIDILITE/MYK SCHAUMBURG/ MYK LATICRETE / BASF/STP / ROFF/MAPEI/MC BAUCHEMIE
8	Reinforcement Steel-IS1786-Fe415, Fe500, Fe500D, Fe550D	SAIL / TATA STEEL /RINL (VIZAG – VSL – Visakhapatnam Steel Plant)/JSW STEEL (NEOSTEEL) / JSPL (PANTHER-Jindal Steel & Power Ltd).
9	Structural Steel & All MS Elements & Plates	SAIL / TATA STEEL /RINL (VIZAG – VSL – Visakhapatnam Steel Plant) / RINL / JSW STEEL (JINDAL) /JSPL (Jindal Steel & Power Ltd)
10	Laminates / Veneer Ply	FORMICA / MERINOLAM / SUNMICA /GREEN LAM / AIKA / CENTURY / KITPLY/DUROPLY/GREENPLY/ROYAL TOUCH / TURAKHIA
11	Glazing (Glass),Tinted Glass, High Performance glass, Reflective Glass, Lacquered/ Back Painted Glass/ Insulated Double Glass	MODI FLOAT/ SAINT GOBAIN / TATA/ TRIVENI / ASAHI INDIA GLASS LTD (AIS) / PILKINGTON/SISECAM

Sl.	ITEM DESCRIPTION	APPROVED MAKES / MANUFACTURES
12	SS and Brass Fittings & Fixtures for wood and aluminum works	KICH/GOLDEN / ENOX / GEZE / PALLADIUM / DORMAKABA / GODREJ / OZONE / EPPW (Electro Plating and Polishing Works, Gujarat)/ HAFELE/YALE
13	Aluminium Sections	HINDALCO/JINDAL/INDAL/BANCO
14	Frication Stay	HETTICH / HAFELE /EBCO/INGERSOLL RAND
15	Hydraulic Door Closures	GOLDEN/GODREJ/HARDWYN/EVERITE /HYPER/STERLING/OZONE/DORSET/ ENOX / DORMAKABA/ HAFELE/GEZE/YALE
16	Door Closer (Floor Spring) & Door automation	GOLDEN/GODREJ/HARDWYN / KICH / OZONE/ HAFELE/ GEZE/ YALE/DORMAKABA
17	Door Locks	GODREJ / GOLDEN / WELMADE (PUNE) / KICH/ HAFELE/ DORMAJABA/EPPW/YALE/GEZE
18	Aluminium Composite Panel	ALUCOBOND/REYNOBOND/ALPOLIC / EUROBOND
19	Compact Sheet/High Pressure laminates (HPL)	GREENLAM/MERINO/STYLAM /FUNDERMAX
20	Ceramic Tile / Vitrified Tile / Industrial tiles / Glazed Tiles / Acid resistant tiles	KAJARIA/SOMANI/H&R JHONSON/NITCO / RESTILE / BELL/ SPARTEK / ASIAN (Asian Granito India Ltd) / ORIENT / PELICAN (Pelican Ceramic Industries Pvt Ltd)
21	Polyethylene expansion joint filler board	SIKA/FOSROC/ PARAMOUNT FOAM/ SUPREME (Dura)/MIGUA
22	Anchor fasteners / expandable Mechanical Frame anchor / Chemical Anchors / Re-barring	HILTI/FISCHER/BOSCH/WURTH/FOSROC/ AFT/ MUNGO/ KILMAS/ TRIXEL
23	Paints (Premium Quality), Primers/Red-oxide.	ASIAN / BERGER / J&N / SHALIMAR/ ICI DULUX / NEROLAC/ SNOWCEM INDIA LTD./JOTUN

Sl.	ITEM DESCRIPTION	APPROVED MAKES / MANUFACTURES
24	Anti-Fungal Acrylic Emulsion Paint	SANDTEXTMATT OF SNOWCEM INDIA / APEX ULTIMA OF ASIAN PAINTS / WEATHER COAT ALL GUARD OF BERGER/ DUROCEM EXTRA
25	Plastic Emulsion / Acrylic Emulsion Paint / Synthetic Enamel	ASIAN PAINTS / J & N / BERGER / SHALIMAR / ICI DULUX / JOTUN
26	False Ceiling/ Metal False Ceiling	SUPERSIL/ HUNTER DOUGLAS/ARMSTRONG/DURLUM LINDNER/ INTERARCH/ SUPERTECH
27	Floor Hardener	FOSROCK/SIKA/CICO/STP / LATICRATE / BASF
28	MS Pipe	TATA/JINDAL /BST /QST /PRAKASH SURYA / BIRLA (INDIA) LIMITED/APOLLO/BST
29	MS Hollow (Tubular) Section (RHS/SHS)	TATA / DECCAN / JINDAL / SAIL/APOLLO/PRAKASH SURYA/BST
30	Stainless Steel (Pipes, tubes, bars, angles, channels etc all general structural sections)	SALEM / JINDAL STAINLESS / HINDUSTAN INOX / RATNAMANI METAL & TUBES LTD / BHANDARI FOILS & TUBES / RENSA/ SUBHLAXMI / APEX / NIKA TUBES/ HEAVY METALS
31	uPVC PIPE / cPVC PIPE / S.W.R PIPE / PVC PIPE	FINOLEX/ SUPREME / ASTRAL / PRINCE/ JAIN / ASHIRVAD PIPES PVT LTD (Bengaluru)
32	UPVC/cPVC/SWR Pipe, Specials and Fittings / All types of PVC pipe specials.	FINOLEX/ SUPREME / ASTRAL / PRINCE/ JAIN/ASHIRVAD PIPES PVT LTD (Bengaluru)
33	Polysulphide / Silicon Sealant	FOSROC/SIKA/CICO/PIDILITE/ DOW CORNING/ MAPEI/ MYK ARMENT/ STP LTD/ MC-BAUCHEMIE/ ROFF/ GE SILICON / WACKER
34	Bitumen	IOC / HP/ ISI MARKED or equivalent approved

Sl.	ITEM DESCRIPTION	APPROVED MAKES / MANUFACTURES
35	All Sanitary and Plumbing Fixtures, Fittings, Accessories etc. all	JAQUAR/ PARRYWARE / HINDUSTAN (HINDWARE) / CERA / KOHLER /ROCA / AMERICAN STANDERD
36	GI Fittings	'R' BRAND / UNIK / KS / ZOLOTO/ APPROVED PIPE MANUFACTURERS
37	GI Pipes	TATA / JINDAL(HISSAR) / BST / QST/ PRAKASH SURYA / ROSHNI
38	GI Sheet	SAIL / TATA / ISPAT (NIPPON)/JINDAL
39	SS Sink	NEELKANTH / JAYNA / NIRALI / KOHLER/ PRESTIGE/ JAQUAR
40	CI S & S Class LA pipe Sand CI pipes & Fittings	IISCO/KESORAM / ELECTROSTEEL / NECO / HEPCO / NEEL / KARTAR
41	Butterfly Valve (IS13095)	AUDCO/ LEHRY /TOSHNIWAL / LEADER / ZOLOTO/SANT/ AUDCO/ KIRLOSKAR / GETECH
42	CI Manhole Cover	NECO / RIF/ KARTAR/ HEPCO / EQUIVALENT APPROVED
43	PVC Gully Traps and Nahani Traps	FINOLEX/ SUPREME / ASTRAL / PRINCE
44	CI Valves	LEADER / AUDCO / LEHRY /TOSHNIWAL / ZOLOTO / SANT/ KIRLOSKAR / GETECH
45	Brass/Gun Metal Valves / NRV	LEADER / SANT / AUDCO / BDK / ZOLOTO/ LEHRY /TOSHNIWAL / KIRLOSKAR
46	CP Flush Valves	JAQUAR/ PARRYWARE / HINDUSTAN (HINDWARE) / CERA / KOHLER /ROCA / AMERICAN STANDERD / KICH
47	Flush Shutter	NATIONAL/ KITPLY/ CENTURY / KUTTY FLUSH DOORS/ KANCHAN PRIMA / GREENPLY / UNIPLY / ARCHIDPLY / ANCHOR PLYWOOD (INDIAN PLYWOOD MANUFACTURING CO. LTD/ DUROPLY
48	CP Brass Fitting	JAQUAR/ PARRYWARE / HINDUSTAN (HINDWARE) / CERA / KOHLER /ROCA / AMERICAN STANDERD / KICH
49	Ball Cock / Valve	LEADER / AUDCO / LEHRY /TOSHNIWAL / ZOLOTO / SANT/ KIRLOSKAR / GETECH

Sl.	ITEM DESCRIPTION	APPROVED MAKES / MANUFACTURES
50	Hume Pipes	INDIAN HUME PIPE CO. / EQUIVALENT ISI MARKED APPROVED
51	Looking Mirror	ATUL / GOLDEN FISH / MODI / LION / CERA / JAQUAR / HINDUSTAN (HINDWARE) AIS / SISECAM/ PILKINGTON
52	Night Latch / Mortise Lock/ Tubular Lock	GODREJ / GOLDEN / WELMADE (PUNE) / KICH/ HAFELE/ DORMAJABA/EPPW/YALE/GEZE
53	Ply & Commercial Boards	KITPLY / CENTURY / DUROPLY/ GREENPLY ARCHIDPLY / MERINO
54	Stainless Steel Doors / GI Powder coated doors	AJNI INDUSTRIES LTD/ SHAKTI HORMAN HORMANN/ ICLEAN (INTEGRATED CLEAN ROOM TECHNOLOGY LTD) / PERFECT / TATA PRAVESH
55	Anti-cockroaches Stainless Steel Perforated trap /SW hanging supports	CHILLY/ CAMRY/ OR EQUIVALENT APPROVED
56	Stainless Steel Perforated trap cover	CHILLY MAKE OR EQUIVALENT APPROVED
57	PVC Vinyl Flooring	BHOR/ARMSTRONG
58	PVC Water Stops /Hydrophilic Swellable rubber strip (Not bentonite type)	MARUTI /JYOTI RUBBER/ FOSROC / ASIAN/ BASF / SIKA / PIDILITE / MAPEI / STP/ TIKIDAN / GRACE / MYK ARMENT
59	PVC Water tank	SINTEX / SUPREME
60	Water Bowl for animals	DELAVAL/APPROVED EQUIVALENT APPROVED.
61	Fibre Glass Wool Insulation Sheets	TWIGA/Lloyd/MINWOOL/ROCKWOOL/ OWENS CORNING
62	Turbo Ventilator/ Roof Extractor / Eco-Ventilator	DEVASHISH TURBO VENTILATORS (DIPL), MUMBAI /DHAKAR ENGINEERS, UDAIPUR / MB ENTERPRISE, AHMEDABAD/SUDHA VENTILATING SYSTEM PVT LTD, AHMADNAGAR /M/S SYGURU TECHNOLOGY SERVICES, VADODARA M/s SAI CORPORATION, VADODARA/ COOLTECH SYSTEM

Sl.	ITEM DESCRIPTION	APPROVED MAKES / MANUFACTURES
63	Vitreous China Sanitary wares	JAQUAR/ PARRYWARE / HINDUSTAN (HINDWARE) / CERA / KOHLER /ROCA / AMERICAN STANDERD
64	HDPE Pipe	RIL/JAIN/DUTRON/HASTI/SUPREME
65	CP fittings	JAQUAR/ PARRYWARE / HINDUSTAN (HINDWARE) / CERA / KOHLER /ROCA / AMERICAN STANDERD
66	Galvanised Steel Precoated Profile Sheets (Roofing and Cladding)	TATA BLUE SCOPE / INTERARCH / POLYSTEEL (DENDRO) / UNIMETAL / METACOLOUR / ISPAT/ JSW
67	Water Type Fire Extinguisher	NEWAGE / SAFEX / SAFEGUARD/ LIFEGUARD/ MINIMAX/ VINTEX/ CEASEFIRE
68	ABC Powder Fire Extinguisher	NEWAGE / SAFEX / SAFEGUARD/ LIFEGUARD/ MINIMAX/ VINTEX/ CEASEFIRE
69	CO2 Type Fire Extinguisher	NEWAGE / SAFEX / SAFEGUARD/ LIFEGUARD/ MINIMAX/ VINTEX/ CEASEFIRE
70	Floor Joints (Resin Based Epoxy Grouts) Floor Tiles Adhesive (High performance Polymer Modified, non-slip adhesive)	ARDEX ENDURA/FOSROC/ PIDILITE/ MYK LATICRETE/BASF/SIKA / STP/ MAPEI / ROFF
71	Bitumen, Sealing Compound	SHALITEX (STP)/ FOSROC / IOC
72	Gypboard/ Fibre Board / Mineral Boards for False Ceiling	GYPSUM INDIA (GYPROC – SAINT GOBIN)/ RAMCO / PROMAT / ARMSTRONG / AEROLITE/ USG BORAL/ KNAUF DANOLINE
73	Cement Paint	SUPER SNOCEM / NITCOCEM / DECOCEM
74	Green Kota / Red Kota Covings & Corner Stones.	VIJAY COVINGS /EQUIVALENT APPROVED
75	Polycarbonate Sheet	LEXAN / PALRAM/TUFLITE/ROOFCLAD/ DPI DAYLIGHTING / DANPAL/ GALLINA INDIA / POLYGAL
76	PU Coating / PU Paint	MRF/SHALIMAR/CIPY/ ASIAN/ ICI / STP JOTUN/ AKZONOBEL / HEMPEL

Sl.	ITEM DESCRIPTION	APPROVED MAKES / MANUFACTURES
77	PVC Foam Plastic Sheet	FLEXIBOND, RAJASHRI PLASTIWOOD/ EQUIVALENT APPROVED
78	FRP/GRP Gratings	BALAJI/ERCON/THERMODRAIN/HP/FIBRO CAST/
79	Screws, nuts bolts, washers etc	KUNDAN / ARROW INTERNATIONAL / ROOFIX/ EJOT NETTLEFOLD / PARAGON/ EQUIVALENT APPROVED
80	HDPE Electro fusion Pipe fittings	GREOG FISCHER/BENTLAY/ SANGIR (TEGA)/ SUPREME
81	Elevator/Lift	JOHNSON/OTIS/OMEGA/KONE
82	Epoxy Flooring	SIKA /FOSROC/PIDILITE /BASF/ APURVA/MYK ARMENT/ ARDEX ENDURA/ MAPEI/ MC-BAUCHEMIE/ CICO
83	Formwork Release Agent (Shuttering liquid), Clean Formwork release agent	FOSROC/CICO/BASF/ MC BAUCHEME/ EQUIVALENTAPPROVED
84	EPDM	AMEE RUBBER INDUSTRIES PVT LTD / BOGRA RUBBER PVT LTD / ANAND REDDIPLEX / ENVIROSEALS / EQUIVALENTAPPROVED
85	Aluminium roofing and cladding sheets	HINDALCO INDUSTRIES LTD / JINDAL ALUMINIUM LTD
86	Self-drilling Screw (for roofing and cladding sheets)	EJOT / HILTI/ROOFIX/BOSCH
87	Welding Electrode	ADOR WELDING LTD / ESAB/ EQUIVALENT APPROVED IF NOT AVAILABLE

Sl.	ITEM DESCRIPTION	APPROVED MAKES / MANUFACTURES
88	Dry stone cladding undercut anchor/SS Cramps	HILTI / FISHER / BLICK / BAGI / KIEL / TRIXEL / EQUIVALENT APPROVED IF NOT AVAILABLE
89	Calcium silicate board	RAMCO HILUX/ EQUIVALENT APPROVED
90	Fiber Mesh	IMPERIAL OVERSEAS / EQUIVALENT APPROVED
91	Polypropylene protection sheet (Expanded laminate polythilen roll)	SUPREME/ EQUIVALENT APPROVED
92	SS Modular Railing System	KICH / Q-RAILING / MAGNUM/ JINDAL/ RINOX
93	Vitrified / Porcelain cove Skirting	PELICAN OR EQUIVALENT APPROVED
94	Polyurethane Concrete flooring (Self Leveling Flooring)	ARDEX ENDURA / FOSROC / BASF / SIKA / MAPEI / MC-BAUCHEMIE
95	MDF Board	NUWUD / CENTURAY PLY BOARD / GREENPLY / SARDA PLYWOOD
96	Single Point locking handle without key for window	PULSE OR EQUIVALENT
97	Rubber Seals	ENVIROSEALS / ANAND REDDIPLEX / EQUIVALENT
98	Brush Strip	ENVIROSEALS / ANAND REDDIPLEX / EQUIVALENT
99	Cement Fibre Board	RAMCO / EVEREST / GYPROC/ CENTURY (ZYKRON) /
100	Self-supported Steel Roofing System	PROFLEX / EQUIVALENT
101	Silicon Paint / Water & Strain repellant Coating for stone or other Surfaces	NEROLAC / ASIANPAINTS / ICI / KILLICK GUARD SPECIALITY PRODUCTS LTD / DOW CORNING / MYK LATICRETE / PIDILITE
102	DUCO Paint	ICI, DUCO
103	SS Finish Wall Connecting Profile	DORMAKABA/ BENE/ MAARS/ GEZE
104	Norton Tape (Double sides) Adhesive tape	NORTON / SUPREME
105	PVC Strips	FIXOPAN / EQUIVALENT

Sl.	ITEM DESCRIPTION	APPROVED MAKES / MANUFACTURES
106	Water Vapour barrier Sheet	SUPREME / EQUIVALENT
107	Extruded Polystyrene	OWENS CORNING / DOW CORNING / SUPREME
108	Acrylic Modified Cementitious water Proofing Compound	CICO / ARMOURCRETE / STRUCTURAL WATER PROOFING COMPANY PVT LTD
109	Mechanical Couplers for Reinforcement steel	SANFIELS / HALFEL / DEXTRA INDIA / ASCON/ UNITECH / TATA / SNTP MECHANICAL SPLICING SYSTEM /MOMENT / KRIDHAN /
110	Frosted / glass film	LG / 3M / GARWARE / DUPONT
111	Stone Sealer	ARDEX ENDURA / MYK LATRICRETE / KILLICK GUARD SPECIALITY / KERAKOLL/ AKEMI / PIDILITE
112	Food grade epoxy coating for water tank	BASF / PIDILITE / FOSROC / ASIAN/ SIKA / MYK ARMENT / STP LTD / MC-BAUCHEMIE
113	Stoneware pipes and Gully Traps/P Trap/S Trap	ANAND or Equivalent approved
114	Prefabricated Polyurethane Roof Insulation Panels	LLOYDS, BLUE STAR/RINAC/BEARDSELL/FRICK/KINGSPAN JINDAL/METECNO
115	Precast RCC Pole and slabs etc.,	Natraj Cement Articles or Equivalent approved

NOTE:

1 For equivalent approved, ISI or approved marked items included above, if opted by contractor, specific approval to be taken by contractor for make, before procurement and use.

2 For the items not indicated above but to be used for civil & structural works, specific approval to be taken before procurement and use after submitting sample, detail of manufacturer, source of supply etc.

3 Samples for all bought out items like pipes, aluminium sections, Door & window fittings, bricks, GI colour coated sheets, sanitary & water

supply fittings etc. should be brought at site and got approved before procurement.

4 Mild Steel (MS) structural steel of smaller sizes such as MS flats, MS square bars, MS Tubes & Hollow sections, MS round bars, MS sheets and MS angles as per the following category may be allowed for brands/make other than indicated above. However, approval of Site Engineer shall be obtained before procurement and use after submitting sample, details of manufacturer and test reports.

Sl	Description	Category
1	MS Flats	Below 50mm wide.
2	MS Square bars MS Hollow Sections (RHS /SHS/ Tubes)	Below 50mm (dia/Size)
3	MS round bars (Structural)	20mm dia and below
4	MS sheets	Thickness 5mm and below
5	MS Angles(Equal/Unequal)	50mm and below.

WE HAVE NOTED THE ABOVE AND CONFIRM THAT OUR TENDER IS BASED ON ABOVE APPROVED MAKES.

Date: _____ **Signature and Seal of Bidder**

LIST OF APPROVED MAKES OF ELECTRICAL WORKS

The following is the list of products and names of the approved manufacturer against each product. The contractor shall quote rates for the various item of works using these products based on maximum two makes out of these approved manufacturers selected & filled up in format given below by the bidder. Any other make of product, not approved below, shall not be allowed for use in this work unless specifically approved in writing separately by purchaser after establishing its technical suitability, price availability & effect on price quoted by contractor for the item where this item is being used. If no make has been selected by the bidder, the purchaser shall be at liberty to advice the contractor to use any of the approved manufacturer given below for any product for this contract.

SR. NO.	ITEM DESCRIPTION	APPROVED MAKES
1.	PVC CONDUITS	PRECISION, POLYCAB, POLYPACK, BHARAT, SUDHKAR, FINOLEX
2.	PVC CONDUIT ACCESSORIES	PRECISION, POLYCAB, POLYPACK, BHARAT, SUDHKAR, FINOLEX
3.	PVC INSULATED, FLEXIBLE STRANDED COPPER CONDUCTOR FRLS WIRES	FINOLEX, RR KABEL (UNILAY), L&T, HAVELL'S, POLYCAB,
4.	PVC INSULATED ARMOURED, ALUMINIUM CONDUCTOR CABLES	KEC, RPG-ASIAN, FINOLEX, NICCO, RR KABEL, CCI, POLYCAB, HAVELS
5.	MODULAR SWITCHES, SOCKET OUTLET & MOULDED COVER PLATES	CRABTREE, SCHEINDER, ANCHOR ROMA , L&T, ABB, HAVELS, SCHNEIDER
6.	MINIATURE CIRCUIT BREAKERS (M.C.B)	LEGRAND, L&T ,HAGER, SIEMENS, ABB, HAVELL'S (CRABTREE),
7.	EARTH LEAKAGE CIRCUIT BREAKERS (ELCB)/RESIDUAL CURRENT CIRCUIT BREAKER (RCCB)	LEGRAND, L&T ,HAGER, SIEMENS, ABB, HAVELL'S (CRABTREE),

SR. NO.	ITEM DESCRIPTION	APPROVED MAKES
8.	MOULDED CASE CIRCUIT BREAKERS (MCCB)	SIEMENS, L&T, ABB, MERLIN GERIN, LEGRAND, ENGLISH ELECTRIC, SCHNEIDER COMPACT NSX
9.	SWITCH FUSE UNITS WITH HRC FUSES FOR PANELS (TPN &TP)	L&T, SIEMENS, ABB, SCHNEIDER, ENGLISH ELECTRIC, TELEMECHANIC
10.	AMMETERS, VOLTMETERS, PF METERS (ANALOGUE)	AUTOMATIC ELECTRIC, L&T (RISHAB), MECO, IMP, SCHNEIDER
11.	AMMETERS, VOLTMETERS, PF METERS (DIGITAL)	L&T (RISHAB), SCHNEIDER, SIEMENS, L&T (RISHAB)
12.	CURRENT TRANSFORMERS (CAST RESIN)	KAPPA, GILBERT MAXWELL, AUTOMATIC ELECTRIC, MECO, BHARATI
13.	ENERGY METERS (MECHANICAL)	UNIVERSAL, JAIPUR, HAVELL
14.	ENERGY METERS (ELECTRONIC)	L&T, RISHAB, SCHNEIDER, SIEMENS REICO, SECURE, MECO, ICD, ELECON
15.	TELEPHONE WIRES & CABLES	FINOLEX, RR KABEL, POLYCAB, SKYTONE, L&T, DELTON
16.	COMPUTER DATA CABLES (CAT 5/6)	LUCENT, AT&T, AMP,D-LINK
17.	TELEPHONE TAG BOX	KRONE, POUYET
18.	LOW TENSION SWITCHGEAR	L&T, SIEMENS, ABB, SCHNEIDER
19.	CABLE COMPRESSION GLANDS	COMET, PEECO, DOWELL, LAPP KABEL
20.	CABLE LUGS	DOWELL'S, LAPP KABEL, COMET PEECO
21.	INDUSTRIAL TYPE METALLIC PLUG SOCKETS	LEGRAND, CUTTLER & HAMMER, SIEMENS,SCHNEIDER, INDO KOPP, CLIPSAL

SR. NO.	ITEM DESCRIPTION	APPROVED MAKES
22.	DISTRIBUTION BOARDS	LEGRAND , L&T (HAGER), SIEMENS, ABB, HAVELL'S (CRABTREE) , INDO KOPP, SCHNEIDER
23.	SELECTOR SWITCHES	KAYCEE, L&T SALZER
24.	INDICATION LAMPS (LED TYPE)	L& T SIEMENS, ABB, SCHNEIDER, ESSEN, BCH, VAISNAV, TECHNIC
25.	RISING MAINS	CONTROL & SWITCHGEAR, ZETA
26.	POWER CAPACITORS	ASIAN, EPCES, L&T,SCHNEIDER, MOMAYA, SEIMENS
27.	MS / GI CONDUITS	AKG, BEC, VIMCO, GUPTA, BHARAT
28.	MS / GI CONDUIT ACCESSORIES	SHARMA, RAMA
29.	TIMER	L&T / SEIMENS/ MINILEC
30.	CABLE TRAYS	PROFAB / UBITECH / TECHNOFAB /OBO/LEGRAND/FRASER
31.	EARTH ELECTRODE	ASHLOK / GRAVIN
32.	UPS	SCHNEIDER-APC / CONSUL NEOWATT / HIREL-HITACHI/ EMERSON
33.	BATTERY BACK UP KIT & EXIT SIGNAGES	BAJAJ/ CROMPTON/ COOPER
34.	FLAME PROOF SOCKETS, SWITCHES	BALIGA/ COOPER/CND HI TECH
35.	RACK	SCHNEIDER/ RITTAL/COMMSCOPE/ PANDUIT
36.	POP UP BOX/NET BOX	A&H MEYER/ LEGRAND
37.	TV CABLES	SKYTON/ FINOLEX/ DELTON
38.	TERMINAL BLOCKS	DOWELL'S/ ELEMEX/ WAGO/ PHOENIX

SR. NO.	ITEM DESCRIPTION	APPROVED MAKES
41.	ELECTRIC MOTORS	SIEMENS/ABB/BHARAT BIJLEE/CROMPTON/KIRLOSKAR/L&T
42.	AIR CIRCUIT BREAKER	L&T – U POWER OMEGA/ SIEMENS 3 WL / SCHNEIDER MASTERPACT NW SERIES/ ABB
43.	MCCB	L&T D' SINE / LEGRAND / SIEMENS 3 VL / MERLIN GERIN COMPACT SERIES/ ABB TMAX/ GE RECORD RANGE / HAGER/SCHNEIDER
44.	PROTECTION RELAYS	L&T / SIEMENS / ABB / AREVA T&D/ ASHIDA
45.	CONTACTORS	L&T / SIEMENS / ABB / SCHNIEDER/ GE
46.	TIMERS ELECTRONIC	L&T / SIEMENS / GE/ ABB/ SCHNIEDER
47.	SWITCH DIS-CONNECTOR FUSE UNITS	L&T / SIEMENS / ABB /SCHNIEDER/GE
48.	MCB/RCCB	LEGRAND/HPC/INDO KOPP/SIEMENS / HAGER / MERLIN GERIN / LEGRAND/ABB/ L&T/ GE/ SCHNIEDER/HAVELLS
49.	MCCB	L&T/ SIEMENS/ABB/LEGRAND/HAGER
50.	INDICATING LAMPS	L&T / SIEMENS / SCHNEIDER / VAISHNO / TEKNIC / ABB
51.	PUSH BUTTONS	ESBEE / SIEMENS / ABB / VAISHNO / TEKNIC/ L&T
52.	ISOLATORS	SIEMENS /ABB / BCH/ HAVELLS/ L&T/HANSU/HENSEL/SINTEX
53.	LOAD MANAGER	SIEMENS/ ABB/ L&T / SCHNEIDER/ CONZERV/ ALLEN BRADLEY (ROCKWELL)

SR. NO.	ITEM DESCRIPTION	APPROVED MAKES
54.	DIGITAL AMMETER & VOLTMETER	CONZERV / L&T / RISHABH /AE/IMP/MECO
55.	ANALOG AMMETER & VOLTMETER	RISHABH / IMP / AE/ L&T/SCHNEIDER
56.	DIGITAL ENERGY METER	CONZERV / L&T / ABB/SIEMENS /HPCL/UNIVERSAL/JAIPUR/REIL
57.	PVC CONDUIT & ACCESSORIES	PRECISION / POLYCAB / CLIPSAL
58.	POWER FACTOR METER	RISHABH / IMP / MECO / AE/ L&T
59.	CURRENT TRANSFORMER	KAPPA / BHARTI/ ASHMORE/ L&T/RISHABH / AE /MAXWELL/IMP/MECO/GILBERT
60.	HT XLPE POWER CABLES	GLOSTER/ CCI / KEC / FINOLEX / NICCO /KEI
61.	LT XLPE POWER CABLES	GLOSTER/ CCI / KEC / FINOLEX /LAPP KABEL / NICCO /RR KABEL /SBEE
62.	LT COPPER CONTROL CABLES	LAPP KABEL / CONCAB / CCI / RPG ASIAN / FINOLEX / RR KABELS/ SBEE/GLOSTER
63.	SIGNAL & INSTRUMENT CABLE	LAPP KABEL / CONCAB /RR KABEL/SBEE/ DIGILINK
64.	POWER CAPACITORS	SIEMENS/ EPCOS / L&T/ ABB/ SCHNIEDER / GE/NEPTUNE-DUCATI
65.	APFC RELAY	BELUKE /SIEMENS / EPCOS / L&T/ ABB/ SCHNEIDER/ NEPTUNE-DUCATI/ GE
66.	CABLE TRAY	INDIANA / MEK / SUNRISE / SUPER / PILCO / SINTEX
67.	ISOLATING SWITCHES	SIEMENS/ABB/L&T/ SCHNEIDER
68.	HRC FUSES	L&T / SIEMENS / GE/ ABB /EE

SR. NO.	ITEM DESCRIPTION	APPROVED MAKES
69.	TERMINAL BLOCKS	WAGO / LAPP INDIA / CONNECT WELL/ ELMEX
70.	POTENTIAL TRANSFORMERS	KAPPA / JYOTI/ BHARTI/AE / ASHMORE
71.	ROTARY SELECTOR SWITCH	KAYCEE / SALZER - L&T / SIEMENS / ABB
72.	CABLE GLANDS	COMET / EX-PROTECTA / DOWELS / LAPP KABEL
73.	CABLE LUGS	DOWELS / COMET / LAPP KABEL/ BRACKO
74.	MECHANICAL INTERLOCK	L&T / SCHNEIDER / ABB/ GE/SIEMENS
75.	XLPE CABLE JOINTING / TERMINATING KIT	RAYCHEM / M-SEAL/BIRLA 3M
76.	PROGRAMMABLE PROTECTION RELAY	MINILEC/ ABB/ L&T/ SIEMENS/ SCHNIEDER/ GE
77.	LT SANDWICH BUS DUCT	L&T/ GE/ C&S/ SIEMENS/ ABB/ SCHNIEDER
78.	STEEL STRUCTURE	SAIL/ESSAR/TISCO/ JINDAL
79.	LT SWITCHGEAR	L&T/SIEMENS/ABB/ SCHNIEDER
80.	POWER / CONTROL CABLES, WIRES	CCI / GLOSTER/ FINOLEX/ UNIVERSAL/ NICCO/ RPG
81.	INDICATION LAMP LED TYPE	BINAY/ SIEMENS/ L&T/ TEKNIC/ ABB
82.	LIGHT FITTINGS	PHILIPS/WIPRO
83.	CEILING/ WALL FANS	BAJAJ/USHA/ORIENT/HAVELLS
84.	EXHAUST FANS	USHA/BAJAJ/ORIENT/ALMONARD
85.	WEATHER PROOF BOXES FOR ISOLATORS, PUSH BUTTONS	HANSU/ HENSEL/ SINTEX

SR. NO.	ITEM DESCRIPTION	APPROVED MAKES
86.	HIGH MAST & STREET LIGHT POLES	BAJAJ/EQUIVALENT AS TECHNICAL PER SPECIFICATION AND BOQ
87.	LIGHTNING PROTECTION	CAPE, DEHN, OBO, JMV, ABB
88.	Voltage Stabilizer	AES/KRYKARD/APLAB/NEEL
89.	High Volume Low Speed Fan	GOLDEN HELIFAN / RR/BRAYAN

Note:

The following shall be got approved from Purchaser:

1. Samples of Conduit, conduit bends & junction box.
2. Samples of Switch box and outlet box with hylem sheet cover & switches.
3. Drawings & inspection for following:
   (i) Distribution boards
   (ii) Electrical switch boards
   (iii) Street light poles & brackets.
   (iv) Galvanised Raceways & its junction box.
   (v) Flood light Tower
4. Samples for modular switches, sockets, grid & cover plate and their boxes.
5. Samples for telephone & computer data outlet box & outlet.
6. Samples of GI wires and strips.
7. All Electrical works shall be carried out by a licensed electrical contractor possessing a valid electrical contractors license in the state where site is located, employing licensed supervisor & skilled workers having valid permits as per the regulations of Indian Electricity Rules and local Electrical Inspector requirements. Copy of contractor's electrical license shall be furnished along with the tender.

WE HAVE NOTED THE ABOVE AND CONFIRM THAT OUR TENDER IS BASED ON THE APPROVED MAKES INDICATED ABOVE.

Date _____ **Signature & Seal of Bidder**

MAXIMUM CAPACITY OF CONDUITS FOR THE DRAWING-IN OF 1100 VOLTS GRADE PVC COPPER WIRES AS PER IS & BS

Nominal Cross Sectional Area of wire (Cu) Sq. mm	**Size of Conduit (mm)**											
	19		25.0		32.0		38		50		63.0	
	S	B	S	B	S	B	S	B	S	B	S	B
1.5	5	4	10	8	14	12	-	-	-	-	-	-
2.5	5	4	8	6	12	10	-	-	-	-	-	-
4.0	3	2	8	6	10	8	-	-	-	-	-	-
6.0	2	1	5	3	8	5	-	-	-	-	-	-
10.0	-	-	3	2	5	4	6	5	-	-	-	-
16.0	-	-	-	-	3	2	6	4	-	-	-	-
25.0	-	-	-	-	2	1	4	3	6	4	7	5
35.0	-	-	-	-	-	-	3	2	5	4	6	4
40.0	-	-	-	-	-	-	2	2	5	4	7	5
50.0	-	-	-	-	-	-	2	1	4	2	5	4

NOTE: This table shows the maximum capacity of conduit for the simultaneous drawing of wires. The table applies to 1100 volts grade wire/cables. The columns headed S applies to runs of conduit which have distance not exceeding 4.25 m between draw-in-boxes and which do not deflect from the straight by an angle of more than 15 deg. The columns headed B apply to runs of conduit which deflect from the straight by an angle of more than 15 deg.

LIST OF STANDARD SKETCHES

S No	DESCRIPTION
➢	Fixing Details for LED Light Fittings
➢	Outlet Box & Installation Details for Ceiling Fan
➢	Details of MS Outlet Box for Installation of Fittings on Slab
➢	Details of MS Outlet Box for Installation of Fittings on Wall
➢	Installation Tips for Lighting Switchboards
➢	Termination of Armoured Cable in Concealed Distribution Board
➢	Laying of Cables , Underground
➢	Rout Maker for Underground Cables & Ckt. Diagram for Earth Continuation Test
➢	Laying of cables in RCC /G I Pipes

NOTE: ITEMS TO BE SUPPLIED AND INSTALLED AS PER DETAILS GIVEN IN THESE SKETCHES WHEREVER APPLICABLE.

SECTION- VI

SCHEDULE OF MATERIAL

TO BE ISSUED

SECTION VI

SCHEDULE OF MATERIAL TO BE ISSUED BY SERVICE RECIPIENT /RSS

No material shall be issued by Service Recipient/RSS unless otherwise specified in the bidding document. All the materials/goods & services are to be arranged by the bidder/contractor for proper completion of the works as per specification, terms & conditions of the bidding document/contract.

SECTION- VII

SCHEDULE OF SUPPLEMENTARY INFORMATION

SECTION - VII, SCHEDULE OF SUPPLEMENTARY INFORMATION

The bidder shall provide the Supplementary Information as Annexed in the form of schedules mentioned hereunder. All these supplementary information shall be considered for the bid evaluation and same in the contract execution. If the requisite information is not supplied by the bidder then the bid may be considered non-responsive and shall be rejected.

a)	Schedule	I	Major items of construction plant to be deployed by the bidder.
b)	Schedule	II	Key Personnel.
c)	Schedule	III	Nominated Sub-Contractors.
d)	Schedule	IV	Major works successfully completed during the last five years.
e)	Schedule	V	Statement of Bonus earned/ Liquidity damages paid in the last five years.
f)	Schedule	VI	Statement of Arbitration & Disputes in the last five years.
g)	Schedule	VII	Financial Business Capability.
h)	Schedule	VIII	Works in hand

SECTION – VII, SCHEDULE – I

Major items of Constructional plant to be deployed by the bidder.

Sl. No.	Description	Specification/Capacity	Machinery Proposed To Be Deployed At Site By Contractor	
			Owned	To Be Hired
1.	**Survey Equipment**			
	Total Station With Accessories			
	Auto Level With Staff			
2.	**Earth Moving Equipment**			
	Backhoe Loader (JCB)	Shovel Capacity :		
	Breaker For Above			
	Poclain With Hydraulic Chisel /Breaker	Bucket Capacity :		
	Front End Loader	Bucket Capacity :		
	Reversible Plate Earth Compactor			
	Plate Earth Compactor			
	Tamping Rammer			
	Water Sprinkling System			
3.	**Lifting Equipment**			
	Tower Crane			
	Hoist			
	Mobile Crane/Hydra	Capacity :		
4.	**Concreting Equipment**			

Sl. No.	Description	Specification/Capacity	Machinery Proposed To Be Deployed At Site By Contractor	
			Owned	To Be Hired
	PLC Controlled Batching Plant With Printing Facility Of Batching Slip & Cement Silos	Machine Capacity = 25cum/Hr		
		Machine Capacity = 30cum/Hr		
	Concrete Pump	Suitable For Pumping Concrete Upto 50mtr Vertical Height & 100mtr Horizontal Length		
	Boom Placer	As per the site requirement		
	Transit Mixers	Capacity		
	Concrete Mixer With Hopper	Batching Capacity = 1 Bag Cement ; Machine Capacity =		
	Vibrator Machine Electric Operated			
	Vibrator Machine Diesel Operated			
	Vibrator Needles	60mm Dia.		
		40mm Dia.		
		25mm Dia.		
	VDF Kit			
	Screed Vibrator			
	Power Trowel			
	VDF Mat			
5.	**Building Work Equipment**			
	Mortar Mixtures (For Mortar Making)	Capacity : Min. 1 Bag		
	Bar Bending Machine	Upto 32mm Dia		
	Bar Cutting Machine	Upto 32mm Dia		
	Chase Cutting Machine			

Sl. No.	Description	Specification/Capacity	Machinery Proposed To Be Deployed At Site By Contractor	
			Owned	To Be Hired
	Rotary Sans Screening Machine			
	Marine Densified Plywood Shuttering (New)	Minimum 5000 SqM shall be deployed at the project site		
	Steel Shuttering Plates (new)			
	Scaffolding			
	Grinding Machine			
	Hammer Drilling Machine			
	Welding Machine			
	Air Compressor			
	Concrete Breakers			
	De Watering Pumps			
6.	**Road Work Equipment**			
	Tandem Vibratory			
	Smooth Wheeled Roller 8-10 MT			
	Hot Mix Plant			
7.	**Transportation Equipment**			
	Hydraulic Dumpers			
	Trucks /Tractor With Trolley			
	Wheel Borrow			
	Tough Rider			
8.	**De Watering Equipment**			
	De Watering Pump	_____HP		
9.	**Power Equipment**			
	DG Set	_____KVA		
10.	**Piling Equipment's (not applicable)**			
	Percussion/Rotary Drilling Rigs Using Direct/Reverse Mud Circulation			
	TMR/ Bailer & Chisel Rigs.			

Sl. No.	Description	Specification/Capacity	Machinery Proposed To Be Deployed At Site By Contractor	
			Owned	To Be Hired
	Winch			
	Derrick			
	Boring/Chiselling Tools			
	Temporary Casings	Pipes-		
11.	**Tremie Arrangements (not applicable)**			
		Concrete Hopper-		
		Hopper Plugs-		
		Tremie Pipe-		
		Holding Clamps-		
		Hoisting Plug-		
	Accessories Like Concrete Placer, Wheel Barrow, Measuring Chain, Bailers, Crow Bars, Dog Clamps With Pins, Steel Measuring Tapes, Mucking Shovel Etc.- 1 Lot			

Note:- Bidder to submit the documents pertaining to ownership of equipment owned by them.

Signature and seal of Bidder

SECTION - VII, SCHEDULE – II, KEY PERSONNEL

1.	**Technical Personnel Requirement**	**No. of persons employed with the bidder**	**No. of persons to be deployed for the project. (This is in addition to the mandatory key manpower requirement as per the Invitation for Bid, Section 0)**
	a) Senior Engineer (Project Manager)- 1 no.		
	b) Site Engineer (Degree holder)- 2 no.		
	c) Billing Engineer (Degree holder)- 1 no. d) Quality control engineer-1 no. e) Electrical engineer – 1 no. f) Safety engineer – 1 no.		
2.	Supervisory Personnel		
	a) Supervisor (Diploma holders)		
	b) Foremen		
	c) Technicians		
3.	Other key staff		

Signature and seal of Bidder

SECTION - VII, SCHEDULE – III, Nominated Sub-contractor

(List of works of value more than 10% of the contract value proposed to be sublet)

Sl. No.	Description	Approx. Value Rs.	Name of the Sub-contractor	Place where similar works previously executed.

Signature and seal of Bidder

SECTION - VII, SCHEDULE – IV

Major <u>similar nature of works successfully completed</u> during the past five years:

Similar nature of works:
Reinforced Cement Concrete (RCC)/Road work/Bridge Work framework buildings having similar finishes including or excluding internal electrification works of Institutional / Hospital / Hostel / Residential / Commercial / Offices / Semen Station/ Animal Farm/Industrial Buildings.

Sr. No.	Name of work	Place	Contract Ref.	Name of Client	Value of Work	Start date of work	Completion date as per work order	Actual Completion date as per completion certificate	Average monthly progress

<u>Note:</u> Documentary evidence for above information to be attached separately in the form of completion certificate, purchase order, TDS certificate, details of payments. Monthly bill value of work progress done etc. issued by the client.

Signature and seal of Bidder

SECTION - VII, SCHEDULE – V

Statement of Bonus earned/ Liquidity damages (L.D.) paid in the past five years :

S. N.	Name of Work	Place	Contr-act ref.	Name of Owner	Value of Work (Rs. Lakh)	Time of Completion (Months)		Bonus / L.D.
						Contract	Actual	

Signature and seal of Bidder

SECTION - VII, SCHEDULE – VI

Statement of Arbitration & disputes in the last five years.

S. N.	Name of Work	Place	Contract reference	Name of Client	Value of Work (Rs. Lakh)	Nature of Dispute	Award of Arbitration

Signature and seal of Bidder

SECTION - VII, SCHEDULE – VII

Financial and business Capability.

1.	Audited annual accounts/ Accounts audited under section 44AB of Income Tax Act of past 3 years	:
2.	Where accounts are not required to be audited following information shall be given for last three years duly attested by a Charted Accountant/ Manager of nationalised Bank.	:
a.	Share Capital	:
	Free Reserves	:
	Other Reserves	:
b.	Term loans from financial institutions & banks	:
c.	Current Liabilities	:
	Bank Cash Credits	:
	Others (Including sundry creditors)	:
d.	Provisions	:
e.	Contingent Liabilities including claims not acknowledged	:
f.	Fixed Assets	:
	Gross	:
	Net	:
g.	Cash and Bank Balances	:
h.	Inventories	:
i.	Debtors & Advances considered good	

More than 6 months :

Less than 6 months :

j. Profit before tax :

k. Loss, if any :

3. Other information

Name of the Bankers :

Bank facilities including credit limits :

4. Projected turn over for the next two years

Year 1 :

Year 2 :

NOTE:

Wherever required documentary evidence may be attached separately.

Signature and seal of Bidder

SECTION - VII, SCHEDULE - VIII, WORKS IN HAND

Sl. No	Name of Work	Contract reference and date	Name of Client (Mobile No. & Email	Place of Contract	Total Value of Contract (Rs. Lakh)	Total Duration of Contract as per PO (Month	Value of Works Completed as on Bid Opening Date (Rs.	Balance Value of Works to be Completed as on Bid	Completion Schedule of Balance Works	
									Period (Months)	Expected date of Complet

Note:- The Purchase order/ Work order copies along with the latest Bill details for value of works completed till date is to be submitted.

Signature and seal of Bidder

SECTION- VIII

FORM OF AGREEMENT

SECTION VIII-FORM OF AGREEMENT FOR CIVIL CONSTRUCTION WORK

(To be submitted by successful bidder after award of contract On Non-Judicial Stamp Paper of minimum value of Rs. 300/- or as per stamp act of Local State Government)

THIS AGREEMENT is made and executed at --------- on the day of 20 between the Rahuri Semen Station(A unit of NDDB Dairy Services) having its registered office at --------, (in the capacity of Pure Agent to _____(hereunder referred as 'Service Recipient') name of the project authority) (herein after referred to as **pure agent**) which expression shall, unless repugnant to the context or meaning thereof, include the successors and assignees of the pure agent) of the ONE PART and _____ (herein after referred to as the **Contractor,** which expression, shall, unless repugnant to the context or meaning thereof, include the heirs, successors, assignees, executors and administrators of the Contractor) of the OTHER PART.

WHEREAS the service recipient is desirous that certain Works should be executed, viz _____ _____ and has, by Letter of Acceptance/Work Order Acceptance dated _____, accepted a bid by the Contractor in response to the Pure Agent's bidding document ref no. _____ for carrying out the above job at a cost Rs._____ (hereinafter referred as contract price), **NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:**

1.0 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.

2.0 The following documents shall be deemed to form and be read and construed as a part of this agreement, viz

i) This Form of Agreement

ii) The Letter of Acceptance/Work Order Acceptance
iii) The said bid and Appendix
iv) The Schedule of Quantities
iv) The Technical Specifications
v) The Drawings
vii) The Schedule of Supplementary information
viii) Special Conditions of Contract
ix) General Conditions of Contract
x) Schedule of Materials to be issued by Project Authority/Pure Agent
xi) Form of Bank Guarantees
xii) Work Order No._____

3.0 The aforesaid documents shall be taken as complementary and mutually explanatory of one another, but in the case of ambiguities and discrepancies shall take precedence in the order set out above.

4.0 In the consideration of the payment to be made by the Pure Agent to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Pure Agent to execute, complete and maintain the works in conformity in all respects with the provisions of the Contract and bidding document.

5.0 The Pure Agent hereby covenants to pay the Contractor in consideration of the execution, completion and maintenance of the works the Contract Price at the times and in the manner prescribed by the Contract.

IN WITNESS WHEREOF the parties hereto have caused this agreement to be executed in accordance with their respective laws the day, month and year first above written.

Signed, sealed & delivered by the Authorised Signatory for the Pure Agent

Signed, sealed & delivered by the Authorised Signatory for the Contractor

Authorised Signatory
Rahuri Semen Station

(in the capacity of Pure Agent to ____
_____ Project Authority Name

Authorised Signatory
Contractor

In the presence of:

WITNESS

1) Signature
Name
Address
2. Signature
Name
Address

In the presence of:

WITNESS

1. Signature
Name
Address
2. Signature
Name
Address

SECTION – X

SCHEDULE OF QUANTITIES
FOR
CIVIL, INTERNAL ELECTRICAL & LANDSCAPE

Section-X (Schedule of Quantities)

Civil, Structural, Water supply, Sanitary, Road work and other miscellaneous works including Internal Electrification, Landscape for;"Additional Infrastructure Buildings of Training Centre, Farmers Hostel, Canteen, Road work, Landscape works at Cow Sanctuary Muzaffarnagar, Uttar Pradesh

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
	EARTHWORK				
1	Excavation in all types of soil/Terrain/Land at the project site which includes all kind of soils, murrum, all type of rocks, for foundations of wall, columns, plinth beams, basement, raft, ducts, trenches, underground sumps, septic tanks, soak well, manhole chambers, gully chambers, including shoring, strutting, bailing out water/pumping off water if required, re-filling the trenches , foundation pits, ramming, watering consolidating in 15 cms to 20 cms layers as directed , removing and stacking simultaneously the excavated stuff any where within the site area complete as directed - From NGL to 1.5 m depth (Refer Item no. 1.01 for detailed specifications in Section IV) *Item included filling of soil /rock of surplus excavated earth, it shall be filled in the plinth of building building /road/land development etc with compaction/consolidation within site with all leads, loading, unloading, stacking of excavated earth after refilling if found surplus, re-excavation, loading, tranportation, unloading, filling & compacting etc., Item includes above all and filling shall not be paid seperately.*	8,456.00	CU.M.		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
2	Excavation in all types of soil/Terrain/Land at the project site which includes all kind of soils, murrum, all type of rocks,for foundations of wall, columns, plinth beams, basement, raft, ducts, trenches, underground sumps, septic tanks, soak well, manhole chambers, gully chambers, including shoring, strutting, bailing out water/pumping off water if required, re-filling the trenches , foundation pits, ramming, watering consolidating in 15 cms to 20 cms layers as directed , removing and stacking simultaneously the excavated stuff any where within the site area complete as directed - For depth exceeding 1.5 m but up to 3.0 m (Refer Item no. 1.02 for detailed specifications in Section IV) *Item included filling of soil /rock of surplus excavated earth, it shall be filled in the plinth of building building /road/land development etc with compaction/consolidation within site with all leads, loading, unloading, stacking of excavated earth after refilling if found surplus, re-excavation, loading, tranportation, unloading, filling & compacting etc., Item includes above all and filling shall not be paid seperately.*	4,009.00	CU.M.		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
3	Excavation in all types of soil, including murrum, for foundations of wall, columns, plinth beams, basement, raft, ducts, trenches, underground sumps, septic tanks, soak well, manhole chambers, gully chambers, including shoring, strutting, bailing out water/pumping off water if required, re-filling the trenches , foundation pits, ramming, watering consolidating in 15 cms to 20 cms layers as directed , removing and stacking simultaneously the excavated stuff any where within the site area complete as directed - For depth exceeding 3.0 m but up to 4.5 m (Refer Item no. 1.03 for detailed specifications in Section IV) *Item included filling of soil /rock of surplus excavated earth, it shall be filled in the plinth of building building /road/land development etc with compaction/consolidation within site with all leads, loading, unloading, stacking of excavated earth after refilling if found surplus, re-excavation, loading, tranportation, unloading, filling & compacting etc., Item includes above all and filling shall not be paid seperately.*	544.00	CU.M.		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
4	Providing and filling in ground in plinth, for land development, Hard park Road etc. with selected earth/murrum brought from approved outside site sources in mutilple layers of 200mm thickness including freight, transportation, loading, unloading, screening if required, watering, ramming, consolidating with mechanical compactor / vibro roller / power roller of 8 to 12 MT, testing cost for suitability of earth/murrum & compaction of each layer,etc complete as directed.(Refer Item no. 1.09 for detailed specifications in Section IV) *Note:-The item also includes filling in road, Hard park, pathway, land development etc. also in required level and camber/slope followed by consolidation using road roller of 8 to 12 MT capacity.* *The earth/murrum of approved quality shall be purchased by the contractor from external sources. Filling plan shall be submitted to the Engineer in charge/site engineer in advance for approval.*	1,000.00	CU.M.		
5	Providing and laying in a compact manner 150 mm thick metal soling in plinth in two layers using average 60 to 80 mm size stones simillar to which used for concrete and RCC works, including test of materials, filling in the voids with largest possible simillar stones, covering and levelling the surface with sand/ layer of murum, dry compaction followed by watering, topping up with sand / murram and consolidation with mechanical plate compactor etc. all complete as directed.(Refer Item no. 1.11 for detailed specifications in Section IV) *Note:-This item includes to bring required level camber/slope followed by consolidation for building works. The thickness shall be 150mm/230mm/300mm/or any other as per drawing*	730.00	CU.M.		
6	Providing and laying dry stone pitching up to 300 mm thick to earthen embankment using stone blocks of approved size, hard, durable and fairly regular in shape and its thickness in any one direction shall not be less than the thickness of pitching as specified and laid to the required slope and filling the joints with cement sand mortar 1:6 (1 part cement, 6 part sand) including pointing with C:M 1:4 (1 part cement, 4 part sand) etc. complete as directed.(Refer Item no. 1.14 for detailed specifications in Section IV)	115.00	CU.M.		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
7	Supplying the chemicals & carrying out pre-construction Anti-termite treatment (IS 6131 part 2) with chlorpyriphos 20 EC with 1 % concentration (IS 8944) OR Imidacloprid 30.50SC with 0.075% concentration (IS 15443) at the various stages of construction in stages 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 pests infestation. This work is to be got executed through an approved specialized agency as per their specifications. (Measurement shall be as per out to out plan dimension in SqM at plinth level of the building treated). Stages of treatment:- A). Treatment for RCC foundations and basement :- After the backfilling up to GL, the peripheral walls shall be treated at its both side up to 500mm depth at the rate of 7.5 Ltr/SqM. B). Treatment at the junction of the wall and floor (filling). :- After the plinth filling is completed, both the sides of the walls at the junction of the wall and filling to be treated at the rate of 7.5 Ltr/SqM. C). Floor treatment :- The top surface of the consolidated earth within plinth walls shall be treated with Chemical emulsion at the rate of 5 Ltr / SqM. D). Treatment of soil along the perimeter of building. :- After the building is complete, the earth along the external perimeter of the building shall be treated for a depth of minimum 300mm & width upto 750mm with Chemical emulsion at the rate of 7.5 Ltr/SqM. E). Treatment of Soil surrounding Pipes, Wastes and Conduits and any other service line going inside the building. (Refer Item no. 1.18 for detailed specifications in Section IV)	4,400.00	SQM		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
8	Clearing jungle including up-rooting of rank vegetations, thorny bushes, saplings, trees of girth (circumference) up to 300mm measured at a height of 1 metre above ground level, other vegetation cover, jungle plants, shrubs, climbers etc all in order to get the clear land having its original top layer including stacking all the removed debris, rubbish, vegetation, trees, saplings etc at the place as directed anywhere within site including loading, unloading, applying all machineries and equipments, etc all complete as directed. (Refer Item no. 1.19 for detailed specifications in Section IV). Jungle clearing plan shall be submitted to the Engineer-In-Charge /Site Engineer in advance for approval. The area covering jungle shall only be measured in clusters for payment which shall be decided by Site Engineer before commencement.	7.00	ACRE		
9	Transporting and stacking of excavated earth/soft rock of site, anywhere outside the site and bringing back the same for filling in plinth, filing for road or hard park etc within the site. This shall include loading at site, transportation from site to the plot/land/stacking yard at out side the site, unloading & spreading at plot/land/stacking yard outside the site including briging the earth/soft rock back at site later for filling at the required places within site by loading the earth at the outside plot/land/stacking yard, transportation up to site, unloading & spreading at site. Rates shall be quoted for all the cost including total travel from the places at site to the stacking yard/land/plot anywhere at out side of the site and bringing back at the site. Loading operation/activity of excavated earth either at site or at the plot/land/stacking yard outside the site shall not be considered as excavation even if the earth shall be loaded by excavating the earth/soft rock at site or at stacking yard etc and it shall not be paid under excavation. All lead/distances etc all shall be considered for quoting the rate and nothing extra shall be paid on any account. Rate is also inclusive of all the charges as applicable including also the rent of stacking yard/land/plot anywhere outside the site. Arranging the stacking yard/land/plot shall be the responsibility of the contractor, etc complete as directed. (Security of the earth stack at the stacking yard shall be the responsibility of contractor)	65.00	Cum		
	SUB TOTAL FOR EARTHWORK Rs.				

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
	CONCRETE				
10	Providing & laying in position machine mixed and machine vibrated cement concrete of controlled grades for reinforced cement concrete structural elements in any shape, size, thickness or depth and design viz. foundations, columns, beams, slabs, raft, floor plinth beams, plinth beam ledges, window sills, copings, thin band beams, walls parapets boxes, folded plates, chajjas, mullions, retaining walls, fins, staircases, overhead and underground water and other fluid tanks, statically loaded foundation rafts/floor, water troughs, manhole slab, septic tank slab, soak well slab etc. its concrete elements in any shape, size, thickness/depth and design as per structural design and as directed in specified compressive strength compressed in N/mm2 at 28 days as per IS 456-2000 using 20 mm or as specified size of crushed stone aggregates including design of concrete mixes, auto weigh batched proportioning, cost of admixtures, necessary lift and lead as specified, finishing concrete surfaces, curing etc. complete but excluding centring/shuttering and reinforcement. The conversion of weigh batching to equivalent volumetric one, if permitted, should be got approved from Engineer before execution. For concrete grade M- 25 below and up to highest plinth level. *Note:-Screed concrete of any thickness shall be paid under this item as directed. Minimum Ordinary Portland Cement (OPC) content for the concrete shall be 370 Kg/CuM. Concrete shall be produced in fully automated concrete batching plant having batch reports printing facility for all ingredients of concrete. All the batch reports prints shall be submitted to the site engineer on daily basis and the batch data shall be maintained in a format for further analysis*	1,412.00	CU. M.		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
11	Providing & laying in position machine mixed and machine vibrated cement concrete of controlled grades for reinforced cement concrete structural elements in any shape, size, thickness or depth and design viz. foundations, columns, beams, slabs, raft, floor plinth beams, plinth beam ledges, window sills, copings, thin band beams, walls parapets boxes, folded plates, chajjas, mullions, retaining walls, fins, staircases, overhead and underground water and other fluid tanks, statically loaded foundation rafts/floor, water troughs, manhole slab, septic tank slab, soak well slab etc. its concrete elements in any shape, size, thickness/depth and design as per structural design and as directed in specified compressive strength compressed in N/mm2 at 28 days as per IS 456-2000 using 20 mm or as specified size of crushed stone aggregates including design of concrete mixes, auto weigh batched proportioning, cost of admixtures, necessary lift and lead as specified, finishing concrete surfaces, curing etc. complete but excluding centring/shuttering and reinforce-ment. The conversion of weigh batching to equivalent volumetric one, if permitted, should be got approved from Engineer before execution. For concrete grade M- 25 to all height from highest plinth level. *Note:-Screed concrete of any thickness shall be paid under this item as directed. Minimum Ordinary Portland Cement (OPC) conent for the concrete shall be 370 Kg/CuM. Concrete shall be produced in fully automated concrete batching plant having batch reports printing facility for all ingredients of concrete. All the batch reports prints shall be submitted to the site engineer on daily basis and the batch data shall be maintained in a format for further analysis*	564.00	CU. M.		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
12	Providing and erecting in position form work shuttering & boxing using steel/plywood shuttering materials of approved quality for concrete elements vertical, horizontal, inclined, circular, curved etc. in all sizes, shapes and designs as per drawing including necessary staging at all intermediate levels, scaffolding, bolts/nuts, fastener nails, wires for keeping in position till concrete is laid and members have acquired required strength, removal thereafter, applying shuttering oil etc. complete as directed. At all levels below ground level and up to highest plinth level for all concrete elements of any shape, size & direction etc complete as directed. *Note:-Approved quality of new plywood and new metal plates/sheets shall be used for shuttering and form works. Subsequent repetitions for shuttering are allowed only till they are in good condition as per the decision of engineer/site engineer.*	7,998.00	SQ.M.		
13	Providing and erecting in position form work shuttering & boxing using steel/plywood shuttering materials of approved quality for concrete elements vertical, horizontal, inclined, circular, curved etc. in all sizes, shapes and designs as per drawing including necessary staging at all intermediate levels, scaffolding, bolts/nuts, fastener nails, wires for keeping in position till concrete is laid and members have acquired required strength, removal thereafter, applying shuttering oil etc. complete as directed. Form Work in superstructure to all heights above highest plinth level for all concrete elements of any shape, size & direction etc complete as directed. *Note:-Approved quality of new plywood and new metal plates/sheets shall be used for shuttering and form works. Subsequent repetitions for shuttering are allowed only till they are in good condition as per the decision of engineer/site engineer.The item includes staging/false staging as applicable and if required at all intermediate levels for all heights.*	3,552.00	SQ.M.		
14	Supplying and mixing with cement for cement concrete/cement mortar, integral water proofing compound approved make & quality as per the requirements and manufacturer's specifications etc. complete as directed. *Note- UOM to be read as litres, Basic price of water proofing compound is Rs. 90 per litre*	285.00	Liter		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
15	Providing and laying Silicon sealant (GE,DOW CORNING or equivalent approved) to expansion joint, grooves etc. including providing and fixing backer rod and masking tape as per manufacturers specification or as directed by the engineer in charge complete (25 mm wide and 12 mm deep) *Item rate includes baker rod if any required for filling for deep more than specfied*	55.00	RM		
16	Providing and Fixing of reinforcement steel dowel bar in the existing RCC elements by re-bar method including machine drilling (minimum drilling hole dia. shall be 1.5 times of the dia. of dowel bar to be inserted and up to suitable inset depth as directed), supply of necessary anchoring chemicals such as epoxy based resin and hardener of approved make like HILTI India or equivalent approved and work to be carried through the competent agency including all materials, labours, tools, etc complete as directed for 8 mm dia bars. (Reinforcement shall be paid under relevant item of this tender), complete as directed. *Item only for rebarring with bonding chemical*	55.00	NO.		
17	Providing and Fixing of reinforcement steel dowel bar in the existing RCC elements by re-bar method including machine drilling (minimum drilling hole dia. shall be 1.5 times of the dia. of dowel bar to be inserted and up to suitable inset depth as directed), supply of necessary anchoring chemicals such as epoxy based resin and hardener of approved make like HILTI India or equivalent approved and work to be carried through the competent agency including all materials, labours, tools, etc complete as directed for 10 mm dia bars. (Reinforcement shall be paid under relevant item of this tender), complete as directed. *Item only for rebarring with bonding chemical*	55.00	NO.		
18	Providing and Fixing of reinforcement steel dowel bar in the existing RCC elements by re-bar method including machine drilling (minimum drilling hole dia. shall be 1.5 times of the dia. of dowel bar to be inserted and up to suitable inset depth as directed), supply of necessary anchoring chemicals such as epoxy based resin and hardener of approved make like HILTI India or equivalent approved and work to be carried through the competent agency including all materials, labours, tools, etc complete as directed for 12 mm dia bars. (Reinforcement shall be paid under relevant item of this tender), complete as directed. *Item only for rebarring with bonding chemical*	55.00	NO.		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
19	Providing and Fixing of reinforcement steel dowel bar in the existing RCC elements by re-bar method including machine drilling (minimum drilling hole dia. shall be 1.5 times of the dia. of dowel bar to be inserted and up to suitable inset depth as directed), supply of necessary anchoring chemicals such as epoxy based resin and hardener of approved make like HILTI India or equivalent approved and work to be carried through the competent agency including all materials, labours, tools, etc complete as directed for 16 mm dia bars. (Reinforcement shall be paid under relevant item of this tender), complete as directed. *Item only for rebarring with bonding chemical*	41.00	NO.		
20	Providing and Fixing of reinforcement steel dowel bar in the existing RCC elements by re-bar method including machine drilling (minimum drilling hole dia. shall be 1.5 times of the dia. of dowel bar to be inserted and up to suitable inset depth as directed), supply of necessary anchoring chemicals such as epoxy based resin and hardener of approved make like HILTI India or equivalent approved and work to be carried through the competent agency including all materials, labours, tools, etc complete as directed for 20 mm dia bars. (Reinforcement shall be paid under relevant item of this tender), complete as directed. *Item only for rebarring with bonding chemical*	16.00	NO.		
21	Providing and Fixing of reinforcement steel dowel bar in the existing RCC elements by re-bar method including machine drilling (minimum drilling hole dia. shall be 1.5 times of the dia. of dowel bar to be inserted and up to suitable inset depth as directed), supply of necessary anchoring chemicals such as epoxy based resin and hardener of approved make like HILTI India or equivalent approved and work to be carried through the competent agency including all materials, labours, tools, etc complete as directed for 25 mm dia bars. (Reinforcement shall be paid under relevant item of this tender), complete as directed. *Item only for rebarring with bonding chemical*	10.00	NO.		
22	Providing and applying concrete bonding compound of approved epoxy based or equivalent make to old / new concrete surfaces at all levels, in vertical and horizontal planes as directed by engineer after necessary chipping & cleaning surface dust free. *Note:-Unit of measurement shall be read as litres. Basic price of concrete bonding chemical is Rs. 1100 per litre*	23.00	Liter		
23	Providing and fixing Anchor Fastener approved make including drilling of hole in frame, concrete/ masonry etc. complete as per manufacturers specification & direction of Engineer In-charge for 10 mm Dia *Note:-Anchore fastener shall be of Galvanised Carbon Steel. Basic rate of 10mm dia anchor fastener Rs. 180/- per No.*	8.00	NO.		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
24	Providing and fixing Anchor Fastener approved make including drilling of hole in frame, concrete/ masonry etc. complete as per manufacturers specification & direction of Engineer In-charge for 12 mm Dia *Note:-Anchor fastener shall be of Galvanised Carbon Steel. Basic rate of 12mm dia anchor fastener Rs. 250/- per No.*	8.00	NO.		
25	Providing and fixing Anchor Fastener approved make including drilling of hole in frame, concrete/ masonry etc. complete as per manufacturers specification & direction of Engineer In-charge for 16 mm Dia *Note:-Anchor fastener shall be of Galvanised Carbon Steel. Basic rate of 16mm dia anchor fastener Rs. 360/- per No*	5.00	NO.		
26	Providing and fixing Anchor Fastener of approved make including drilling of hole in frame, concrete/ masonry etc. complete as per manufacturers specification & direction of Engineer In-charge for 20 mm Dia *Note:-Anchor fastener shall be of Galvanised Carbon Steel. Basic rate of 20mm dia anchor fastener Rs. 460/- per No*	5.00	NO.		
27	Providing and laying machine mixed plain cement concrete (PCC) 1:4:8 in volumetric proportion (1 parts of cement: 4 part coarse sand : 8 part stone aggregates of size 37 mm and down) for specified thickness, for foundations below masonry/RCC walls, column footings, sunken floor terraces at any height above plinth level, raft at any depth below floors, pavements, roads, plinth protection, bed blocks, anchor blocks, etc. including centring and shuttering if required, laying spreading, ramming, consolidating as per requirement and curing etc. complete as directed. (Refer Item no. 2.03 of Section IV for detailed specifications) *Note:-Stone aggregates may be 20mm and down graded or 37mm and down graded for use in PCC. This item shall be paid for elements in any shape, size & thickness or depth and also for columns at terrace for future expansion provision, encasing of pipes/services, screed concreting etc. all. Item includes shuttering work at all heights.*	967.00	CU.M.		
28	Providing and grouting the foundation bolts/pockets, base plates etc with ready mixed non shrink, free flow, self levelling, cementitious grout making holes if necessary in concrete, curing etc. as per the recommendations of the manufacturer, complete as directed. (Refer Item no. 2.20 of Section IV for detailed specifications) *Note:-The item also includes grouting of pipes and various services in masonry or concrete elements, grouting of holdfasts etc.*	1.00	CU.M.		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
29	Providing and placing in position 25mm thick approved make polyethylene joint filler board cross linked, non-absorbent, semi rigid and cellular for forming expansion joints in concrete, brickwork and block work. The board shall have the properties of showing recovery of compression, compressive strength, low water absorption, resistant to acids, alkalis, resistant to temperature variations, oxidising agents and biological degradation. This board shall be placed in locations before concreting as per drawing or as instructed by the Engineer in the expansion and construction joints in the required size and shape. 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. It shall be measured in Sq.M. Wastage shall not be considered for payment. (Refer Item no. 2.27 of Section IV for detailed specifications) *Notes- Density of filler board should be 100 Kg/cum*	13.00	SQM		
30	Providing and laying 150mm X 150mm size cement concrete & cement finish vata in proportion 1:2:4 (1 cement: 2 course sand : 4 part 10mm or down graded stone aggregates) including making and finishing zaries in wall etc. finish with good surface as directed. (Item self explainatory - No detailed specifications in Section IV for detailed specifications)	17.00	RM		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
31	Providing and fixing of concrete compound wall having height of minimum 2.1 metres made with precast pre-stressed reinforced cement concrete posts having 8 nos, 4mm dia GI wires as reinforcement steel and of M 35 grade of concrete as per following details. (1) Excavation in any type of soil for foundation pits of minimum size (500mm x 500mm x minimum 800mm deep) including filling the excavated earth as directed followed by compaction (2) Laying of Plain cement concrete (1:2:3 proportion) for pits (500mmX500mmX minimum 800mm) for erection of pre-stressed RCC posts. The spacing of RCC posts shall be according to the length of concrete panel/plank (3) Providing and fixing in line level & plumb the Pre-cast RCC post of M-35 grade concrete of size (2950 mm long x 150 mm wide x 150 mm thick having grooves for the provision of tightly fixing the pre-cast pre-stressed concrete wall panels/planks) as per requirement & details including provision for fixing of MS angle posts for fixing wire fencing over it etc. (4) Providing and fixing pre cast planks(panels) of pre-stressed Cement concrete of M-30 grade of size (2100 mm long x 300 mm wide x 38 to40 mm thick) and having three nos. 4mm dia GI wires as reinforcement steel in line, level & plumb including filling joints with cement slurry or as per the recommendations of manufacturer etc completed as per the drawings and as directed. The item includes excavation, concrete and all the pre-stressed concrete works including labour cost etc complete. *Notes- weight of concrete post shall be 77 Kg per running foot, Compressive strength at 28 days of concrete post shall be 35 N/mm2 .*	199.00	RM		
32	Providing, fabricating and fixing in position 8 mm dia. TMT reinforcement steel bars of minimum grade Fe 415 confirming to IS 1786 - 1985 of approved or equivalent make for RCC structures as per design including transporting, unloading and incidental charges for handling cutting, bending, and binding with two strands of annealed steel wire of 18 gauge, welding if necessary etc. complete as directed. *Note:-Approved make TMT reinforcement steel bar shall conform to IS 1786 shall be Fe 500 or higher grade*	63,360.00	kg		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
33	Providing, fabricating and fixing in position 10 mm dia. TMT reinforcement steel bars of minimum grade Fe 415 confirming to IS 1786 - 1985 of approved or equivalent make for RCC structures as per design including transporting, unloading and incidental charges for handling cutting, bending, and binding with two strands of annealed steel wire of 18 gauge, welding if necessary etc. complete as directed. *Note:-Approved make TMT reinforcement steel bar shall conform to IS 1786 shall be Fe 500 or higher grade*	34,967.00	kg		
34	Providing, fabricating and fixing in position 12 mm dia. TMT reinforcement steel bars of minimum grade Fe 415 confirming to IS 1786 - 1985 of approved or equivalent make for RCC structures as per design including transporting, unloading and incidental charges for handling cutting, bending, and binding with two strands of annealed steel wire of 18 gauge, welding if necessary etc. complete as directed. *Note:-Approved make TMT reinforcement steel bar shall conform to IS 1786 shall be Fe 500 or higher grade*	57,949.00	kg		
35	Providing, fabricating and fixing in position 16 mm dia. TMT reinforcement steel bars of minimum grade Fe 415 confirming to IS 1786 - 1985 of approved or equivalent make for RCC structures as per design including transporting, unloading and incidental charges for handling cutting, bending, and binding with two strands of annealed steel wire of 18 gauge, welding if necessary etc. complete as directed. *Note:-Approved make TMT reinforcement steel bar shall conform to IS 1786 shall be Fe 500 or higher grade*	56,877.00	kg		
36	Providing, fabricating and fixing in position 20 mm dia. TMT reinforcement steel bars of minimum grade Fe 415 confirming to IS 1786 - 1985 of approved or equivalent make for RCC structures as per design including transporting, unloading and incidental charges for handling cutting, bending, and binding with two strands of annealed steel wire of 18 gauge, welding if necessary etc. complete as directed. *Note:-Approved make TMT reinforcement steel bar shall conform to IS 1786 shall be Fe 500 or higher grade*	35,020.00	kg		
37	Providing, fabricating and fixing in position 25 mm dia. TMT reinforcement steel bars of minimum grade Fe 415 confirming to IS 1786 - 1985 of approved or equivalent make for RCC structures as per design including transporting, unloading and incidental charges for handling cutting, bending, and binding with two strands of annealed steel wire of 18 gauge, welding if necessary etc. complete as directed. *Note:-Approved make TMT reinforcement steel bar shall conform to IS 1786 shall be Fe 500 or higher grade*	5,056.00	kg		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
	SUB TOTAL FOR CONCRETE Rs.				-

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
	MASONRY WORK				
38	Providing and constructing brick masonry in any shape in machine mixed Cement Mortar (CM) 1:6 (1 part cement and 6 part coarse sand) in all works with approved quality burnt clay bricks having minimum crushing strength minimum 75 Kg./Sq.cm including all necessary scaffolding, racking out the joints, curing etc. complete as directed in superstructure at all heights above highest plinth level (Refer Item no. 3.02 of Section IV for detailed specifications)	1,030.00	CU.M.		
39	Providing and constructing brick masonry in partition walls in any shape & for all works with approved quality burnt clay bricks having minimum crushing strength minimum 75 Kg./Sq.cm, at all levels in machine mixed CM 1:4 (1 part cement and 4 part coarse sand) including scaffolding, racking out joints, providing & laying reinforcement of 2 Nos. 6 mm dia bars at every fourth course or 25 mm x 1.2 mm iron hoop in every 3rd course, curing, etc. complete as directed at all levels below and above highest plinth level. (Rate includes the cost of MS bars or iron hoop). (Refer Item no. 3.03 of Section IV for detailed specifications) FOR 115MM THICK PARTITION WALLS. *Rate are excluding the cost of MS bars or iron hoop*	317.00	SQM		
40	Providing and constructing honeycomb brick masonry work in any shape and for all works with approved quality burnt clay bricks having minimum crushing strength minimum 75 Kg./Sq.cm in machine mixed Cement Mortar (CM) 1: 4 (1 part cement and 4 part coarse sand) of specified thickness as per details at all levels including racking of joints, scaffolding, curing etc complete as directed at all levels below and above highest plinth level. (Refer Item no. 3.05 of Section IV for detailed specifications)	48.00	CU.M.		
41	Providing and constructing brick masonry in any shape in machine mixed Cement Mortar (CM) 1:6 (1 part cement and 6 part coarse sand) in all works with approved quality burnt clay bricks having minimum crushing strength 75 Kg./Sq.cm including all necessary scaffolding, racking out the joints, curing etc. complete as directed in foundation at all levels below and up to highest plinth level. (Refer Item no. 3.01 of Section IV for detailed specifications)	728.00	CU.M.		
	SUB TOTAL FOR MASONRY WORKS Rs.				

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
	WOOD & ALUMINIUM WORKS				
42	Providing & fixing teak wood work of any size and shape for frames/ beading / lipping /architrave / additional members or supports for other works and not included under the respective items / change in size of specified members etc complete as per drawing including holdfast, nails, etc *including providing and applying surface preparation for smooth finish, putty, primer application and two or more coats of painting with synthetic enamel paint/polishing in required finish for all types of wooden works. Basic price of Teak wood per cum is Rs. 100000*	1.23	CU. M.		
43	Providing fabricating and fixing 4mm thk. ACP cladding of approved make & shade at all heights with necessary Alu. section Sub frames of size 50mm X 25mm X 2mm thick, minimum 20 micron colour anodized finish of approved make, Supportive MS structure as per Architectural shapes & to withstand wind pressure of 190Kg/Sqmt. Sub frames, MS structure and Cleats shall be fixed to Civil structure with necessary clamps, Galvanized M.S brackets and anchor fasteners. All clamps and brackets shall be Hot dip galvanized minimum 80 microns thick and shall conform to IS:4759-1996. Any other accessories such as fastening straps, nuts, bolts, rivets, washers, etc. other than anchor system shall be of Indian standard grade. All joints of ACP must be sealed with DOW CORNING 789 weather sealant or equivalent of approved colour. (Rate shall include providing open cell polyethylene backer rods, weather sealant etc. complete as per requirements and as directed by the Engineer In charge. The weather sealant shall be of approved or equivalent make)	104.00	SQM		
44	Providing and fixing frameless glass doors made from 12mm thick fully toughened glass with patch fittings of stainless steel – 304 such as top pivot, top patch, bottom patch, corner lock cum lock keeper plate and floor springs of approved make including SS-304 pull handles 600 mm long etc complete as directed.	7.00	SQM		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
45	Providing and fixing Meter box cupboard on wall with 2nd class TW frame of 75 mm x 37 mm fixed with two nos. MS hold fasts of size 20 x 3 mm 150 mm long on each vertical side to be grouted in PCC 1:2:4 block of size 230 x230x300mm / expansion anchor fasteners of minimum 12mm dia, 19mm thick pre-laminated shutter of approved make etc. complete with TW lipping/beading. The item includes supply and fixing SS-304 grade fixtures / fastenings and slit of clear glass for energy meter including fixing glass with lipping / beading and TW architraves and applying 2 or more coats of first quality synthetic enamel paint of approved make and shade over a coat of wood primer or polishing of required shade etc. complete as directed. *All fixtures and fittings shall be of SS 304. Plywood provided shall be laminated both sides using 1 mm thick lamination sheet.*	12.00	SQ.M.		
46	Extra for providing & making vision panel in flush door shutter/TW shutter including TW lipping, beading and painting / polishing matching to the finish of the shutter etc complete as directed.	9.00	SQ.M.		
47	Providing and fixing cupboard below platform with SALWOOD frame 75 mm x 37 mm fixed with 2 nos. MS hold fasts of size 20x3 x150 mm long on each vertical side to be grouted in PCC 1:2:4 or fixing with coach bolts, 19 mm thick pre- laminated/ commercial board shutter of approved make with T.W lipping , including one shelf of similar material with its supporting, Aluminium anodised / powder coated fittings and fixtures , 2 or more coats of first quality synthetic enamel paint over a coat of wood primer or flat paint or polish of required shade etc. complete as directed.\	11.00	SQ.M.		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
48	Providing and fixing flush door shutter of 37 mm (total thickness) with 1 mm thick lamination on both side of approved make and quality thermosetting synthetic resin bond solid batten core with 10 mm thick lipping of first quality teak wood batten on all edges with SS-304 grade fixtures and fittings such as tower bolts, handles, aldrops, door stopper, hinges etc. as per details, of approved make, including 2 or more coat of first quality synthetic enamel paint of approved make & shade, over a coat of wood primer, or flat paint or polish of required shade etc. all complete as directed *Note:-Fittings and fixtures shall be of approved make stainless steel grade 304. Minimum four numbers of Stainless Steel butt hinges of size minimum 125mm x 75mm x3mm per shutter leaf. All the screws/fasteners shall also be of SS 304 grade etc complete as directed.* *Basic Rate of SS 304 Handle-Push or Pull Type - Rs.2000/- per pair, Tower Bolt Rs. 600 per no. Aldrop Rs. 900/- per no., Laminate Rs.700/- per sqm.*	128.00	SQ.M.		
49	Providing and fixing, floor mounted door closer of approved make in place of SS hinges / pivot and leaf mounted door closer, complete as directed. *Basic rate of floor mounted door closer is Rs 4100.00 per No*	24.00	NO.		
50	P/F Satin stainless steel grade 316 pull handle of approved or equivalent make, including the cost of screws and other incidental charges complete. For size 150 mm *Basic price of a pair of two Nos of SS Handles. Rs. 1000/- per No, (A pair of two handles shall be considered as one No.)*	222.00	NO.		
51	Providing and fixing satin stainless steel grade 316 pull handle of approved or equivalent make , including the cost of screw and other incidental charges complete. For size 300 mm and above. *Basic price of a pair of two Nos of SS Handles Rs. 2600/- per No, (A pair of two handles shall be considered as one No.)*	33.00	NO.		
52	Providing and fixing Satin Stainless steel finish grade 316 floor mounted door stopper approved or equivalent make, including the cost of screw and other incidental charges complete. *Notes-Please read as foot operated door stopper inplace floor mounted door stopper as mentioned above. Basic rate of foot operated Door stopper Rs 600 per No.*	112.00	NO.		
53	Providing and fixing Satin SS finish stainless steel grade 304 tower bolt of approved or equivalent make, including the cost of screw and other incidental charges complete For size 250mm or other size. *Basic rate of tower bolt is Rs. 800 per No*	132.00	NO.		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
54	Providing and fixing IS : 3564 marked aluminium extruded section body tubular type universal hydraulic door closer with double speed adjustment with necessary accessories and screws etc. complete. *Basic Price of Leaf mounted Door Closer: Rs. 2500/- per no.*	44.00	NO.		
55	Providing and fixing automatic sliding door of approved make for building main entrance application as per approved drawing and compliant with european standards and produced accoring to the guidelines for power operated doors, BGR 232, the UVV and the VDE regulations, TUV design tested, tested according to the low voltage guidelines, fulfils DIN 18650 standards. The track profile should be separate from the main profile for enabling reduction in vibration insulation, operator length 4150mm, clear passage opening 2000mm, clear height 2500mm and fixed glazing on both sides covering the entire operator length with 12mm toughened frameless clear glass as recommended by manufacturer, including microprocessor controlled drive unit with self learning mechanism, program selector with knob, motion detector (eagle 6 radars, 02 nos), mechanical components, toothed belt, cover profile, floor guide for frameless glass (02 nos), glass clamping nail (02 nos), safety device-light barrier (01 pair), maximum power consumption 230V/50-60 Hz maximum 180 W and durability tested for 10 lakh cycles, body finish shall be standard silver anodised operator profile or as approved, electro-mechanical lock with 12mm thick plain toughened frameless glass for complete elevation and 2 moving panels, including providing and fixing UPS of 750 VA with power back-up of 20 minutes etc complete as per approved drawing and the recommendation of the manufacturer.	1.00	SET		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
56	Providing and fixing powder coated aluminium (minimum thickness of powder coating 50 micron) frame works for doors, windows, ventilators, sliding windows and partitions with extruded built-up standard tubular sections / appropriate Z sections and other sections of approved or equivalent make conforming to IS: 733 and IS: 1285, fixed with rawl plugs and screws or with fixing clips, or with expansion hold-fasteners including necessary filling up of gaps at junctions, at top, bottom and sides with required PVC/Neoprene felt, Silicon sealant of approved make etc. Aluminium sections shall be smooth, rust free, straight, mitered and jointed mechanically wherever required including cleat angle, aluminium snap beading for glazing/paneling, CP Brass/stainless steel screws, all complete as per architectural drawings and the direction of the Engineer -in- charge, (Cost of glazing / paneling shall paid separately as per the respective items). *Note:-Aluminium extruded sections for door shutters, window shutters (sliding, casement, folded, side hung, top hung or other etc all types of windows/ventilators) louvers, partitions, snap beading, U beading, Channels etc etc all are also incudes under this item.* *The sliding arrangement for door/windows etc. through rollers, pivots and handles or any other fitments are also included under the item. EPDM rubber gasket etc. are also included under the item. Only the aluminium sections shall be measured for payment in Kg. Cost of all other materials, consumables, fitments etc. as above is deemed/considered as included.*	6,470.00	kg		
57	Providing and fixing Satin Stainless steel finish grade 316 mortice lock consisting of lock cylinder with half cylinder one side key and handles of approved or equivalent make, including the cost of screw and other incidental charges complete. *Notes-Basic rate of mortice lock with key and all accessories as per manufacturer shall be Rs. 2400/- per No.* *Mortice lock shall be SS 316/SS 304 grade.*	45.00	NO.		
58	Providing and fixing fly proof S.S. wire mesh to window shutters with aluminium beading (which will be paid separately under respective aluminium item).	248.00	kg		
59	Providing and fixing of additional Hinges, Satin SS finish of approved or equivalent make including the cost of screws and other incidental charges (Extra over and above) as per the approved sample complete (if not mentioned in item description) *Notes- Basic rate of SS Hinge Rs.600 Per No.*	442.00	NO.		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
60	Supply & Fixing of Sun Control Polyester films of 38 Micron Thickness. The colour of the Film should be Anthracite, having special acrylic adhesives with Scratch resistant top coating. The Film should be capable of 75% Total Solar Energy Reduction, 83% Glare Reduction, 99% UV Rays reduction and G Value of 0.25	120.00	SQM		
61	Providing & Fixing 5mm thick High-pressure Compact Laminated sheet (HPL) in aluminium door and partitions. Compact (HPL) sheet shall be made from solid grade compact High Pressure Laminate manufactured under high pressure and temperature with bunch of kraft papers and decorative papers including approved quality PVC/ neoprene gasket etc complete as directed. (Cost of aluminium snap beading and aluminum sections shall be paid separately against the respective item)	185.00	SQM		
62	Providing and fixing toughened glass of 5.50mm thickness glazing in aluminium door, window, ventilator shutters and partitions with PVC/ neoprene gasket etc. complete as per the architectural drawings and as directed. (Cost of aluminium snap beading and aluminum sections shall be paid separately against the respective item)	364.00	SQM		
63	Providing and fixing concealed lock in sliding windows of approved make & shade as directed. *Basic price of concealed lock shall be Rs 300.00 per No.*	101.00	NO.		
64	Providing and fixing Aldrop of Stainless Steel (SS) 316 grade and of approved size and make including all the fixing accessories as per the recommendations of manufacturer etc complete as directed. *Basic rate of Aldrop Rs 900 per No*	93.00	NO.		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
65	Providing and fixing door frame of size 125mm x 62mm of Sal Wood with two rebates and grooves as per architectural details, frame shall be fixed with masonry/RCC works by providing and fixing of special frame anchors of HILTI/equivalent approved make as per manufacturers recommendations, minimum four anchors on each legs including provision in the frame for fixing mortise lock, door closer, tower bolts, stoppers, aldrops etc including surface preparation for smooth finish, two or more coats of first quality synthetic enamel paint of approved make over a coat of primer or four stage polishing on the wood surfaces prepared with application of two or more coats of approved make wood putty cum primer etc complete as directed.	164.00	RM		
66	Providing, fabricating and fixing Stick type structural glazing walls with extruded aluminum sections in true plumb, line & levels with nylon washers and thermal separators, 5.0mm thick reflective heat-strengthened glass Stick on Aluminium Sections with 3M Make Structural Glazing pressure tape together with standard accessories & Silicon Sealant of Dow corning 789 or Sil proof GE. The Glazing System shall be fabricated and fixed by providing aluminum sections for all the intermediate member sections of 46 mm X 73.50 mm X 1.80 mm having unit weight 1.135 Kgs/Mtr and end framing with aluminium sections of size 38.10 mm X 63.50 mm X 1.80 mm with unit weight 0.952 Kgs/Mtr or equivalent section size. Aluminum sections shall be color anodised (20 micron) or powder coated (40 to 50 micron). Item includes fixing in RCC or masonary structure using suitable Stainless Steel anchor fasteners of HILTI/equivalent approved make and as per the recommendations of the manufacturers' design basis, including stainless steel fasteners for aluminum sections fabrication. Size of glazing shall be fabricated as per the site condition and as per drawing etc complete as directed. Total area of stick wall structural glazing without taking in to account the openings/windows will be measured for payment in SqM.	224.00	SQM		
	SUB TOTAL FOR WOOD & ALUMINIUM WORKS Rs.				

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
	FINISHING WORKS				
67	Providing and applying 12 mm thick plain cement plaster finish at all heights and below highest plinth level in Cement Mortar (CM) 1:4 (1 part cement: 4 parts sand- 50% coarse and 50% fine) in line, level and plumb to the walls, concrete elements, beams, ceiling, stair, columns, pardis, including making plaster bands, stripes, moulds, pattas, grooves etc, over any brick or concrete surface as specified including scaffolding, curing and finishing smooth, complete as directed. *Note:-Item includes for all shapes.*	339.00	SQ.M.		
68	Providing and applying 19 mm thick plain cement plaster finish in two layers with first coat of 12mm thick with Cement Mortar (CM) 1:4 (1 part cement: 4 parts sand- 50% coarse and 50% fine) in line, level and plumb and second coat of 7 mm thick with CM (1:2) (1 part cement : 2 part fine sand) to the walls, concrete elements, beams, ceiling, stair, columns, pardis, including making plaster bands, stripes, moulds, pattas, grooves etc, over any brick or concrete surface as specified including scaffolding, curing and finishing smooth, complete as directed at all heights and below highest plinth level. *Note:-Item includes for all shapes.*	6,965.00	SQ.M.		
69	Providing and applying 19 mm thick sand faced cement plaster in two coats at all heights below and above highest plinth level with first coat of 12 mm thickness with cement mortar 1:4 (1part cement: 4 part of coarse sand) and top coat of 7 mm thickness with cement mortar 1:3 (1part cement: 3 parts of coarse sand) finishing using sponge to give uniform finish, on all types of concrete/brick surfaces including making plaster bands, stripes, pattas, grooves, drip moulds as per drawing/details, including scaffolding, curing etc., complete as directed. *Note:-Measurement shall be for plain area without consideration of co-efficient for sand faced surfaces. Item includes for all shapes.*	3,971.00	SQ.M.		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
70	Providing and applying 25 mm thick water proof cement plaster in two layers of 15 mm under layer and 10 mm thick top layer both in C M 1: 3 (1 part cement: 3 part sand -50% coarse and 50% fine) in line, level and plumb at all heights below and above highest plinth level, including adding water proofing compound of approved quality and make as per manufacturer's specifications necessary scaffolding curing etc complete as directed. (Quantity of waterproofing admixture added, shall be measured and paid for under relevant item). *Note:-Item also includes providing and applying neat cement finish to the plastered surface minimum @ 2.2 Kg per SqM. Item includes for all shapes. Testing agaist the leakages is included in this item.*	559.00	SQ.M.		
71	Providing and applying neat cement finish to the plastered surface @ 2.2 Kg per SqM, including scaffolding, rubbing smooth with steel trowel / planer at all heights and below and above highest plinth level, curing etc. complete as directed.	221.00	SQ.M.		
72	Providing and applying (with brush only) white washing with lime on new /old work, at all heights below and above highest plinth level , three or more coats to give an even shade to walls, ceiling, AC sheets, etc., including addition of glue of approved make, Indigo (blue) to give bright finishing including scaffolding etc. complete as directed.	221.00	SQ.M.		
73	Providing and applying plastic emulsion paint of approved make and desired shade , on new / old work including the preparation of surface for painting, applying primer and putty, rubbing the surface, again applying primer, applying plastic paint in two or more coats to give an even shade , at all heights below and above highest plinth level, scaffolding etc complete as per manufacturer's specifications and as directed. *Note:-Putty shall be applied in two or more coats and for minimum average 1mm thick to get even surfaces.*	7,025.00	SQ.M.		
74	Providing and applying 1st quality synthetic enamel paint / flat paint on new/old work, at all heights below and above highest plinth level, of required shade and approved make including preparation of surface for painting, applying primer and putty, with two or more coats, scaffolding complete as per manufacturer's specifications, etc. and as directed. *Note:-Putty shall be applied in two or more coats and for minimum average 1mm thick to get even surfaces.*	87.00	SQ.M.		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
75	Providing and applying 7 mm thick plaster to the RCC elements like ceiling, beams, RCC staircase etc in Cement Mortar (CM) 1:4 (1 part cement: 4 parts sand- 50% coarse and 50% fine) in line, level and plumb to the walls, concrete elements, beams, ceiling, stair, columns, pardis, including making plaster bands, stripes, moulds, pattas, grooves etc, over any brick or concrete surface as specified including scaffolding, curing and finishing smooth, complete as directed. *Note:-Item includes for all shapes.*	375.00	SQ.M.		
76	Providing and fixing 12.5 mm thick tapered edge Gypsum board conforming to IS:2095-Part 1 for vertical and horizontal surfaces at all height false ceiling including providing and fixing of frame work made of special sections power pressed from M.S. sheet and galvanized in accordance with zinc coating of grade 350 as per IS:277 and consisting of angle cleats of size 25 mm wide x 1.6 mm thick with flanges of 22 mm and 37 mm at 1200 mm centre to centre. One flange fixed to ceiling with dash fasteners 12.5 mm dia. x 40 mm long with 6 mm dia. bolts to the angle hangers of 25 x 25 x 0.55 mm of required length and other end of angle hanger being fixed with nut and bolts to G.I. channel 45 mm x 15 mm x 0.9 mm running at the rate of 1200 mm centre to centre to which the ceiling section 0.5 mm thick bottom wedge of 80 mm with tapered flanges of 26 mm each having clips of 10.5 mm at 450 mm centre to centre shall be fixed in a direction perpendicular to G.I. channels with connecting clips made out *of 2.64 mm dia x 230 mm long G.I. wire at every junction, including fixing perimeter channels 0.5 mm thick 27 mm high having flanges of 20 mm and 30 mm long, the perimeter of ceiling fixed to wall/partition with the help of rawl plugs at 450 mm centre, with 25mm long dry wall screws @230 mm interval, including fixing of gypsum board to ceiling section and perimeter channel with the help of dry wall screws of size 3.5 x 25mm at 230 mm c/c, including jointing and finishing to a flush finish of tapered and square edges of the board with recommended jointing compound , jointing tapes , finishing with jointing compound in 3layers covering upto 150 mm on both sides of joint and two coats of primer suitable for board etc all as per manufacturer's specification and also including the cost of making openings for light fittings, grills, diffusers, cut-outs made with frame of perimeter channels suitably fixed, all complete as per drawings, spec. (Painting shall be paid under separate item). All the materials shall be supplied from approved manufactureres/makes and works shall be carried out as per the manufacturers specifications.*	2,309.00	SQ.M.		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
77	Providing and fixing high tensile strength acid and alkali resistant latex metal free composition nontoxic Fiber Glass Mesh (FGM) of minimum density of 145 GSM (Gram per SqM) and 5mm X 5mm meshing size for reinforcement of surfaces during all kinds of plaster works at the junction of masonry work and RCC work or on any other place as directed to receive plaster including fixing the FGM in 300mm wide patta with Cement mortar (1 part cement :1 part fine sand) stretched properly and at all the heights below and above highest plinth level including scaffolding etc complete as directed.	291.00	SQ.M.		
78	Providing and applying textured paint of approved make on wall, ceiling, beam, columns, etc. with two coat of white putty of approved make. Application shall be done as per approved type of textured paint.	624.00	SQ.M.		
79	Providing and Fixing Teracota Jali in Position at any Floor and at any Height in Line and Level of Size 200Mm X 200 Mm X 60 Mm or 220 Mm X 220 MM X 60 Mm or as per the Design and Details given by Architect and fixing the jali with Colot Pigmented Adhesive of Approved Quality like Nuvocotto / Multibond / Cerabond 28 or Equivalent make, and fixing with Adhesive, stiffner etc. Complete as per Manufacturer's Instruction for fixing jali and Painting the Same with Three or More coats of Approved quaity and approved Color Shed of Weather Proof anti Fungus Acrylic exterior Paint on one coat of Apporved Primer. The Rate include all material, Labor,Painting, Scaffolding, at any Height and all etc. Complete as per Architect Details. Basic Rate for Terracota Jali is 1125 INR / M2. + GST.	245.00	SQ.M.		
80	Providing and applying 1mm-2mm thick Terre Granules' trowel finish (Earthen)- A special multicoloured combination of specific coated stones or sand in a 4-coat system- 1 coat of base primer (50µm-60 µm) of required colour (Earthen) as approved by the architect/engineer in-charge by Brush/Roller, 1 coat of Terre Granules (0.8mm to 1.2mm) thickness(Earthen) with steel trowel, 1 coat of clear matt/gloss finish top coat(30µm-40µm). Above application is to be carried out on the single/double coat smooth mala plaster. and design & pattern given as per Architectural drawing and making grooves with base coat of with base primer of required colour all as per drawings and design supplied by architect and instruction given by authority and E.I.C. at all heights & levels.	259.00	SQ.M.		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
81	Providing and applying 1mm-2mm thick Terre Pallet Dholpur Store finish Texture made of Co polymer binders & fina natural marble powder (Earthen, Coral, Spectrum)- as per required design and pattern as approved by the architect/engineer in-charge over one coat of water base primer (Earthen, Coral, Spectrum) using Brush as a pattern tool texture. This is to be carried out on the single/double coat smooth mala plaster at all height and levels with required scaffolding etc. complete as directed.	259.00	SQ.M.		
82	Providing and applying acrylic based Anti fungus exterior paint of approved make of desired shade on new work of smooth / sand faced / rough cast plaster finish.. Preparation of surface to be painted should be free from dust, grease any growth of fungus, algea or moss needs to be removed thoroughly by vigorous wire brushing and washing the surface with water, Freshly plastered surface to be allowed to cure completely. In case of surface imperfections such as holes, dent and cracks are to be filled only by using mixture of white cement and fine sand in the ratio of 1 : 3 at no extra cost (note - Any kind of putty is not recommended) for painting, applying primer of approved make, applying 2 coats of approved make paint as per specification at all heights below and above highest plinth level, scaffolding etc. complete as directed. (Measurement to be of the treated surface & nothing extra for rough / sand face surface) *Note:-Paint shall be Apex Ultima Protek or equivalent approved make. Measurements shall be for plain area without consideration of multiplying co-efficient for sand faced surface or any other textured, wrinkled or other special surfaces.*	3,685.00	SQ.M.		
	SUB TOTAL FOR FINISHING WORKS Rs.				

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
	FLOORING WORKS				
83	Providing and laying pre-polished hand / machine cut green Kota stone of uniform shade of size 11"x 11" / 11"x17" / 17"x17" / 17"x23" /23"x23" or in required size as per drawing , 25 to 30 mm thick in flooring as per approved pattern over average 30 mm thick cement mortar 1:4 (1 part cement :4 part coarse sand) including spreading neat cement slurry @ 4.4 Kg / sq m with flush pointing of the joints with cement paste mixed with matching green colour, curing, machine / hand polishing ,cleaning with oxalic acid, wax polishing moping the finished surface of flooring with water and kerosene for 10 days etc. complete as directed. *Note:-Cement slurry/paste shall be applied @4.4 Kg/SqM or more if required for required thickness.All moulding of edges included in the item*	216.00	SQ.M.		
84	Providing and laying pre-polished machine cut green Kota stone of uniform shade in required size as per drawing,18 to 20 mm thick in skirting / dado flush with plaster with a groove or projecting as per detail / approved pattern over a bedding of 12 mm thick cement mortar 1:4 (1 part cement :4 part coarse sand) including spreading neat cement slurry with flush pointing of the joints with cement paste mixed with matching green colour, curing, machine / hand polishing, wax polishing moping the finished surface with water and kerosene for 10 days etc. complete as directed. The joints of skirting / dado to be matched with flooring without any extra cost. *Note:- Cement slurry/paste shall be applied @4.4 Kg/SqM or more if required for required thickness. The item is applicable also for parapet top, and such other locations, copings, bands, strips, etc. Providing of pre-finished nosing for the exposed edges shall be included. The cost of making full "V" or half "V" grooves/bevelled edges of the kota stone is included as per the drawing and as directed.*	15.00	SQ.M.		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
85	Providing and laying pre-polished machine cut single piece green Kota stone of uniform shade in required size as per drawing 25 to 40 mm thick for treads, risers, sides of staircase, kitchen platform, window cills over 20 mm thick cement mortar bed of CM 1:4 (1 part cement :4 part of coarse sand) with thick cement slurry including making 3 to 5 mm V shaped grooves if required, curing machine / hand, curing, grinding, polishing, wax polishing etc complete as directed. - For Kota stones of size above 1.0M and upto1.5 M long in single piece. *Note:-Cement slurry/paste shall be applied @ 4.4 Kg/SqM or more if required for required thickness. The item is applicable also for parapet top, and such other locations, copings, bands, strips, etc. Providing of pre-finished nosing for the exposed edges shall be included. The cost of making full "V" or half "V" grooves/bevelled edges of the kota stone is included as per the drawing and as directed.*	99.00	SQ.M.		
86	Providing and laying 50 mm thick IPS flooring with under layer of 38 mm thickness and top layer of 12 mm thickness complete as directed, 1:2:4 (1 part cement, 2 part coarse sand and 4 part stone aggregate 12.5 mm and down graded) finished smooth with top layer of 12 mm thick mortar in CM 1:2 (1 part cement : 2 part coarse sand)and cement slurry @ 2.2 Kg / Sq.M including rubbing/ grinding the top surface to match, including rounding off the junction and corners with floors and walls, necessary construction joints, finishing the top surface smooth / chequered or broom, curing etc. complete as directed. *Note:-Aluminium strip/Groove filling shall be paid separately under respective item. Cutting of grooves shall be included under this item only.*	413.00	SQ.M.		
87	Providing & mixing approved quality and make floor hardener of approved make as per manufacturers specification complete as directed. *Basic price of floor hardner shall be Rs 40/- per Kg.*	886.00	kg		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
88	Providing and laying cement water-proofing of average 115 mm thick for balcony, terrace etc at all the levels, with layer of 20 mm thick cement mortar 1:3 (1 part cement : 3 part coarse sand)mixed with water proofing compound of approved make and as specified by the manufacturer, laying brick bats of required size impregnating in to the base mortar bed with gap of 12 mm all around according to slope, level and curing the same, the gaps around brick bats filled with cement mortar 1:3 (1 part cement : 3 part coarse sand) mixed with waterproofing compound as above , 15 to 20 mm layer above brick bats and finishing top with neat cement @ 2.75 Kg/Sq.M. making square 300 x 300 mm chequered finish marks with string , finishing around rain water outlets curing etc. complete including furnishing of guarantee for 10 years. The work should be carried out through an approved specialised agency like India Water Proofing Co. or equivalent.	406.00	SQ.M.		
89	Providing and laying 75 mm thick waterproofing treatment for balcony, sunk slabs, toilets, water tanks, slopping terraces, returns (watta) at all levels with brick / stone aggregates etc complete as directed. at all the levels, with layer of 20 mm thick cement mortar 1:3 (1 part cement : 3 part coarse sand)mixed with water proofing compound of approved make and as specified by the manufacturer, laying brick bats of required size impregnating in to the base mortar bed with gap of 12 mm all around according to slope, level and curing the same, the gaps around brick bats filled with cement mortar 1:3 (1 part cement : 3 part coarse sand) mixed with waterproofing compound as above , 15 to 20 mm layer above brick bats and finishing top with neat cement @ 2.75 Kg/Sq.M. making square 300 x 300 mm chequered finish marks with string , finishing around rain water outlets curing etc. complete including furnishing of guarantee for 10 years. The work should be carried out through an approved specialised agency.	174.00	SQ.M.		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
90	Providing and laying 18 - 20 mm thick pre-polished to mirror finish machine cut approved quality Granite stone Flooring of required size (length and width of the stone slab), colour in approved pattern including bands, strips patta in flooring, platform top, treads / cills of uniform colour, texture and pattern over 20 mm thick cement mortar 1:4 (1 part cement : 4 part sand) with cement paste @ 4.4 Kg/SqM filling of joints with white cement / cement mixed with colour pigments to match the shade, applying epoxy based damp proof coating on the base concrete surface, rounding off the exposed edges as per the drawing, necessary curing, polishing, protection of finished surface, cleaning the same finally etc. complete as directed. *Note:-The item also includes providing narrow bands up to 150mm width wherever required as per the drawing. If required, granite shall also be fixed by leaving 4mm x 4mm joints through spacers. The item also includes vanity counters etc.* *Granite stone shall be mirror polished, premoulded and prepolished and machine cut.* *Item rate shall also be inclusive of making V grooves as per drawing where ever required, full/half round moulding of the exposed edges as per the drawing, fixing grit aggregates back on stone with araldite/equivalent solution for bonding etc are included.* *Cement slurry /paste shall be applied @4.4 kg/sqm or more if required for required thickness. Item also includes single piece granite shall be up to 1500 mm long for treads.* *Basic rate of granit stone shall be Rs. 2500/- per Sqm*	291.00	SQ.M.		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
91	Providing and laying pre-polished to mirror finish average 20 mm thick machine cut approved quality Granite stone of required size (length and width of the stone slab), in approved pattern, single piece in skirting , dado , risers of uniform colour, texture and pattern over 12 mm thick cement mortar 1:3 (1 part cement : 3 part coarse sand) with cement paste @ 4.4 Kg/SqM filling of joints with white cement / cement mixed with colour pigments to match the shade , applying epoxy based damp proof coating on the base concrete/wall surface, curing, polishing, protection of finished surface, cleaning the same finally etc. complete as directed. *Notes-The item also includes for risers of staircase, facia & drops, door frames, wall lining (veneer work), jambs, cills & soffits of opening. Also including making V groove as per drawing , full/ half round moulding of the exposed edges, fixing grit aggregates back on stone with araldite/ equivalent solution for bonding etc. Thickness of granite may vary from 18 - 20 mm. facias, drops etc* *Granite shall be fixed by providing and applying approved make Polymer modifed tiles adhesive of required thickness confirming to type -2 as per IS 15477 in place of cement slurry or paste.The item includes providing narrow bands also up to 150mm width wherever required as per the drawing.* *Basic rate of granit stone shall be Rs. 2500/- per Sqm. Item rate includes all above as specified.*	154.00	SQ.M.		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
92	Providing and laying 18 mm. to 20 mm thick pre-polished to mirror finish machine cut approved quality Granite stone of required size & shape (length and width of the stone slab), colour in approved pattern, single piece in skirting , dado , risers, treads, of uniform colour, texture and pattern over 12 mm thick cement mortar 1:3 (1 part cement : 3 part coarse sand) with cement paste @ 4.4 Kg/SqM filling of joints with white cement / cement mixed with colour pigments to match the shade, applying epoxy based damp proof coating on the base concrete/wall surface, polishing the exposed edges as per the drawing, necessary curing, polishing, protection of finished surface, cleaning the same finally etc. complete as directed.The stone used should be in one single long piece up to 2000mm length as per the drawing. Only finished granite work shall be measured & considered for payment. *Notes-The item also includes for risers of staircase, facia & drops, door frames, wall lining (veneer work), jambs, cills & soffits of opening. Also including making V groove as per drawing , full/ half round moulding of the exposed edges, fixing grit aggregates back on stone with araldite/ equivalent solution for bonding etc. Thickness of granite may vary from 18 - 20 mm.* *Granite shall be fixed by providing and applying approved make Polymer modifed tiles adhesive of required thickness confirming to type -2 as per IS 15477 in place of cement slurry or paste.The item includes providing narrow bands also up to 150mm width wherever required as per the drawing.* *Basic rate of granite stone shall be Rs. 2500/- per Sqm. Item rate includes all above as specified.*	22.00	SQ.M.		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
93	Providing and laying self finish cement concrete of grade M-25 in self finished flooring of 75 to 150 mm thickness or as specified in drawing over prepared sub-base in alternate panels of area upto 12 SqM and longer side up to 3.5 M or as per site conditions in line and level maintaining slope as per drawing including Formwork using MS channels of required height, compacting with needle and surface vibrator, levelling, finishing smooth with a float of cement or cement mixed with floor hardener, curing, providing and cutting the concrete floor for grooves 6mm wide X 10mm deep, contraction/expansion joints of 25mm wide and depth as per drawing by cutter machine, providing necessary steel reinforcement, curing etc complete as per the drawing / as directed. (Reinforcement, floor hardener, expansion joint filler shall be measured and paid separately in relevant tender items) *Note:-Concrete shall be produced in fully automated concrete batching plant having batch reports printing facility for all ingredients of concrete. All the batch reports prints shall be submitted to the site engineer on daily basis and the batch data shall be maintained in a format for further analysis. Minimum Ordinary Portland Cement (OPC) content for the concrete shall be 370 Kg/CuM.*	44.00	CU. M.		
94	Labour charges for providing half round moulding on edges of kotah stone, green marble stone by using all tools such as special grinding and art cutter machines including making the edges mirror polished etc complete as directed. *Note:-This item is for edge moulding of stones other than granite stones. Edge moulding of granite /kota stones for exposed edges are included under the respective items of granite themselves.*	56.00	RM		
95	Labour charges for providing full round moulding on edges of kotah stone, green marble stone and granite stone by using all tools such as special grinding and art cutter machine including making the edges mirror polished etc complete as directed. *Note:-This item is for edge moulding of stones other than granite/kotah stones. Edge moulding of granite /kota stones for exposed edges are included under the respective items of granite/kota themselves.*	113.00	RM		
96	Labour charges for making antiskid strip in granite stone 25 mm width & 5 mm deep etc complete. *Note:-This item is applicable for other stones as well ,item includes staircase tread also*	41.00	RM		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
97	Extra labour charges for providing opening of required size & shape for wash basins/ kitchen sink in kitchen platform, vanity counters and similar location in marble/stone work including necessary holes for pillar taps etc. including rubbing and polishing of cut edges etc. complete.	53.00	NO.		
98	Providing and fixing 1st quality ceramic glazed wall tiles conforming to IS:15622 (thickness to be specified by the manufacture) of approved make of white colour, size as approved by site engineer in flooring/ vertical walls of underground/over head water tanks for protection to waterproofing with water proofing compound (Measurement for water proofing compound shall be paid separately as specified in the respective item) & pasted with grey cement slurry applied uniformly on back of tile@3.3 kg per sq.m. including point with epoxy resin and hardner of approved or equiavelnt make & approved quality. the rate shall include for waterfall test & guarantee for waterproofing for 10 years from the date of virtual completion. *Notes- Tiles shall be fixed by providing and applying approved make Polymer modifed tiles adhesive confirming to type -4 as per IS 15477 in place of neat cement slurry and paste. The size and thickness of tiles shall be as per approved sample.* *Basic rate of Ceramic tile shall be Rs. 700/- per SqM* *Rates shall be inclusive of providing and filling approved make of hard wearing impervious resin based abrasion impact resistant epoxy grout of required shade, food grade and for 4mm width x 4mm depth as per the recommendations of manufacturer specifications and tile spacer.*	21.00	SQ.M.		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
99	Providing & laying 10-12mm premium /1st quality vitrified tiles of approved make having size 600x600 mm or any approved size and shade having plain edges in flooring/dado/skirting over average 20 mm thk. Cement mortar 1:4 (1 part cement: 4 part coarse sand) bed laid to requisite ,line, level & slope, fixed with cement slurry @ 4.4kg/sqm of honey like consistency, making 3-5mm grooves using spacers & filling of joints with pigmented tile grout of approved make to match the shade etc. in flooring, providing & fixing skirting/ dado in line and level over the 12 mm thk. cement plaster in neat cement slurry @ 4.4kg/sqm of honey like consistency, with cleaning the area with water or water with mild acid etc. all complete as directed *Notes-Basic rate of Glazed Vitrified tiles shall be be Rs. 1000/- per SqM. Tiles shall be fixed by providing and applying approved make Polymer modifed tiles adhesive confirming to type -3 as per IS 15477 in place of neat cement slurry and paste. Rates shall be inclusive of providing and filling approved make of hard wearing impervious resin based abrasion impact resistant epoxy grout of required shade for 4mm width x 4mm depth as per the recommendations of manufacturer specifications with tile spacer. The size and thickness of tiles may vary as per selection of tiles. Filling of grout flush with the edges of stone/tiles shall be achieved by filling the grout in two or more runs leaving time intervals in between. Item includes for the joints of flooring, skirting and dado etc all. Tiles should be Glazed vitirified tiles (GVT)*	3,798.00	SQ.M.		
100	Providing and fixing PVC strips 3/5 mm & 50 mm wide in proper vertical position in IPS or Cast in Siitu. Flooring in line and level as per the direction.	115.00	RM		
101	Providing and laying pourable grade polysulphide sealant of approved make as per specifications and detailed drawing in expansion joints at all levels in horizontal plane. Item will be paid in running meter per 6mm width per 10mm depth. Rate includes cleaning of joints with airblower and making it dustfree, application of masking tapes on adjacent sides, priming of sides of joint area etc.. Note: the edges of the joint should be rectangular in shape. If any cracks are observed before application of filler compound, then it should be repaired prior to application as per direction of Engineer in charge. *Notes- Item shall be Including of masking tape*	154.00	RM		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
102	Providing and laying 1st quality vitrified tiles minimum 8mm to 9.5mm thick of approved make, shade and size in skirting and dado laid with 4mm wide and 4mm deep joints (using PVC spacers at 100 mm spacing) at all around the tile edges, shall be set in providing and laying/applying high polymer modified cement based tile adhesive bed of 5mm thick as per manufacturers specifications and using suitable steel notch trowel over bedding of 12mm thick cement mortar 1 : 3 (1 part cement : 3 part coarse sand) laid to requisite line, level and plumb, either flush with the wall surface or uniformly projecting as per details / directed including cutting / making holes, raking & cleaning the joints and filling the joints with resin based epoxy grout of matching/required colour, curing and cleaning with mild acid etc complete as directed. (Resin based epoxy grout for joint filler shall be paid under the relevant item of tender) *Notes-Basic rate of Glazed Vitrified tiles shall be Rs. 900/- per SqM. Tiles shall be fixed by providing and applying approved make Polymer modifed tiles adhesive confirming to type -3 as per IS 15477 in place of neat cement slurry and paste. Rates shall be inclusive of providing and filling approved make of hard wearing impervious resin based abrasion impact resistant epoxy grout of required shade for 4mm width x 4mm depth as per the recommendations of manufacturer specifications with tile spacer. The size and thickness of tiles may vary as per selection of tiles. Filling of grout flush with the edges of stone/tiles shall be achieved by filling the grout in two or more runs leaving time intervals in between. Item includes for the joints of flooring, skirting and dado etc all. Tiles should be Glazed vitirified tiles (GVT)*	1,256.00	SQ.M.		
103	Extra for vacuum de-watering & finishing over concrete surface laid under relevent tender item of self finish cement concrete of grade M-20 / M-25/ M-30 or any surface immediate after surface vibration. It involves levelling of concrete in desire slop with Trimix surface Vibrator, Vacuum De-watering by Trimix Vacuum Pump and Suction Mat, finishing by Power Trowel with disk & blade up to desire finish, cuting groove as required by Groove Cutting Machine and curing etc. complete as manufacturers specification or as directed etc. *Item includes cutting the joints for groove of 6 mm x 10 mm. Item also applicalble for RCC roadwork*	979.00	SQM		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
104	Extra over and above for Labor charges and other incidentals for making drinking water trough in granite and kota stones works including cleaning, cutting hole for waste coupling for drain point etc. complete as per the drawings and as directed by Engineer-in-Charge. (Granite stone and Kota stone used shall be paid under relative item of works).	20.00	RM		
105	Providing and fixing for both side polished, single piece minimum 18 mm thick Granite stone pardi with machine cut edges and cut to required shape etc. complete as directed.	47.00	SQM		
	SUB TOTAL FOR FLOORING WORKS Rs.				

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
	STEEL WORK				
106	Providing and fixing MS BRC fabric grill fabricated out of BRC fabric of grid 75mm x 25 mm 8 to 10 SWG fixed to MS frame made of MS angles, Tee section and flat beading, with joints metered and electrically welded to frame work including, fixing with hold fasts in concrete blocks 1:2:4 of size 230x 200x150mm, two or more coats of first quality synthetic enamel paint of approved make and shade over a coat of primer etc. complete as per architectural drawing and as directed. The rates shall include providing and fixing BRC fabric however, MS frame work, MS flats for beading / hold fasts shall be paid under relevant item of MS grill. BRC fabric into the frame shall be measured in SqM.	7.00	SQ.M.		
107	Providing, fabricating and fixing in position, grill, railing, steel ladder, Safety MS bars to windows/ ventilator of MS rolled sections as per architect's details including cutting welding, grinding to smooth surface, fixing hold fast of MS sections embedded in concrete 1:2:4 (1 part cement, 2 part coarse sand, 4 part of stone aggregate 12 mm and down), anchor bolts including 2 or more coats of first quality synthetic enamel paint of approved make over a coat of primer etc. complete as directed. *Note:- Item included cost of providing and fixing minimum 8mm dia approved make expansion anchore bolts suitable for RCC/masonary works for fixing base plates.* *Item also includes providing and fabricating of MS gratings, MS frames, MS guard bar, brackets, MS foundation bolts etc, similar other works and MS rolled sections used in other items of works etc.*	6,016.00	kg		
108	Providing, fabricating and fixing in position MS inserts such as nosing, corner angles of columns, plates, flats, tee's, protection channels of reception dock, supports, brackets and monorails, hooks, frame around cut-out, MS pipe sleeves etc. as per drawings and specifications, in true line and level including embedding the same into the permanent works at the time of casting of RCC works or fixing with or without base plate fixed to RCC element with appropriate size expansion bolts as per design, with necessary welding, grinding and painting with two or more coat of approved first quality synthetic enamel paint over a coat of primer etc. complete as directed.	1,802.00	kg		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
109	Providing, fabricating and fixing MS pipe railing as per the architect's details / as directed using MS pipes / square or hollow section, with necessary specials including painting with two or more coats of synthetic enamel paint of approved make and quality over a coat of red oxide primer etc complete as directed. (MS standard rolled sections used in railing shall be measured and paid under respective item) *Note:-The pipes shall be class B (Medium duty). Item included cost of providing and fixing minimum 8mm dia approved make expansion anchore bolts suitable for RCC/masonary works for fixing MS railing. Stair case railing shall be paid in this item*	50.00	kg		
110	Providing, fabricating and fixing in position grill of MS hollow section as per the details given by the architect including cutting, welding, grinding to smooth surface, fixing hold fast embedded in concrete 1:2:4, anchor bolts, painting with two or more coats of first quality synthetic enamel paint of approved make and quality over a coat of red-oxide primer complete as directed. (MS standard section used in grill shall be measured and paid under relevant Item) *Notes- Grills of service ducts shall also be paid under this items. Item included cost of providing and fixing minimum 8mm dia approved make expansion anchore bolts suitable for RCC/masonary. MS Solid hinges for openable grill shutters shall be paid under this item only.*	116.00	kg		
111	Providing, fabricating and fixing Animal Travis (Animal traps) made from GI "B" class pipes as per the drawings including cutting, welding mitring, fitting the joints, termination of the open ends in required curvature / profile with fixing blank caps to open ends,which also includes welding with insert plates, various profile bending of the pipes as per the drawing using motorised and controlled pressure hydraulic bending machine using GI pipes of specified diameter mainly 50mm and down, fixing in RCC column reinforcements in position truly vertical/plumb and alignment using all supporting system till the concreting is laid and initial strength is gained and cleaning, painting including with two or more coats of first quality sythetic enemal paint of approved make over a coat of approved make primer etc. complete as directed. (Insert plates shall be paid in relevant item, MS hinges shall be paid under this item only and nothing extra shall be paid for the same). Wastages shall not be payable	124.00	kg		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
112	Providing and fixing in position GI barbed wire of 12 to 14 gauge, 4 points barb for fencing on precast cement concrete posts/MS angle posts as per approved design including fixing with GI "U" shaped clips etc complete as directed. Note: Each Barbed wire shall to be measured in Running meter. *Note: Make shall be Tata Tiscon, A1 Fence or equalvalent approved. Basic price of barbed wire is Rs 20 per Running meter*	412.00	RM		
	SUB TOTAL FOR STEEL WORK Rs.				

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
	ROOFING, MS STEEL STRUCTURE BUILDINGS & STRUCTURAL CLADDINGS, BARRICADES ETC WORKS				
113	Supplying, fabricating, assembling, hoisting, building, fixing and erecting in position to alignments, levels, plumbs as per approved drawings, structural steel work in-built up roof truss girders, MS structural buildings, built-up columns, beams, ties, side claddings, structural platforms and structural barricades with booms, lattice girders roof trusses, gable frames, purlins/built-up purlins, columns, ties, beams, cladding structures, side runners, etc., to detail, welded (welding as specified by the structural consultant) / bolted constructions comprising R.S. joints, channels, angles, plates or any MS rolled section including necessary permanent rivets, bolts & nuts, welding, handling straightening, cutting, making holes by drill machine, shop/site assembly, erection, (including preparation of templates) transport to site, storing, etc., surface preparation by rubbing with motorised wired brush, sand paper, emery machines and painting with shop/site coat of red oxide primer prior to erection and two or more coats of first quality synthetic enamel paint of approved make and quality over a coat of red oxide primer after erecting in position at all heights including necessary scaffolding and staging, as required complete as directed. Payment will be made on the basis of standard section weights for net weight erected in position excluding rivets, temporary bolts, etc., but payment will be made for permanent bolts, nuts and washers. *Item includes the wind ties (MS flats) fixed on top of roof sheets.Item includes for profile bent/curved MS sections bent using motorised and controlled hydraulic bending machine if required.*	11,961.00	kg		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
114	Supplying, fabricating, assembling, hoisting, erecting in position, building and fixing in position to alignments, levels and plumb as per approved drawings, structural steel work in-built up roof truss girders, MS structural buildings, built-up columns, beams, ties, side claddings, structural platforms, structural barricades and side claddings with booms, lattice girders roof trusses, gable frame, purlins / built-up purlins, cladding structures, side runners, etc., to detail, welded (welding as specified by the structural consultant) / bolted MS section B or C (Medium or Heavy) class pipes / medium or Heavy duty tubular square/rectangular sections having minimum yield strength of 310 N/Sq.mm (YSt 310 Grade) and confirming to the specifications as per IS 4923 & IS 1161 for structural purposes and of approved make including bending to required curvature/profile using motorised and controlled hydraulic bending machine, cutting, radius bending, mitring and Welding after matching including necessary permanent rivets, bolts & nuts, welding, handling straightening, cutting, making holes by drill machine, shop / site assembly, erection, (including preparation of template) transport to site, storing, etc., surface preparation by rubbing with motorised wired brush, sand paper, emery machines and painting with shop/site coat of red oxide primer prior to erection and two or more coats of first quality synthetic enamel paint of approved make and quality over a coat of red oxide primer after erecting in position at all heights including necessary scaffolding and staging as required complete and as directed. (MS rolled sections like flats, plates, angles, T's, ' I '/ 'C' sections etc used shall be measured and paid under relevant item)	96,158.00	kg		
115	Providing & fixing holding down bolts with nut, washer, upper portion of the bolts up to 100 mm portion or as specified threaded to requirement etc. complete as directed. (Rate to include for placing the bolts in position with templates etc.)	776.00	kg		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
116	Providing & fixing GALVALUME colour coated cold rolled sheets made of 0.45mm base metal thickness and Total Coated Thickness(TCT) as 0.5mm, 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 and 5 microns back-up epoxy coating at the bottom having 1020/1080mm cover width with 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 Buildiex(R) AS 3566 Class 3/ HILTI/BOSCH having drilling capacity minimum 6-8mm and in required diameter and length (length keeping in view under deck insulation if any) fixed using torque drill machine all complete with EPDM sealing washers with sealant. Rate shall be included with cost of plastic caps of approved colour of UV resistant and button bolts etc. for the fasteners. Rate shall include also providing and fixing in roofing, side claddings, walls of structural buildings and all accessories and utilities like ridge, corner piece, aprons, barge boards, gutters, flashings, end pieces, trims etc., all accessories etc. complete The rates shall include all materials, tool/tackles, labour, scaffolding including handling and storage of the materials, providing guarantee as per the policy of manufacturer etc complete as directed for all heights. 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. *Basic price of galvalume sheet shall be Rs 800 per Sqm. Item also incudes Flashing, Ridge, Eve-curve etc and shall be paid in SqM.Length of self tapping screw shall be longer enough considering the thickness of underdeck glaswool which shall be 75 mm thick if designed so that the glasswool thickness is maintained incase of glass wool insualtion is used under GI sheet*	6,472.00	SQ.M.		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
117	Providing & Fixing roof mounted ventilators of 600mm diameter, vertical vane natural wind driven and manufactured from aluminium metal. The bearing arrangement shall be Double row heavy duty ball bearing system out of the path of discharge/exhaust air to ensure greater bearing life and continued discharge efficiency. Ventilator head shall be installed on variable-angle elbow to counter roof slope and to ensure ventilator to remain perpendicular to the horizontal. The ventilator & elbow assembly shall be installed on UV stabilised FRP base of profile matching with the existing roofing sheets. All installations shall be done by cutting holes of maximum 650 mm diameter on roof sheets and placing UV stabilised FRP base above the hole. Vanes shall be made from aluminium alloy and minimum 24 vanes shall be there. Shaft shall be made of solid stainless steel of 304 grade. Holding Bracket shall be of aluminium alloy. Bearing shall be double row heavy duty ball bearing system. Ventilator tops shall be mill finished or powder coated with matching colour coat. The ventilator shall be weather-tight under proper installation and normal operating conditions. The item includes for providing and fixing of all applicable bases, dampers, fixings, trims, straps, flashings and other specified fittings complete in all manner as directed. The item also includes providing and fixing of all the necesarry fittings and arrangements for erection, making opening in roof, proper sealing after erection, loading/unloading, delivery at site, tools, machinery, material, labour, taxes & duties etc complete as directed. *Notes- FRP base 2.0 mm thick. Vanes shall be 0.7 mm thick, shaft shall ve of 18 to 20 mm diameter. Holding bracket shall be 4.0 mm thick. Capacity of withstanding wind speed - 55m/s Basic price of turbo ventilator shall be Rs 13500 per No.*	2.00	NO.		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
118	Providing and Fixing approved colour – softlight with Light Transmission 60% (max) or as approved, of approved or equivalent make 12mm thick (minimum) confirming to specifications mentioned below. The polycarbonate system shall consist of 12mm thick (min.) single panel. Panel Width shall not exceed 600mm to ensure best performance for wind uplift, vibration, oil canning and visual appearance. Panels over 600mm wide shall not be approved. The panels shall be uniform in color with an integral Nano-Cell core. In a cross section, the core shall be constructed of Nano cells not to exceed 4.5mm x 4.5mm. Wide cell panel configurations greater than 4.5mm by 4.5mm shall not be accepted. Panels shall be manufactured with Vertical Standing Seam at both sides of the panel. Welding or gluing of up stands or standing seam is not acceptable. Snap-on connector to interlock the panels shall have a grip-lock double tooth locking mechanism to ensure maximum uplift capability with end-cap / Aluminum U-Profile (mill finish) for ends. Panels shall be co-extruded UV protected. UV protected side shall always face the sun /top.The full system shall be fitted on MS purlins perpendicular to direction of sheeting with purlin spacing as specified by Manufacturer. Panels shall be secured with snap-on connectors (with or without Aluminium spacer) and concealed Stainless Steel fasteners as required. Panels shall be installed by a solution provider (specialized agency) approved by the manufacturer. Approved agency must submit letter from manufacturer (dated not earlier than the date of issue of tender document). Installer / Solution provider shall comply with all statutory regulations or / and compliances complete as directed.	12.00	SQ.M.		
	SUB TOTAL FOR ROOFING, MS STEEL STRUCTURE BUILDINGS & STRUCTURAL CLADDINGS, BARRICADES ETC WORKS Rs.				

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
	MISCELLANEOUS WORKS				
119	Providing and fixing night latch of approved make with a set of keys etc complete as directed. *Basic price of Night latch shall be Rs 1300/- per No.*	1.00	NO.		
120	Providing & filling electrical jharies 150 to 250 mm wide and average 50 to 75 mm deep with cement mortar 1:3 and finishing the same to match with the surrounding including painting/white washing etc. complete as directed.	113.00	RM		
121	Dismantling stone/Brick masonry walls or partition wall plastered or un plastered as per instructions including finishing the broken surface to match with the surroundings, removal and disposal of debries within site including cutting the reinforcement bars, if any etc. complete as directed. *Note:- Item includes dismantling of PCC. Item also includes disposal of debris anywhere outside site.*	10.00	CU. M.		
122	Dismantling the RCC beams, slabs, lintels, columns, pardi, walls, platform etc. including finishing the broken surface to match with the surroundings, removal and disposal of debries within site, including cutting the reinforcement/ MS inserts stacking the same and handing over to stores / yard within site etc. complete as directed. *Note:- Item also includes disposal of debris anywhere outside site.*	3.00	CU. M.		
123	Providing and filling the jharies 25mm to 150mm wide and 50mm to 100mm deep with PCC 1:2:4 (1 part cement:2part sand: 4 parts 12.5 and down graded aggregates) and finishing the same as per surroundings including scaffolding, cutting the reinforcement bars, curing etc. complete as directed	112.00	RM		
124	Dismantling plain cement concrete in flooring/pavement/ wall foundation etc. as per instruction and disposing the debris/muck within the site at approved location. *Note:- Item also includes disposal of debris anywhere outside site.*	5.00	CU. M.		
125	making cutouts in brick work & finishing with 19mm thick cement plaster cm 1:4 at all height	10.00	NO.		
126	Providing and Fixing heavy duty antiskid surfaced PVC rungs of minimum 25mm thick, minimum 175mm wide, minimum 265mm long, reinforced with joint less “U” shaped 12mm dia MS reinforcement steel embedded in PVC rung and capable of withstanding load of minimum 200Kg including fixing or grouting in masonry, RCC or concrete works and finishing the surface good as per the surrounding etc complete as directed.	70.00	NO.		
	SUB TOTAL FOR MISCELLANEOUS WORKS Rs.				

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
	ROAD WORK				
127	Surface dressing including preparation of sub grade of road bringing earth work to required grade, slope and camber in the existing surface, including cutting or filling earth up to 300mm thickness, watering, consolidation with 8-10 MT Power Road Roller, etc. complete as per details and as directed	1,185.00	SQ.M.		
128	Providing & laying base course in two layers in compacted thickness of 100 mm (each course 100 mm thick consolidated), using stone aggregates of nominal size 65 mm, including filling voids with similar stone of smaller size, similar stone grit, stone aggregates of suitable size, dry rolling, spreading the binding material like murrum, watering and consolidation with 8-10 MT power road roller etc. complete as directed.	196.00	CU. M.		
129	Providing and laying cement concrete of grade M-25 in pavements, roads and kerbs over prepared sub-base in alternate panels of width up to 3.5 and length up to 6.0 M or as per architects' drawing in the line level maintaining slope including form work using MS channels of required height, compacting with needle vibrator and surface vibrator, floating the surface smooth, providing stripped/broom finish evenly, providing and cutting necessary grooves of 6mm wide X 10mm deep and construction/expansion joints of 25mm wide and depth as per drawing with heavy duty cutter machine, finishing the same and casting kerbs as per drawing, providing necessary steel reinforcement, curing etc. complete as per the drawing/as directed. (Item includes kerb casting. Reinforcement steel, filling of expansion joint with filler material shall be measured separately in relevant tender items and paid for) *Note:-Concrete shall be produced in fully automated concrete batching plant having batch reports printing facility for all ingredients of concrete. All the batch reports prints shall be submitted to the site engineer on daily basis and the batch data shall be maintained in a format for further analysis. Minimum Ordinary Portland Cement (OPC) content for the concrete shall be 370 Kg/ CuM.*	147.00	CU. M.		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
130	Providing and laying interlocking pavement stones of approved quality, shape, size , colour and make having compressive strength of minimum 350 kg/sq.cm (M 35) and thickness not less than 80mm 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 including preparation of sub grade of road bringing earth work to required grade, slope and camber in the existing surface, including cutting or filling earth up to 300 mm thickness, watering, consolidation with 8-10 MT Power Road Roller, etc. complete as per details and as directed *Notes- Pavement stone shall be cast in PU / rubber mould for smooth finish and laid with multiple color combinations*	206.00	SQ.M.		
131	Providing and filling of SHALITEX sealing compound of grade A –IS 1834-1984 in the contraction/ expansion joints of the RCC roads/hard park .The joints shall be of size 6mm wide X 10 mm deep. Before applying the sealing compound the sides of the joints should be cleaned of dust and shalitex primer should be applied .The rate includes labour charges for laying along with heating the compound etc., as per the manufacturer's specification and as directed.	40.00	RM		
132	Providing & applying Thermoplastic paint of approved or equivalent make and desire shade on bituminous / concrete surface, including scrubbing of road / kerb surface by wire brush to dislocate the dust from the surface, plotting of points on the carriageway for centerline & edge line marking, pre-marking on Centerlines/Edge line /Kerbline using string & chalk, including Hand propelled machine, the thermoplastic material is to be pre-heated while all the above activities are carried out, The molten thermoplastic material is transferred then from the pre-heater to applicator machine. all complete as manufacturer's specification and as directed.	20.00	SQ.M.		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
133	Providing & applying Thermoplastic paint of approved or equivalent make and desire shade in bands up to 200 mm width, specially for zebra crossing, including scrubbing of road / kerb surface by wire brush to dislocate the dust from the surface, plotting of points on the carriageway for centerline & edge line marking, pre-marking on Centerlines/Edge line /Kerbline using string & chalk, including Hand propelled machine, the thermoplastic material is to be pre-heated while all the above activities are carried out, The molten thermoplastic material is transferred then from the pre-heater to applicator machine. all complete as manufacturer's specification and as directed.	45.00	RM		
134	Providing and fixing mild steel dowel/ tie bars of approved make including greasing etc. in concrete pavement as per details complete and as directed.	294.00	kg		
135	Providing & laying 40mm dia UPVC pipe of approved make and pressure 6 kg./sq.cm. in sheathing for dowel / tie bars in concrete pavements as per details including plugging the ends using uPVC pipe caps and adhesives etc. complete as directed.	29.00	RM		
136	Providing and laying pre-cast / cast in- situ kerbing in cement concrete M-20 and 450mm wide, 75 to 100 mm thick and total 250 high, 100-125 mm thick web, edge duly chamfered including necessary excavation, surface dressing, cutting the road, laying PCC 1:5:10 (1 part cement 5 part coarse sand 10 part stone aggregate 20/37 mm and down) 100 mm thick, shuttering / moulds for exposed finish or provide smooth plaster with neat cement finish, curing as per approved drawing etc complete as directed. *Note:-Pre-cast kerb stones may be of equivalent sizes other than stipulated above as per the architectural drawings etc complete as directed. The grade of concrete shall be M25 instead of M20*	474.00	RM		
137	Providing and filling of sealing compound of approved make and of grade A – IS 1834-1984 in the contraction/ expansion joints of the RCC roads/hard park .The joints shall be of size 10 mm wide X 20 mm deep. Before applying the sealing compound, the sides of the joints shall be cleaned of dust followed by applying shalitex primer. The rate includes all labour charges for laying, heating the compound etc complete as per the manufacturer's specification and as directed.	49.00	RM		
	SUB TOTAL FOR ROAD WORK Rs.				

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
	WATER SUPPLY WORK				
138	Providing and laying concealed underground waterline of "B" class GI pipe of ISI mark of the following diameters, including all necessary heavy duty specials of ISI mark, including excavation in soil/murum/rock, providing and applying metal primer and two coats of Bituminous paint of approved make after successful pressure testing of the pipeline, sand cushioning and covering with sand, refilling of trenches, compaction etc. complete as directed - for 80 mm nominal bore (NB) GI pipe. *Note:-Item also includes for laying pipes in open in structure/concealed in structure/under ground including excavation and back filling For open system, necessary special GI clamping arrangement comprising of nuts, bolts, anchoring in structure, U clamps, clamp receiver flat etc shall be provided and fixed at every 1.2 metres minimum. For concealed system in the structure, necessary chasings in the walls/RCC membersshall be carried out followed by filling the same with CM(1:1) etc complete including painting of the pipes as per drawing and as directed. All cost as above are included. GI Pipe shall be used internal as well as external works.*	206.00	RM		
139	Providing and laying concealed underground waterline of "B" class GI pipe of ISI mark of the following diameters, including all necessary heavy duty specials of ISI mark, including excavation in soil/murum/rock, providing and applying metal primer and two coats of Bituminous paint of approved make after successful pressure testing of the pipeline, sand cushioning and covering with sand, refilling of trenches, compaction etc. complete as directed - for 50 mm nominal bore (NB) GI pipe. *Note:-Item also includes for laying pipes in open in structure/concealed in structure/under ground including excavation and back filling For open system, necessary special GI clamping arrangement comprising of nuts, bolts, anchoring in structure, U clamps, clamp receiver flat etc shall be provided and fixed at every 1.2 metres minimum. For concealed system in the structure, necessary chasings in the walls/RCC membersshall be carried out followed by filling the same with CM(1:1) etc complete including painting of the pipes as per drawing and as directed. All cost as above are included.GI Pipe shall be used internal as well as external works.*	237.00	RM		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
140	Providing and laying concealed underground waterline of "B" class GI pipe of ISI mark of the following diameters, including all necessary heavy duty specials of ISI mark, including excavation in soil/murum/rock, providing and applying metal primer and two coats of Bituminous paint of approved make after successful pressure testing of the pipeline, sand cushioning and covering with sand, refilling of trenches, compaction etc. complete as directed -for 40 mm nominal bore (NB) GI pipe. *Note:-Item also includes for laying pipes in open in structure/concealed in structure/under ground including excavation and back filling For open system, necessary special GI clamping arrangement comprising of nuts, bolts, anchoring in structure, U clamps, clamp receiver flat etc shall be provided and fixed at every 1.2 metres minimum. For concealed system in the structure, necessary chasings in the walls/RCC membersshall be carried out followed by filling the same with CM(1:1) etc complete including painting of the pipes as per drawing and as directed. All cost as above are included.GI Pipe shall be used internal as well as external works.*	46.00	RM		
141	Providing and laying concealed underground waterline of "B" class GI pipe of ISI mark of the following diameters, including all necessary heavy duty specials of ISI mark, including excavation in soil/murum/rock, providing and applying metal primer and two coats of Bituminous paint of approved make after successful pressure testing of the pipeline, sand cushioning and covering with sand, refilling of trenches, compaction etc. complete as directed -for 25 mm nominal bore (NB) GI pipe. *Note:-Item also includes for laying pipes in open in structure/concealed in structure/under ground including excavation and back filling For open system, necessary special GI clamping arrangement comprising of nuts, bolts, anchoring in structure, U clamps, clamp receiver flat etc shall be provided and fixed at every 1.2 metres minimum. For concealed system in the structure, necessary chasings in the walls/RCC membersshall be carried out followed by filling the same with CM(1:1) etc complete including painting of the pipes as per drawing and as directed. All cost as above are included.GI Pipe shall be used internal as well as external works.*	46.00	RM		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
142	Providing and laying concealed underground waterline of "B" class GI pipe of ISI mark of the following diameters, including all necessary heavy duty specials of ISI mark, including excavation in soil/murum/rock, providing and applying metal primer and two coats of Bituminous paint of approved make after successful pressure testing of the pipeline, sand cushioning and covering with sand, refilling of trenches, compaction etc. complete as directed - for 15 mm nominal bore (NB) GI pipe. *Note:-Item also includes for laying pipes in open in structure/concealed in structure/under ground including excavation and back filling For open system, necessary special GI clamping arrangement comprising of nuts, bolts, anchoring in structure, U clamps, clamp receiver flat etc shall be provided and fixed at every 1.2 metres minimum. For concealed system in the structure, necessary chasings in the walls/RCC membersshall be carried out followed by filling the same with CM(1:1) etc complete including painting of the pipes as per drawing and as directed. All cost as above are included.GI Pipe shall be used internal as well as external works.*	46.00	RM		
143	Providing & fixing heavy duty Gun Metal wheel valve of approved quality and make ISI marked, for lines of following diameters complete as directed - For 80 mm dia NB pipeline.	4.00	NO.		
144	Providing & fixing heavy duty Gun Metal wheel valve of approved quality and make ISI marked, for lines of following diameters complete as directed - For 50 mm dia NB pipeline.	14.00	NO.		
145	Providing & fixing heavy duty Gun Metal wheel valve of approved quality and make ISI marked, for lines of following diameters complete as directed - For 40 mm dia NB pipeline.	21.00	NO.		
146	Providing & fixing heavy duty Gun Metal wheel valve of approved quality and make ISI marked, for lines of following diameters complete as directed - For 25 mm dia NB pipeline.	5.00	NO.		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
147	Providing & fixing heavy duty Gun Metal wheel valve of approved quality and make ISI marked, for lines of following diameters complete as directed - For 15 mm dia NB pipeline.	10.00	NO.		
148	Providing and fixing chromium plated brass bib cock of approved make with chromium plated flange (disc) etc. for 15 mm dia NB pipeline, complete as directed. *Basic rate of Bib cock Shall be Rs. 1600/- per No.*	3.00	NO.		
149	Providing and fixing longbody CP brass bib cock of approved make with chromium plated flange (disc) etc. for 15 mm dia NB pipeline, complete as directed. *Basic rate of long body brass bib cock Shall be Rs. 1200/- per No.*	22.00	NO.		
150	Providing and fixing chromium plated concealed brass heavy-duty stop cock of approved make with chromium plated flange (disc) etc. complete as directed - For 15 mm dia NB pipeline. *Basic rate of Brass stop cock Shall be Rs. 1000/- per No.*	88.00	NO.		
151	Providing and fixing chromium plated brass heavy duty angle valve of approved make with chromium plated flange (disc) etc. complete as directed - For 15 mm dia NB pipeline. *Basic rate of Angle valve Shall be Rs. 1100/- per No.*	1.00	NO.		
152	Providing and fixing CP Brass heavy duty overhead pressure adjusted shower rose with revolving joint, of approved make confirming to approved sample with CP brass 190 mm matching arm with wall flange etc complete as directed. *Basic rate overhead pressure adjusted shower rose Shall be Rs. 2400/- per No.*	21.00	NO.		
153	Providing & fixing brass chromium plated towel rail of approved make of 610 mm length including drilling, supply and fixing brass screws securing the rail firmly at both the ends etc. complete as directed. *Basic rate of towel rack/tower rail Shall be Rs. 1200/- per No.*	21.00	NO.		
154	Providing and laying Chromium plated brass metal pillar cock (sink mounted/platform mounted/wall mounted/auto shut off type etc as directed) of approved make and suitable for 15 mm dia as directed. (Basic rate shall be Rs. 2500 per no.)	4.00	NO.		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
155	Providing and fixing forged brass lever operated ball valve of full flow with forged brass ball (Machined to mirror smooth finish with hard chrome plated) and spindle with setting and gland of superior quality having minimum working pressure of 25 kg/cm2 etc. complete as directed. For 40mm Dia. *Note:- The item includes for providing and fixing special fittings/flanges for connection of valves with pipes of PVC/cPVC/GI/MS/etc as required and applicable.*	3.00	NO.		
156	Providing and fixing C.I. Butterfly valve, water type class PN 1.6 as per IS: 13095 or BS:5155, including necessary nuts, bolts, gaskets etc. with flanges as required, complete in all respects.For 80 mm nominal bore. *Note:- The item includes for providing and fixing special fittings/flanges for connection of valves with pipes of PVC/cPVC/GI/MS/etc as required and applicable.*	3.00	NO.		
157	Providing and fixing C.I. Butterfly valve, water type class PN 1.0 as per IS: 13095 or BS:5155, including necessary nuts, bolts, gaskets etc. with flanges as required, complete in all respects.For 100 mm nominal bore.	2.00	NO.		
158	Providing & fixing testing & commissioning gun metal horizontal / vertical non return valve 80 mm dia conforming to IS 778 and tested to a pressure not less than 15 Kg/Sq cm, Including rubber gasket, flanges, union, nuts, bolts & washers complete as required.	2.00	NO.		
159	Providing and Fixing, testing and commissioning of C.P. brass pillar cock of approved or equivalent make complete as required. All work complete as per satisfaction of / Consultant/ Engineer-in-charge.	30.00	NO.		
160	Providing and fixing in position tested 25mm nominal bore concealed underground waterline UPVC pipes confirming to ASTM D.1785 for pipes and schedule 80 including solvent jointing of applying primer of P70 and solvent of UPVC 705 with all fittings like bends, tees, reducers, elbows, unions, etc. confirming to ASTM D.2467 Schedule 80 including all necessary excavation, successful pressure testing of the pipeline, sand cushioning and covering with sand, refilling of trenches, compaction etc. complete as directed. Note:-Item also includes for providing and making all necessary and required permanent connections/terminations with new as well as existing pipes (uPVC/cPVC/GI/MS/etc) and the pipes laid under the scope of other contractors/agencies (uPVC/cPVC/GI/MS/etc) if required and for which necessary specials and fittings (excluding Valves) shall be provided and fixed.	104.00	RM		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
161	Providing and fixing in position tested 40mm nominal bore concealed underground waterline UPVC pipes confirming to ASTM D.1785 for pipes and schedule 80 including solvent jointing of applying primer of P70 and solvent of UPVC 705 with all fittings like bends, tees, reducers, elbows, unions, etc. confirming to ASTM D.2467 Schedule 80 including all necessary excavation, successful pressure testing of the pipeline, sand cushioning and covering with sand, refilling of trenches, compaction etc. complete as directed. Note:-Item also includes for providing and making all necessary and required permanent connections/terminations with new as well as existing pipes (uPVC/cPVC/GI/MS/etc) and the pipes laid under the scope of other contractors/agencies (uPVC/cPVC/GI/MS/etc) if required and for which necessary specials and fittings (excluding Valves) shall be provided and fixed.	171.00	RM		
162	Providing and fixing concealed/open 50 mm dia Chlorinated Polyvinyl Chloride (CPVC) pipes for water line, having thermal stability for hot & cold water supply, including all CPVC plain & brass threaded fittings including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and testing of joints complete as directed *Note: SDR 11 Pipe to be considered. Item also includes for providing and making all necessary and required permanent connections/terminations with new as well as existing pipes (uPVC/cPVC/GI/MS/etc) and the pipes laid under the scope of other contractors/agencies (uPVC/cPVC/GI/MS/etc) if required and for which necessary specials and fittings (excluding Valves) shall be provided and fixed.* *Item also includes for providing and fixing accessories/special compatible fittings including brass threaded compatible fittings etc as applicable and as required as per manufacturers recommendations for fixing with uPVC/cPVC/GI pipes and CP fittings etc as and if applicable. Necessary special GI clamping arrangement comprising of nuts, bolts, anchoring in structure, U clamps, clamp receiver flat etc shall be provided and fixed at every 1.2 metres minimum for open system and making zaries and filling the same with CM(1:1) etc all are included for concealed system.*	59.00	RM		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
163	Providing and fixing concealed/open 40 mm dia Chlorinated Polyvinyl Chloride (CPVC) pipes for water line, having thermal stability for hot & cold water supply, including all CPVC plain & brass threaded fittings including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and testing of joints complete as directed *Note: SDR 11 Pipe to be considered. Item also includes for providing and making all necessary and required permanent connections/terminations with new as well as existing pipes (uPVC/cPVC/GI/MS/etc) and the pipes laid under the scope of other contractors/agencies (uPVC/cPVC/GI/MS/etc) if required and for which necessary specials and fittings (excluding Valves) shall be provided and fixed.* *Item also includes for providing and fixing accessories/special compatible fittings including brass threaded compatible fittings etc as applicable and as required as per manufacturers recommendations for fixing with uPVC/cPVC/GI pipes and CP fittings etc as and if applicable. Necessary special GI clamping arrangement comprising of nuts, bolts, anchoring in structure, U clamps, clamp receiver flat etc shall be provided and fixed at every 1.2 metres minimum for open system and making zaries and filling the same with CM(1:1) etc all are included for concealed system.*	56.00	RM		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
164	Providing and fixing concealed/open 32 mm dia Chlorinated Polyvinyl Chloride (CPVC) pipes for water line, having thermal stability for hot & cold water supply, including all CPVC plain & brass threaded fittings including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and testing of joints complete as directed *Note: SDR 11 Pipe to be considered. Item also includes for providing and making all necessary and required permanent connections/terminations with new as well as existing pipes (uPVC/cPVC/GI/MS/etc) and the pipes laid under the scope of other contractors/agencies (uPVC/cPVC/GI/MS/etc) if required and for which necessary specials and fittings (excluding Valves) shall be provided and fixed.* *Item also includes for providing and fixing accessories/special compatible fittings including brass threaded compatible fittings etc as applicable and as required as per manufacturers recommendations for fixing with uPVC/cPVC/GI pipes and CP fittings etc as and if applicable. Necessary special GI clamping arrangement comprising of nuts, bolts, anchoring in structure, U clamps, clamp receiver flat etc shall be provided and fixed at every 1.2 metres minimum for open system and making zaries and filling the same with CM(1:1) etc all are included for concealed system.*	1.00	RM		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
165	Providing and fixing concealed/open 25 mm dia Chlorinated Polyvinyl Chloride (CPVC) pipes for water line, having thermal stability for hot & cold water supply, including all CPVC plain & brass threaded fittings including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and testing of joints complete as directed *Note: SDR 11 Pipe to be considered. Item also includes for providing and making all necessary and required permanent connections/terminations with new as well as existing pipes (uPVC/cPVC/GI/MS/etc) and the pipes laid under the scope of other contractors/agencies (uPVC/cPVC/GI/MS/etc) if required and for which necessary specials and fittings (excluding Valves) shall be provided and fixed.* *Item also includes for providing and fixing accessories/special compatible fittings including brass threaded compatible fittings etc as applicable and as required as per manufacturers recommendations for fixing with uPVC/cPVC/GI pipes and CP fittings etc as and if applicable. Necessary special GI clamping arrangement comprising of nuts, bolts, anchoring in structure, U clamps, clamp receiver flat etc shall be provided and fixed at every 1.2 metres minimum for open system and making zaries and filling the same with CM(1:1) etc all are included for concealed system.*	2.00	RM		
166	Providing and Fixing 110x110 mm uPVC 'P' trap with 2-3 inlets required size fItting with seal 50 mm of self cleansing design floor/urinal trap without vent suspended with supporting clamp or in sunken portion including cutting and making good the walls and floors wherever required complete in all respects.	191.00	NO.		
167	Supplying, Installation, Testing and Commissioning of 15mm NB forged brass air release vent valve, screwed male end as per IS 554 / BS 21 / ISO 7, Chrome plated forged brass body and cover, Full bore, to release entrapped air in any piping system and ergonomic design etc. *Item also includes for providing and making all necessary and required permanent connections/terminations with new as well as existing pipes (uPVC/cPVC/GI/MS/etc) and the pipes laid under the scope of other contractors/agencies (uPVC/cPVC/GI/MS/etc) if required and for which necessary specials and fittings (excluding Valves) shall be provided and fixed.* *Item also includes for providing and fixing accessories/special compatible fittings including brass threaded compatible fittings etc as applicable and as required as per manufacturers recommendations for fixing with uPVC/cPVC/GI pipes and CP fittings etc as and if applicable*	273.00	NO.		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
168	Providing & fixing CI Circular manhole cover of 455mm dia. of 40 Kg. weight including CI frame of approved make. The cover shall be got approved in advance and shall be fixed by grouting the frame in brickwork / RCC cover slab, including painting with two coats of bituminous paint etc. complete as directed. The cover may be of any other size and shape as directed.	2,449.00	kg		
169	Providing & fixing brass chromium plated Soap Dish Holder including drilling, supply and fixing brass screws etc. complete as directed. *Basic Price of Chromium plated soap dish shall be Rs 550/- per No.*	41.00	NO.		
170	Providing & fixing concealed cPVC pipe SDR -11 class water pipe line of ISI mark of following diameters at all levels, including all necessary heavy duty specials (fittings) of ISI mark, fixing with approved arrangement viz. 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 , making holes, cutting floors, making good the walls and floors etc. complete as directed for 15mm dia. *Note:-Item also includes for providing and making all necessary and required permanent connections/terminations with new as well as existing pipes (uPVC/cPVC/GI/MS/etc) and the pipes laid under the scope of other contractors/agencies (uPVC/cPVC/GI/MS/etc) if required and for which necessary specials and fittings (excluding Valves) shall be provided and fixed. For concealed system in the structure, necessary chasings in the walls/RCC members shall be carried out followed by filling the same with CM(1:1) etc complete.*	127.00	RM		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
171	Providing & fixing concealed cPVC pipe SDR -11 class water pipe line of ISI mark of following diameters at all levels, including all necessary heavy duty specials (fittings) of ISI mark, fixing with approved arrangement viz. 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 , making holes, cutting floors, making good the walls and floors etc. complete as directed for 25mm dia.Note:-Item also includes for providing and making all necessary and required permanent connections/terminations with new as well as existing pipes (uPVC/cPVC/GI/MS/etc) and the pipes laid under the scope of other contractors/agencies (uPVC/cPVC/GI/MS/etc) if required and for which necessary specials and fittings (excluding Valves) shall be provided and fixed. For concealed system in the structure, necessary chasings in the walls/RCC members shall be carried out followed by filling the same with CM(1:1) etc complete.	106.00	RM		
172	Providing and fixing long body CP brass two way bib cock complete as directed. (Jaguar make)for 15 mm dia NB pipeline, complete as directed. *Basic Price of long body CP brass two way bib cock is Rs 2000/- per No.*	16.00	NO.		
173	Providing and laying concealed in brick wall/RCC element waterline of 50mm dia, SCH- 80, uPVC pipe of approved make including excavation of trenches in soil/murum/rock, laying and jointing the pipes and fittings in line and level, including fittings as per manufacturer's recommendations, refilling excavated earth, compacting & watering etc complete as directed. *Note:-Item also includes for providing and making all necessary and required permanent connections/terminations with new as well as existing pipes (uPVC/cPVC/GI/MS/etc) and the pipes laid under the scope of other contractors/agencies (uPVC/cPVC/GI/MS/etc) if required and for which necessary specials and fittings (excluding Valves) shall be provided and fixed.*	242.00	RM		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
174	Providing and laying concealed in brick wall/RCC element waterline of 65mm dia, SCH- 80, uPVC pipe of approved make including excavation of trenches in soil/murum/rock, laying and jointing the pipes and fittings in line and level, including fittings as per manufacturer's recommendations, refilling excavated earth, compacting & watering etc complete as directed. *Note:-Item also includes for providing and making all necessary and required permanent connections/terminations with new as well as existing pipes (uPVC/cPVC/GI/MS/etc) and the pipes laid under the scope of other contractors/agencies (uPVC/cPVC/GI/MS/etc) if required and for which necessary specials and fittings (excluding Valves) shall be provided and fixed.*	36.00	RM		
175	Providing and installing on terrace, multilayered (minimum triple layered) cylindrical vertical PVC water storage tanks of approved make of capacity from 500 ltrs to 5000 ltrs with closed top having manhole and cover with threaded lid & extra insert lid for protection against algae formation, UV stabilised with white coloured outer layer, water tank shall be made from food grade material including shifting the tank from site store, supplying and fixing connection inlets, outlets, air vents, overflow, drain pipes including washers, check nuts, Neosprine gaskets etc of specified sizes and as per the recommendations of manufacturer including hydraulic testing and painting all the accessories with one coat of primer and two coats of synthetic enamel paint of approved make if required etc complete as directed. *Note:-Unit of measurement (UOM) is Litre. Item also includes for providing and making all necessary and required permanent connections/terminations with new as well as existing pipes (uPVC/cPVC/GI/MS/etc) and the pipes laid under the scope of other contractors/agencies (uPVC/cPVC/GI/MS/etc) if required and for which necessary specials and fittings (excluding Valves) shall be provided and fixed*	21,000.00	Liter		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
176	Providing and installing on MS structural Over head(OH) water tank platform up to 20 metres height from the base ground level of OH tank, multilayered (minimum triple layered) cylindrical vertical PVC water storage tanks of approved make of capacity from 5000 ltrs to 10000 ltrs with closed top having manhole and cover with threaded lid & extra insert lid for protection against algae formation, UV stabilised with white coloured outer layer, water tank shall be made from food grade material including shifting the tank from site store, supplying and fixing connection inlets, outlets, air vents, overflow, drain pipes including washers, check nuts, Neosprine gaskets etc of specified sizes and as per the recommendations of manufacturer including hydraulic testing and painting all the accessories with one coat of primer and two coats of synthetic enamel paint of approved make if required etc complete as directed. *Note:-Unit of measurement (UOM) is Litre. All the tanks shall be interconnected using GI/uPVC pipes at the bottom as diected. Item also includes for providing and making all necessary and required permanent connections/terminations with new as well as existing pipes (uPVC/cPVC/GI/MS/etc) and the pipes laid under the scope of other contractors/agencies (uPVC/cPVC/GI/MS/etc) if required and for which necessary specials and fittings (excluding Valves) shall be provided and fixed. Tanks shall be installed using hydraulic cranes of suitable capacity if required.*	12,000.00	Liter		
177	Providing and fixing Flush Valve of 40mm dia size (concealed body) with exposed shut off provision of approved make including cutting and making good the walls etc complete as directed	13.00	NO		
178	Providing, Laying & fixing Open /Concealed 40mm dia unplastisized Polyvinyl Chloride (uPVC) pipes for water supply line 10KG/cm2, having thermal stability for hot & cold water supply, including all uPVC plain & brass threaded fittings including fixing the pipe with clamps at 1.00 m spacing/or as directed. This includes jointing of pipes & fittings with one step uPVC solvent cement and testing of joints complete as directed *Note:-Item also includes for providing and making all necessary and required permanent connections/terminations with new as well as existing pipes (uPVC/cPVC/GI/MS/etc) and the pipes laid under the scope of other contractors/agencies (uPVC/cPVC/GI/MS/etc) if required and for which necessary specials and fittings (excluding Valves) shall be provided and fixed. Necessary special GI clamping arrangement comprising of nuts, bolts, anchoring in structure, U clamps, clamp receiver flat etc shall be provided and fixed at every 1.2 metres minimum.*	54.00	RM		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
	SUB TOTAL FOR WATER SUPPLY WORK Rs.				-

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
	SANITARY WORK				
179	Providing and laying 300 mm diameter non-pressure class NP2 RCC Hume pipes with collars including excavation of trenches in soil/murum/rock, laying the pipes as per layout and drawing, filling the joints with stiff mixture of cement mortar (1 part cement :1part fine sand) and jute, curing, testing the pipe and refilling the trenches in layers with due compaction & watering etc. complete as directed *Note:-Bed shall be well screen local sand instead of gravel.*	96.00	RM		
180	Providing and laying 250 mm diameter non-pressure class NP2 RCC Hume pipes with collars including excavation of trenches in soil/murum/rock, laying the pipes as per layout and drawing, filling the joints with stiff mixture of cement mortar (1 part cement :1part fine sand) and jute, curing, testing the pipe and refilling the trenches in layers with due compaction & watering etc. complete as directed *Note:-RCC Humepipe diameter shall be 250 mm instead of 230 mm specified above. Bed shall be well screen local sand instead of gravel.*	26.00	RM		
181	Providing and laying 150 mm diameter non-pressure class NP2 RCC Hume pipes with collars including excavation of trenches in soil/murum/rock, laying the pipes as per layout and drawing, filling the joints with stiff mixture of cement mortar (1 part cement :1part fine sand) and jute, curing, testing the pipe and refilling the trenches in layers with due compaction & watering etc. complete as directed *Note:-Bed shall be well screen local sand instead of gravel.*	102.00	RM		
182	Providing and laying 110 mm diameter uPVC rain water line of 4 Kg / Sq cm rating of approved make with all necessary specials to be jointed adhesive as per manufacturers specifications etc complete for open pipeline / in brick wall / RCC structure including clamping to secure in position etc. complete as directed. *Note:-The item includes for providing and fixing exposed on wall (open) at all levels unplasticized polyvinyl chloride pipe (PVC-U) of 110 mm nominal outside diameter, type A confirming as per IS 13592 including all fittings as applicable, fixing with approved arrangement viz. standard pattern holders bat clamps made out of galvanised Mild Steel(MS) flat carrier (minimum 4mm thick) fixed with existing RCC or brick masonry using cast steel expandable mechanical anchors of approved make as per the recommendation of manufacturer and galvanised Mild Steel(MS) "C" clamp (minimum 5.0mm thick/dia threaded) fixed on the bat clamps to secure the pipe with GI nuts and washers of required shape and size so as to fit tightly on the pipes when tightened, Tee connection shall be used at the terrace junction instead of bend etc complete as directed.*	55.00	RM		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
183	Providing and laying 160mm diameter uPVC rain water line of 4 Kg/Sqcm rating of approved make with all necessary specials to be jointed adhesive as per manufacturers specifications etc complete for open pipeline / in brick wall / RCC structure including clamping to secure in position etc. complete as directed. *Note:-The item includes for providing and fixing exposed on wall (open) at all levels unplasticized polyvinyl chloride pipe (PVC-U) of 160 mm nominal outside diameter, type A confirming as per IS 13592 including all fittings as applicable, fixing with approved arrangement viz. standard pattern holders bat clamps made out of galvanised Mild Steel(MS) flat carrier (minimum 4mm thick) fixed with existing RCC or brick masonry using cast steel expandable mechanical anchors of approved make as per the recommendation of manufacturer and galvanised Mild Steel(MS) "C" clamp (minimum 5.0mm thick/dia threaded) fixed on the bat clamps to secure the pipe with GI nuts and washers of required shape and size so as to fit tightly on the pipes when tightened, Tee connection shall be used at the terrace junction instead of bend etc complete as directed.*	87.00	RM		
184	Providing and fixing 32 mm dia chromium plated brass heavy type approved quality bottle trap with matching wall flange etc. all complete as directed.	4.00	NO.		
185	Providing and laying 450 mm diameter non-pressure class NP2 RCC Hume pipes with collars including excavation of trenches in soil/murum/rock, laying the pipes as per layout and drawing, filling the joints with stiff mixture of cement mortar (1part cement :1part fine sand) and jute, curing, testing the pipe and refilling the trenches in layers with due compaction & watering etc. complete as directed	24.00	RM		
186	Providing and laying 600 mm diameter non-pressure class NP2 RCC Hume pipes with collars including excavation of trenches in soil/murum/rock, laying the pipes as per layout and drawing, filling the joints with stiff mixture of cement mortar (1part cement :1part fine sand) and jute, curing, testing the pipe and refilling the trenches in layers with due compaction & watering etc. complete as directed	24.00	RM		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
187	Providing and fixing looking mirror 5mm to 8mm thick of approved make fixed with brass oxidized/SS-304 grade studs, clamps, CP cup type screw/silicon adhesive etc. *Providing and fixing of 5mm to 8 mm thick looking mirror annealed silver mirror of Saint-Gobain Miralite Revolution make or equivalent and installed by SGG Glassmate or equivalent tapes or silicones. The adhesive used should be certified as neutral, compatible with the mirror back paint (certified by mirror manufacturer) and must not be Oxime based. The mirror shall have curved corners and shall be fixed directly on the wall /tiles perfectly levelled, silver mirror must be made industrially from base glass conforming to EN 572-2 in optical properties; Silver coating of min 0.7 g/m2; Back paint should be highly durable (passes PERSOZ hardness test for min.130 oscillatios or more); Conforms to CASS test as per EN ISO 9227; Conforms to cross cut test as per EN ISO 2409; reflection and High humidity durability, conforming to BS EN 1036 1999, absolute lead free i.e < 50 ppm, no arsenic, no copper, no formaldehyde,Iron PPM Mirror is less than 700 PPM. compressive strenght1000 MPa,tensile strenght 40 MPa*	31.00	SQ.M.		
188	Providing and fixing liquid soap holder with soap bottle of approved make fixed with CP brass screws etc. complete as directed.	5.00	NO.		
189	Providing and constructing square or circular mouth 100 mm dia. PVC gully trap of approved make having size around 160mm X 110mm including rising piece, PVC grating. Gully trap shall be having one outlet and three closed inlets, seal traps, etc all for domestic and industrial grade, including excavation, foundation concrete BBCC 1:5:10(1 part cement, 2 part coarse sand, 4 part of brickbat) 230 mm thick masonry, in Cement Mortar (CM) 1:6 (1 part cement, 6 part coarse sand), cement mortar 1:3 (1 part cement,3 part coarse sand) plaster, neat cement finish and back filling etc. and water tight PVC cover with frame of suitable size (inside) etc complete as per the design complete as directed.	39.00	NO.		
190	Providing and fixing 125mm PVC Nahani trap (floor trap) self cleaning design with outlet size 75mm dia of approved make with perforated brass cast CP jali including cutting the floor and fixing trap in CC 1:2:4 making good the floor etc. complete as directed.	110.00	NO.		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
191	Providing and fixing approved make white/approved other colour Vetrious China oval or other shaped wash basin of size 560x 410mm or other as per the drawing for counter mounting above the counter or below the counter, specially fabricated brackets painted white, 32mm dia C.P waste coupling (code ALD-705), 32mm dia C.P cast brass bottle trap and pipe to wall with C.P wall flange and rubber adopter for waste connection complete, including cutting and making good the walls wherever required. or approved equivalent) *Basic rate of wash basin Rs. 5000/- Per No.*	58.00	NO.		
192	Providing and Fixing Electric Hand dryers, fully automatic, metal body in powder coating S.S. Finish of approved make *Notes- Basic Price of Electri c Hand Dryer:* ***Rs. 10500/*** *- per no .*	2.00	NO.		
193	Supply and fixing CP sawan neck tap with left/right hand operating knob, including cutting and making good the wall etc. of approved make *(Basic rate of swan neck tap Rs. 1700/- Per No.)*	1.00	NO.		
194	Providing and fixing 15mm C.P brass pillar tap long neck for wash basin of approved make	1.00	NO.		
195	Providing and fixing C.P. brass towel ring fixed to PVC cleats with C.P. brass screws of approved make	32.00	NO.		
196	Providing and fixing C.P. Brass Coat Hook fixed with P.V.C. cleats with C.P. Brass screw all complete	32.00	NO.		
197	Providing and Fixing CP Health Faucet (Hand Shower) with 1 mt: flexible tube and Wall Hook complete of approved make	25.00	NO.		
198	Providing and fixing air vent cowl of PVC as per approved sample for 50 diameter pipe including jointing using adhesive as recommended by manufacturer appropriately etc complete as directed.	5.00	NO.		
199	Providing and fixing 125mm PVC Nahani trap (floor trap) self cleaning design with outlet size 75mm dia of approved make with perforated PVC jali including cutting the floor and fixing trap in CC 1:2:4 (1part of cement; 2 part of course sand; 4 parts of course aggregate) making good the floor, including connecting with drain pipes, sealing with rubber gaskets, fixing of top tile & strainer of chromium plated on top of the trap etc. complete as directed. *Notes- Basic rate of PVC Nahani Trap shall be Rs 500/- per No.*	3.00	NO.		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
200	Providing and fixing Stainless Steel Perforated trap cover of 150 X 150 mm (minimum 18SWG) into Floor tile including cutting of tile, silicon filling for water proofing, etc. complete over P trap or Nahni trap. *Basic rate of Stainless Steel Anti cockroaches trap shall be Rs. 600/ - Per No.*	99.00	NO.		
201	Providing and fixing Anti cockroaches Stainless Steel Perforated trap with cover of 153 X 153 mm (CCT-SFC-153) into Floor tile including cutting of tile, silicon filling for water proofing, etc. complete over P trap or Nahni trap. *Basic rate of Stainless Steel Anti cockroaches trap shall be Rs. 700/ - Per No.*	2.00	NO.		
202	Providing and fixing uPVC type B Ring fit SWR Pipe of ISI mark of following diameters at all levels, including any/all type fittings, Multi floor trap, P -traps heavy duty specials (fittings) of ISI mark, with specialized joint, rings, fitting Concealed or open on wall/ RCC with all necessary chasses (jharies in walls) for laying pipe line in masonry or Open on wall 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 , testing after installation of pipe ,making holes, cutting floors, making good the walls and floors etc. complete as directed for 75mm OD. *Note:-Pipes shall be Unplasticized polyvinyl chloride Industrial pipes (PVC-U), type B confirming as per IS 13592.*	78.00	RM		
203	Providing and fixing uPVC type B Ring fit SWR Pipe of ISI mark of following diameters at all levels, including any/all type fittings, Multi floor trap, P -traps heavy duty specials (fittings) of ISI mark, with specialized joint, rings, fitting Concealed or open on wall/ RCC with all necessary chasses (jharies in walls) for laying pipe line in masonry or Open on wall 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 , testing after installation of pipe ,making holes, cutting floors, making good the walls and floors etc. complete as directed for 110mm OD. *Note:-Pipes shall be Unplasticized polyvinyl chloride Industrial pipes (PVC-U), type B confirming as per IS 13592.*	78.00	RM		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
204	Providing and fixing uPVC type B Ring fit SWR Pipe of ISI mark of following diameters at all levels, including any/all type fittings, Multi floor trap, P -traps heavy duty specials (fittings) of ISI mark, with specialized joint, rings, fitting Concealed or open on wall/ RCC with all necessary chasses (jharies in walls) for laying pipe line in masonry or Open on wall 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 , testing after installation of pipe ,making holes, cutting floors, making good the walls and floors etc. complete as directed for 160mm OD. *Note:-Pipes shall be Unplasticized polyvinyl chloride Industrial pipes (PVC-U), type B confirming as per IS 13592.*	2.00	RM		
205	Providing and laying uPVC Eco drain or Fome Core SN8 pipe of approved quality including all necessary fittings, excavation of trenches in soil/murum up to 1500mm depth, providing & laying 150 mm thick BBCC 1:5:10 (1 part cement, 5 part coarse sand, 10 part brickbat) as bedding, laying and jointing the pipe in line and level as per manufacturer's specification with PCC 1:5:10 (1 part cement, 5 part coarse sand, 10 part stone aggregate) all around of the pipe, refilling of the trenches, testing before concealed the pipe etc. complete as directed. Encasing of the pipe line with PCC 1:5:10 will be not be paid separately for 110 mm OD. *Note:-Pipes shall be non-pressure unplasticized polyvinyl chloride pipe (PVC-U) of grade SN8, SDR 34 as per IS 15328 and the size of the pipe shall be 110 mm nominal outside diameter. Encasing of the pipe line with PCC 1:5:10 will be not be paid separately for 110 mm OD. Encasing with PCC shall be 100mm thick at all the three sides around the pipe. Please read FOAMCORE instead of Fome Core. Pipe shall be Selfit type*	113.00	RM		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
206	Providing and laying uPVC Eco drain or Fome Core SN8 pipe of approved quality including all necessary fittings, excavation of trenches in soil/murum up to 1500mm depth, providing & laying 150 mm thick BBCC 1:5:10 (1 part cement, 5 part coarse sand, 10 part brickbat) as bedding, laying and jointing the pipe in line and level as per manufacturer's specification with PCC 1:5:10 (1 part cement, 5 part coarse sand, 10 part stone aggregate) all around of the pipe, refilling of the trenches, testing before concealed the pipe etc. complete as directed. Encasing of the pipe line with PCC 1:5:10 will be not be paid separately for 160 mm OD. *Note:-Pipes shall be non-pressure unplasticized polyvinyl chloride pipe (PVC-U) of grade SN8, SDR 34 as per IS 15328 and the size of the pipe shall be 160 mm nominal outside diameter. Encasing of the pipe line with PCC 1:5:10 will be not be paid separately for 160 mm OD. Encasing with PCC shall be 100mm thick at all the three sides around the pipe. Please read FOAMCORE instead of Fome Core. Pipe shall be Selfit type*	141.00	RM		
207	Providing and laying 250mm dia (Nominal Diameter) uPVC, FOAMCORE/ECODRAIN, SN8 pipe of approved make including all necessary fittings, excavation of trenches in soil/murum/rock up to 1500mm depth, providing & laying 150 mm thick BBCC 1:5:10 (1 part cement, 5 part coarse sand, 10 part brickbat) as bedding, laying and jointing the pipe in required line, level and as per manufacturer's specification, encasing the pipe by providing & laying with 100mm thick PCC 1:5:10 (1 part cement, 5 part coarse sand, 10 part stone aggregate) at all the three sides around of the pipe, refilling of the trenches, watering, compacting and testing before concealing the pipe etc complete as directed. *Note:-Pipes shall be non-pressure unplasticized polyvinyl chloride pipe (PVC-U) of grade SN8, SDR 34 as per IS 15328 and the size of the pipe shall be 250 mm nominal outside diameter Encasing of the pipe line with PCC 1:5:10 will be not be paid separately. Encasing with PCC shall be 100mm thick at all the three sides around the pipe.*	81.00	RM		
208	Providing and fixing Flush Valve of 40mm dia size (concealed body) with exposed shut off provision of approved make including cutting and making good the walls etc complete as directed	17.00	NO.		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
209	Providing and fixing Stainless Steel grade 304 Sink of overall size 685mm X 510mm and bowl size 610mm X 460mm X 250mm of approved make with Chrome Plated (CP) Fittings such as CP Sink Cock, CP Angle Stop cock, CP Bottle Trap including all necessary fittings and specials such as CI brackets, CP waste coupling, 40 mm dia. cPVC waste pipe to be laid concealed in wall up to floor drain with plain and brass threaded bends, applying two coats of aluminium paint to the brackets etc. complete as directed. *Notes- Basic rate of SS Sink including cock, stop cock if any etc CP accessories all Rs. 10000/- per Lot(No). The size and model of SS Sink may also be other than specified if any as above.*	4.00	NO.		
210	Providing and fixing large flat back white glazed first quality urinal of approved make with all fixing accessories including Chrome Plated (CP) auto closing concealed urinal flush valve with wall flange of approved make including the required length of 40 mm dia. cPVC waste pipe to be laid concealed in wall up to floor drain with plain and brass threaded bends concealed in wall etc complete as per the recommendations of manufacturer and as directed. *Basic rate of large Flatback Urinal including flush valve and other CP accessories Rs. 10000/- Per No(Lot).*	28.00	NO.		
211	Providing and fixing first quality white glazed wash basin of 550mm x 400mm x 200mm size and approved shape with necessary specials and wall brackets as per the recommendations of manufacturer, one chromium plated (CP) brass auto closing system with built-in control cock with wall mounted flange pillar cock of 15mm dia or pillar cock of approved make, CP Bottle trap of size 300mm x 190mm (with internal partition) 32mm dia size with 300mm & 190mm long wall connection pipes & wall flange of approved make, one 15mm CP angle stop cock with wall flange of approved make, 450mm long braided hoses with two 15mm nuts & rubber washers without nipple of approved make and all required fittings, 31mm dia chromium plated waste couplings of approved make, heavy duty brackets with two coats of aluminium paint over brackets, including the required length of 40 mm dia. cPVC waste pipe to be laid concealed in wall up to floor drain with plain and brass threaded bends concealed in wall etc. complete as directed. *Notes- Basic rate of wash basin including CP cock, bottle trap, angle cock and other CP accessories shall be total Rs. 10000/- per (Lot)No.*	2.00	NO.		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
212	Providing and fixing first quality approved make white glazed vitreous china WC Orissa pan of size 580mm X 445mm X 260mm of approved make with 100mm sand cast CI "P" or "S" trap of approved ISI mark fixed in cement concrete 1: 1.5 : 2.5 (1 part cement, 1.5 parts coarse sand, 2.5 parts of stone aggregate), Flush Valve of 40mm dia Size (concealed body) with exposed shut off provision of approved make etc all complete as directed. *Basic rate of WC Orissa pan Rs. 4200/ - Per No.*	14.00	NO.		
213	Providing and fixing First quality wall mounted European type white glazed vitreous china Water Closet of size 495mm X 350mm X 335mm of approved make including all accessories and fixing with CI chair brackets or SS fastners as per the recommendation of manufacturer, seat cover of approved make, Flush Valve of 40mm dia Size (concealed body) with exposed shut off provision of approved make, Hand shower (Health Faucet) with 8mm dia 1.2 meter long easy flex tube in chrome finish of approved make & CP wall hook, Rack Bolts, braided connection pipe, two way bib cock with wall flange of approved make, cutting and making good the walls and floors, treating the joints with silicon joint etc complete as directed. *Notes- Basic rate of wall mounted WC inlcuding seat cover, Flush Valve, Hand shower (Health Faucet) with 8mm dia 1.2 meter long easy flex tube & CP wall hook all total shall be Rs. 10600/- per No.*	21.00	NO.		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
214	Providing & Construction of underground rain water re-charge well 4m internal dia with 2.0m water holding above the filtering media and below connection level of drainage line and desilting chamber with following specifications and including supplying, installation & execution of all jobs, complete as per drawings and directions of Engineer-in-Charge. Peripheral brick masonry in cement mortar 1:4 (1cement: 4 coarse sand) with necessary 15 mm thick cement plaster 1 :3 neat finish.Foundation concrete 1:5:10 (1 cement : 5 coarse sand : 10 graded stone aggregate 40 mm nominal size) (200mm thick). Geo textile membrane, 200 mm thick sand (1.5 to 2 mm size), 100 mm thick activated carbon and 500 mm thick brick aggregate 40 to 63 mm size. 200mm thick R.C.C. slab in M20 mix to cover the well at top including necessary centring, shuttering and reinforcement with required openings /cutouts etc. complete in all respects. Desilting chamber 1500x1000x900mm deep from connection level in brick masonary, foundation concrete and RCC slab as above complete in all respects as per drawing.Supplying and fixing PVC coated M.S. foot rests. Making all inlets & outlets in brick masonry walls including cutting holes& making good the same. 10- 12 mm thick cement plaster 1 :3 (1 cement : 3 fine sand) mixed with water proofing compound on top of R.C.C slab, finished smooth. 2 Nos. 560 mm dia SFRC heavy duty conforming to IS 12592 manhole cover in top slab. 200mm dia PVC plain/perforated solid pipe laid vertically upto 30 meters below bottom of harvesting well, including necessary drilling/ boring in ground in all kinds of soil as directed by the Engineer-in-charge.Rate to include excavation back filling, disposal of surplus excavated soil with all leads and all other materials & operations necessary for completing the job.	2.00	NO.		
215	Providing and fixing single piece concealed cistern wall mounted pneumatic flush tank of 5- 6 litre capacity with dual function operating plate on wall for flushing w.c.Including all fittings fixtures stand, supports, connecting with adjoining pipe line with require approved quality adhessive solution and making good the wall to match with the adjoining surface. The rate includes dismentling brickwork,allfixing labour , all material, testing and putting in functioning condition with all gaurantee/ warrentee etc.complete. Fixing to be done strictly as per the manufacturer's fixing details given . Basic Rte Rs. 7200/- per NO.[Make : Jaquar/ Geberit /Hindware /Kohler/Grohe or equivalent .	16.00	Nos		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
	SUB TOTAL FOR SANITARY FITTINGS Rs.				

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
	LAND SCAPPAING				
216	Supplying & laying of red soil/approved fertile soil for making of mounds in the shape and profile approved including levelling. The final consolidated volume only to be measured & paid. *This item also includes Making of mounds using garden red soil, dresssing in the shape and profile given in the drawing or as directed by engineer in-charge.*	250.00	CU.M.		
217	DEVELOPMENT OF LAWN : Supply and laying of Mexican grass to be planted by Turfing method. The spacing, location and other details as per the drawings and specifications. Rate to include for excavation, plant cost, transportation, installation, cultivation, labour, maintenance etc., all complete.	650.00	SQ.M.		
218	Supply and laying of Bermuda grass dibbling method with lawn nodes planted 3" c/c, including supply & leveling of earth 100mm, manure, pesticides, weeding, mowing and handing over lush green lawn as per specification and as directed by Site engineer. *The spacing, location and other details as per the drawings and specifications. Rate to include for excavation, plant cost, transportation, installation, cultivation, labour, maintenance etc., all complete.*	400.00	SQ.M.		
219	Supplying & stacking of Vermin compost/Organic manure, sludge, dump manure,/farm yard manure/animle dung manure etc (adequate for horticulture work) from approved disposal work site including cost of transportation, labour for shifting etc complete as instrcuted by engineer in-charge.	365.00	kg		
220	Supply and planting of Palm trees/accent trees such as Plumeria Alba 1.8 mtrs *(2-3 FT Ht Poly Size 15x16 inch)*	25.00	NO.		
221	Supply and planting of shrubs all 300 mm height such as Ixora Coccinae Pink *(TMC Verigated, 2-3 FT Ht Poly Size 7x8 inch)*	75.00	NO.		
222	Supply and planting of Palm trees/accent trees such as Plumeria Alba 1.8 mtrs *(Royal palm 5-6Ft Ht Poly Size 15x16 inch)*	25.00	NO.		
223	Supply and planting of Palm trees/accent trees such as Plumeria Alba 1.8 mtrs *(Juniperse 3 - 4Ft Ht Poly Size 15x16)*	25.00	NO.		
224	Supply and planting of Palm trees/accent trees such as Topiary Ficus trees 1.0 mtrs bushy *(Ficus panda Ball shape 2 - 3Ft Ht Poly Size 15x16 inch)*	25.00	NO.		
225	Supply and planting of Bougainvillea glabra of height as sprcified in the item. *(Bougainvillea Mix variety 2-3 FT Ht Poly Size 7x8 inch)*	125.00	NO.		
226	Supply and planting of shrubs all 300 mm height such as Heliconia Psittacorrum Rubra/Rostrata *(Syngonium red 1 FT Ht Poly Size 7x8 inch)*	125.00	NO.		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
227	Supply and planting of shrubs all 300 mm height such as Alpinia Zerumbet *(Sanchezia nobilis 1-2 FT Ht Poly Size 7x8 inch)*	125.00	NO.		
228	Supply and planting of shrubs all 300 mm height such as Alpinia Zerumbet *(100 mm height Acalypha holand 1-2 FT Ht Poly Size 7x8 inch)*	125.00	NO.		
229	Supply and planting of Palm trees/accent trees such as Eugenia bushy of height as specified in the item. *(Ugenia 3 - 4Ft Ht Poly Size 13x13)*	10.00	NO.		
230	Supply and planting of Neem tree plants/other tree plans (4 to 5 feet heght) for Animal paddock area giving maximum shadow for summar season once fully grown	150.00	NO.		
231	Supply and planting of decorative Trees Medium and Large such as Pongamia, Ceasalpinia, Lagerstromia, Bauhunia, Golden melauluca, Tabebuia Rosea, Jacaranda etc *This Item is applicable to supply of Conocarpus, Azadirachta Indica, Terminalis mentalis, Putranjiva roxburghii, Bauhunia purpurea,Mimusops elengi, Lagerstroemia speciosa,Pongamia pinnata,Spathodea campanulata, Kigelia pinnata, Tabebuia argentea, Delonix regia, Sterculia alata,etc. The height of plants shall be 3 ft to 4 ft, well grown in healthy condition with minimum exposed or as specified including all leads & lift, carriage, handling, manuring, applying presticide and fertilizer etc.*	75.00	NO.		
232	Providing and installing Tree guards of 1.8 Mtr height and minimum 400 mm clear internal diameter, framing made of three vertical supports of MS angle 20mm X 20mm X 2mm thick and three circular ring strips of MS flats 20mm X 2mm thick at top, middle and bottom, the Weld mesh jali shall be made of 14 SWG vertical and circular wires forming 60mm X 60mm (hole) size welded to the MS frame works of angles and circular stiprs forming a circular cage type tree guard including painting with two coats of synthetic enamel paint over a coat of primer after surface preparation for removal of surface dirt, dust etc including fixing the vertical MS angles (legs) of the tree guard in cement concrete etc comple as directed. (Concrete shall be paind under the item of concrete works up to plinth in CuM)	90.00	No		

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
233	Medium and Tall together - Making of pits 0.45m x 0.45m x 0.45m size with 50% excavated earth and remaining 50% in the ratio of 1:2:3 mixture of sand, cattle manure & redsoil and planting the trees (excluding cost of shrubs) in any type of soil. *It is for all type of trees, Palms shrubs etc, clearing and grubbing of site manually or by mechanical means including removal of debris, bushes, vegetation, uprooting rank vegetation, weeds and other wild growth by forking repeatedly, breaking clods along with disposal of all rubbish and contaminated soil outside project premises at designated location, including all leads and lifts, etc., complete at all locations and areas as per drawings, technical specifications . The rates are including filling of pits with 50% excavated earth and remaining 50% in the ratio of 1:2:3 mixture of sand ,dump manure/farm yard manure/animal dung manure & redsoil and planting the trees ,flooding with water, filling with earth if necessary watering and finally fine dressing, levelling etc., including stacking and disposal of materials declared unserviceable and surplus earth by spreading and levelling as directed, within site premisis. This includes supply of labour.*	750.00	NO.		
234	Planting of Ground Covers - Making of pits 1mx1mx0.30 m size with 50% excavated earth and remaining 50% in the ratio of 1:2:3 mixture of sand, cattle manure & redsoil and planting the trees (excluding cost of ground covers) in any type of soil *It is for all type of trees, Palms shrubs etc, clearing and grubbing of site manually or by mechanical means including removal of debris, bushes, vegetation, uprooting rank vegetation, weeds and other wild growth by forking repeatedly, breaking clods along with disposal of all rubbish and contaminated soil outside project premises at designated location, including all leads and lifts, etc., complete at all locations and areas as per drawings, technical specifications . The rates are including filling of pits with 50% excavated earth and remaining 50% in the ratio of 1:2:3 mixture of sand ,dump manure/farm yard manure/animal dung manure & redsoil and planting the trees ,flooding with water, filling with earth if necessary watering and finally fine dressing, levelling etc., including stacking and disposal of materials declared unserviceable and surplus earth by spreading and levelling as directed, within site premisis. This includes supply of labour.*	162.00	NO.		
235	Supplying and fixing wooden sticks to support the plants/ trees etc with minimum 3.0 mt long & 50 mm thick in size and shall be straight without any cracks.	62.00	NO.		

Section-X (Schedule of Quantities)

Sl	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	Amount (Rs)
236	Formation and cultivation of earth including dressing to desired levels, breaking clods, removing rank vegetation, unwanted stones and rocks and cultivating the area to the extent of 6" depth *It also includes watering the same in all kind of soil, rough dressing of the trenched ground, clearing and grubbing of site manually or by mechanical means including removal of debris, bushes, vegetation, uprooting rank vegetation, weeds and other wild growth by forking repeatedly, breaking clods along with disposal of all rubbish and contaminated soil outside project premises at designated location, including all leads and lifts, etc., complete at all locations and areas as per drawings, technical specifications.*	1,200.00	SQ.M.		
237	Supply, installation, testing and commissioning of drip irrigation pipe of 16mm/20mm NB, UV resistant Linear low-density polyethylene (LLDPE) material including dripping nozzles/emitters/drippers for tree plantation in the Animal paddock(loafing) area including, emitting pipe fittings/joiners, drip line fittings etc, excavation, laying pipes under ground, leaving the nozzle connection adjacent to the tree planted, connection from the existing water supply line by providing and fixing suitable pressure reducing valves etc complete including all fittings cum fixtures as directed. The work shall be executed as a turn-key solution including all as one comprehensive package for the land development in totality including any deliverable missing in the scope as above if any.	700.00	RM		
238	SITC OF MOBILE/ PORTABLE SPRINKLER *Brass Sprinkler with MS stand height of max. 2 mtrs, water cover dia is 10 mtrs. Item includes supply, laying & fixing of 1 inch flexible rubber hose pipe (requirement is 1 roll/ sprinkler, 1 roll is equal to 30 mtrs)*	3.00	NO.		
239	FLEXIBLE KINK RESISTANCE POLYURETHANE TUBING *Supply,Fixing & commissioning of flexible kink resistant 16mm inline tubing with Garden Hose Spray Gun for High Pressure Nozzles with Nozzle Set, Anti-Slip Design, for Watering Plants (requirement is 1 spray gun/ roll, 1 roll is equal to 30 mtrs)*	75.00	RM		
	SUB TOTAL FOR FOR LANDSCAPE Rs.				

SR. NO	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	NET AMOUNT (Rs)
	WIRING				
240	Providing and fixing/ laying of conduit and wires for Light point wiring with 1.5 sq. mm PVC insulated, FRLS, copper conductor (stranded) 1100V grade wires alongwith earthing in 25mm dia. medium duty PVC surface/ concealed conduit system including providing and fixing one no. 10 Amp single pole modular switch grid plate mounted with moulded cover plate in zinc chromate passivated GI box suitable for modular switch, complete in all respect (wiring & conduiting up to switchboard not included in item cost), for one light point controlled by one switch. *Including making zaries in the wall and finishing the same*	220.00	NO.		
241	Providing and fixing/ laying of conduit and wires for Light point wiring with 1.5 sq. mm PVC insulated, FRLS, copper conductor (stranded) 1100V grade wires alongwith earthing in 25mm dia. medium duty PVC surface/ concealed conduit system including providing and fixing one no. 10 Amp single pole modular switch grid plate mounted with moulded cover plate in zinc chromate passivated GI box suitable for modular switch, complete in all respect (wiring & conduiting up to switchboard not included in item cost), for two light points controlled by one switch. *Including making zaries in the wall and finishing the same*	250.00	NO.		
242	Providing and fixing/ laying of 3LP with 1 switch conduit and wires for Light point wiring 1.5 sq. mm PVC insulated, FRLS, copper conductor (stranded) 1100V grade wires alongwith earthing in 25mm dia. medium duty PVC surface/ concealed conduit system including providing and fixing one no. 10 Amp single pole modular switch grid plate mounted with moulded cover plate in zinc chromate passivated GI box suitable for modular switch, complete in all respect (wiring & conduiting up to switchboard not included in item cost), for three light points controlled by one switch.	110.00	NO.		
243	Providing and fixing/ laying of conduit and wires for Light point wiring with 1.5 sq. mm PVC insulated, FRLS, copper conductor (stranded) 1100V grade wires alongwith earthing in 25mm dia. medium duty PVC surface/ concealed conduit system including providing and fixing one no. 10 Amp single pole modular switch grid plate mounted with moulded cover plate in zinc chromate passivated GI box suitable for modular switch, complete in all respect (wiring & conduiting up to switchboard not included in item cost), for for three light points controlled by 2 nos. 2 way switch. *Including making zaries in the wall and finishing the same*	5.00	NO.		
244	Providing and fixing/ laying of conduit and wires for Ceiling fan point wiring with 1.5 sq. mm PVC insulated, FRLS, Cu. conductor (stranded) 1100V grade wires alongwith earthing in 25 mm dia. Medium duty PVC surface/ concealed conduit system including providing and fixing one no. modular 10A single way switch, grid plate mounted with moulded cover plate, two module electronic stepped fan regulator in zinc chromate passivated GI box suitable for modular switches, with GI box for fan suspension, complete in all respect (wiring & conduiting up to switchboard not included in item cost). *Including making zaries in the wall and finishing the same*	230.00	NO.		

SR. NO	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	NET AMOUNT (Rs)
245	Providing and fixing/ laying of conduit and wires for Exhaust / Brackate fan point wiring with 1.5 sq. mm PVC insulated, FRLS, Cu. conductor (stranded) 1100V grade wires alongwith earthing in 25 mm dia. Medium duty PVC surface/ concealed conduit system including providing and fixing one no. modular 10A single way switch, grid plate mounted with moulded cover plate in zinc chromate passivated GI box suitable for modular switches complete in all respect (wiring & conduiting up to switchboard not included in item cost). *Including making zaries in the wall and finishing the same. Item includes providing & fixing 10 A 3 pin 250V modular socket outlet and 10 A 3 pin plug top for Exhaust Fan/Bracket fan*	45.00	NO.		
246	Providing and fixing/ laying of conduit & wires for Buzzer point wiring with 1.5 sq. mm. PVC insulated, FRLS, Cu. conductor 1100V grade wires in 25 mm dia Medium duty PVC concealed/ surface conduit system including providing and fixing one no. 10 Amp modular buzzer push button, grid plate mounted with moulded cover in zinc chromate passivated GI box suitable for modular switches (wiring & conduiting up to switchboard not included in item cost) complete in all respect. Including making zaries in the wall and finishing the same.	20.00	NO.		
247	Providing and fixing zinc chromate passivated GI box suitable for modular switches with grid plate moulded cover , in surface / concealed conduit system and 1 no. 10 A 3 pin 250 V modular socket outlet with safety shutter and 10 A 250 V modular switch for 10 A isolated power point (wiring & conduiting up to power plug point not included in item cost) complete in all respect. *Including making zaries in the wall and finishing the same.*	50.00	NO.		
248	Providing and fixing 10A 3 pin 250 V modular socket outlet and 10 A 250 V modular switch in existing lighting switch board, including connections within the box with 1.5 sq. mm PVC insulated, FRLS copper conductor 1100 V grade wires. (wiring & conduiting up to power plug point not included in item cost) *Including making zaries in the wall and finishing the same.*	220.00	NO.		
249	Providing and fixing zinc chromate passivated GI boxes with moulded sheet cover in surfaces/concealed conduit system for 20 A power point (socket and switch are separated from each other by a distance of 2 mtr. Max). In one box 20 A universal 6 pin 250 V modular type socket outlet having safety shutter to be fixed and in other 1 no. 20 A 250 V modular type switch to be fixed. Both the boxes to be interconnected with surface/ concealed conduit system with 2.5 sq. mm. PVC insulated FRLS, Cu conductor (stranded), 1100 V grade wires and 2.5 sq. mm. Green PVC insulated earth wire. (Cost of wiring and conduiting up to the first box from DB is not included in this item cost). *Including making zaries in the wall and finishing the same.*	170.00	NO.		
250	Circuit wiring with PVC insulated, FRLS, 1100V grade, Cu. conductor (stranded) wires of red/blue/yellow colour for phase, black colour for neutral & green colour for earthing in Medium duty PVC surface/concealed conduit system, complete with wires and conduit sizes of 2 x 2.5 Sq. mm for power (phase & neutral) and 1 x 1.5sq mm for earthing in 25 mm dia medium duty PVC conduit. *Including making zaries in the wall and finishing the same*	5,000.00	RM		

Section-X (Schedule of Quantities)

SR. NO	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	NET AMOUNT (Rs)
251	Circuit wiring with PVC insulated, FRLS, 1100V grade, Cu. conductor (stranded) wires of red/blue/yellow colour for phase, black colour for neutral & green colour for earthing in Medium duty PVC surface/concealed conduit system, complete with wires and conduit sizes of 2 x 4.0 sq. mm. for power (phase & neutral) and 1 x 2.5 sq. mm for earthing in 25 mm dia Medium duty PVC conduit. *Including making zaries in the wall and finishing the same*	3,500.00	RM		
252	Circuit wiring with PVC insulated, FRLS, 1100V grade, Cu. conductor (stranded) wires of red/blue/yellow colour for phase, black colour for neutral & green colour for earthing in Medium duty PVC surface/concealed conduit system, complete with wires and conduit sizes of 4 x 4.0 sq. mm. for power (phases & neutral) and 2 x 2.5 sq. mm for earthing in 25 mm dia Medium duty PVC conduit. *Including making zaries in the wall and finishing the same*	250.00	RM		
253	Sub main wiring (1 PHASE) with PVC insulated, FRLS, Cu. Conductor (stranded) 1100V grade wires of red/yellow/blue colour for phase, black colour for neutral & green colour for earthing in Medium duty PVC surface/ concealed conduit system complete with wires and conduit of size 2x6sq. mm. For power and 1x4 sq. mm for earth wire in 25 mm dia conduit. *Including making zaries in the wall and finishing the same*	100.00	RM		
254	Sub main wiring (3 PHASE) with PVC insulated, FRLS, Cu. Conductor (stranded) 1100V grade wires of red/yellow/blue colour for phase, black colour for neutral & green colour for earthing in Medium duty PVC surface/ concealed conduit system complete with wires and conduit of size 4x10 sq. mm for power (phases & neutral) and 2x6 sq. mm for earth wire in 38 mm dia Medium duty PVC conduit. *Including making zaries in the wall and finishing the same*	50.00	RM		
255	Providing & laying spare concealed or surface 25 mm dia Medium duty PVC conduit for wiring complete with accessories and draw out boxes and their covers.	3,500.00	RM		
256	Providing & laying spare concealed or surface 38 mm dia Medium duty PVC conduit for wiring complete with accessories and draw out boxes and their covers.	100.00	RM		
257	Supply & pulling of 2.5 sq.mm PVC insulated, FRLS, copper conductor (stranded) wire, 1100 V grade, in existing conduit/ GI pipe/ raceways/ modular furniture.	20.00	RM		
258	Supply & pulling of 4.0 sq.mm PVC insulated, FRLS, copper conductor (stranded) wire, 1100 V grade, in existing conduit/ GI pipe/ raceways/ modular furniture	50.00	RM		
259	Providing & Laying of 40 mm dia HDPE Pipe 6kg/cm² ISI 600mm underground for laying of LAN cable including excavation & refilling the trench	500.00	RM		
260	Supply and fixing 32 amps 240 V SPN Industrial type socket outlet with 2 pole and earth, plug top alongwith 32 amps 'C' series SP MCB, in sheet steel enclosure complete with all accessories.	10.00	NO.		
261	Providing and fixing 32 amps 440 V TPN Industrial type socket outlet with 4 pole and earth, plug top alongwith 32 amps 'C' series 4P MCB, in sheet steel enclosure complete with all accessories.	10.00	NO.		

SR. NO	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	NET AMOUNT (Rs)
262	Extra over & above for providing & fixing of lighting switch boards made of powder coated sheet steel box with self locking hinged cover and hylam sheet cover in place of regular switch box	15.00	NO.		
	SUB TOTAL FOR WIRING Rs.				

SR. NO	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	NET AMOUNT (Rs)
	FIXTURE INSTALLATION				
263	Installation, testing and commissioning of ceiling/ bracket fan, with all standard accessories and connecting with 1.5 sq mm Cu. conductor PVC wires.	80.00	NO.		
264	Installation, testing and commissioning of ceiling/ bracket fan, with all standard accessories and connecting with 1.5 sq mm Cu. conductor PVC wires. The standard hanging rod of ceiling fan to be replaced with new GI class `B' pipe above 700 mm and up to 3000 mm long (including painting of new pipe) *Supply of Downroad of Upto 1500 mm length included in the item*	230.00	NO.		
265	Installation, testing & commissioning of exhaust fan up to 300 mm size with all accessories in existing opening in wall and connecting with 2.5 sq mm Cu. conductor PVC flexible cable with flexible conduit from exhaust fan point. *Note :Item also includes supply & installation of louvers of same shade ,size as the exhaust fans)*	45.00	NO.		
266	Making opening in wall including finishing in all respects for exhaust fan up to 300 mm size.	45.00	NO.		
267	Fixing, testing and commissioning of bell/ buzzer/ musical bell/bell indicator on buzzer point.Item includes supply of approved make Bell	20.00	NO.		
268	Installation, testing and commissioning of LED lighting fixture directly on ceiling/ beams/ walls / trusses/false ceiling/shed etc. complete with all accessories . The item include supply of anchore fastners for fixing the Lighting fixture & connecting with 1.5 sq.mm Cu. conductor wires from light point.	650.00	NO.		
	SUB TOTAL FOR FIXTURE INSTALLATION Rs.				

Section-X (Schedule of Quantities)

SR. NO	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	NET AMOUNT (Rs)
	STREET LIGHTING				
269	Supply & installation of street light bracket, fabricated from mild steel medium class pipe ERW type, of 50 mm NB ,1.8 m long having 500 mm vertical &1300 mm bent, with MS/ Thermoplastic switch box of apprx. size 250x200x80 mm having 30A 4 way connector for power, 30A 4 way connector for neutral, 10 A SP MCB. and concealed/ surface conduit(Maximum 5.0 m) between MS/ Thermoplastic box and bracket for wiring .	10.00	NO.		
270	Supply & installation of pole for post top lantern fitting, fabricated from MS `B' class ERW pipe,65 mm NB 1.0 M long with MS/ thermoplastic switch box of apprx. size 250X200X80 MM having 30 A 4 way connector for power, 30 A 4 way connector for neutral, 10 A SP MCB & 25 mm steel conduit between MS box & pole for pulling wires ,complete in all respects. FOR ENTRANCE GATE	10.00	NO.		
271	Supply & installation of pole for post top lantern fitting, fabricated from MS `B' class ERW pipe,65 mm NB 3.5 M long with MS/ thermoplastic switch box of apprx. size 250X200X80 MM having 30 A 4 way connector for power, 30 A 4 way connector for neutral, 10 A SP MCB ,complete in all respects., 1:2:4 Concrete foundation pedestal of size 300x300x1000 mm included in the scope of installation - FOR OPEN GROUND.	5.00	NO.		
272	Fixing, testing & commissioning light fixture on street light pole including wiring from switch box to fixture with 3x2.5 sq. mm copper conductor, FRLS, PVC insulated and sheathed flexible cable.	35.00	NO.		
273	Fixing, testing & commissioning light fixture on pole but for post top lantern at gate, including wiring from switch box to fixture with 3x2.5 sq. mm copper conductor, FRLS, PVC insulated and sheathed flexible cable.	4.00	NO.		
274	Fixing, testing & commissioning light fixture on pole for post top lantern in open ground, including wiring from switch box to fixture with 3x2.5 sq. mm copper conductor, FRLS, PVC insulated and sheathed flexible cable.	10.00	NO.		
275	Supply and installation of hot dip galvanized polygonal/ octagonal street light pole 6000 MM long with foundation bolts, switch box with 30A, 4 way connector for phase, & neutral, 10 A SP MCB, GI earthing pipes with Internal Junction Box earthing wires etc complete as per the detail drawing and technical specification with single arm on top. The rate of the Item also includes the cost of excavation in ground for pole foundation, Reinforcement Steel, Cement concrete of 1:2:4 grade, necessary shuttering, bed concrete with PCC (1:4:8), back filling of excavated earth, water curing of concrete for 7 days, supply & laying of “A” Class GI pipes in the foundation for laying wires/Cables and earthings, etc. complete as directed and as per the drawing. MAKE K-Light- 6181/82	35.00	NO.		
276	Supply & installation of flood lighting 5mtr height tower fabricated from MS Angle/flats, with MS/ Thermoplastic switch box having 30 A 4 way connector for power, 30 A 4 way connector for neutral, 15 A SP MCB, G I earthing pipe . Tower to be Complete with painting & details as per technical specifications and drawing The rate of the Item also includes the cost of excavation in ground for pole foundation, Reinforcement Steel, Cement concrete of 1:2:4 grade, necessary shuttering, bed concrete with PCC (1:4:8), back filling of excavated earth, water curing of concrete for 7 days, supply & laying of “A” Class GI pipes in the foundation for laying wires/Cables and earthings, etc. complete as directed and as per the drawing.Item Includes installation,testing and commissioning of Suitable flood light on the poled	10.00	NO.		
	SUB TOTAL FOR STREET LIGHTING Rs.				

Section-X (Schedule of Quantities)

SR. NO	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	NET AMOUNT (Rs)
	EARTHING & LIGHTENING PROTECTION				
277	Providing Maintenance free Chemical Earthing Pit similar to Axix Electrode Model (3Mtr rod with 2 Bag of 25 Kgs GREP Compound) Two GI pipes one inside the other with proper hot deep galvanization outer dia 62 mm & inner dia 32 mm. The cavity between the rod pipes is filled with Ground Resistance Improvement Powder. The electrode should be sealed from both the ends. Each Electrode should be supplied with bags of GRIP Compound (Ground Resistance Improvment Powder). The Characteristics of this compound is highly conductive, non magnetic & non corrosive in nature. Including all accessories, and civil work complete as per IS 3043-1987 latest revision.	10.00	NO.		
278	Providing Maintenance free Chemical Earthing Pit similar to Axix Earth Electrode (3Mtr rod with 2 Bag of 25 Kgs GREP Compound) Two Copper pipes one inside the other ,outer dia 62 mm & inner dia 32 mm. The cavity between the rod pipes is filled with Ground Resistance Improvement Powder. The electrode should be sealed from both the ends. Each Electrode should be supplied with bags of GRIP Compound (Ground Resistance Improvment Powder). The Characteristics of this compound is highly conductive, non magnetic & non corrosive in nature. Including all accessories, and civil work complete as per IS 3043-1987 latest revision.	14.00	NO.		
279	Providing and laying earth continuity conductor in ground/ on surface of building with necessary clamps as required, of size – GI strip 25X3mm	100.00	RM		
280	Providing and laying earth continuity conductor in ground/ on surface of building with necessary clamps as required, of size – CU strip 25X3mm	50.00	RM		
281	Providing and laying earth continuity conductor in ground/ on surface of building alongwith pipe with necessary clamps as required, of size – GI wire 8 SWG in 19mm A class GI pipe	100.00	RM		
282	Providing & laying earth continuity conductor in ground/on surface /concealed of building alongwith pipe as required with Al. Conductor wire(single core), 10 square mm, PVC insulated of black colour in 19mm 'A' class GI pipe.	500.00	RM		
283	Providing & laying earth roof conductor for lighting protection ,GI strip 25x6 mm complete with SMC/DMC Supports,clamps, Insulator, etc etc.	60.00	RM		
284	GI PERFORATED CABLE TRAY - 300 MM X 50MM X 2MM-Supply & Installation of GI PERFORATED CABLE TRAY - 300 MM(Wide) X 50MM(Depth) X 2MM(Thickness) with supports ,anchor fasteners ,bends & couplings etc. as required.Cable trays shall be provided with Covers	500.00	RM		
285	GI PERFORATED CABLE TRAY - 150 MM X 50MM X 2MM-Supply & Installation of GI PERFORATED CABLE TRAY - 150 MM(Wide) X 50MM(Depth) X 2MM(Thickness) with supports ,anchor fasteners ,bends & couplings etc. as required Cable trays shall be provided with Covers	200.00	RM		

SR. NO	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	NET AMOUNT (Rs)
286	GI PERFORATED CABLE TRAY - 50 MM X 50MM X 2MM-Supply & Installation of GI PERFORATED CABLE TRAY - 50 MM(Wide) X 50MM(Depth) X 2MM(Thickness) with supports ,anchor fasteners ,bends & couplings etc. as required Cable trays shall be provided with Covers	350.00	RM		
287	Providing & Fixing of Lightening Arrestor *Lightining Arrestor with five pointer. Four small 100 mm length with 8mm dia. Center spike with 16mm dia with length 300 mm having pointed radius 2 mm at tip. collector of five spike should have dia more than 30 mm. Conection terminal 12mm hole should be provided. Insulator bush made of polypropolene material to be used between for base of Lightining arrestor and desired pole for fitting. Pole:- GI pipe OD=48mm with height of 1mtr with base plate(100 x100x 6mm) /clamp for wall mounted. (25x6mm L=150 mm) Including supply & Instllation of Guying kit 5mm gauge wire with pvc coated as per length , u clip bolt, eye bolt and two way stud with one side hook anchor bolt and fastner etc accesory for fitting.*	5.00	NO.		
	SUB TOTAL FOR EARTHING & LIGHTENING PROTECTION Rs.				

SR. NO	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	NET AMOUNT (Rs)
	TELEPHONE & COMPUTER DATA WIRING				
288	Providing and fixing/laying of conduit and wires for 1 Telephone point in one box wiring (from telephone tag box to point) with 4 pair, un-armoured, PVC insulated and sheath, 0.51 mm dia. Annealed tinned Cu conductor in 25 mm Medium duty PVC surface/ concealed conduit system including providing and fixing one no. flush type RJ11 modular telephone socket outlet, grid plate mounted with moulded cover plate in zinc chromate passivated GI box. *Including making zaries in the wall and finishing the same.*	25.00	NO.		
289	Providing and fixing TV cable outlet in zinc chromate passivated GI box with moulded modular sheet cover. (cost of TV cable wiring up to this box is not included in this item).	15.00	NO.		
290	Providing & Laying coaxial TV cable in existing surface/ concealed Medium duty PVC system.	350.00	RM		
291	Providing & laying Wires for computer /telephone points/CCTV with CAT – 6, 4 pair copper conductor UTP cable in existing conduit/raceways/ modular furniture	5,000.00	RM		
292	Providing & fixing of a single computer data grid plate mounted outlet unit suitable for CAT-6 Cable with moulded cover plate in recessed zinc chromate passivated GI box complete as required for computer networking system. (No cost for wire & conduit to be included) *Including making zaries in the wall and finishing the same*	50.00	NO.		
293	Providing jelly filled armoured telephone cable , PVC insulated and sheathed , 0.51 mm dia annealed tinned copper conductor Telephone cable size - 10 pair.	500.00	RM		
294	Providing and fixing KRONE type telephone tag block with GI box with prefabricated powder coated or Thermoplastic box, suitable for 50 pairs.	1.00	NO.		
295	Providing and fixing KRONE type telephone tag block with GI box with prefabricated powder coated or Thromoplastic box , suitable for 10 pairs.	5.00	NO.		
296	Supply, Installation, Testing & Commissioning of 6-core Outdoor Cable - Corrugated Steel tape Armored, Loose-tube, Gel-filled, 9/125 Single Mode OS2 Fiber Cabel where ever required in prelaid conduits / RCC hume pipes/HDPE/DWC, whichever maybe available, as per technical specification etc. as required. (Data Networking - Fiber Optic Cable and Components)	500.00	RM		
297	Laying and connecting multi pair telephone cable armoured, jelly filled, PVC insulated & sheath 0.51 mm dia annealed tinned Cu conductor, in underground system including excavation for trenches ,providing bricks & sand etc., identification of pairs and connection in tag block at both ends. (COST OF CABLE NOT INCLUDED IN THIS ITEM) Up to 20 pair telephone cable.	500.00	RM		
298	Laying and connecting multi pair telephone cable armoured, jelly filled, PVC insulated and sheathed, 0.51mm dia annealed tinned copper conductor in air (on cable tray/trenches/GI pipes etc.) with GI clamps, identification of pairs and connections in tag box at both ends. (COST OF CABLES, CABLE TRAYS, GI PIPE ETC. NOT TO BE INCLUDED IN THIS ITEM) - Telephone cable size - up to 20 pair.	200.00	RM		
	SUB TOTAL FOR TELEPHONE & COMPUTER DATA WIRING Rs.				

SR. NO	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	NET AMOUNT (Rs)
	DISTRIBUTION SYSTEM				
299	Supply, installation & commissioning of fabricated/ readymade cubicle type switchboard, totally enclosed, dust & vermin proof, floor mounted, as per specifications enclosed along with powder coating painting, complete with following major components/ switchgears, cable alleys, bus bars & inter-connections & rubber mat as per details of incoming & outgoing switchgear & components MCCB shall be with thermal magnetic release *.I/C & O/G cables will have BOTTOM/TOP ENTRY. As per specs, Approved makes & SLD. LSB having Incoming and Outgoing ratings as: I/C-1 :1 No. 250 A, 50 kA ,4P MCCB O/G : with on/off/trip indication lamps for all MCCB outgoing feeders. 10kA, 125A 4P MCCBs,-3 NO,25kA, 80A 4P MCCBs,-5 NO,25kA, 63 A 4P MCBs-4 NO 10kA, 32A FP MCBs-2 NOS,Street Light Controller feeder consists of 40A 4P MCCB & Power contactors - 1 Set. Street light circuit feeders will be controlled by 1 No. 24 - hour Electronic Timer & shall have auto / Manual Selector Switch, ON/OFF push Buttons, Power contactors, On / Off Ind lamps etc. O/g feeders for Street light circuits must have 32A DP MCB 6 nos.with ON / OFF indication lamps, Street light feeder will have provision for operation on manual mode /auto mode - Farmer & AI Trainning Center Main Panel*	1.00	SET		
300	Supply, installation & commissioning of fabricated/ readymade cubicle type switchboard, totally enclosed, dust & vermin proof, floor mounted, as per specifications enclosed along with powder coating painting, complete with following major components/ switchgears, cable alleys, bus bars & inter-connections & rubber mat as per details of incoming & outgoing switchgear & components MCCB shall be with thermal magnetic release .I/C & O/G cables will have BOTTOM/TOP ENTRY. As per specs, Approved makes & SLD. LSB having Incoming and Outgoing ratings as: I/C :1 No. 125 A, 35 kA ,4P MCCB with R,Y,B phase indication lamps, on / off /Trip indication for all feeders , Digital MFM, Digital Ammeter 0-100 A with SS & CTs, Digital Voltmeter 0-500 V with SS. O/G : with on/off/trip indication lamps for all MCCB outgoing feeders. 10kA, 63A 4P MCBs,-12 NOS,10kA, - [01] AI TRAINING CENTER & FARMER TRAINING CENTER PANEL	1.00	SET		
301	Supply, installation & commissioning of fabricated/ readymade cubicle type switchboard, totally enclosed, dust & vermin proof, floor mounted, as per specifications enclosed along with powder coating painting, complete with following major components/ switchgears, cable alleys, bus bars & inter-connections & rubber mat as per details of incoming & outgoing switchgear & components MCCB shall be with thermal magnetic release .I/C & O/G cables will have BOTTOM/TOP ENTRY. As per specs, Approved makes & SLD. LSB having Incoming and Outgoing ratings as: I/C :1 No. 80 A, 50 kA ,4P MCCB with R,Y,B phase indication lamps, on / off /Trip indication for all feeders , Digital MFM, Digital Ammeter 0-100 A with SS & CTs, Digital Voltmeter 0-500 V with SS. O/G : with on/off/trip indication lamps for all MCB outgoing feeders. 10kA, 40A 4P MCBs-8 NO,10kA,- [02-1] HOSTEL BUILDING-1, [02-2] HOSTEL BUILDING-2 PANEL	2.00	SET		

SR. NO	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	NET AMOUNT (Rs)
302	Supply, installation & commissioning of fabricated / readymade MCCB type electrical distribution board (6 WAYS 3 PHASE OUT GOING) flush type, indoor enclosure, hinged front cover, dust & vermin proof complete with switchgear given below and interconnection, as per detailed specification enclosed, along with powder coating painting. All MCCB with min 25 KA and MCB/RCCB/ELCB shall be of min 10 KA rupturing capacity. RCCB /ELCB shall have sensitivity of 300 mA. Detail of incoming & outgoing switchgear & component enclosed Incoming: 40 A FP MCB-1No. 40A 300mA RCCB -3 No., Outgoing: 16-32 A TP MCB-18 nos	5.00	NO.		
303	Supply, installation & commissioning of fabricated / readymade MCB type electrical distribution board (6 WAYS VTPN DB) flush type, indoor enclosure, hinged front cover, dust & vermin proof complete with switchgear given below and interconnection, as per detailed specification enclosed, along with powder coating painting. All MCB with min 25 KA and MCB/RCCB/ELCB shall be of min 10 KA rupturing capacity. RCCB /ELCB shall have sensitivity of 300 mA. Detail of incoming & outgoing switchgear & component enclosed Incoming: 63 A FP MCB-1No. ,Outgoing: 40A 10KA TP MCB -3 nos.,32A 10KA TP MCB- 3nos, [03] CANTEEN BUILDING VTPN DB	1.00	NO.		
304	Supply, installation & commissioning of fabricated / readymade MCB type electrical distribution board (SPN 4 WAYS) flush type, indoor enclosure, hinged front cover, dust & vermin proof, complete with switchgear given below and interconnection, as per detailed specification enclosed, along with powder coating painting. All MCB & RCCB/ ELCB shall be of minimum 10 KA rupturing capacity. RCCB /ELCB shall have sensitivity of 300 mA. Detail of incoming & outgoing switchgear & component enclosed *Incoming: 32 A DP MCB+RCCB, 1 No., Outgoing: 10 - 20 A SP MCB- – 4 nos.*	5.00	NO.		
305	Supply, installation & commissioning of fabricated / readymade MCB type electrical distribution board (SPN 8 WAYS) flush type, indoor enclosure, hinged front cover, dust & vermin proof, complete with switchgear given below and interconnection, as per detailed specification enclosed, along with powder coating painting. All MCB & RCCB/ELCB shall be of minimum 10 KA rupturing capacity. RCCB /ELCB shall have sensitivity of 300 mA. Detail of incoming & outgoing switchgear & component enclosed *Incoming: 32 A DP MCB+RCCB, 1 No., Outgoing: 10 - 20 A SP MCB- – 8 nos.*	5.00	NO.		
306	Supply, installation & commissioning of fabricated / readymade MCB type electrical distribution board (SPN 12 WAYS) flush type, indoor enclosure, hinged front cover, dust & vermin proof, complete with switchgear given below and interconnection, as per detailed specification enclosed, along with powder coating painting. All MCB & RCCB/ELCB shall be of minimum 10 KA rupturing capacity. RCCB /ELCB shall have sensitivity of 300 mA. Detail of incoming & outgoing switchgear & component enclosed *Incoming: 40 A DP MCB+RCCB, 1 No., Outgoing: 10 - 20 A SP MCB- – 12 nos.*	2.00	NO.		

SR. NO	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	NET AMOUNT (Rs)
307	Supply, installation & commissioning of fabricated / readymade MCCB type electrical distribution board (8 WAYS 3 PHASE OUT GOING) flush type, indoor enclosure, hinged front cover, dust & vermin proof complete with switchgear given below and interconnection, as per detailed specification enclosed, along with powder coating painting. All MCCB with min 25 KA and MCB/RCCB/ELCB shall be of min 10 KA rupturing capacity. RCCB /ELCB shall have sensitivity of 300 mA. Detail of incoming & outgoing switchgear & component enclosed Incoming: 63 A FP MCB-1No. 40A 300mA RCCB -3 No., Outgoing: 16-32 A SP MCB-24 nos	8.00	NO.		
308	Laying of XLPE insulated outer and inner PVC sheet 1100 V grade armoured Al. Conductor cable in underground including excavation, supply of bricks/sand etc. and providing and fixing cable glands and lugs at both ends as per specification. Near end of cable, if required GI pipe A class of suitable size to be provided without extra cost instead of laying cable in ground with bricks & sand. (COST OF CABLE NOT TO BE INCLUDED IN THIS ITEM.) Cable size up to 16 SQMM.	1,500.00	RM		
309	Laying of XLPE insulated outer and inner PVC sheet 1100 V grade armoured Al. Conductor cable in underground including excavation, supply of bricks/sand etc. and providing and fixing cable glands and lugs at both ends as per specification. Near end of cable, if required GI pipe A class of suitable size to be provided without extra cost instead of laying cable in ground with bricks & sand. (COST OF CABLE NOT TO BE INCLUDED IN THIS ITEM.) Cable size above 16 sq. mm. up to 50 sq. mm.	1,000.00	RM		
310	Laying of XLPE insulated outer and inner PVC sheet 1100 V grade armoured Al. Conductor cable in underground including excavation, supply of bricks/sand etc. and providing and fixing cable glands and lugs at both ends as per specification. Near end of cable, if required GI pipe A class of suitable size to be provided without extra cost instead of laying cable in ground with bricks & sand. (COST OF CABLE NOT TO BE INCLUDED IN THIS ITEM.) Cable size above 120 sq. mm. up to 300 sq. mm.	400.00	RM		
311	Providing PVC insulated outer and inner PVC sheath, 1100 V grade, armoured Copper conductor cable (cable laying cost not included) -size of cable 4x4 sq mm.	100.00	RM		
312	Providing XLPE insulated outer and inner PVC sheath, 1100 V grade, armoured Aluminium conductor cable (cable laying cost not included) -size of cable 2x10 sq mm.	50.00	RM		
313	Providing XLPE insulated outer and inner PVC sheath, 1100 V grade, armoured Aluminium conductor cable (cable laying cost not included) -size of cable 4X10 sq mm.	700.00	RM		
314	Providing XLPE insulated outer and inner PVC sheath, 1100 V grade, armoured Aluminium conductor cable (cable laying cost not included) -size of cable 4X16 sq mm.	50.00	RM		
315	Providing XLPE insulated outer and inner PVC sheath, 1100 V grade, armoured Aluminium conductor cable (cable laying cost not included) -size of cable 4X25 sq mm	530.00	RM		

SR. NO	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	NET AMOUNT (Rs)
316	Providing XLPE insulated outer and inner PVC sheath, 1100 V grade, armoured Aluminium conductor cable (cable laying cost not included) -size of cable 3.5X50 sq mm.	400.00	RM		
317	Providing XLPE insulated outer and inner PVC sheath, 1100 V grade, armoured Aluminium conductor cable (cable laying cost not included) -size of cable 3.5X120 sq mm.	200.00	RM		
318	Providing XLPE insulated outer and inner PVC sheath, 1100 V grade, armoured Aluminium conductor cable (cable laying cost not included) -size of cable 3.5X150 sq mm.	500.00	RM		
319	Laying of XLPE insulated outer and inner PVC sheet 1100 V grade armoured Al. Conductor cable in air (on cable trays or GI Pipes etc.) including providing and fixing GI Cable clamps, cable glands and lugs at both ends as per specification (COST OF CABLE, CABLE TRAYS, GI PIPES NOT INCLUDED IN THIS ITEM.) Cable size upto 16 sq mm	500.00	RM		
320	Laying of XLPE insulated outer and inner PVC sheet 1100 V grade armoured Al. Conductor cable in air (on cable trays or GI Pipes etc.) including providing and fixing GI Cable clamps, cable glands and lugs at both ends as per specification (COST OF CABLE, CABLE TRAYS, GI PIPES NOT INCLUDED IN THIS ITEM.) Cable size above 16 sq. mm. up to 50 sq. mm	100.00	RM		
321	Laying of XLPE insulated outer and inner PVC sheet 1100 V grade armoured Al. Conductor cable in air (on cable trays or GI Pipes etc.) including providing and fixing GI Cable clamps, cable glands and lugs at both ends as per specification (COST OF CABLE, CABLE TRAYS, GI PIPES NOT INCLUDED IN THIS ITEM.) Cable size above 120 sq. mm. up to 300 sq. mm	50.00	RM		
322	Providing and Laying of copper conductor, PVC insulated, unarmoured cable - 1100 volts, 3.5x10 sqmm	50.00	RM		
	SUB TOTAL FOR DISTRIBUTION SYSTEM Rs.				

Section-X (Schedule of Quantities)

SR. NO	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	NET AMOUNT (Rs)
	LIGHT FITTINGS ,FANS,RO,WATER COOLER,AIR CONDITIONERS,DG SET,CCTV				
323	Supply of IP20 LED surface mounted 4ft baton light fixture of wattage upto 45 W fixture Minimum lumen output of min. 120 lumens/watt. With necessary mounting arrangement. THD < 10% , PF > 0.90 maintain min. 70% of lumen output at 50000 burning hrs. Surge protection of min. 2KV. Operating voltage range 140-270V AC. Servicability class B Fixture data sheet, catalogue, LM80 & LM79 report, technical test certificate of the fixture in accordance with IS & IEC standards and detailed driver report to be submitted. Reference Model : Philips : BN308C LED60S-6500 L120 PSU WH"/Equivalent in Wipro/Equivalent in Bajaj	200.00	NO.		
324	Supply of upto 20W LED surface Downlight lighting fixture (minimum IP 20 protected) neutral white light colour lumen output of minimum 1600 lumens maintain min. 70% of lumen output at 50000 burning hrs. Minimum inbuilt surge protection of minimum 2KV THD<10%. Servicability class B The fixture should be complete with all necessary surface mounting accessories. LM80 & LM79 report, technical test certificate of the fixture in accordance with IS & IEC standards and detailed driver report to be submitted. Reference Model no. : Wipro: LD81-171-XXX-60-SM / Philips : SM261C LED20S - 6500 PSU WH/Equivalent in Bajaj	20.00	NO.		
325	Supply of recess mounted decorative LED light fixture upto 18W Downlight with minimum 1300 lumens output (minimum IP 20 protected) with powder coated pressure die cast aluminium housing. The fixture should have multi chip on board LED and metal clad PCB. The luminaire should have neutral white light colour . The fixture should have minimum inbuilt surge protection of minimum 2KV. The fixture should be complete with all necessary surface mounting accessories. Fixture catalogue, technical test certificate of the fixture in accordance with IS & IEC standards and detailed driver report to be submitted. Suggested Make and Model no. : Philips: DN172 B LED 15S/ Wipro: IRIS SLIM ROUND LD80-171-XXX-60-XX/Equivalent in Bajaj	180.00	NO.		

SR. NO	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	NET AMOUNT (Rs)
326	Supply of Recess mounted LED 2x2 ft panel light fixture upto 40W with minimum 3500 lumen output and should maintain min. 70% of lumen output at 50000 burning hrs (min. IP20 protected) with powder coated CRCA housing and translucent diffuser. The fixture should have multi chip on board LED and metal clad PCB. The luminaire should have neutral white light colour . The fixture should have minimum inbuilt surge protection of minimum 2KV with THD<15%. The fixture should be complete with all necessary mounting accessories alongwith Powder coated Mounting Frame suitable for Jypsum/ POP typical false ceilings. Fixture catalogue, LM80 & LM79 report, technical test certificate of the fixture in accordance with IS & IEC standards and detailed driver report to be submitted. Suggested Make and Model No.: Philips:RC380B LED36S / Wipro: CRCO10R038HP57GL1 /Equivalent Model of Bajaj /	40.00	NO.		
327	Supply of whether proof LED surface mounted 4ft baton light fixture of wattage upto 40 W (minimum IP65 protected) fixture Minimum lumen output of min. 120 lumens/watt. Virgin polycarbonate with UV stabilized diffusers with necessary mounting arrangement. THD < 10% , PF > 0.90 maintain min. 70% of lumen output at 50000 burning hrs. Surge protection of min. 2KV. Operating voltage range 140-270V AC. Servicability class B Fixture data sheet,, catalogue, LM80 & LM79 report, technical test certificate of the fixture in accordance with IS & IEC standards and detailed driver report to be submitted. Reference make and model : Philips : WTC 201CLED 44S-6500-PSU-L120/Equivalent in Wipro/Equivalent in Bajaj	150.00	NO.		
328	Supply of whether proof LED surface mounted 2ft baton light fixture of wattage upto 10 W (minimum IP65 protected) fixture Minimum lumen output of min. 90 lumens/watt. Virgin polycarbonate with UV stabilized diffusers with necessary mounting arrangement. THD < 10% , PF > 0.90 maintain min. 70% of lumen output at 50000 burning hrs. Surge protection of min. 2KV. Operating voltage range 140-270V AC. Servicability class B Fixture data sheet,, catalogue, LM80 & LM79 report, technical test certificate of the fixture in accordance with IS & IEC standards and detailed driver report to be submitted. Reference make and model : Philips : WTC 201CLED 44S-6500-PSU-L120/Equivalent in Wipro/Equivalent in Bajaj	20.00	NO.		

SR. NO	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	NET AMOUNT (Rs)
329	Supply of surface/ wall mounted LED industrial flood light with external cradle adjustable mounting. wattage uptp 60W (minimum IP 65 protected) with powder coated pressure die cast aluminium housing injection molded polycarbonate diffuser neutral white light colour with lumen output of minimum 5100 lumens min. 70% of lumen output at 50000 burning hrs. inimum inbuilt surge protection of Minimum 5KV with THD<10%. The fixture should be complete with all necessary surface mounting accessories. Fixture catalogue, LM80 & LM79 report, technical test certificate of the fixture in accordance with IS & IEC standards and detailed driver report to be submitted. Refrence Model: Wipro: / Philips: Equivalent model with required specifications.	5.00	NO.		
330	Supply of LED industrial street light fixture upto 60W mimimum 5000 lumen output min. 70% of lumen output at 50000 burning hrs (minimum IP 65 protected) Powder coated pressure die cast aluminium housing . Neutral white light colour. surge protection of minimum 5KV THD<10%. Complete with all necessary mounting accessories for mounting on typical street light poles & brackets. Fixture catalogue, LM80 & LM79 report, technical test certificate of the fixture in accordance with IS & IEC standards and detailed driver report to be submitted. Suggested Make and Model No.: Wipro: LR02-671-XXX-57-XX or latest /Philips: BRP409 LED 064 (Round Shape holder) /Equivalent in Bajaj	35.00	NO.		

Section-X (Schedule of Quantities)

SR. NO	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	NET AMOUNT (Rs)
331	Supply of whether proof LED surface mounted 7wt Spike light fixture with IP65 rating (minimum IP65 protected) fixture Minimum lumen output of min. 90 lumens/watt. Virgin polycarbonate with UV stabilized diffusers with necessary mounting arrangement. THD < 10% , PF > 0.90 maintain min. 70% of lumen output at 50000 burning hrs. Surge protection of min. 2KV. Operating voltage range 140-270V AC. Servicability class B Fixture data sheet,, catalogue, LM80 & LM79 report, technical test certificate of the fixture in accordance with IS & IEC standards and detailed driver report to be submitted. Reference make and model :Wipro	30.00	NO.		
332	Supply of 45W clear street light LED fixture with mimimum 3500 lumen output and should maintain min. 70% of lumen output at 50000 burning hrs (minimum IP 65 protected) with powder coated pressure die cast aluminium housing . The fixture should have multi chip on board LED and metal clad PCB. The luminaire should have neutral white light colour. The fixture should have minimum inbuilt surge protection of minimum 4KV with THD<10%. The fixture should have thermally and physically isolated optical & driver compartment. The fixture should be complete with all necessary mounting accessories for typical street light poles & brackets. Fixture catalogue, LM80 & LM79 report, technical test certificate of the fixture in accordance with IS & IEC standards and detailed driver report to be submitted. Complete with adjustable type wall mounting arragnement as per the photograph shown as suggestion. Suggested Make and Model No.: Philips BRP050 LED36S/WIPRO LR13-501-XXX-57-XX/ CROMPTON GREAVES : LSTP/45/CDL /Bajaj BRTFG 45W LED V2	2.00	NO.		
333	Supply of Post top lantern light fixtures with LED lighting (industrial fixture) of upto 45W with minimum 2500 lumen output (minimum IP 65 protected) with powder coated pressure die cast aluminium housing . The fixture should have multi chip on board LED . The luminaire should have neutral white light colour. The fixture should have minimum inbuilt surge protection of minimum 3KV with THD<10%. The fixture should have thermally and physically isolated optical & driver compartment. The fixture should be complete with all necessary mounting accessories for typical street light poles & brackets. Fixture catalogue, LM80 & LM79 report, technical test certificate of the fixture in accordance with IS & IEC standards and detailed driver report to be submitted. Suggested Make and Model No.: Wipro: LP02-501-XXX-57-XX / BAJAJ : BGCT W4 LED WW/ Similiar in Philips/	20.00	NO.		
334	Wall Fan- Wall mounted air circulators / fans, 400 mm sweep complete with all accessories. Fan shall be suitable for operation on 230 V, 50 Hz, AC supply. REference Make & model : Bajaj - Esteem / Crompton Greaves (CG) - High flow wall fan / equivalent in Orient & Usha make./Equivalent in Bajaj	10.00	NO.		

SR. NO	DESCRIPTION	QTY	UOM	UNIT RATE (Rs)	NET AMOUNT (Rs)
335	Supply of BEE Min. Single Star rated Ceiling fan of 1200 mm sweep, It shall be suitable for 230 V, 50 Hz AC supply. Fan should have two double ball bearings type and should have aluminium body and 3 aluminium blades, top & bottom canopy, down rods, capacitor, duly wired up to the connector block and ready for use. Colour of fan shall be white and it shall be without regulator. Refrence Make & model: Crompton Greaves (CG) - HB PLUS or HS PLUS/ Usha – Technix/Bajaj – Excel Star / Orient - PSPO Energy Star	210.00	NO.		
336	Supply of Heavy duty exhaust fan with IP-55 protection against water entry & dust ingress, totally enclosed highly efficient heavy duty motor with pressure die cast aluminium rotor mounted on two ball bearings, aerodynamically contoured sheet steel blades, rigid frames with rubber mounting, epoxy powder coated paint finish. Fan to confirm to IS:2312-1967. Fan shall be suitable for operation on 230 V, 50 Hz, AC and of 1400 RPM. Impeller diameter of the fan shall be 300 mm. Item also includes supply of metallic louvers of same shade and size as the exhaust fans) Refrence Make & Model: Crompton Greaves (CG) -HDEF 300/4/1. / USHA/ Bajaj - Supreme Plus & equivalent in Almonard & Marathon make.	40.00	NO.		
	SUB TOTAL OF LIGHT FITTINGS ,FANS,RO,WATER COOLER,AIR CONDITIONERS,DG SET,CCTV				

Section - X
Schedule of Quantities

SUMMARY SHEET		
SL	**DESCRIPTION (TRADE NAMES)**	**TOTAL (RS)**
1	EARTHWORK	
2	CONCRETE	
3	MASONRY WORK	
4	WOOD & ALUMINIUM WORKS	
5	FINISHING WORKS	
6	FLOORING WORKS	
7	STEEL WORK	
8	ROOFING, MS STEEL STRUCTURE BUILDINGS & STRUCTURAL CLADDINGS, BARRICADES ETC WORKS	
9	MISCELLANEOUS WORKS	
10	ROAD WORK	
11	WATER SUPPLY WORK	
12	SANITARY WORK	
13	LANDSCAPING	
14	WIRING	
15	FIXTURE INSTALLATION	
16	STREET LIGHTING	
17	EARTHING & LIGHTENING PROTECTION	
18	TELEPHONE & COMPUTER DATA WIRING	
19	DISTRIBUTION SYSTEM	
20	LIGHT FITTINGS ,FANS,RO,WATER COOLER,AIR CONDITIONERS,DG SET,CCTV	
A	TOTAL PRICE (Rs) :	
B	DISCOUNT : _____ %	
C	NET TOTAL PRICE (Rs)	
D	NET TOTAL PRICE IN WORDS :	
E	BIDDERS TO MENTION % OF TAXES AND DUTIES CONSIDERED :	

General Notes for Section X (Schedule of Quantity - SOQ)

1. "PVC" to be considered as per the same specification of "uPVC / PVC-U" for all PVC pipes and specials mentioned under items of the Schedule of Quantity.

2. The contractor shall provide and make all necessary and required permanent connections/terminations with new as well as existing pipes (uPVC/cPVC/GI/MS/etc) and the pipes laid under the scope of other contractors/agencies (uPVC/cPVC/GI/MS/etc) at his own cost for which he shall provide and supply all the specials and fittings (excluding Valves). Quoted rates of various items include cost of such connections/terminations including specials and fittings even if not specified in the items.

3. Various item of works include for providing and fixing accessories/special compatible fittings including brass threaded compatible fittings etc as applicable all required as per manufacturers recommendations for fixing with uPVC/cPVC/GI pipes and CP fittings etc as and if applicable. Quoted rates of various items include cost of the same.

4. "Dia." or "Diameter" refers to Nominal bore/Nominal size of the pipes and specials mentioned under any item of Schedule of Quantity if not mentioned specifically. OD/O.D. refers to outer diameter of the material.

5. Road gully chambers and Plinth Protection works etc. are included in technical specifications and shall be measured and paid under individual items of the tender in different trades as applicable.

6. Manhole chambers, Inspection chambers and all other chambers for utility or any other purpose having sizes other than stipulated under various items of work **or** having no separate item at all for the same, they shall be measured and paid under individual items of schedule of quantity of the tender(this contract) in different trades as applicable such as excavation, concrete, masonry, finishing, flooring etc.

7. Scaffolding, staging, false staging at all required levels, lift, lead, transportation, loading, unloading, all wastages, rolling margins, works at all the heights & levels, curing with water for required time period etc. are inclusive for all the items required to be executed under the Schedule of Quantities of this contract even if not mentioned in any item of work. Rates are included under the respective items accordingly.

8. Plinth level of the building shall be the finished floor level of the Ground floor. Plinth level for the compound wall shall be considered as top level of ground RCC beam for the portion under consideration. If ground RCC beam does not exist, Ground Level shall be considered as plinth level for such cases.

9. Basic price/ Basic rate of material as mentioned in the Schedule of Quantity shall be in Indian Rupees if not mentioned specifically.

10. Contractor shall be required to carry out mock-up exercise cum sampling works for all the finishing works, flooring works, door and window works, steel works, plumbing and sanitary works for approval of the architect cum structural consultant and NDS. This shall be deemed covered under the total contract price quoted by the bidder/contractor.

11. Chrome plated wall flanges shall be provided and fixed for all the plumbing items if not specified or not mentioned in the items of works. This shall be deemed covered under the respective item rates/prices quoted by the bidder/contractor for the works.

12. All the specialised works like Waterproofing, Pest control, PU flooring, Epoxy coving etc. shall be carried out through authorised applicator of the manufacturer. They need to provide Performance Guarantee for 5-10 years as mentioned in respective items of SOQ. Rates are included under the respective items.

13. M-sand (Robo sand) to comply with the latest codal provisions used for all construction works. However for second coat of 7 mm thick of sand face plastering, river sand is to be used to get uniform finish.

14. In the case of two or more similar items of works available in the Schedule of Quantity (SOQ), measurements shall be

recorded/considered for payment under the item for which the rate is quoted lowest by the contractor among such items.

15. All the service pipelines to be laid/fixed exposed on walls/RCC members shall be provided and fixed with approved arrangement viz. standard pattern holders bat clamps "**C**" shaped made out of galvanized/painted Mild Steel(MS) flat carrier (minimum 4mm thick) fixed with existing RCC or brick masonry using expandable mechanical anchors of approved make as per the recommendation of manufacturer and galvanized Mild Steel(MS) "**C**" or "**U**" clamp (minimum 5.0mm thick/dia threaded) fixed on the bat clamps to secure the service pipes with GI nuts and washers of required shape and size so as to fit tightly on the pipes when tightened etc complete as directed. The spacing of such clamps shall be maximum 1200mm or as directed otherwise. This shall be followed for all the service pipelines (water supply, sanitary, electrical etc) in open system even if not specifically mentioned in any item of works in the Schedule of Quantities of this contract. Rates are included under the respective items.

SECTION- IX

ACCEPTABLE FORMS

OF BANK GUARANTEES

SECTION IX

Acceptable Forms of Bank Guarantees

Table of contract

1.0 Form of Bank Guarantee for Performance Security (On Non-Judicial Stamp Paper of Rs. 100 minimum or as per the stamp act of Local State Government.)

Bank Guarantee no. Date:

This deed of guarantee made this_____day of _____ (Two thousand _____by (Name and the address of the Bank), hereinafter referred to as the bank, which expression shall unless repugnant to the context and meaning thereof includes its legal representatives, successors and assignees and the ----------,(hereinafter referred to as the Service Recipient) which expression shall unless repugnant to the context AND meaning thereof include its legal representative, successors or assignees.

Where as RSS, in the capacity of Pure Agent on behalf of the Service Recipient, has awarded a contract bearing no.____ _____dated_____ on M/s. _____ _____(name and the address of the party), hereinafter referred to as the Contractor, for the execution, completion and the maintenance of_____.

And whereas, the Contractor has agreed to submit a performance security in the form of a bank guarantee to the Service Recipient as per the terms and conditions of the bidding documents and the Contract which will be kept valid up to_____calendar months from the date of bank guarantee (the period should be till end of Period of Maintenance).

In consideration of the RSS, in the capacity of Pure Agent on behalf of the Service Recipient, having agreed to award the Contract on the Contractor, we _____ (the name of bank), do hereby guarantee, undertake, promise and agree to with the Service Recipient, its legal representatives, successors and assignees that the within named (the name of the Contractor) their legal representatives and assignees will faithfully perform and fulfil everything within the bidding document and the Contract order on their part to be performed or fulfilled, at the time (time being the essence of the Contract) and in the manner therein provided, do all obligations hereunder and we further undertake and guarantee to make payment to the Service Recipient a sum of Rs._____(Rupees_____only) without any demur, in case the Contractor, their legal representatives and assignees do not faithfully perform and fulfil everything within the bidding document and the Contract order on their part to be performed or fulfilled, at

the time and in the manner therein provided and do not wilfully and promptly do all obligations hereunder.

In case, the Contractor fails to perform or fulfil the Contract as per the terms and conditions agreed upon, the Service Recipient is entitled to demand an amount equal to Rs. ---------- from the Contractor and the demand made by the Service Recipient itself will be conclusive evidence and proof that the Contractor has failed to perform or fulfil his obligations under the Contract and neither the Contractor nor the Bank will be entitled to raise any dispute regarding the reasons for the failure of performance or fulfilment on any ground .

We, (the name of the Bank), do hereby undertake to pay an amount equal to Rs. ----------, being the amount due and payable under this guarantee, without any demur, merely on a demand from the Service Recipient which has to be served on us before the expire date of bank guarantee i.e._____stating that the amount claimed is due by way of non-performance of the Contractual obligations as aforesaid by the Contractor or by the reason of the Contractor's failure to perform the said contractual commitments , any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs._____(Rupees_____ _____ only) being the full amount guaranteed.

We, (the name of bank), further agree that the performance security herein contained shall remain in full force and effect for a period of _____ calendar months from the date of the bank guarantee (the period shall be till the end of Period of Maintenance) and till the Service Recipient certifies that the terms and conditions of the said Contract have been fully and properly carried out by the said Contractor and accordingly discharge the guarantee, unless a demand or a claim under this guarantee is made on us in writing by the Service Recipient on or before_____we shall be discharged from all liabilities under this performance security thereafter.

We, (the name of bank), further agree with the Service Recipient that the Service Recipient shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and the conditions of said bidding document and the Contract or to extend the time of performance by the said Contractor from time to time or postpone for any time or from time to time and any of the power exercisable by the Service Recipient against the Contractor and to forebear or enforce any of the terms and

conditions relating to the said bidding document and the Contract and we shall not be relieved from our liability by reason of any such variation or extension being granted to the said Contractor, or for any forbearance, act or omission on the part of the Service Recipient to the said Contractor by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

This guarantee shall be in addition to and without prejudice to any other securities or remedies which the Service Recipient may have or hereafter possess in respect of the works executed or intended to be executed and the Service Recipient shall be under no obligation to marshal in favour of the bank any such securities or funds or asset that the Service Recipient may be entitled to receive or have a claim upon and the Service Recipient at its absolute discretion may vary, exchange, renew, modify or refuse to complete to enforce or assign any security or instrument.

The bank agrees that the amount hereby guaranteed shall be due and payable to the Service Recipient on serving us with a notice before expiry of bank guarantee, requiring the payment of the amount and such notice shall be deemed to have been served on the bank either by actual delivery thereof to the bank or by dispatch thereof to the bank by registered post at the address of the bank.

In order to give full effects to the provisions of this guarantee the bank hereby waives all rights inconsistent with the above provisions and which the bank might otherwise as a guarantor be entitled to claim and enforce.

We,_____, undertake to renew the Bank Guarantee provided the request for renewal is made by the contractor before the expiry of Bank Guarantee.

We,_____, lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Service Recipient in writing and the guarantee shall be a continuous and irrevocable guarantee up to a sum of Rs._____(Rupees_____.) only.

Notwithstanding anything stated hereinbefore: (i) our liability under this guarantee is restricted to Rs._____(ii) the guarantee shall remain in force till_____and (iii) the Bank is liable to pay the guarantee amount or any part thereof under this bank guarantee only if the Service Recipient serves upon the Bank a written claim or demand on or before_____.

SIGNATURE

PLACE

BANK SEAL

DATE

BANK CODE NO.

NOTE:

1: The contractor should ensure that the seal and the code no. of the signatory are put by the bankers, before submission of the bank guarantees.

2: The value of stamp duty should be minimum Rs. 100 or as per the latest stamp act of local State Government from where the Bank Guarantee is issued.

3: Bank should confirm the bank guarantee through "Structured Financial Messaging System (SFMS)", Bank account details of beneficiary are as follows:

Beneficiary Name	
Bank Account Number	
IFSC Code	
Beneficiary Bank Name	
Beneficiary Bank Address	

1. **Bank charges, if any, on this account will be borne by the beneficiary**
2. **If the issuing bank is not having the SFMS facility, the bank guarantee needs to be confirmed by its controlling office i.e. Administrative / Regional / Zonal Office to the following address**

Beneficiary Name	
Beneficiary Address	

2.0 Form of Bank Guarantee for Bid security (On the Non-Judicial Stamp paper of Rs. 100 minimum or as per the stamp act of Local State Government).

Bank Guarantee No: Date:

This deed of guarantee made this_____day of_____(two thousand and _____) by (Name and the address of the Bank), hereinafter referred to as the Bank, which shall unless repugnant to the context and the meaning thereof includes its legal representatives, successors and assignees and the Rahuri Semen Station ,(hereinafter referred to as the RSS) which expression shall unless repugnant to the context and meaning thereof include its legal representative, successors or assignees.

Whereas the RSS has invited bids for the Construction of the proposed _____ _____ by the Invitation to bid no._____.

AND WHEREAS M/s _____ _____ (Name and the Address of the bidders) who having submitted their bids (hereinafter referred to as the bidder) and have agreed to deposit to the RSSan amount indicated in the Invitation to bid as per the terms and the conditionsof the bidding documents.

AND WHEREAS the RSS is also willing to accept a Bank guarantee in lieu ofpayment by demand draft of an amount equivalent to the amount of bid security required to be deposited by the bidder to the RSS and the guarantee shall bekept valid for 120 days after the day of the opening of the bids.

In consideration of the RSS having agreed to consider the bid proposals having submitted by the bidder without depositing the amount of bid security and against this Bank guarantee, we (name and the address of the Bank) hereby undertake and guarantee to make payment to the RSS the amount of bid security or any part thereof not deposited by the bidder to the RSS at any time (time being the essence of the Contract) when the RSS asks for the same asper the terms and the conditions of the bidding documents within 120 days from the date of opening of the bids.

The Bank further undertakes not to revoke this guarantee during its currency except with the previous consent of the RSS in writing and the guarantee shall be continuous and irrevocable guarantee up to a sum of Rs. _____ (Rupees_____only) provided

always that any indulgence or forbearance on the part of the RSS to the said bidder, with or without the consent of the Bank shall not prejudice or restrict remedies against the bank nor shall the same in any event be a ground of defence by the Bank against the RSS.

In case the RSS puts forth a demand in writing on the Bank for the paymentof the amount in full or in part against this Bank guarantee, the Bank will consider without demur that such demand by itself is a conclusive evidence and proof that the bidder has failed in complying with the terms and conditions stipulated by the RSS in its bidding document and payment will be made tothe without raising any disputes regarding the reasons for such failures on the part of the bidder.

The Bank shall not be discharged or released from this guarantee by any arrangement between the bidder and the RSS with or without the consent of the Bank or any alterations in the obligations of the parties or by an indulgence, forbearance shown by the RSS to the bidder.

This guarantee shall be in addition to and without prejudice to any other securities or remedies which the RSS may have or hereafter possess against the bidder and the RSS shall be under no obligations to marshal in favour of the Bank any such securities or fund or assets that the RSS at its absolute discretion may vary, exchange, renew, modify or refuse to complete or enforce orassign any security or instrument.

The Bank agrees that the amount hereby guaranteed shall be due and payable to the RSS on serving us with a notice before expiry of Bank Guarantee requiring the payment of the amount and such notice shall be deemed to have been served on the Bank either by actual delivery thereof to the Bank or by dispatch thereof to the Bank by registered post at the address of the Bank.

In order to give full effect to the provisions of this guarantee the Bank thereby waives all rights inconsistent with the above provisions and which the Bank might otherwise as a guarantor be entitled to claim and enforce.

The guarantee shall remain in force until_____and the Bank undertakes to renew the Bank Guarantee provided the request is made by the bidder before the expiry of Bank Guarantee.

Notwithstanding anything stated hereinbefore:(I) our liability under this guarantee is restricted to Rs. _____ (Rupees _____ _____ only) (ii) The bank

guarantee shall remain in force till_____and (iii) The bank is liable to pay the guarantee amount or any part thereof under this bank guarantee only if the RSS serves upon the Bank a written claim or demand on or before_____.

Place

Signature

Date:

Bank Seal

Bank Code no.

Note :

1: **Bidders should ensure that the seal and code no. of signatory is put by the Bankers, before submission of the Bank guarantees.**

2: **The value of stamp duty should be minimum Rs. 100 or as per latest stamp act of Local State Government, from where the bank guarantee is issued.**

3: **Bank should confirm the bank guarantee through "Structured Financial Messaging System (SFMS)",. Bank account details of beneficiary are as follows:**

Name of Beneficiary	
Current Account No.	
RTGS/IFSC code	
Name of Bank & Address	

1. **Bank charges, if any, on this account will be borne by the beneficiary**

2. **If the issuing bank is not having the SFMS facility, the bank guarantee needs to be confirmed by its controlling office i.e. Administrative / Regional / Zonal Office to the following address**

Beneficiary Name	
Beneficiary Address	

4.0 Form of Bank Guarantee for Retention Money (on Non-judicial Stamp Paper of Rs. 100 minimum or as per stamp act of local state Govt.)

Bank Guarantee no. Date:

This deed of guarantee made this_____day of_____(two thousand _____) by_____(Name and the address of the Bank), hereinafter referred to as "the Bank", which express where the context and the meaning so require, include its legal representatives, successors and assignees of the bank and ----------, (hereinafter referred to as the Service Recipient) which expression shall unless repugnant to the context and the meaning thereof include its legal representative, successors and assignees.

WHEREAS the RSS in the capacity of Pure Agent on behalf of the Service Recipient, has placed its Contract order bearing no._____dated_____on (name and address of the party) hereinafter called the Contractor, for the construction of_____ _____ _____

AND WHEREAS the Service Recipient has agreed to pay to the Contractor the retention money i.e. **5% of the value of the Contract** on submission of a Bank guarantee of equal amount, which will be kept valid up to_____.

In consideration of the Service Recipient having agreed to pay to the Contractor Rs._____(Rupees_____ _____ only) being the retention money we (the Bank), hereby undertake and guarantee to make repayment to the Service Recipient of the said amount without any demur or any part thereof which does not become payable to the Contractor by the Service Recipient in accordance with and subject to the terms and conditions of the said Contract. The Bank further undertakes not to revoke this guarantee during its currency except with the previous consent of the Service Recipient in writing and this guarantee shall be a continuous and irrevocable guarantee up to a sum of Rs._____(Rupees _____ _____ _____ only).

The Bank shall not be discharged or released from this guarantee by any arrangement between the Contractor and the Service Recipient ~~NDS~~ with or without the consent of the Bank or any alterations in the obligations of the parties or by an indulgence, forbearance shown by the Service Recipient to the Contractor and the same shall not prejudice or restrict remedies against the

Bank nor shall the same in any event be a ground of defence by the Bank against the Service Recipient. We_____(name of bank) do hereby undertake to pay an amount equal to Rs._____being the amount due and payable under this guarantee without any demur, merely on a demand from the Service Recipient stating that the amount claimed is due to the Service Recipient. In case, the Service Recipient puts-forth a demand in writing on the bank for the payment of amount in full or in the part against this bank guarantee, the bank shall consider that such demand by itself is conclusive evidence and proof that the contractor has failed in compliance with the terms and conditions stipulated by Service Recipient in the contract and payment shall be made to Service Recipient without raising any dispute regarding the reasons for any such lapse/ failure on the part of the contractor.

This guarantee shall be in addition to and without prejudice to any other securities or remedies which the Service Recipient may have or hereinafter possess in respect of the works executed or intended to be executed and the Service Recipient shall be under no obligation to marshal in favour of the bank any such securities or funds or assets that the Service Recipient may be entitled to receive or have a claim upon and the Service Recipient at its absolute discretion may vary, exchange, renew, modify or refuse to complete to enforce or assign any security or instrument.

The Bank agrees that the amount hereby guaranteed shall be due and payable to the Service Recipient on Service Recipient's serving us with a notice before expiry of Bank Guarantee requiring the payment of the amount and such notice shall be deemed to have been served on the Bank either by actual delivery thereof to the Bank or by dispatch thereof to the Bank by registered post at the address of the said Bank.

We,_____, undertake to renew the bank guarantee provided the request for renewal is made by the contractor before the expiry of bank guarantee.

In order to give full effect to the provisions of this guarantee the Bank hereby waives all rights inconsistent with the above provisions and which the Bank might otherwise as guarantor be entitled to claim and enforce.

Notwithstanding anything stated hereinbefore : (I) our liability under this guarantee is restricted to Rs._____(Rupees _____ _____ only), (ii) The guarantee shall remain in force till_____and (iii) The Bank is liable to pay the guarantee amount or anypart thereof under the bank guarantee only if the Service Recipient serves upon the Bank a written claim or demand on or before_____.

Place

Signature

Date

Bank Seal

Bank Code no.

Note:

1: Contractor should ensure that the seal and code no. of signatory is put by the Bankers, before submission of the Bank guarantees.

2: The value of stamp duty should be minimum Rs. 100 or as per latest stamp act of Local State Government from where the Bank Guarantee is issued.

3: Bank should confirm the bank guarantee through "Structured Financial Messaging System (SFMS)", Bank account details of beneficiary are as follows:

Beneficiary Name	
Bank Account Number	
IFSC Code	
Beneficiary Bank Name	
Beneficiary Bank Address	

1. **Bank charges, if any, on this account will be borne by the beneficiary**

2. **If the issuing bank is not having the SFMS facility, the bank guarantee needs to be confirmed by its controlling office i.e. Administrative / Regional / Zonal Office to the following address**

Beneficiary Name	
Beneficiary Address	

Format of BG – Advance for Project Civil Works

Form of Bank Guarantee against Advance payment (on Non-judicial Stamp Paper of Rs. 100 minimum OR as per the stamp act of local State Govt. from where the BG is issued)

Bank Guarantee No: Date:

In consideration of ---------- , (hereinafter called "the Service Recipient") having agreed to grant an Advance payment of Rs._____ (Rupees_____only) to M/s_____(Name & Address of the Contractor_____) (hereinafter called "the said contractor") under the terms and the conditions of the Work order no._____dated_____(herein after referred to as the Contract) made by RSS in the capacity of Pure Agent on behalf of the Service Recipient, and M/s _____ _____ for the construction of_____(hereinafter called "the said work ") on production of Bank Guarantee for Rs._____(Rupees _____only), we (_____Bank Name, Issuing branch and Address_____) (hereinafter called the Bank) do hereby undertake to pay the Service Recipient an amount not exceeding Rs. _____ (Rupees_____only) against any written request by the Service Recipient.

We,_____(the Bank), do hereby undertake to pay the amounts due and payable under this guarantee without any demur merely on a written demand from the Service Recipient which has to be served on us before the expiry date of Bank Guarantee i.e. _____ stating that the amount claimed is on account of non-mobilization of man and material as required and as per the terms and conditions contained in the Contract. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee and shall be restricted to an amount not exceeding Rs._____(Rupees_____only).

We,_____(the Bank), further agree that the guarantee herein contained shall remain in full force and effect till DD/MM/YYYY (Expiry date of the Bank Guarantee).

We,_____(the Bank), further agree that the Service Recipient shall have the fullest liberty without our consent and without affecting in any manner our obligation hereunder to vary any of the terms and conditions of the said Contract to extend the time of performance by the said Contractor from time to time or to postpone for any time or from time to time any of the power exercisable by the Service Recipient against the said Contractor and to forebear or enforce any of the terms and conditions relating to the said Contract and we shall not be relieved from our liability by reason of any such variation, or extension or for any forbearance, act of omission on the part of the Service Recipient or any indulgence by the Service Recipient to the said Contractor or any such matter or thing whatsoever which under the law relating to the sureties would but for this provision have effect of so relieving us.

The Bank agrees that the amount hereby guaranteed shall be due and payable to the Service Recipient on serving us with a written notice before expiry of Bank Guarantee requiring the payment of the amount and such notice shall be deemed to have been served on the Bank either by the actual delivery thereof to the bank or by dispatch thereof to the Bank by registered post at the address of the Bank or by email communications to the Branch Manager of the Bank by the Service Recipient / its agent .

We,_____(the bank), lastly undertake not to revoke this guarantee during its currency except with the previous consent of Service Recipient in writing.

We,_____(the bank), undertake to renew the bank guarantee provided the request for renewal is made by the said contractor before the expiry of Bank Guarantee.

Notwithstanding anything stated hereinbefore: (i) our Liability under this Bank guarantee is restricted to Rs._____(Rupees _____ _____only), (ii) The guarantee shall remain in force till DD/MM/YYYY and (iii) the bank is liable to pay the guarantee amount or any part thereof under this bank guarantee only if the Service Recipient serves upon the Bank a written claim or demand on or before_____.

Place
Date

Signature
Bank Seal
Bank Code no.

Note:

1. Contractor should ensure that Seal and Code no. of the Signatory is put by the bankers, before the submission of the Bank guarantees.

2. The value of stamp duty should be minimum Rs. 100 or as per latest stamp act of Local State Government from where the Bank Guarantee is issued.

3. **Bank should confirm the bank guarantee through *"Structured Financial Messaging System (SFMS)"*. Bank account details of beneficiary are as follows:**

Beneficiary Name	
Bank Account No.	
IFSC code	
Beneficiary Bank Name	
Beneficiary Bank Address	

Bank charges, if any, on this account will be borne by the beneficiary

If the issuing bank is not having the SFMS facility, the bank guarantee needs to be confirmed by its controlling office i.e. Administrative / Regional / Zonal/ Circle Office to the following address

Beneficiary Name	
Beneficiary Address	

The details of the controlling office (Administrative/ Regional/ Zonal /Circle office) confirming the Bank Guarantee are as under:

Bank Name	
Bank Address	
Nature of Control with the BG Issuing Bank	Administrative/ Regional/ Zonal/ Circle (Mention the one applicable)
Contact No.	
e-mail Id	

Kindly note that necessary action on the Bank Guarantee will be taken by RSS [As a Pure Agent for Consultancy Projects] only upon receipt of confirmation in either one of the mode as prescribed above.

SECTION- XI

SKETCHES / DRAWINGS

COW SANCTUARY

NO.	BUILDING NAME	NOS. OF BUILDING	BUILTUP AREA IN SQ.MT.		STRUCTURE OF BUILDING
			BUILTUP	TOTAL BUILTUP	
00	PLOT AREA [ALL SITE]			174024.784 SQ.MT. 43.00 ACRE	
	PLOT AREA [COW SANCUTUARY]			128065.023 sq.mt. 31.64 acre	
1	COW SHED	18 NOS.	507.29 sq.mt.	9131.22 sq.mt.	
1a	LOFING AREA	18 NOS.	1210.249 sq.mt.	21784.482 sq.mt.	
2	VETERINARY DISPENSARY CUM OFFICE [10 MANPOWER]		234.325 sq.mt.		
3	WORKER'S AMENITY		121.66 sq.mt.		
3a	GENERAL TOILET		66.526 sq.mt.	188.186 sq.mt.	
4	SUB STATION [LT POWER]		97.84 sq.mt.		
5	CENTRAL STORE		100.00 sq.mt.		
6	IMPLEMENT SHED		300.00 sq.mt.		
7	CATTLE FEED GODOWN		100.00 sq.mt.		
8	HAY GODOWN		1293.358 sq.mt.		
9	CHAFF CUTTER		100.00 sq.mt.		
10	SILAGE		640.00 sq.mt.		
11	COW UNLOADING PLATFORM				
12	WATCHMAN CABIN , TIME OFFICE & ENTRANCE GATE		30.00 sq.mt.		
13	METERING ROOM		24.00 sq.mt.		
14	TWO POLE STRUCTURE AND FENCING		40.00 sq.mt.		
15	SUPERVISORS QUARTER		614.17 sq.mt.		
16	LABOUR QUARTER [10-QUARTER]		397.09 sq.mt.		
17	INCINERATOR ROOM		100.00 sq.mt.		
18-1	PARKING SHED		81.40 sq.mt.		
18-2	PARKING SHED [STAFF QUARTER AREA]		81.40 sq.mt.		
19	OVER HEAD WATER TANK [50,000 LITER CAPACITY]				
20	U.G. TANK FOR WATER STORAGE [1,00,000 LITER CAPACITY]				
21	PUMP ROOM		30.00 sq.mt.		
22	SLURRY TANK				
23	SHED FOR GAS BANK				
24	WEIGH BRIDGE CABIN				
24A	WEIGH BRIDGE				

[25] BIO GAS PLANT AREA

S.NO.	NAME	SIZE	TYPE	CAPACITY
0	SITE FOR BIO GAS _ PLOT AREA	8450.11 sq.mt. 2.088 acre		
1	DUNG UNLOADING TANK	7.0 DIA. X 2.75 MT.L.D. + 0.5 MT. F.B.	RCC	1,00,000 LITER CAPACITY
2	DIGESTER FEED TANK	10.0 DIA. X 2.75 MT.L.D. + 0.5 MT. F.B.	RCC	2,00,000 LITER CAPACITY
3	DIGESTER TANK	33.50 DIA. X 8.0 MT.L.D. + 0.75 MT. F.B.	M.S.E.P. WITH RCC PLATFORM	7000 CU.MT. CAPACITY
4	SLURRY TANK	10.0 DIA. X 2.75 MT.L.D. + 0.5 MT. F.B.	RCC	2,00,000 LITER CAPACITY
5	FILTER WATER TANK	10.0 DIA. X 2.75 MT.L.D. + 0.5 MT. F.B.	RCC	2,00,000 LITER CAPACITY
6	SLS SYSTEM	5.0 MT. X 5.0 MT.	M.S.PLATFORM +SHED	-
7	PSA SHED WITH MCC ROOM	20.0 MT. X 30.0 MT.	M.S.SHED	-

COW SANCTUARY_AI TRAINING CENTER & FARMER TRAINING CENTER

NO.	BUILDING NAME	NOS. OF BUILDING	BUILTUP AREA IN SQ.MT.		STRUCTURE OF BUILDING
			BUILTUP	TOTAL BUILTUP	
	PLOT AREA FOR [**AI TRAINING CENTER & FARMER TRAINING CENTER**]			37509.68 sq.mt. 9.268 acre	
0	SITE FOR AI TRAINING CENTER & FARMER TRAINING CENTER _PLOT AREA				
26	AI TRAINING CENTER & FARMER TRAINING CENETER	1-NOS.		2041.38 sq.mt.	
27	HOSTEL BUILDING	2-NOS.	1036.98X2 sq.mt.	2073.96 sq.mt.	
28	CANTEEN BUILDING	1-NOS.		324.277 sq.mt.	
29	TRAINING SHED FOR TRAINEES	1-NOS.		60.61 sq.mt.	
30	FOUR-WHEELER PARKING AREA [08 NOS.]			138.57 sq.mt.	
31	TWO-WHEELER PARKING AREA [20 NOS.]			70.37 sq.mt.	
32	WATCHMAN CABIN			20.78 sq.mt.	
33	ENTRANCE GATE				

ROAD AREA		SQ.MT.	COMPOUND WALL		LENGTH
[1] RCC ROAD					
[2] BRICK ON EDGE PAVER ROAD			[2] COMPOUND WALL = CW2		
[3] PAVER AREA					
[4] PLINTH PROTECTION AREA					
[5] RCC KURBING					

REVISION DETAILS :

TENDER DRAWING
DATE: 15.10.2024

CLIENT:

PROJECT CONSULTANT :
NDDB DAIRY SERVICES
NDDB HOUSE , CHAUDHARY JHANDU SINGH ROAD , NEAR KAMAL CINEMA COMPLEX , B4 BLOCK , SAFDARJUNG ENCLAVE , NEW DELHI - 110029

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SOLA, AHMEDABAD-380060.
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TITLE:
SITE LAYOUT PLAN FOR
AI TRAINING CENTER & FARMER TRAINING CENTER

DWG NO.	AR-00-01	
DEALT	NIMA	
PRJCT. CODE	2301	
CHCKD. BY		PROJECT NAME: **PROPOSED COW SANCTUARY PROJECT AT TUGLAKPUR GOSALA MUZAFFARNAGAR, UP.**
DATE	16.02.2023	
SCALE	N.T.S	

[25] BIO GAS PLANT AREA

S.NO.	NAME	SIZE	TYPE	CAPACITY
0	SITE FOR BIO GAS _ PLOT AREA	8450.11 sq.mt. 2.088 acre		
1	DUNG UNLOADING TANK	7.0 DIA. X 2.75 MT.L.D. + 0.5 MT. F.B.	RCC	1,00,000 LITER CAPACITY
2	DIGESTER FEED TANK	10.0 DIA. X 2.75 MT.L.D. + 0.5 MT. F.B.	RCC	2,00,000 LITER CAPACITY
3	DIGESTER TANK	33.50 DIA. X 8.0 MT.L.D. + 0.75 MT. F.B.	M.S.E.P. WITH RCC PLATFORM	7000 CU.MT. CAPACITY
4	SLURRY TANK	10.0 DIA. X 2.75 MT.L.D. + 0.5 MT. F.B.	RCC	2,00,000 LITER CAPACITY
5	FILTER WATER TANK	10.0 DIA. X 2.75 MT.L.D. + 0.5 MT. F.B.	RCC	2,00,000 LITER CAPACITY
6	SLS SYSTEM	5.0 MT. X 5.0 MT.	M.S.PLATFORM +SHED	-
7	PSA SHED WITH MCC ROOM	20.0 MT. X 30.0 MT.	M.S.SHED	-

COW SANCTUARY_AI TRAINING CENTER & FARMER TRAINING CENTER

NO.	BUILDING NAME	NOS. OF BUILDING	BUILTUP AREA IN SQ.MT.		STRUCTURE OF BUILDING
			BUILTUP	TOTAL BUILTUP	
	PLOT AREA FOR **[AI TRAINING CENTER & FARMER TRAINING CENTER]**			37509.68 sq.mt. 9.268 acre	
0	SITE FOR AI TRAINING CENTER & FARMER TRAINING CENTER _PLOT AREA				
26	AI TRAINING CENTER & FARMER TRAINING CENETER	1-NOS.		2041.38 sq.mt.	
27	HOSTEL BUILDING	2-NOS.	1036.98X2 sq.mt.	2073.96 sq.mt.	
28	CANTEEN BUILDING	1-NOS.		324.277 sq.mt.	
29	TRAINING SHED FOR TRAINEES	1-NOS.		60.61 sq.mt.	
30	FOUR-WHEELER PARKING AREA [08 NOS.]			138.57 sq.mt.	
31	TWO-WHEELER PARKING AREA [20 NOS.]			70.37 sq.mt.	
32	WATCHMAN CABIN			20.78 sq.mt.	
33	ENTRANCE GATE				

ROAD AREA		SQ.MT.	COMPOUND WALL		LENGTH
[1] RCC ROAD					
[2] BRICK ON EDGE PAVER ROAD			[2] COMPOUND WALL = CW2		
[3] PAVER AREA					
[4] PLINTH PROTECTION AREA					
[5] RCC KURBING					

REVISION DETAILS :

TENDER DRAWING
DATE: 15.10.2024

CLIENT:

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PROJECT CONSULTANT :
NDDB DAIRY SERVICES
NDDB HOUSE , CHAUDHARY JHANDU SINGH ROAD , NEAR KAMAL CINEMA COMPLEX , B4 BLOCK , SAFDARJUNG ENCLAVE , NEW DELHI - 110029

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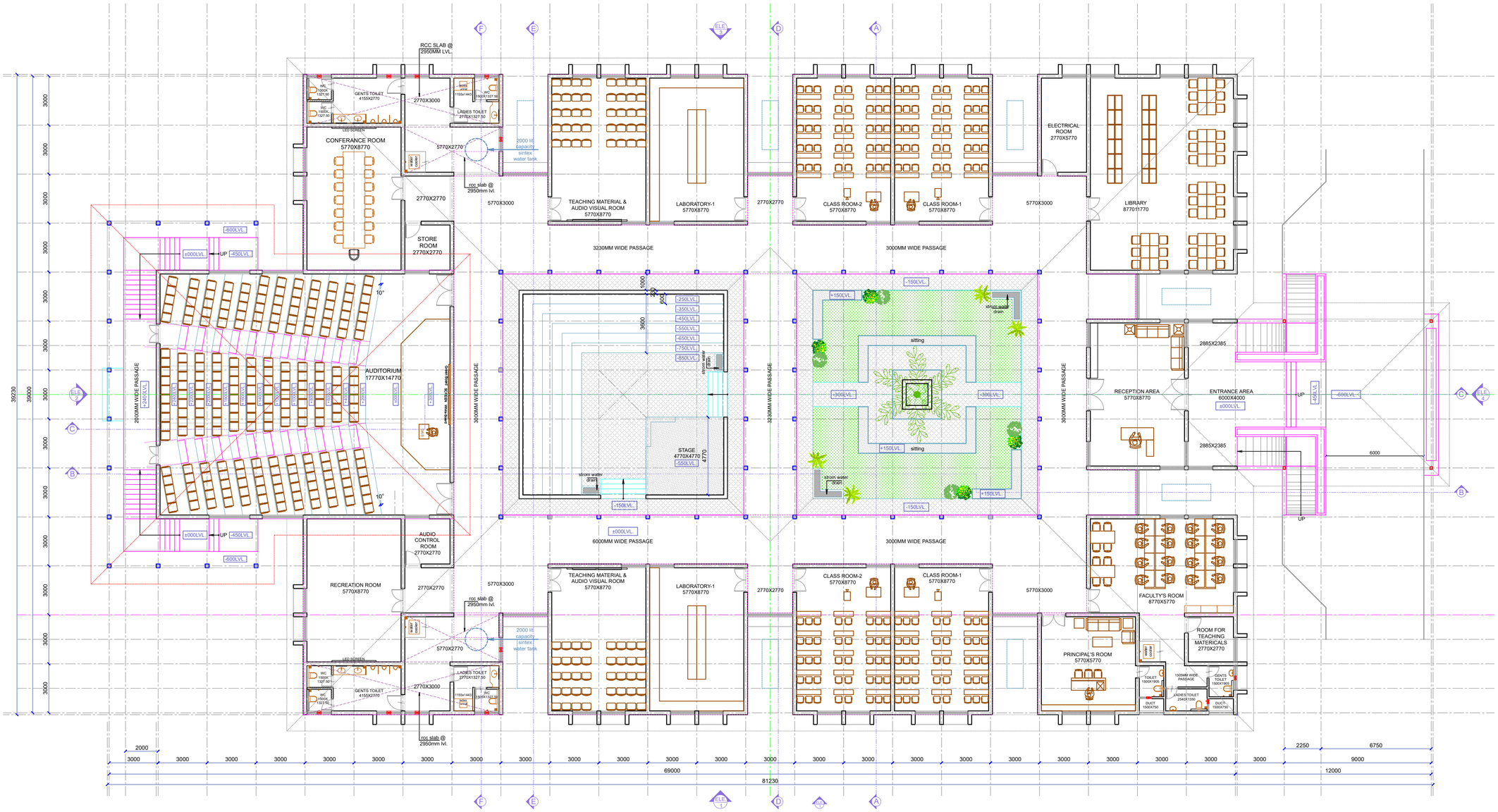
CONTACT: +91 8320322835 E-MAIL: vgstorsion@yahoo.co.in

TITLE:
SITE LAYOUT PLAN FOR
AI TRAINING CENTER & FARMER TRAINING CENTER

DWG NO.	AR-00-01	
DEALT	NIMA	
PRJCT. CODE	2301	
CHCKD. BY		PROJECT NAME: **PROPOSED COW SANCTUARY PROJECT AT TUGLAKPUR GOSALA MUZAFFARNAGAR, UP.**
DATE	16.02.2023	
SCALE	N.T.S	



GROUND FLOOR PLAN

BUILTUP AREA

BUILTUP AREA = 2041.38 SQ.MT.

REVISION DETAILS :

REV.NO.	DATE	DESCRIPTION

TENDER DRAWING
DATE: 15.10.2024

CLIENT:

NDDB DAIRY SERVICES
NDDB HOUSE , CHAUDHARY JHANDU SINGH ROAD , NEAR KAMAL CINEMA COMPLEX , B4 BLOCK , SAFDARJUNG ENCLAVE , NEW DELHI - 110029

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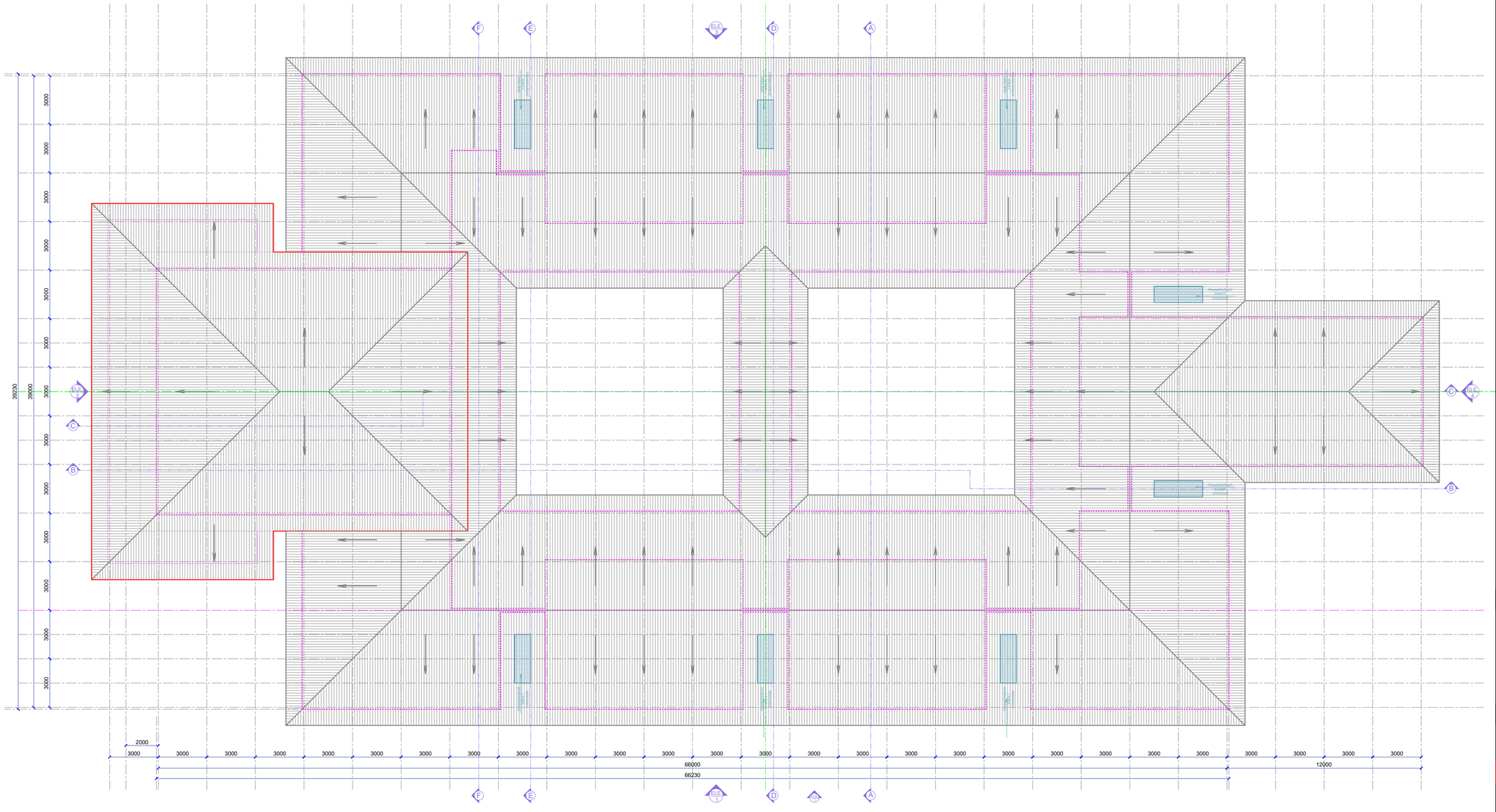
TITLE: GROUND FLOOR PLAN

DWG NO.	AR-26-01	NAME OF BUILDING:- [26] AI TRAINING CENTER & FARMER TRAINING CENTER
DEALT	NIMA	
PRJCT. CODE	2401	PROJECT NAME: **FARMER TRAINING CENTER & AI TRAINING CENTER_ COW SANCTUARY AT TUGLAKPUR MUZAFFARNAGAR, UP.**
CHCKD. BY		
DATE	24.01.2024	
SCALE	N.T.S	



ROOF PLAN

REVISION DETAILS :

REV.NO.	DATE	DESCRIPTION

TENDER DRAWING
DATE: 15.10.2024

CLIENT:

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W E
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NDDB HOUSE , CHAUDHARY JHANDU SINGH ROAD , NEAR KAMAL CINEMA COMPLEX , B4 BLOCK , SAFDARJUNG ENCLAVE , NEW DELHI - 110029

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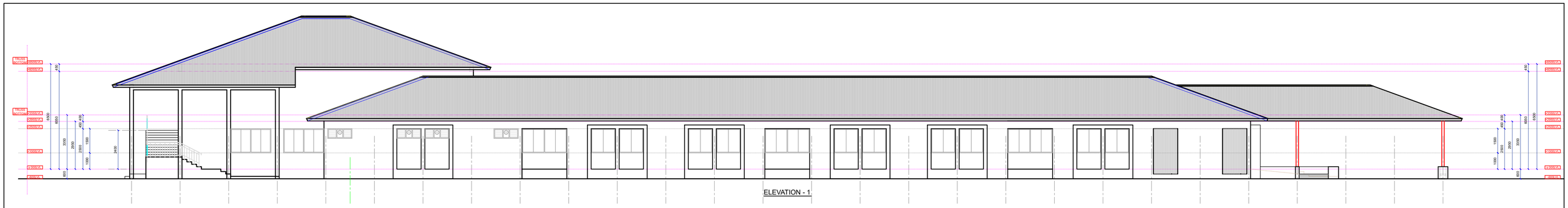
TITLE:
ROOF PLAN

DWG NO.	AR-26-02	NAME OF BUILDING:- [26] AI TRAINING CENTER & FARMER TRAINING CENTER
DEALT	NIMA	
PRJCT. CODE	2401	PROJECT NAME: **FARMER TRAINING CENTER & AI TRAINING CENTER_ COW SANCTUARY AT TUGLAKPUR MUZAFFARNAGAR, UP.**
CHCKD. BY		
DATE	24.01.2024	
SCALE	N.T.S	



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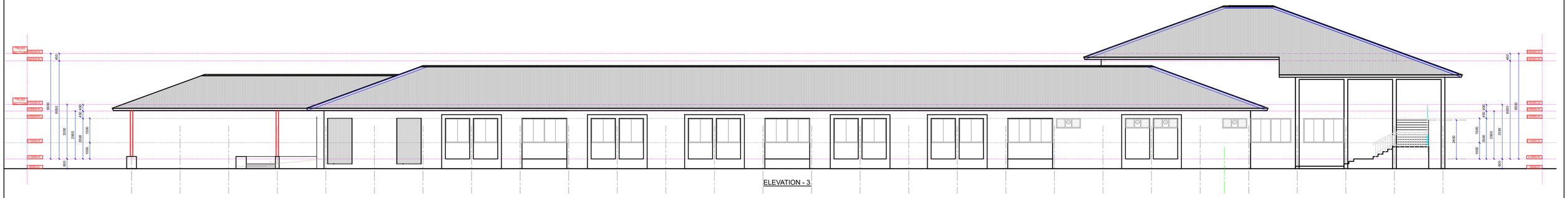
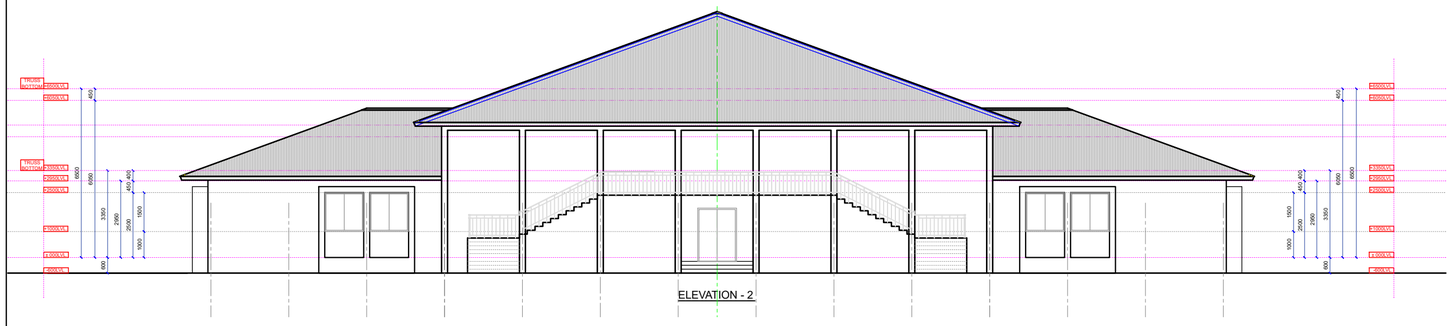


ELEVATION - 3



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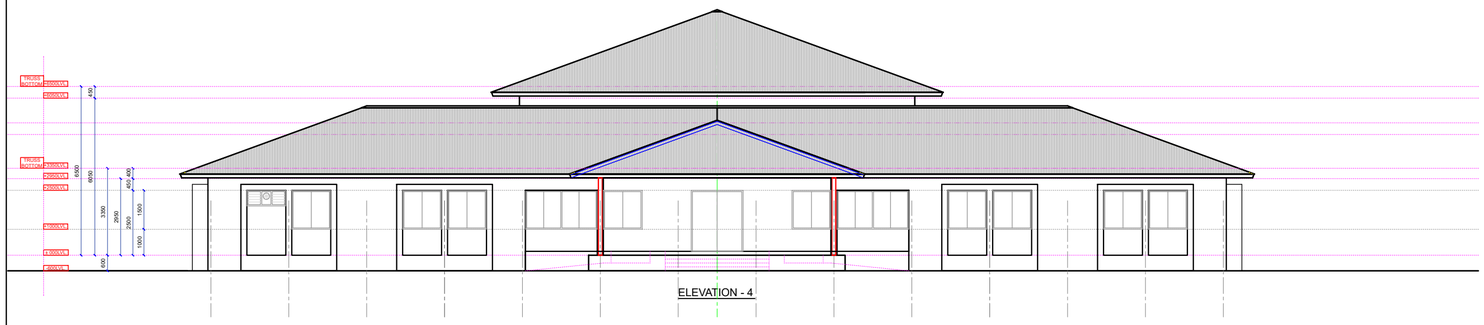

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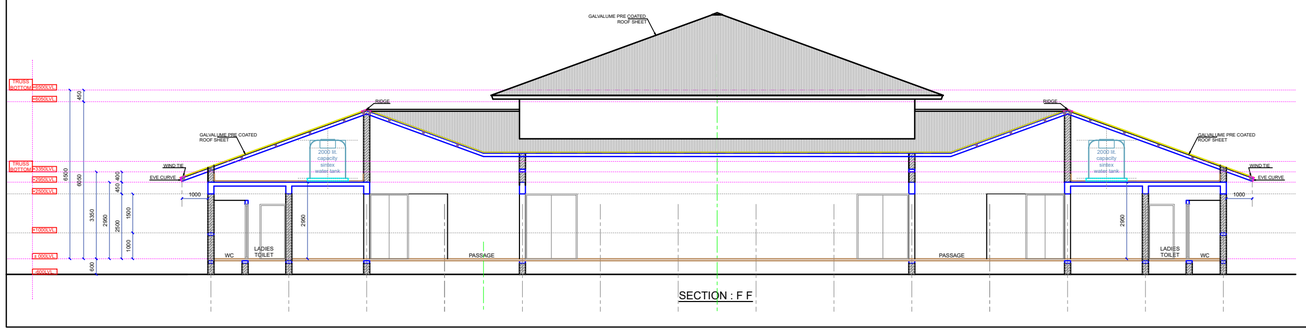

SECTION : F F

REVISION DETAILS :

REV.NO.	DATE	DESCRIPTION

TENDER DRAWING
DATE: 15.10.2024

CLIENT:

NDDB DAIRY SERVICES
NDDB HOUSE , CHAUDHARY JHANDU SINGH ROAD , NEAR KAMAL CINEMA COMPLEX , B4 BLOCK , SAFDARJUNG ENCLAVE , NEW DELHI - 110029

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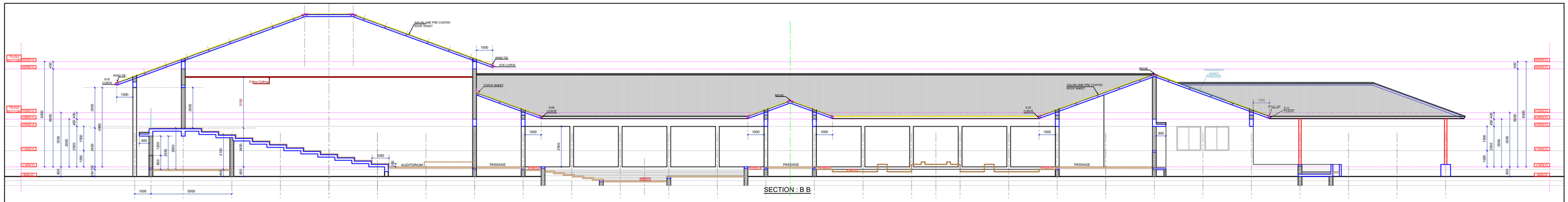
TITLE:
ELEVATION : 1 , 2 , 3 , 4
SECTION : F-F

DWG NO.	AR-26-03	NAME OF BUILDING:- [26] AI TRAINING CENTER & FARMER TRAINING CENTER
DEALT	NIMA	
PRJCT. CODE	2401	PROJECT NAME: **FARMER TRAINING CENTER & AI TRAINING CENTER_ COW SANCTUARY AT TUGLAKPUR MUZAFFARNAGAR, UP.**
CHCKD. BY		
DATE	24.01.2024	
SCALE	N.T.S	



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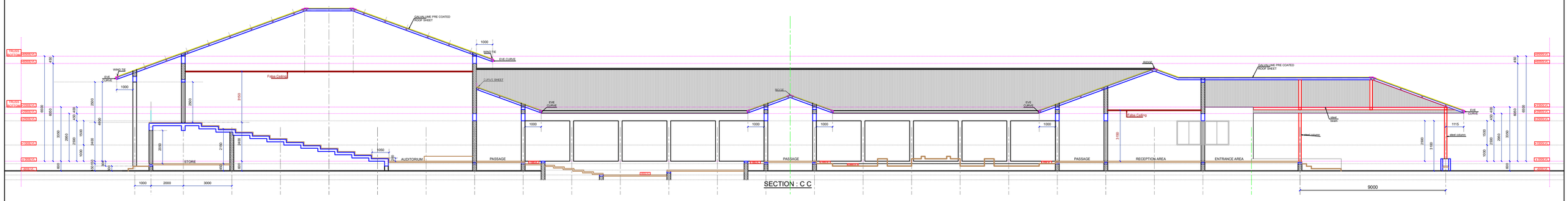

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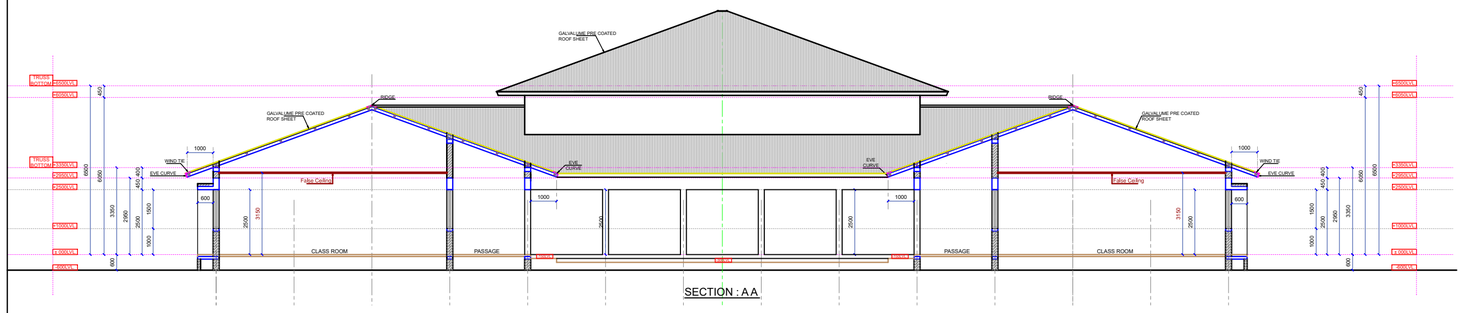

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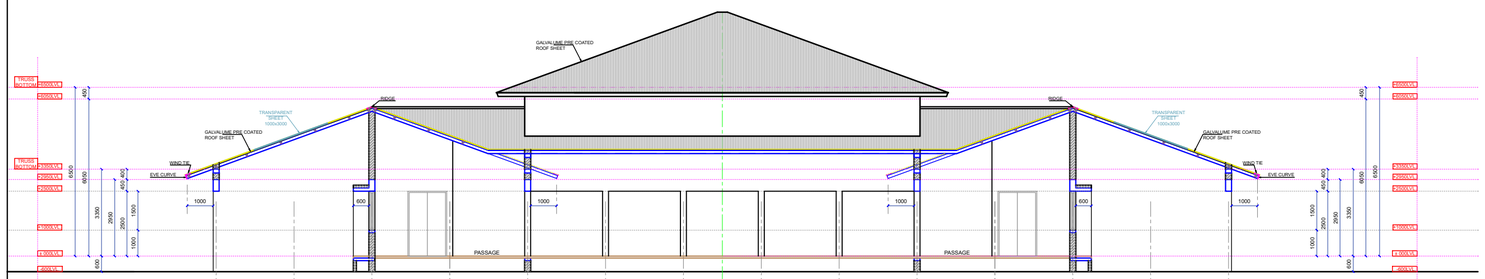
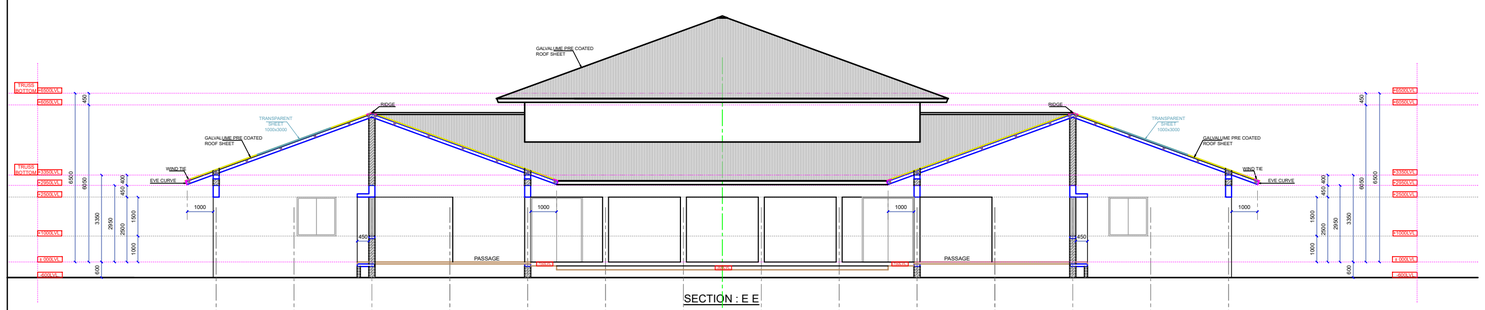


SECTION : D D



SECTION : E E

REVISION DETAILS :

REV.NO.	DATE	DESCRIPTION

TENDER DRAWING
DATE: 15.10.2024

CLIENT:

NDDB DAIRY SERVICES
NDDB HOUSE , CHAUDHARY JHANDU SINGH ROAD , NEAR KAMAL CINEMA COMPLEX , B4 BLOCK , SAFDARJUNG ENCLAVE , NEW DELHI - 110029

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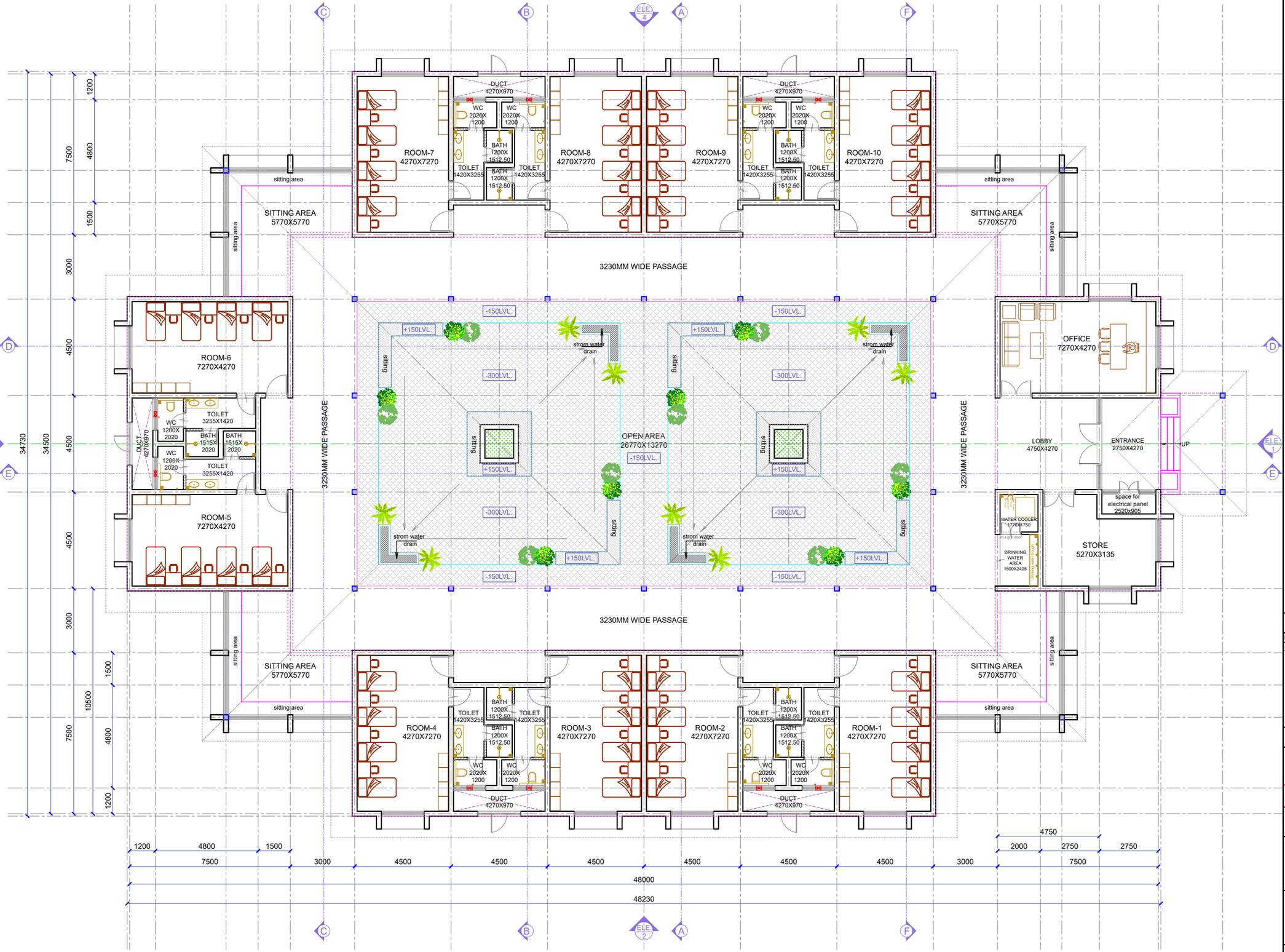
CONTACT. +91 8320323835 E-MAIL: vgstorsion@yahoo.co.in

TITLE:
SECTION : A-A , B-B , C-C , D-D , E-E , F-F

DWG NO.	AR-26-04	NAME OF BUILDING:- [26] AI TRAINING CENTER & FARMER TRAINING CENTER
DEALT	NIMA	
PRJCT. CODE	2401	PROJECT NAME: **FARMER TRAINING CENTER & AI TRAINING CENTER_ COW SANCTUARY AT TUGLAKPUR MUZAFFARNAGAR, UP.**
CHCKD. BY		
DATE	24.01.2024	
SCALE	N.T.S	



BUILTUP AREA
BUILTUP AREA = 1036.98 SQ.MT.

REVISION DETAILS :

REV.NO.	DATE	DESCRIPTION

TENDER DRAWING
DATE:15.10.2024

CLIENT:

N
W E
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NDDB DAIRY SERVICES
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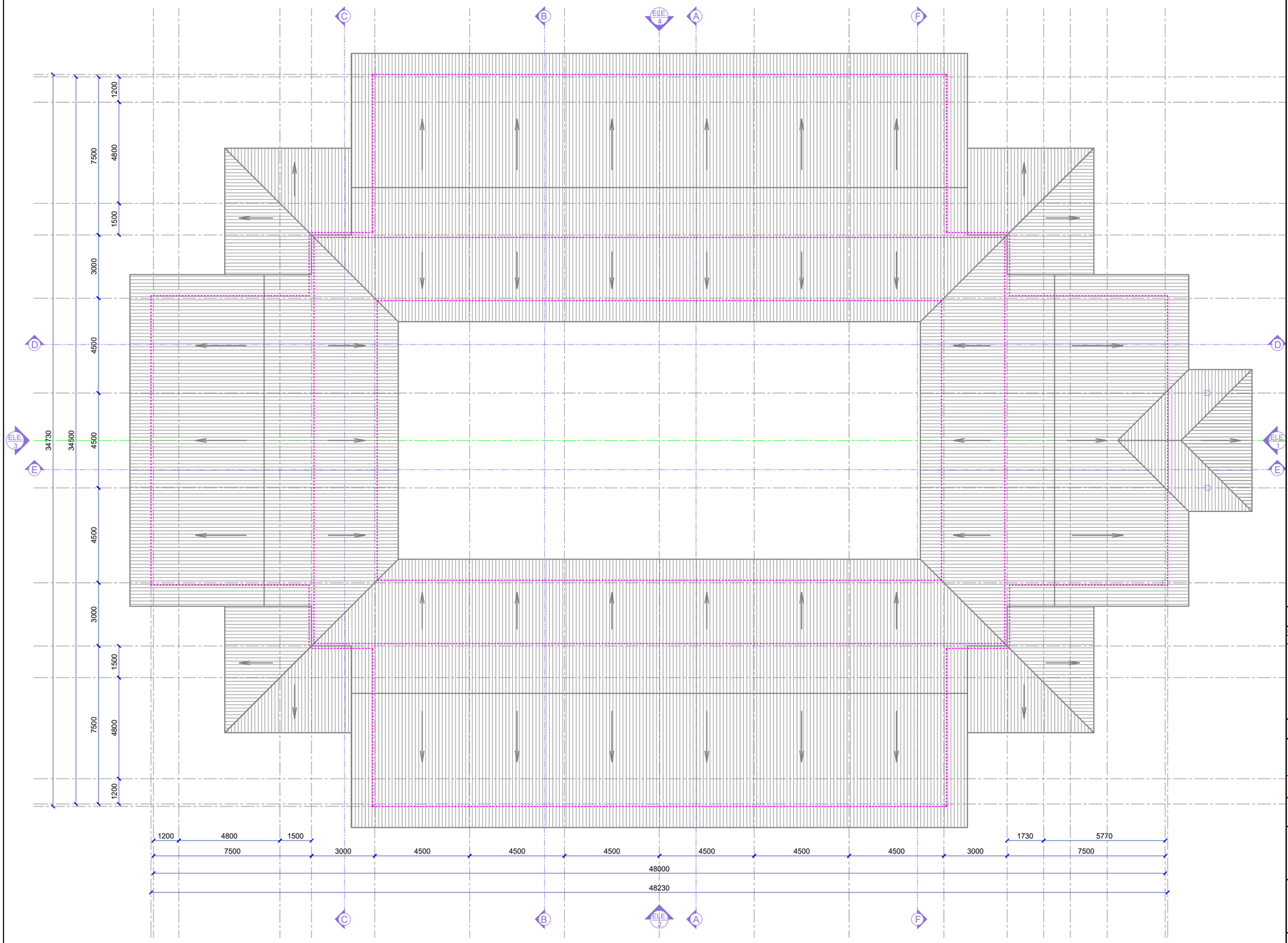
TITLE:
GROUND FLOOR PLAN

DWG NO.	AR-27-01	NAME OF BUILDING:- [27] HOSTEL BUILDING [NOS. FOR ROOM-10]
DEALT	NIMA	
PRJCT. CODE	2401	PROJECT NAME: FARMER TRAINING CENTER & AI TRAINING CENTER_ COW SANCTUARY AT TUGLAKPUR MUZAFFARNAGAR, UP.
CHCKD. BY		
DATE	24.01.2024	
SCALE	N.T.S	



REVISION DETAILS :		
REV.NO.	DATE	DESCRIPTION

TENDER DRAWING
DATE: 15.10.2024

N
W E
S

CLIENT:

NDDB DAIRY SERVICES
NDDB HOUSE , CHAUDHARY JHANDU SINGH ROAD , NEAR KAMAL CINEMA COMPLEX , B4 BLOCK , SAFDARJUNG ENCLAVE , NEW DELHI - 110029

TORSION
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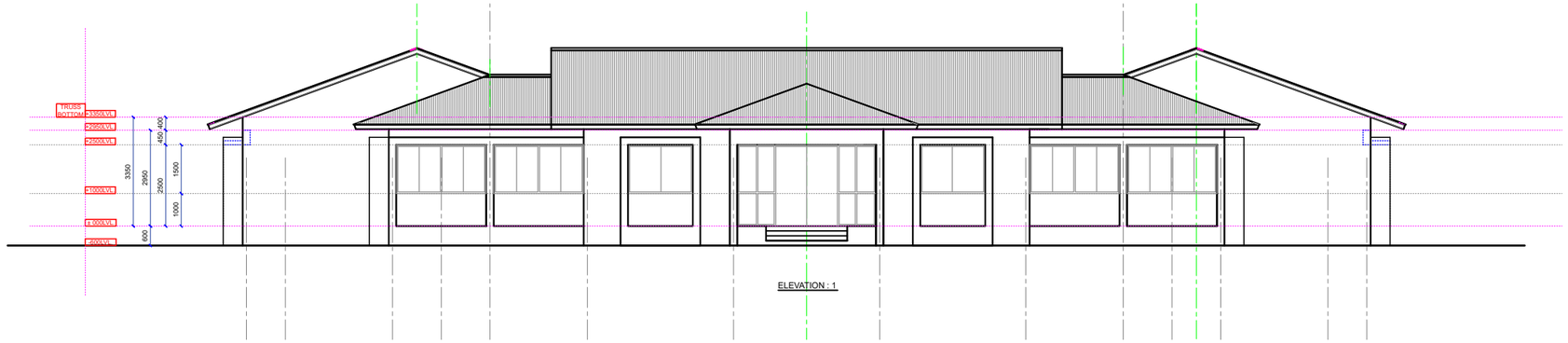
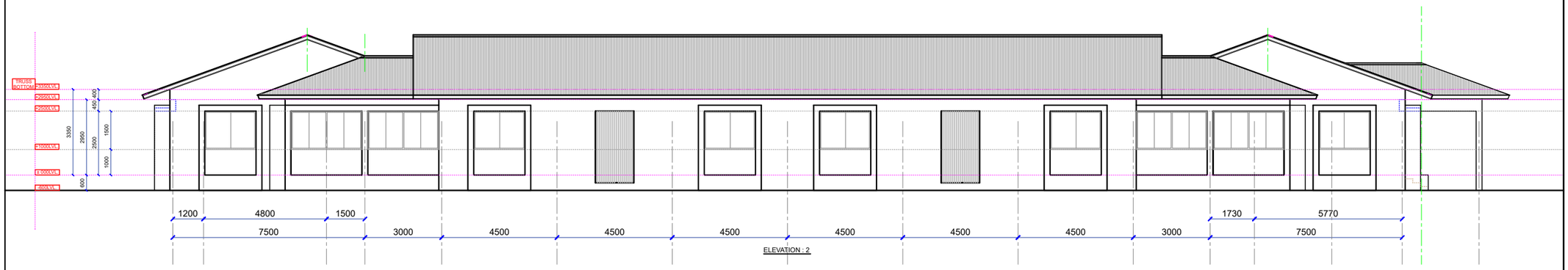
SOLA, AHMEDABAD-380060.
CONTACT: +91 8320322835 E-MAIL: vgstorsion@yahoo.co.in

TITLE:
ROOF PLAN

DWG NO.	AR-27-02	NAME OF BUILDING:- [27] HOSTEL BUILDING [NOS. FOR ROOM-10]
DEALT	NIMA	
PRJCT. CODE	2401	PROJECT NAME: **FARMER TRAINING CENTER & AI TRAINING CENTER_ COW SANCTUARY AT TUGLAKPUR MUZAFFARNAGAR, UP.**
CHCKD. BY		
DATE	24.01.2024	
SCALE	N.T.S	



ELEVATION : 1



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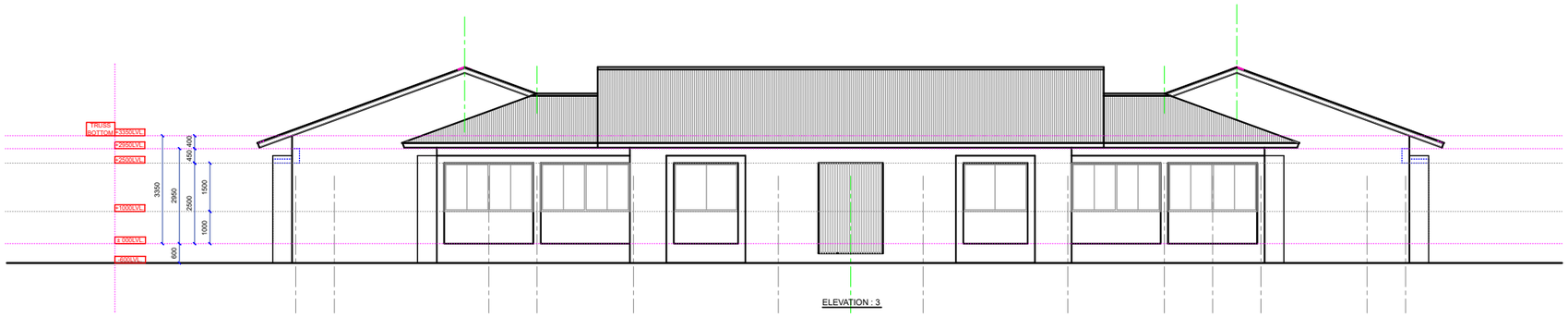

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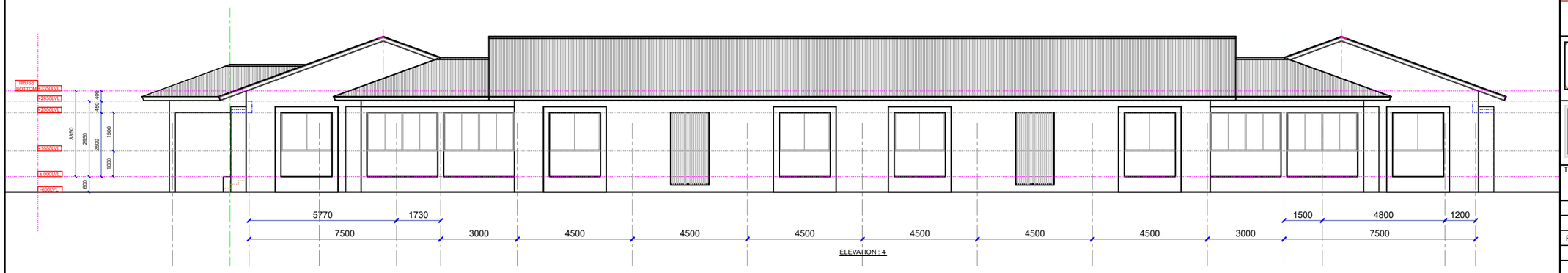

ELEVATION : 4

REVISION DETAILS :

REV.NO.	DATE	DESCRIPTION

TENDER DRAWING
DATE: 15.10.2024

CLIENT:

NDDB DAIRY SERVICES
NDDB HOUSE , CHAUDHARY JHANDU SINGH ROAD , NEAR KAMAL CINEMA COMPLEX , B4 BLOCK , SAFDARJUNG ENCLAVE , NEW DELHI - 110029

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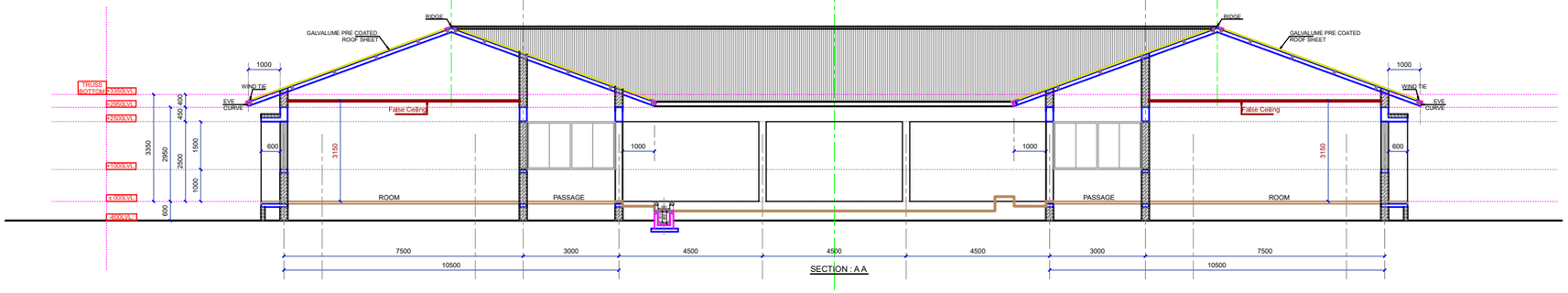
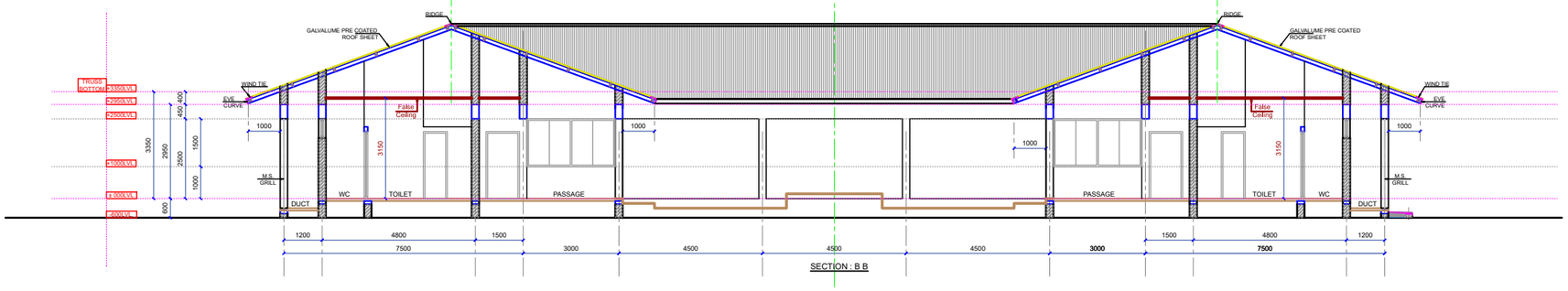
TITLE:
ELEVATION : 1 , 2 , 3 , 4

DWG NO.	AR-27-03	NAME OF BUILDING:- [27] HOSTEL BUILDING [NOS. FOR ROOM-10]
DEALT	NIMA	
PRJCT. CODE	2401	PROJECT NAME: **FARMER TRAINING CENTER & AI TRAINING CENTER_ COW SANCTUARY AT TUGLAKPUR MUZAFFARNAGAR, UP.**
CHCKD. BY		
DATE	24.01.2024	
SCALE	N.T.S	



SECTION : A A



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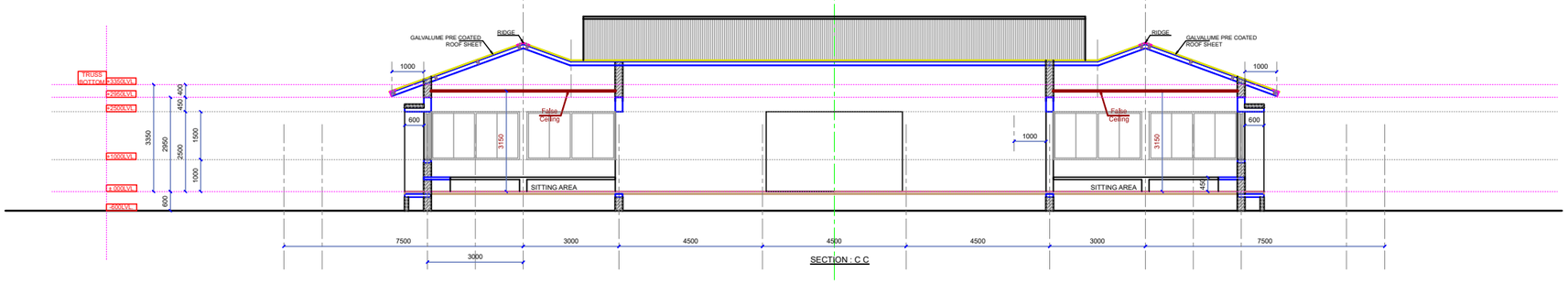
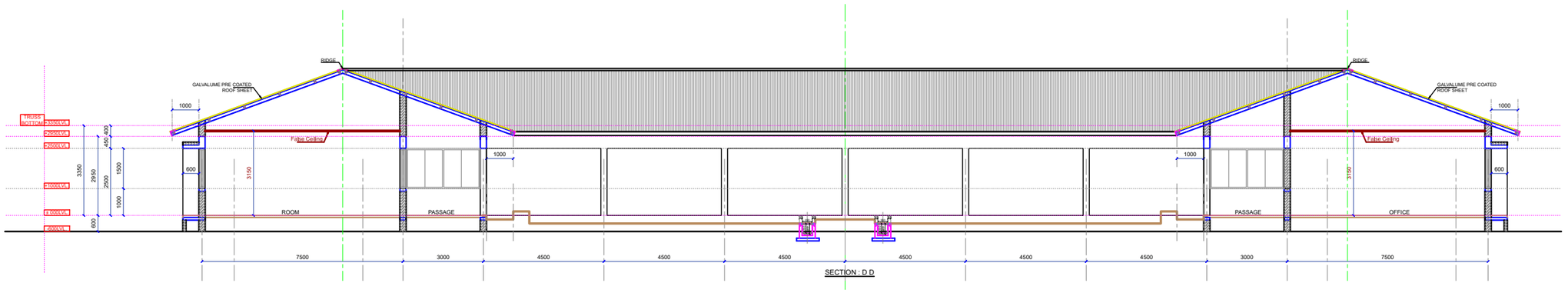


SECTION : C C



SECTION : D D

REVISION DETAILS :

REV.NO.	DATE	DESCRIPTION

TENDER DRAWING
DATE: 15.10.2024

CLIENT:

NDDB DAIRY SERVICES
NDDB HOUSE , CHAUDHARY JHANDU SINGH ROAD , NEAR KAMAL CINEMA COMPLEX , B4 BLOCK , SAFDARJUNG ENCLAVE , NEW DELHI - 110029

TORSION
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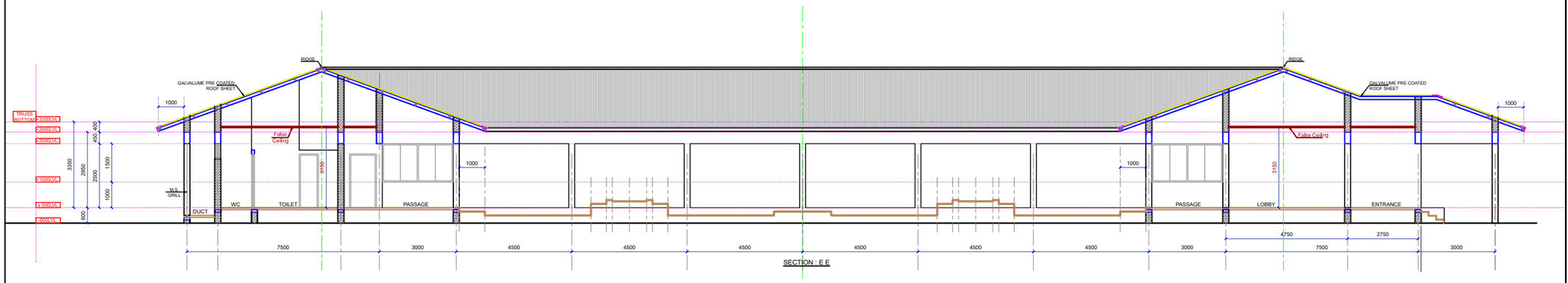
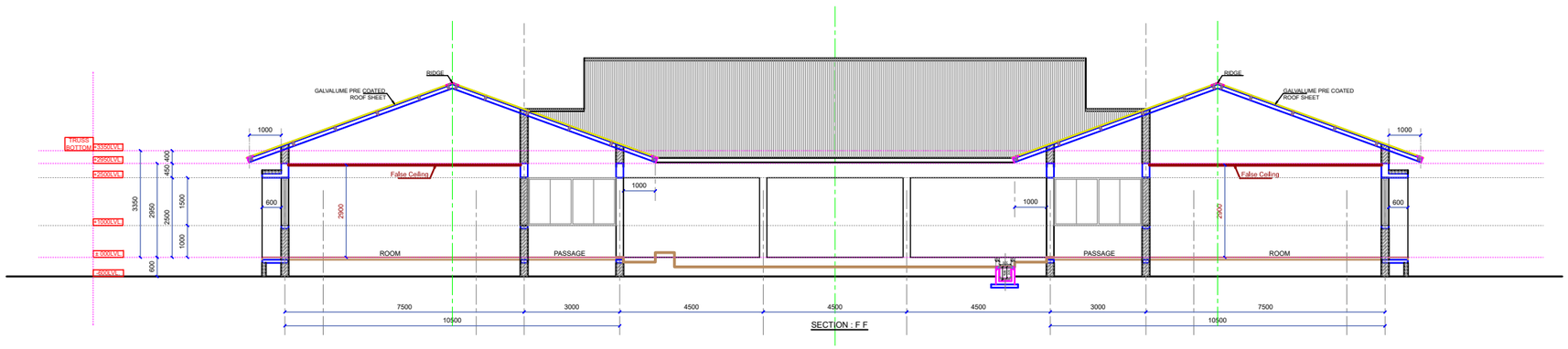
CONTACT: +91 8320322835 E-MAIL: vgstorsion@yahoo.co.in

TITLE:
SECTION : A-A , B-B , C-C , D-D

DWG NO.	AR-27-04	NAME OF BUILDING:- [27] HOSTEL BUILDING [NOS. FOR ROOM-10]
DEALT	NIMA	
PRJCT. CODE	2401	PROJECT NAME: **FARMER TRAINING CENTER & AI TRAINING CENTER_ COW SANCTUARY AT TUGLAKPUR MUZAFFARNAGAR, UP.**
CHCKD. BY		
DATE	24.01.2024	
SCALE	N.T.S	



SECTION : E E



SECTION : F F

REVISION DETAILS :

REV.NO.	DATE	DESCRIPTION

TENDER DRAWING
DATE: 15.10.2024

CLIENT:

NDDB DAIRY SERVICES
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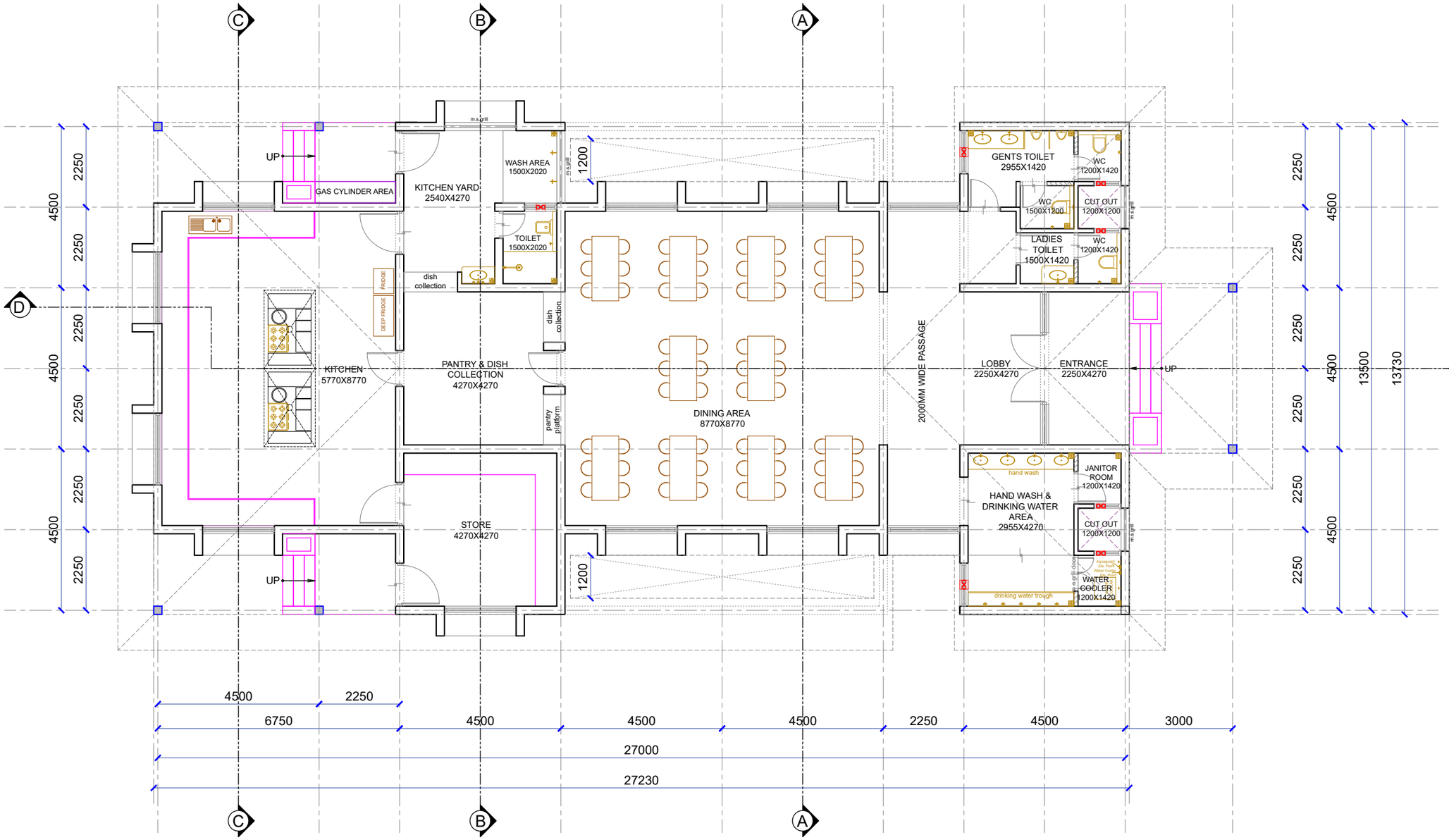
TITLE:
SECTION : E-E , F-F

DWG NO.	AR-27-05	NAME OF BUILDING:- [27] HOSTEL BUILDING [NOS. FOR ROOM-10]
DEALT	NIMA	
PRJCT. CODE	2401	PROJECT NAME: **FARMER TRAINING CENTER & AI TRAINING CENTER_ COW SANCTUARY AT TUGLAKPUR MUZAFFARNAGAR, UP.**
CHCKD. BY		
DATE	24.01.2024	
SCALE	N.T.S	



BUILTUP AREA
BUILTUP AREA = 324.27 SQ.MT.

REVISION DETAILS :

REV.NO.	DATE	DESCRIPTION

TENDER DRAWING
DATE: 15.10.2024

CLIENT:

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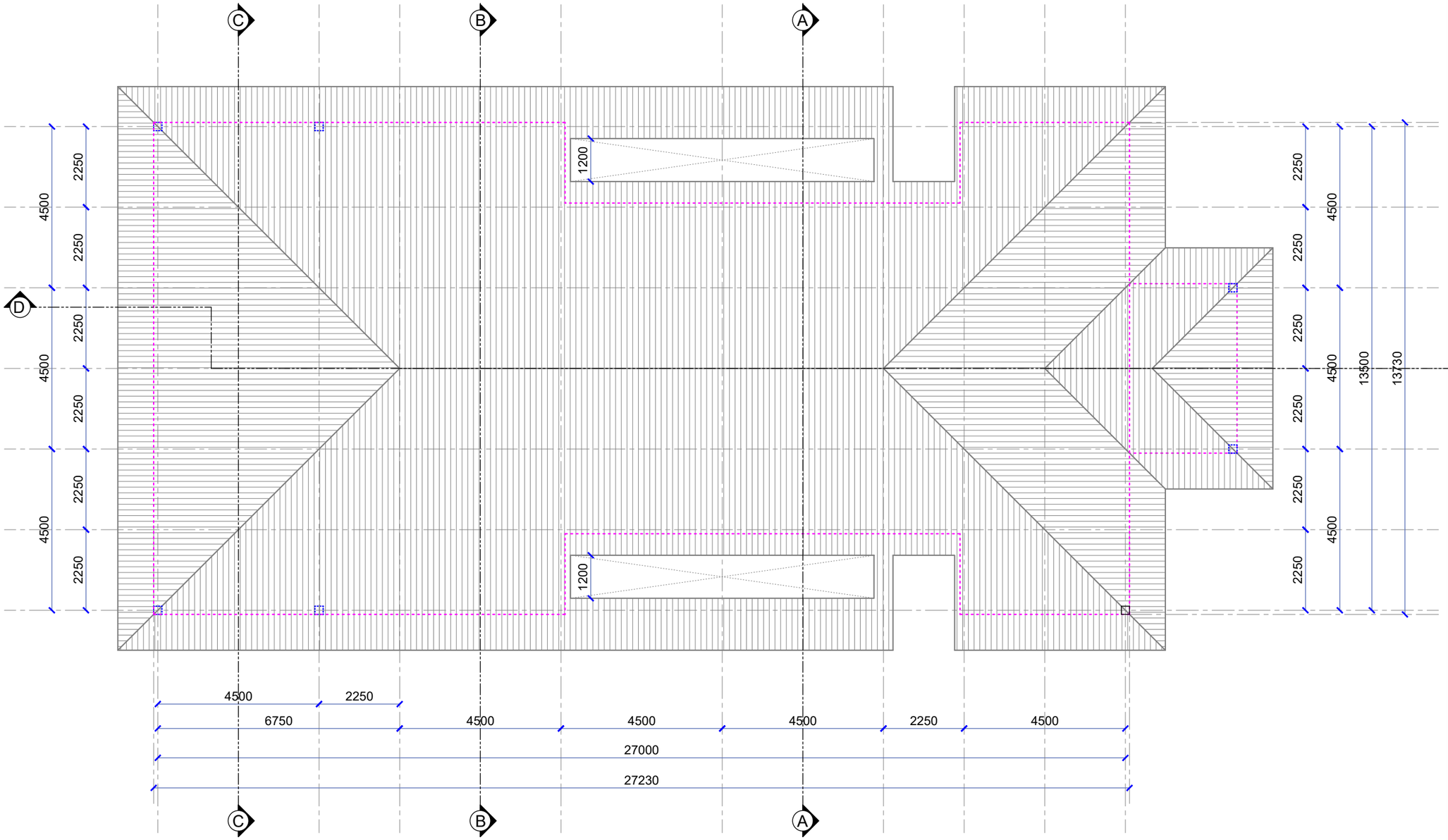
TITLE:
GROUND FLOOR PLAN

DWG NO.	AR-28-01	NAME OF BUILDING:- [28] CANTEEN BUILDING
DEALT	NIMA	
PRJCT. CODE	2401	PROJECT NAME: **FARMER TRAINING CENTER & AI TRAINING CENTER_ COW SANCTUARY AT TUGLAKPUR MUZAFFARNAGAR, UP.**
CHCKD. BY		
DATE	24.01.2024	
SCALE	N.T.S	



REVISION DETAILS :

REV.NO.	DATE	DESCRIPTION

TENDER DRAWING
DATE: 15.10.2024

CLIENT:

N
W E
S

NDDB DAIRY SERVICES
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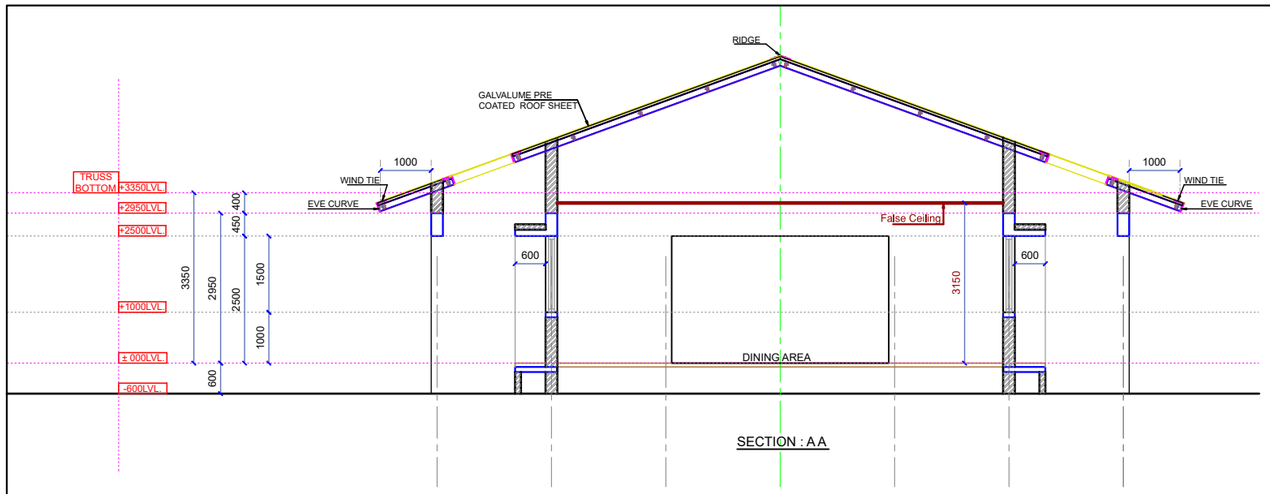
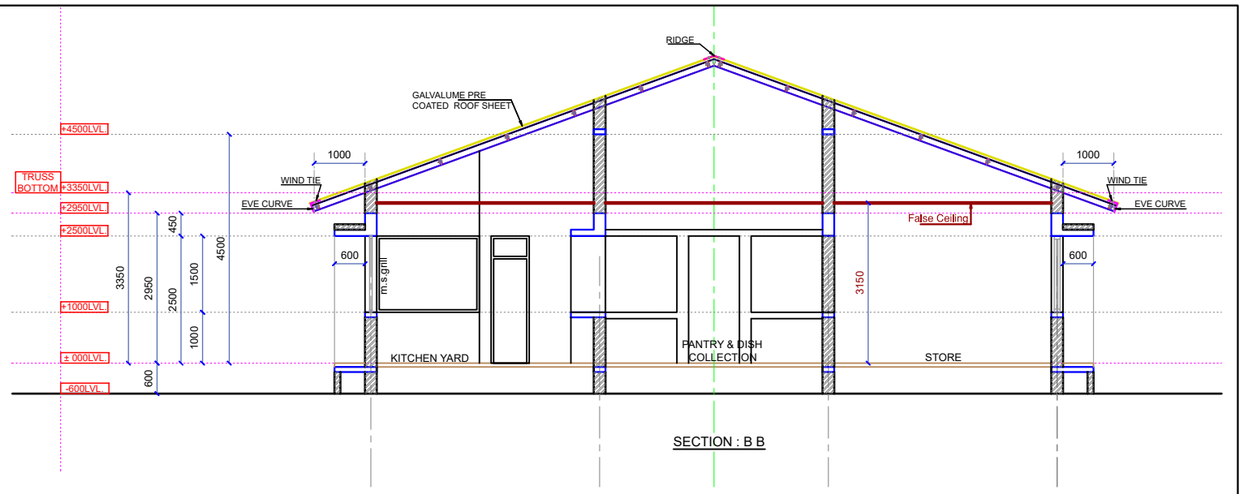
TITLE:
ROOF PLAN

DWG NO.	AR-28-02	NAME OF BUILDING:- [28] CANTEEN BUILDING
DEALT	NIMA	
PRJCT. CODE	2401	PROJECT NAME: FARMER TRAINING CENTER & AI TRAINING CENTER_ COW SANCTUARY AT TUGLAKPUR MUZAFFARNAGAR, UP.
CHCKD. BY		
DATE	24.01.2024	
SCALE	N.T.S	



SECTION : A A



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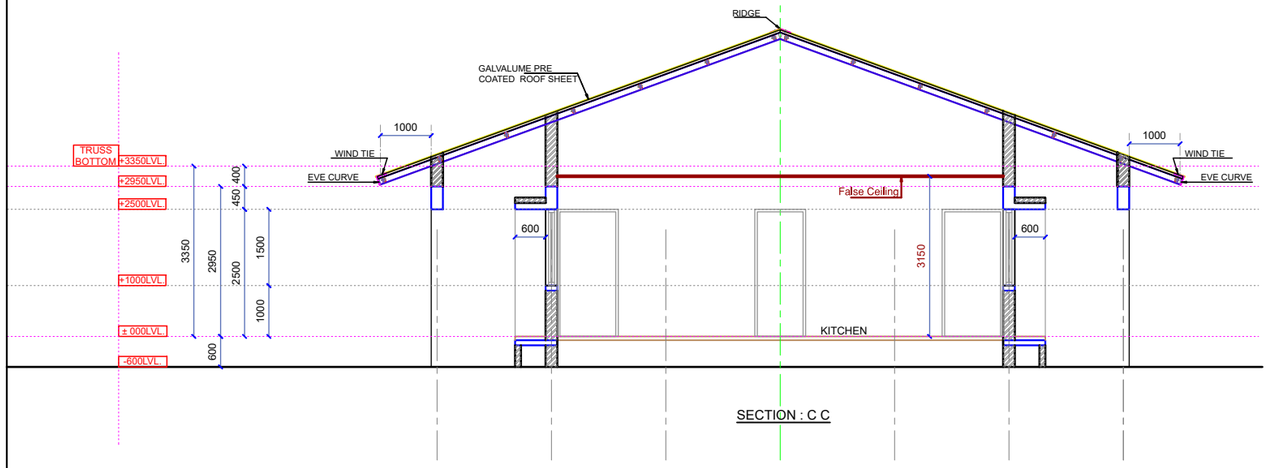

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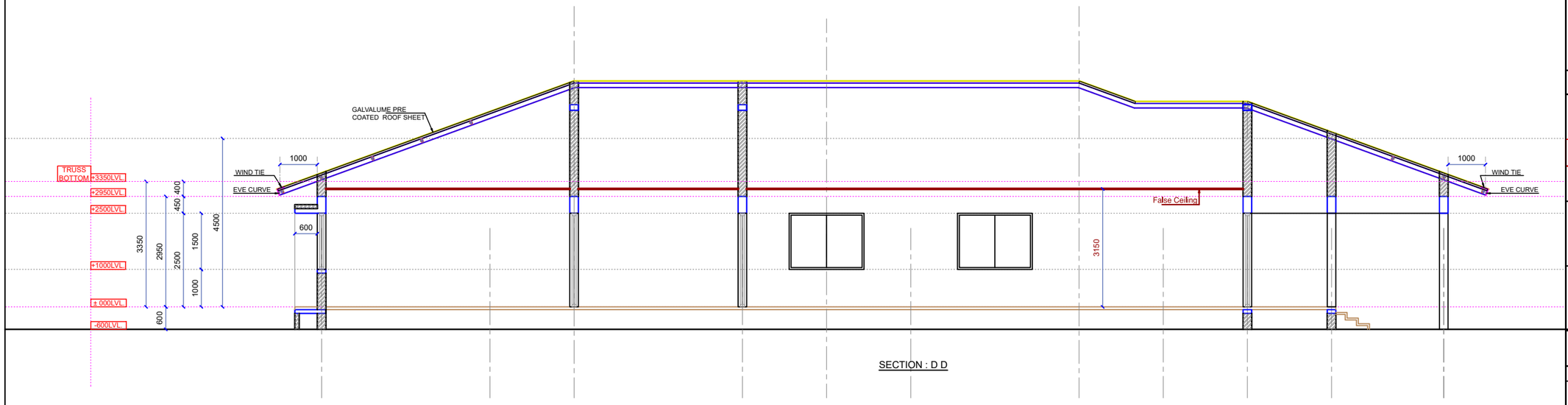

SECTION : D D

TENDER DRAWING
DATE: 15.10.2024

CLIENT:

REVISION DETAILS :

REV.NO.	DATE	DESCRIPTION

NDDB DAIRY SERVICES
NDDB HOUSE , CHAUDHARY JHANDU SINGH ROAD , NEAR KAMAL CINEMA COMPLEX , B4 BLOCK , SAFDARJUNG ENCLAVE , NEW DELHI - 110029

TORSION
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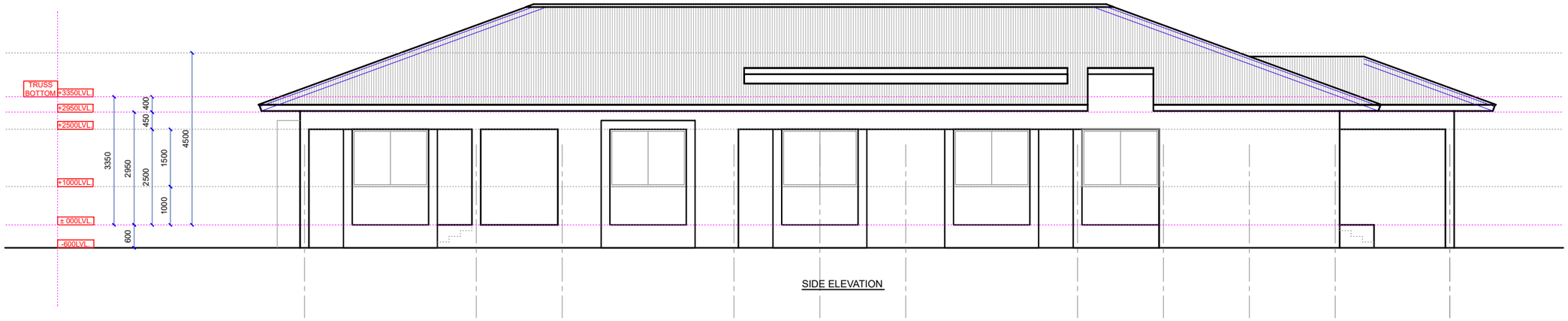
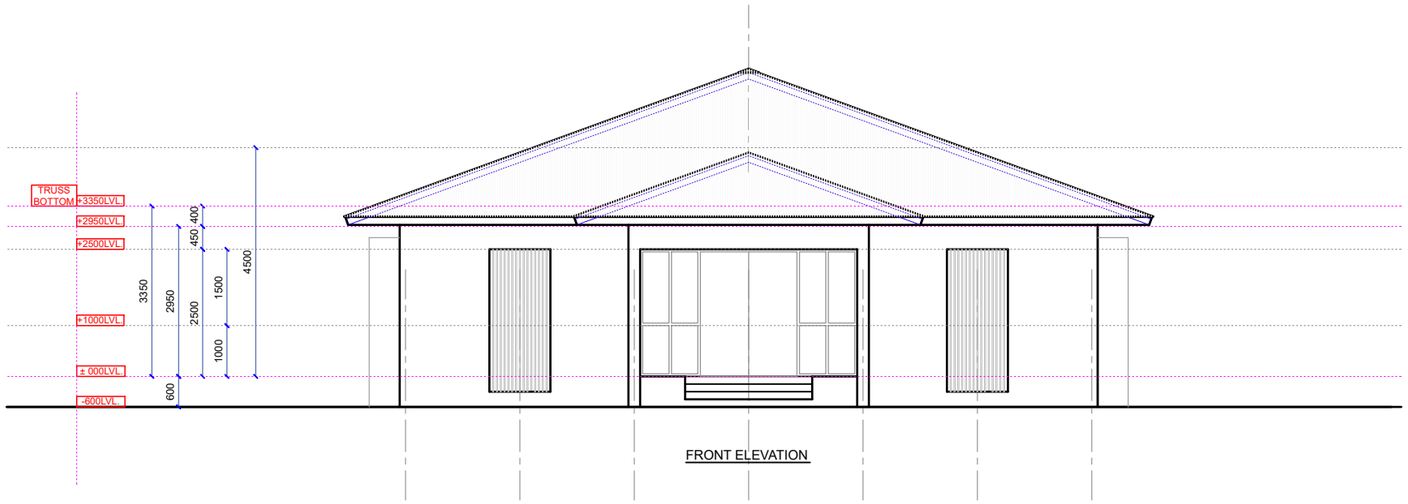
CONTACT: +91 8320322835 E-MAIL: vgstorsion@yahoo.co.in

TITLE:
SECTION : A-A , B-B , C-C , D-D

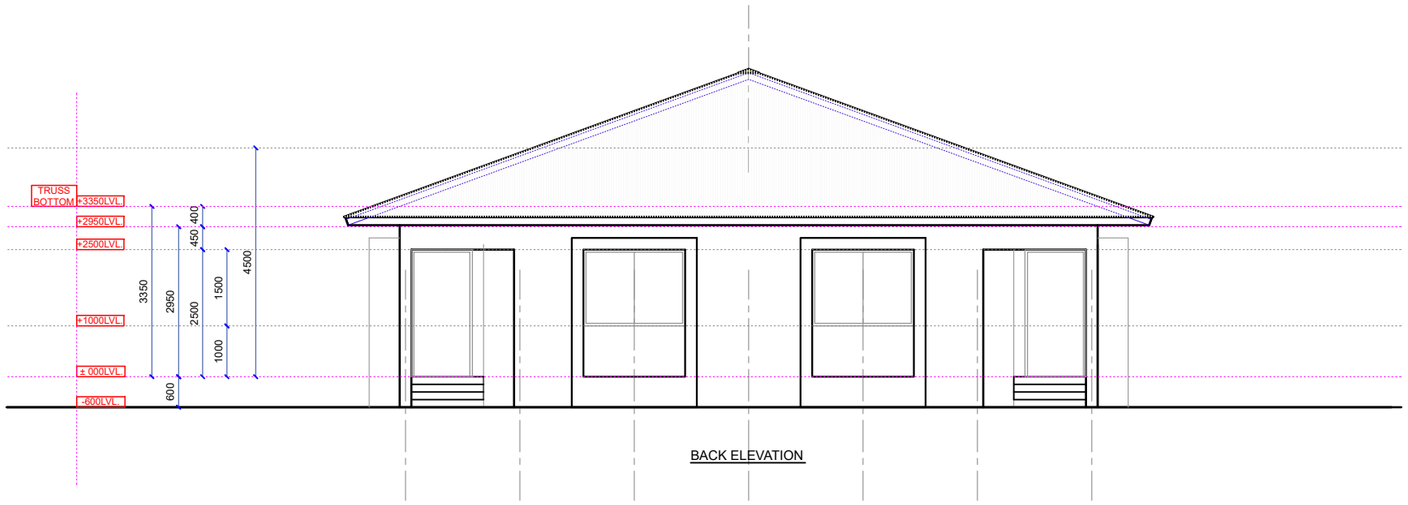
DWG NO.	AR-28-03	NAME OF BUILDING:- [28] CANTEEN BUILDING
DEALT	NIMA	
PRJCT. CODE	2401	PROJECT NAME: **FARMER TRAINING CENTER & AI TRAINING CENTER_ COW SANCTUARY AT TUGLAKPUR MUZAFFARNAGAR, UP.**
CHCKD. BY		
DATE	24.01.2024	
SCALE	N.T.S	



SIDE ELEVATION



FRONT ELEVATION



BACK ELEVATION

REVISION DETAILS :

REV.NO.	DATE	DESCRIPTION

TENDER DRAWING
DATE: 15.10.2024

CLIENT:

NDDB DAIRY SERVICES
NDDB HOUSE , CHAUDHARY JHANDU SINGH ROAD , NEAR KAMAL CINEMA COMPLEX , B4 BLOCK , SAFDARJUNG ENCLAVE , NEW DELHI - 110029

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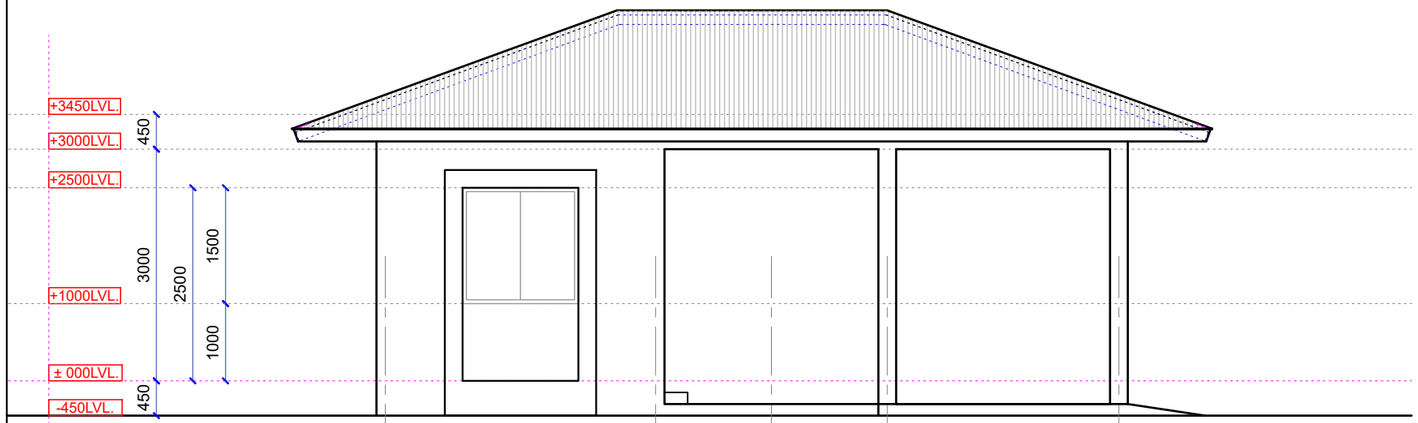
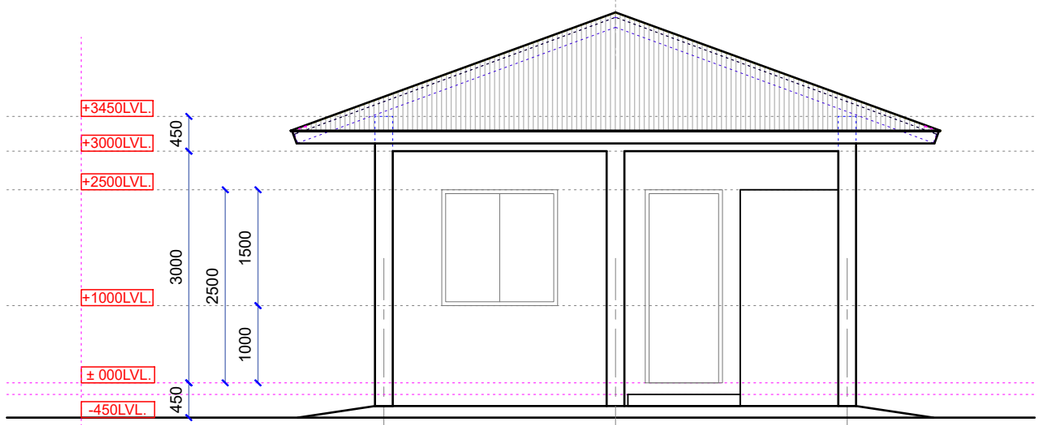
SOLA, AHMEDABAD-380060.
CONTACT: +91 8320322835 E-MAIL: vgstorsion@yahoo.co.in

TITLE:
ELEVATION

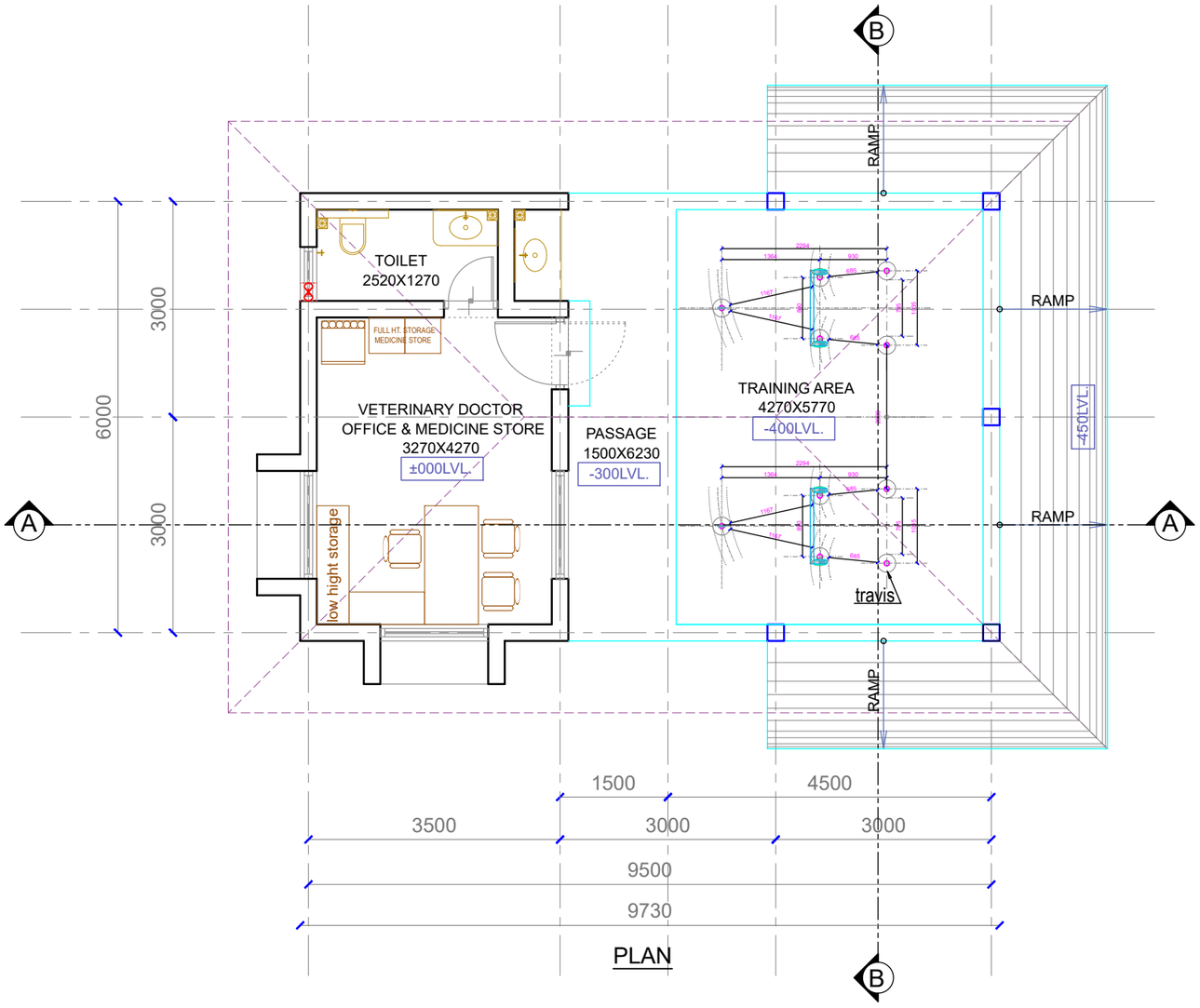
DWG NO.	AR-28-04	NAME OF BUILDING:- [28] CANTEEN BUILDING
DEALT	NIMA	
PRJCT. CODE	2401	PROJECT NAME: **FARMER TRAINING CENTER & AI TRAINING CENTER_ COW SANCTUARY AT TUGLAKPUR MUZAFFARNAGAR, UP.**
CHCKD. BY		
DATE	24.01.2024	
SCALE	N.T.S	



SIDE ELEVATION



FRONT ELEVATION



PLAN

REVISION DETAILS :

REV.NO.	DATE	DESCRIPTION

TENDER DRAWING
DATE: 15.10.2024

CLIENT:

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NDDB DAIRY SERVICES
NDDB HOUSE , CHAUDHARY JHANDU SINGH ROAD , NEAR KAMAL CINEMA COMPLEX , B4 BLOCK , SAFDARJUNG ENCLAVE , NEW DELHI - 110029

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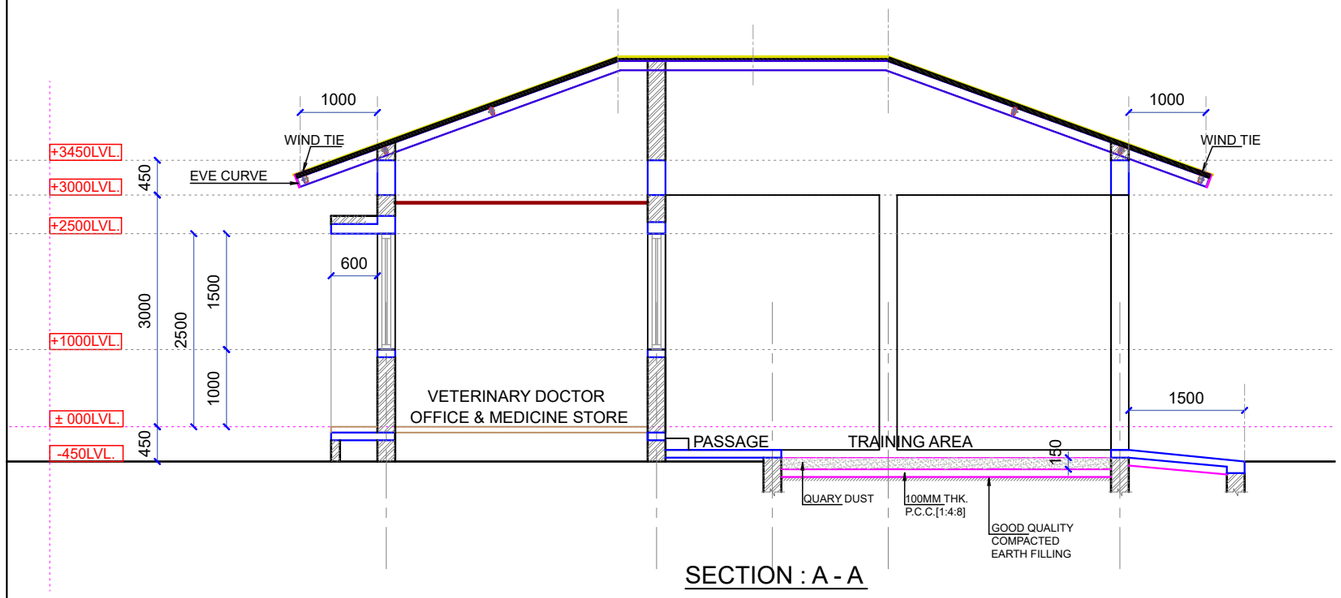
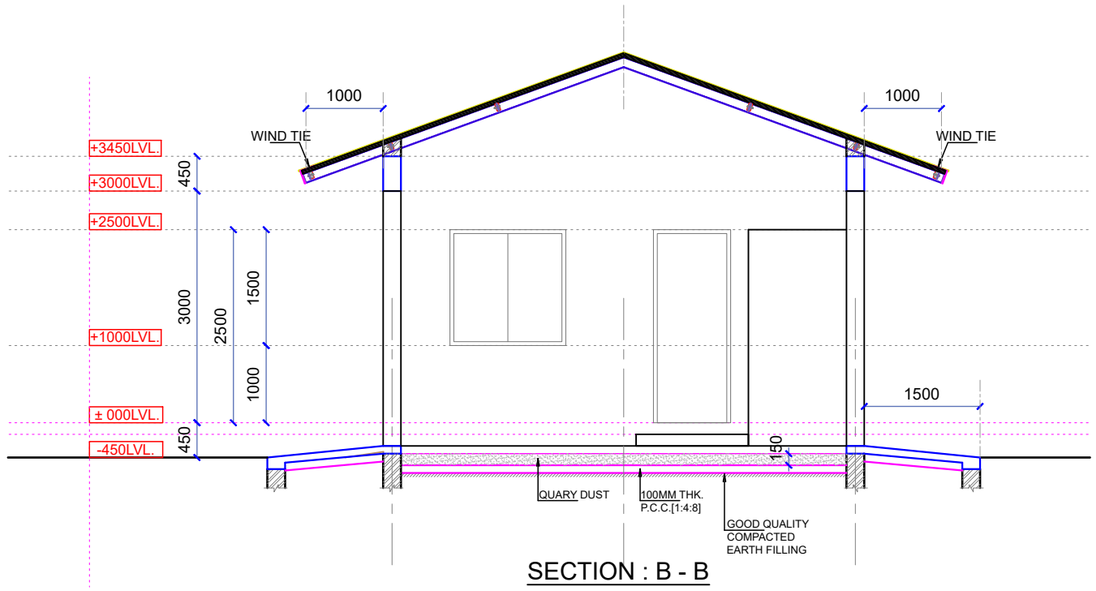
TITLE:
PLAN , SIDE ELEVATION , FRONT ELEVATION

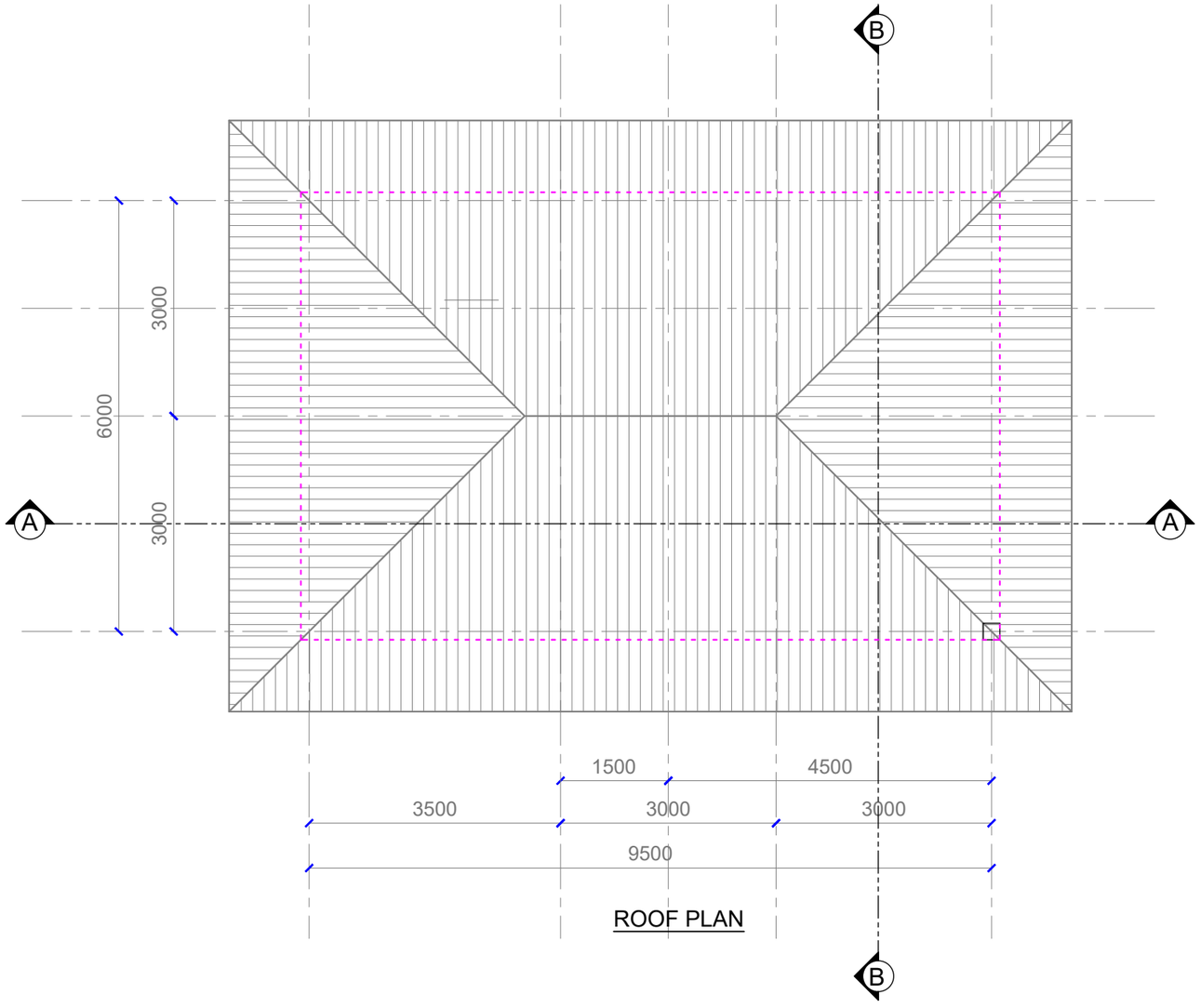
DWG NO.	AR-29-01	NAME OF BUILDING:- [29] TRAINING SHED FOR TRAINEES
DEALT	NIMA	
PRJCT. CODE	2401	PROJECT NAME: **FARMER TRAINING CENTER & AI TRAINING CENTER_ COW SANCTUARY AT TUGLAKPUR MUZAFFARNAGAR, UP.**
CHCKD. BY		
DATE	24.01.2024	
SCALE	N.T.S	



SECTION : A - A



SECTION : B - B



ROOF PLAN

REVISION DETAILS :

REV.NO.	DATE	DESCRIPTION

N
W E
S

TENDER DRAWING
DATE: 15.10.2024

CLIENT:

NDDB DAIRY SERVICES
NDDB HOUSE , CHAUDHARY JHANDU SINGH ROAD , NEAR KAMAL CINEMA COMPLEX , B4 BLOCK , SAFDARJUNG ENCLAVE , NEW DELHI - 110029

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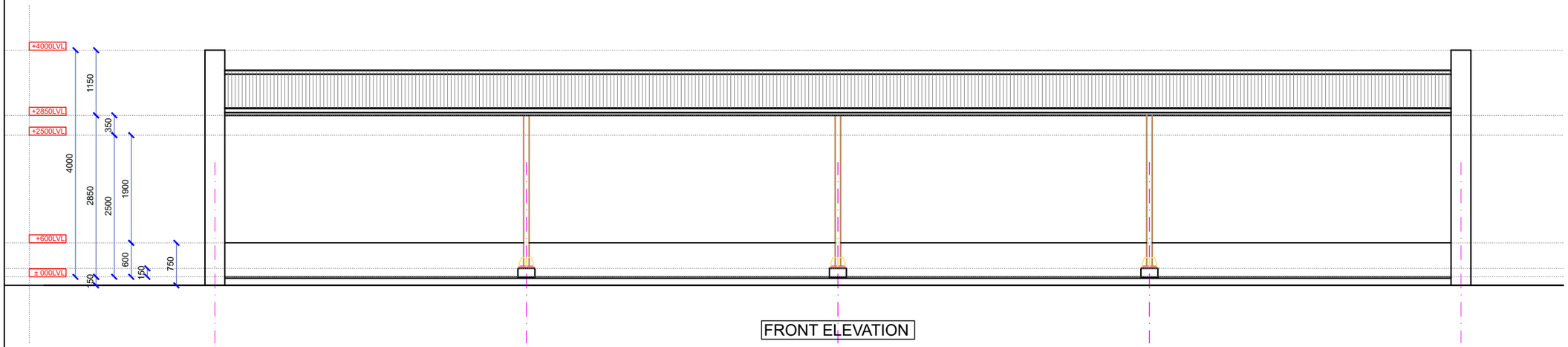
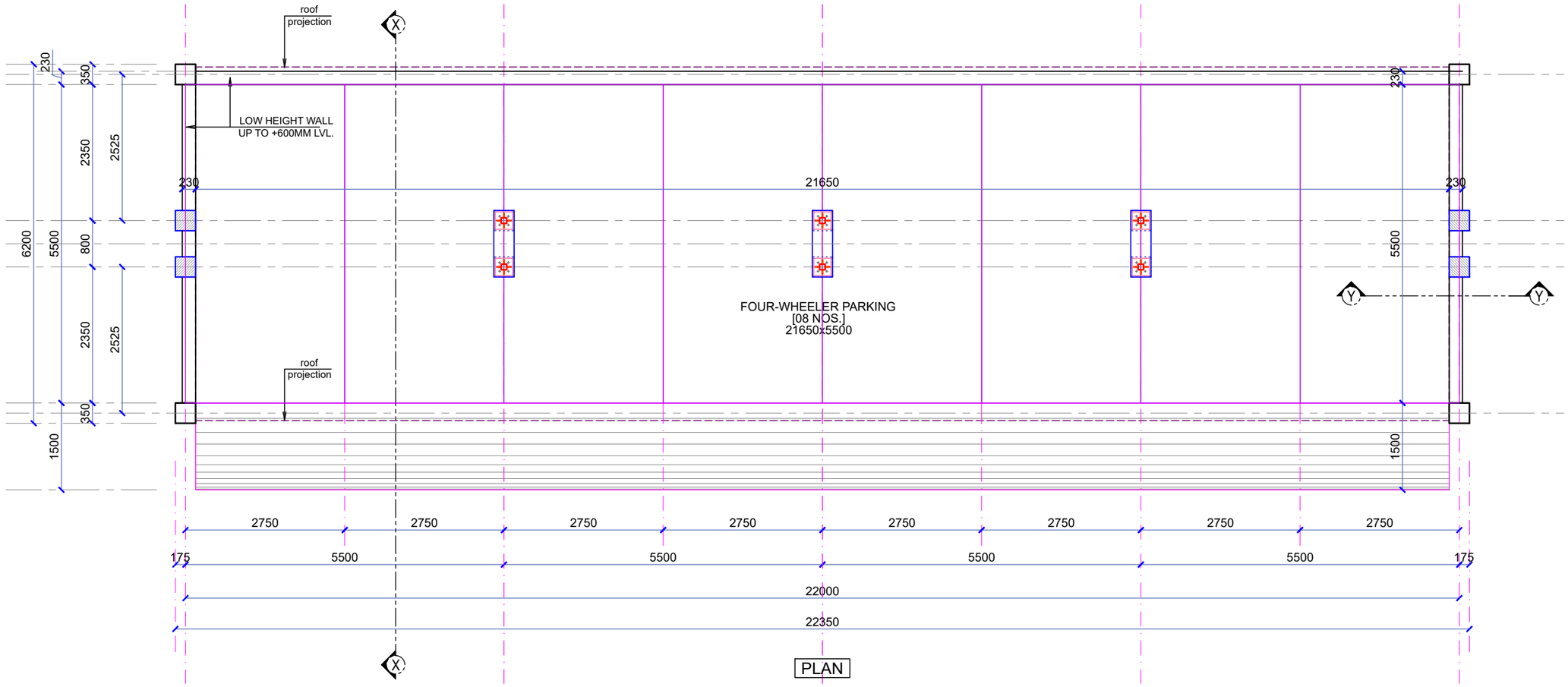
CONTACT: +91 8320322835 E-MAIL: vgstorsion@yahoo.co.in

TITLE:
ROOF PLAN , SECTION : A-A , B-B

DWG NO.	AR-29-02	NAME OF BUILDING:- [29] TRAINING SHED FOR TRAINEES
DEALT	NIMA	
PRJCT. CODE	2401	PROJECT NAME: **FARMER TRAINING CENTER & AI TRAINING CENTER_ COW SANCTUARY AT TUGLAKPUR MUZAFFARNAGAR, UP.**
CHCKD. BY		
DATE	24.01.2024	
SCALE	N.T.S	



FRONT ELEVATION



PLAN

REVISION DETAILS :

REV.NO.	DATE	DESCRIPTION

TENDER DRAWING
DATE: 15.10.2024

CLIENT:

N
W E
S

NDDB DAIRY SERVICES
NDDB HOUSE , CHAUDHARY JHANDU SINGH ROAD , NEAR KAMAL CINEMA COMPLEX , B4 BLOCK , SAFDARJUNG ENCLAVE , NEW DELHI - 110029

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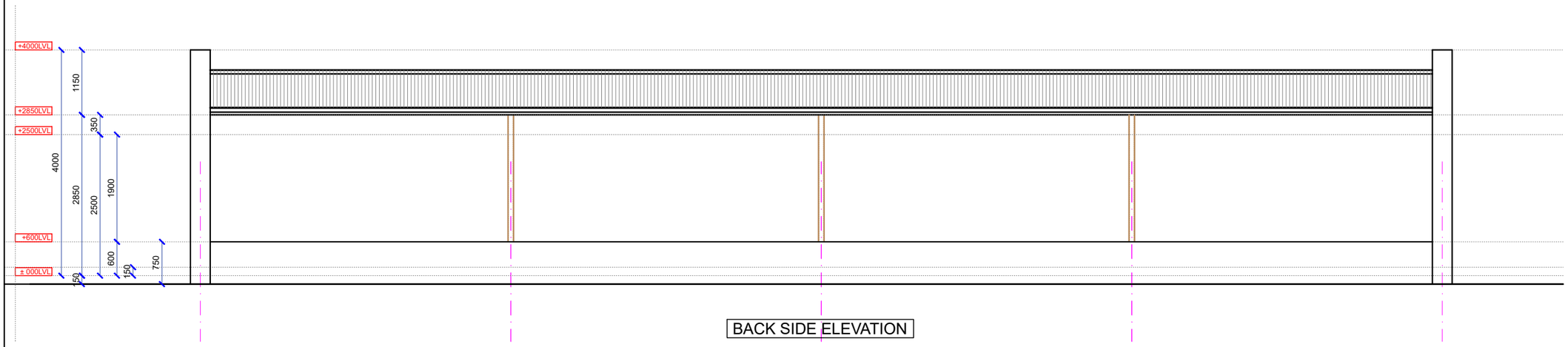
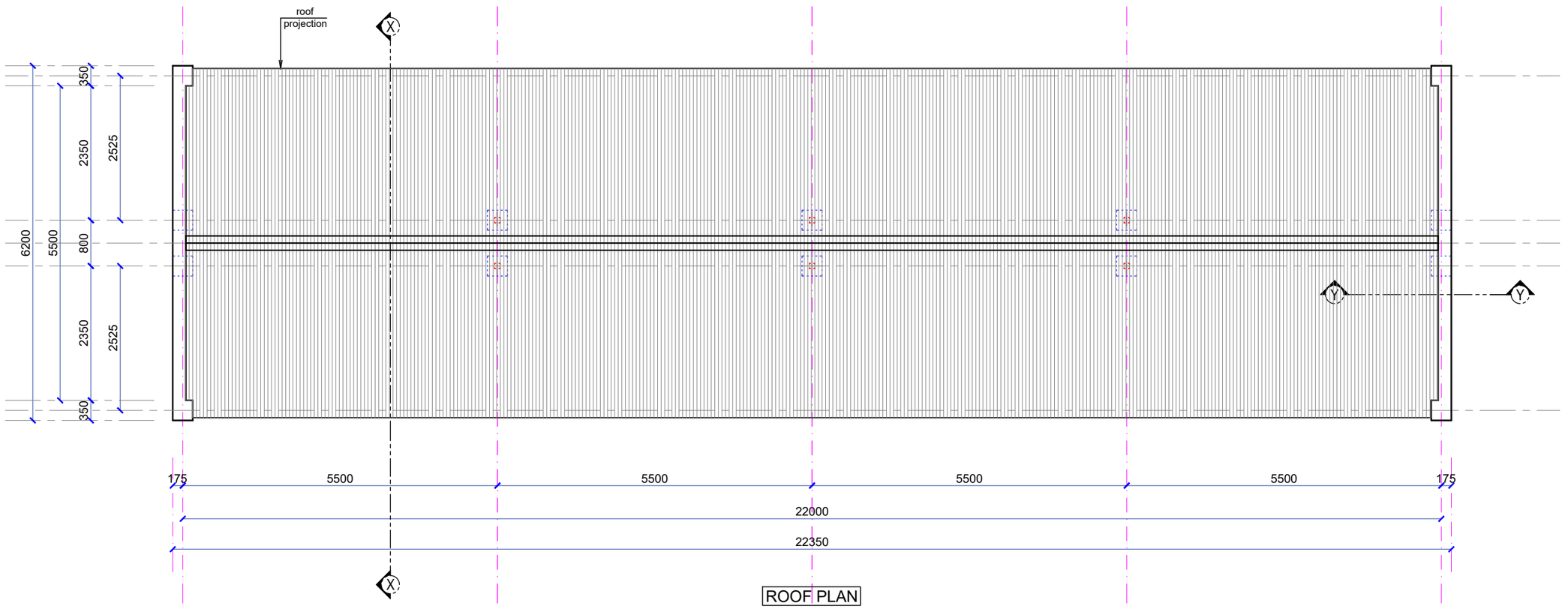
CONTACT: +91 8320322835 E-MAIL: vgstorsion@yahoo.co.in

TITLE:
PLAN , FRONT ELEVATION

DWG NO.	AR-30-01	NAME OF BUILDING:- [30] FOUR-WHEELER PARKING
DEALT	NIMA	
PRJCT. CODE	2401	PROJECT NAME: **FARMER TRAINING CENTER & AI TRAINING CENTER_ COW SANCTUARY AT TUGLAKPUR MUZAFFARNAGAR, UP.**
CHCKD. BY		
DATE	24.01.2024	
SCALE	N.T.S	



BACK SIDE ELEVATION



ROOF PLAN

REVISION DETAILS :

REV.NO.	DATE	DESCRIPTION

TENDER DRAWING
DATE: 15.10.2024

CLIENT:

NDDB DAIRY SERVICES
NDDB HOUSE , CHAUDHARY JHANDU SINGH ROAD , NEAR KAMAL CINEMA COMPLEX , B4 BLOCK , SAFDARJUNG ENCLAVE , NEW DELHI - 110029

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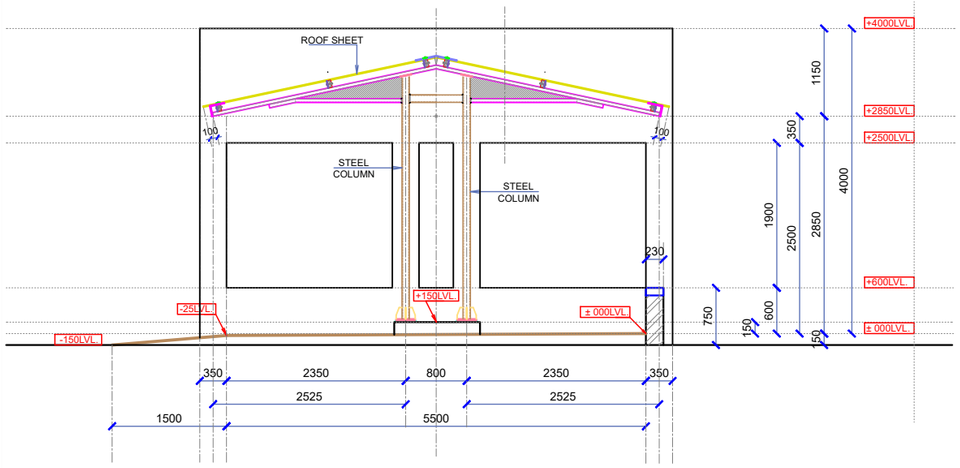
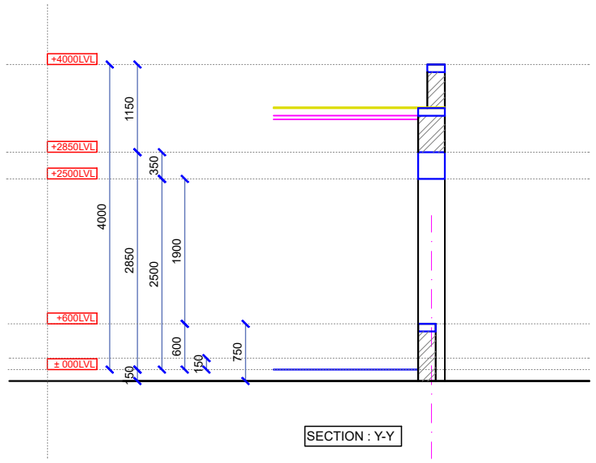
TITLE:
ROOF PLAN , BACK SIDE ELEVATION

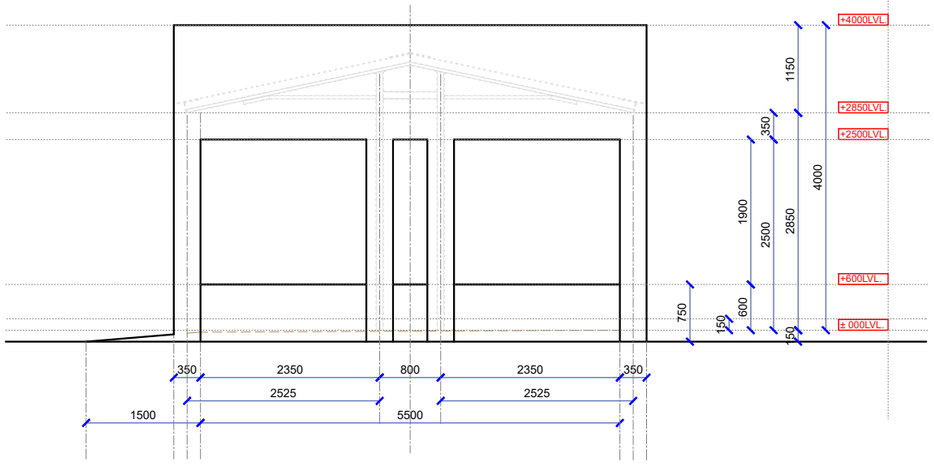
DWG NO.	AR-30-02	NAME OF BUILDING:- [30] FOUR-WHEELER PARKING
DEALT	NIMA	
PRJCT. CODE	2401	PROJECT NAME: **FARMER TRAINING CENTER & AI TRAINING CENTER_ COW SANCTUARY AT TUGLAKPUR MUZAFFARNAGAR, UP.**
CHCKD. BY		
DATE	24.01.2024	
SCALE	N.T.S	



SECTION : X-X



SECTION : Y-Y



SIDE ELEVATION

REVISION DETAILS :

REV.NO.	DATE	DESCRIPTION

TENDER DRAWING
DATE: 15.10.2024

CLIENT:

NDDB DAIRY SERVICES
NDDB HOUSE , CHAUDHARY JHANDU SINGH ROAD , NEAR KAMAL CINEMA COMPLEX , B4 BLOCK , SAFDARJUNG ENCLAVE , NEW DELHI - 110029

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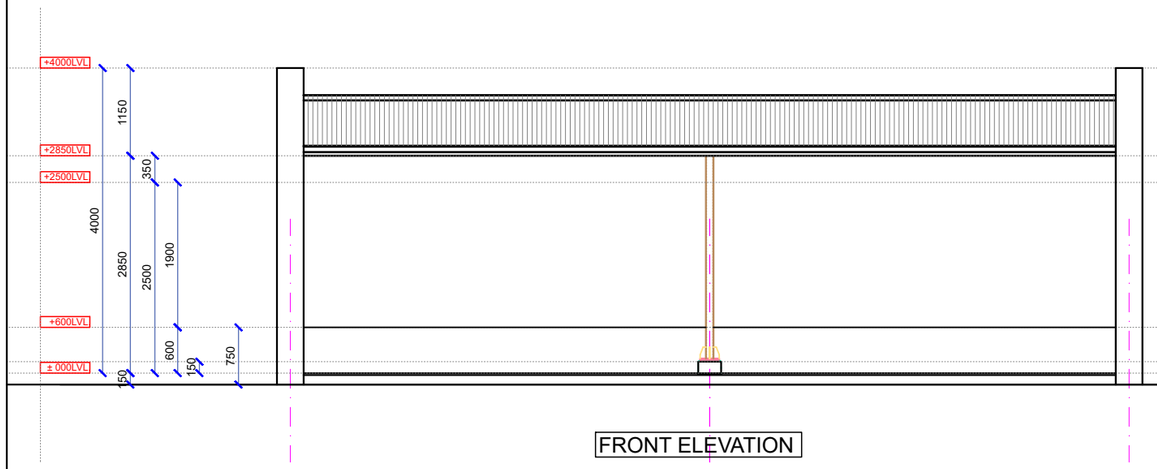
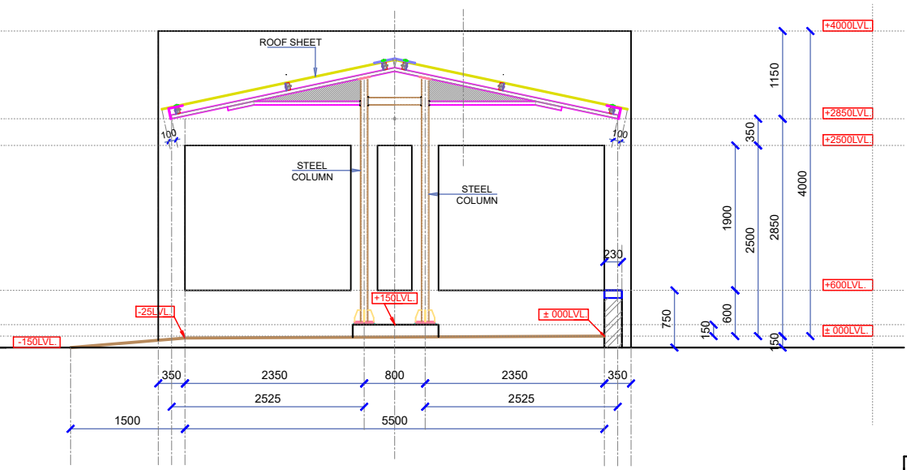
SOLA, AHMEDABAD-380060.
CONTACT: +91 8320322830, E-MAIL: vgstorsion@yahoo.co.in

TITLE:
SECTION : X-X , Y-Y , SIDE ELEVATION

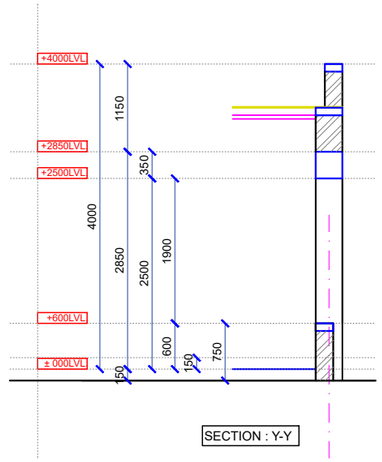
DWG NO.	AR-30-03	NAME OF BUILDING:- [30] FOUR-WHEELER PARKING
DEALT	NIMA	
PRJCT. CODE	2401	PROJECT NAME: **FARMER TRAINING CENTER & AI TRAINING CENTER , COW SANCTUARY AT TUGLAKPUR MUZAFFARNAGAR, UP.**
CHCKD. BY		
DATE	24.01.2024	
SCALE	N.T.S	



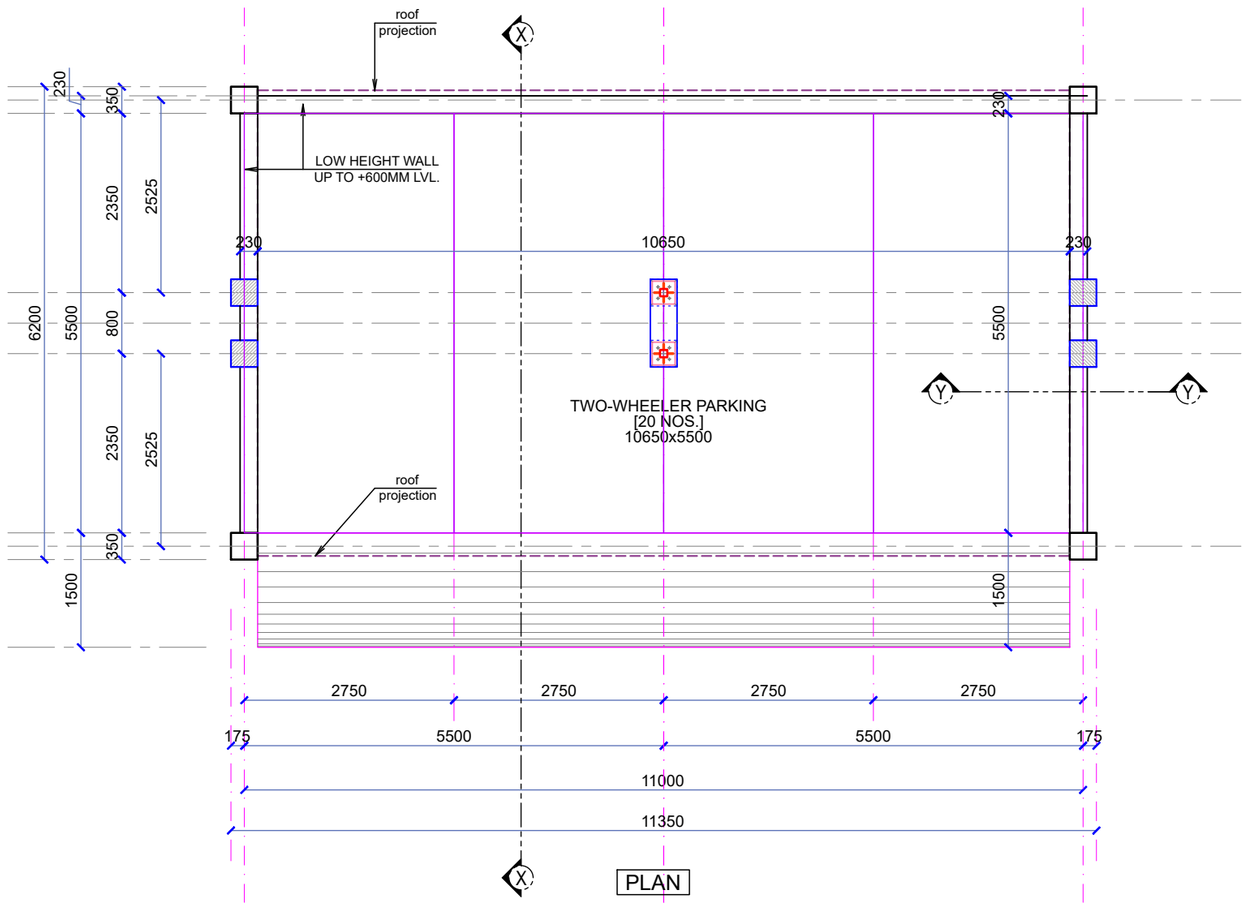
FRONT ELEVATION



SECTION : X-X



SECTION : Y-Y



PLAN

REVISION DETAILS :

REV.NO.	DATE	DESCRIPTION

TENDER DRAWING
DATE: 15.10.2024

CLIENT:

NDDB DAIRY SERVICES
NDDB HOUSE , CHAUDHARY JHANDU SINGH ROAD , NEAR KAMAL CINEMA COMPLEX , B4 BLOCK , SAFDARJUNG ENCLAVE , NEW DELHI - 110029

TORSION
ENGINEERS & CONSULTANTS
ARCHITECTURE•STRUCTURE•INTERIOR
906-907, FORTUNE BUSINESS HUB,
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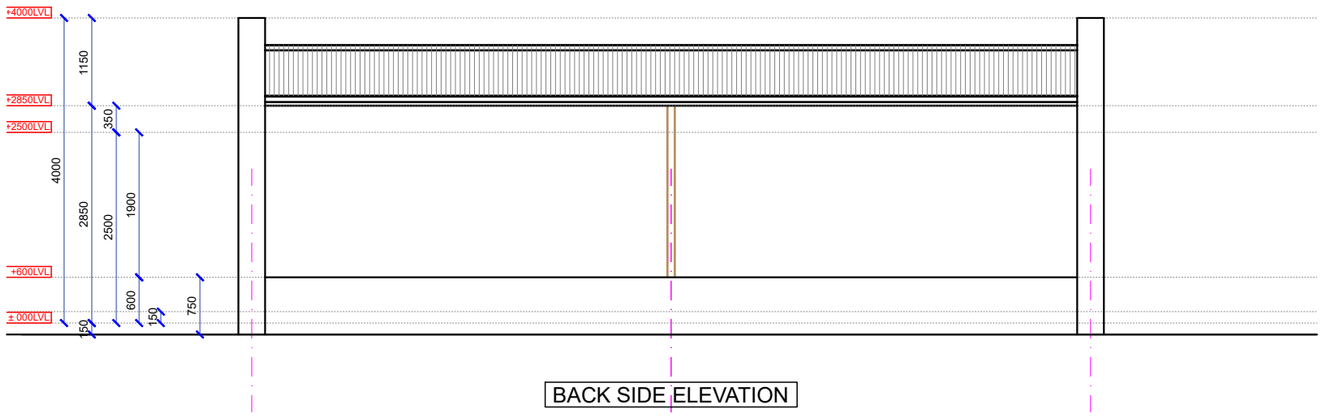
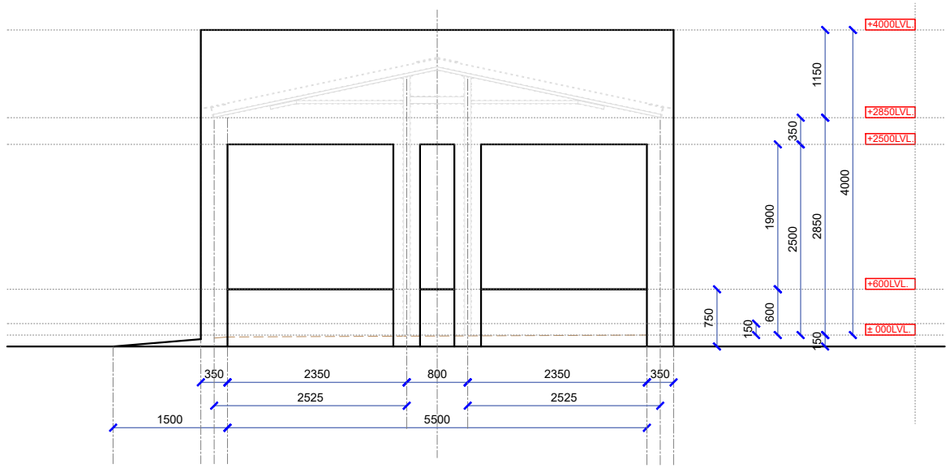
SOLA, AHMEDABAD-380060.
CONTACT: +91 8320322835 E-MAIL: vgstorsion@yahoo.co.in

TITLE:
PLAN , FRONT ELEVATION , SECTION : X-X , Y-Y

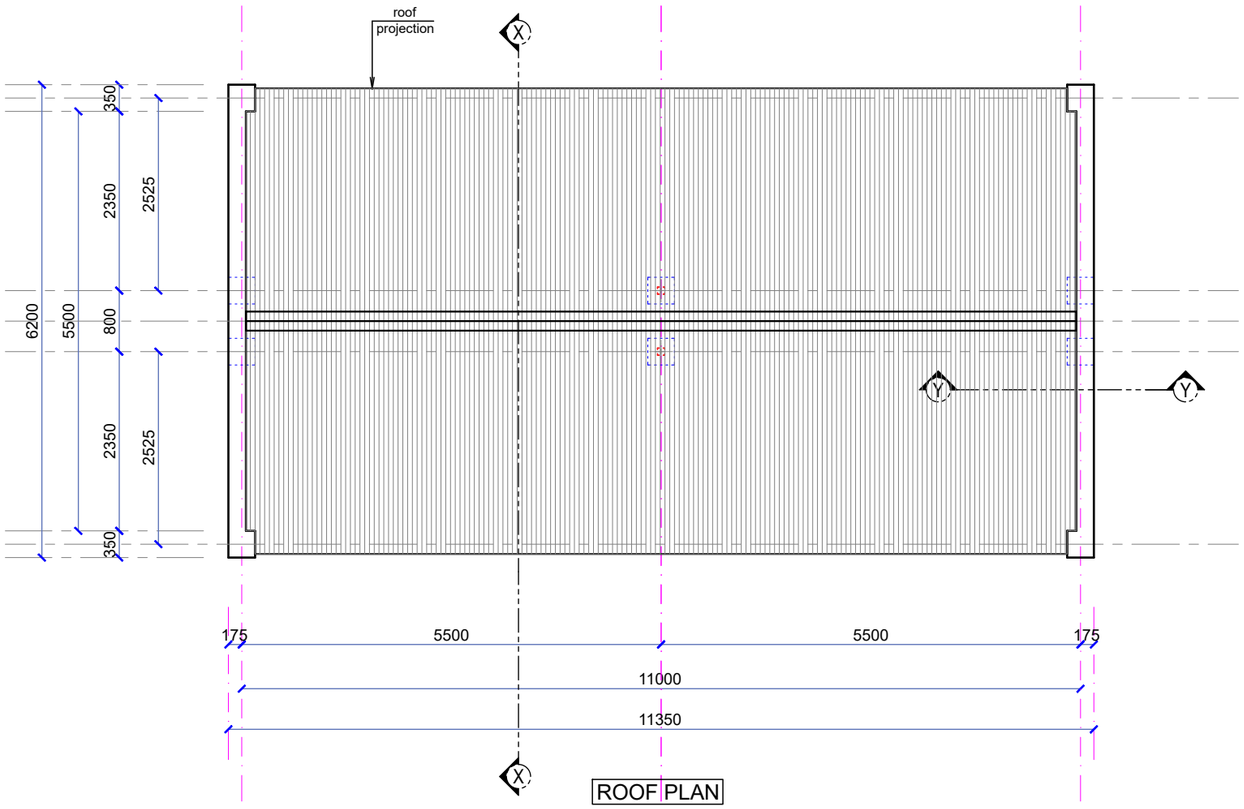
DWG NO.	AR-31-01	NAME OF BUILDING:- [31] TWO-WHEELER PARKING
DEALT	NIMA	
PRJCT. CODE	2401	PROJECT NAME: **FARMER TRAINING CENTER & AI TRAINING CENTER_ COW SANCTUARY AT TUGLAKPUR MUZAFFARNAGAR, UP.**
CHCKD. BY		
DATE	24.01.2024	
SCALE	N.T.S	



BACK SIDE ELEVATION



SIDE ELEVATION



ROOF PLAN

REVISION DETAILS :

REV.NO.	DATE	DESCRIPTION

N
W E
S

TENDER DRAWING
DATE: 15.10.2024

CLIENT:

NDDB DAIRY SERVICES
NDDB HOUSE , CHAUDHARY JHANDU SINGH ROAD , NEAR KAMAL CINEMA COMPLEX , B4 BLOCK , SAFDARJUNG ENCLAVE , NEW DELHI - 110029

TORSION
ENGINEERS & CONSULTANTS
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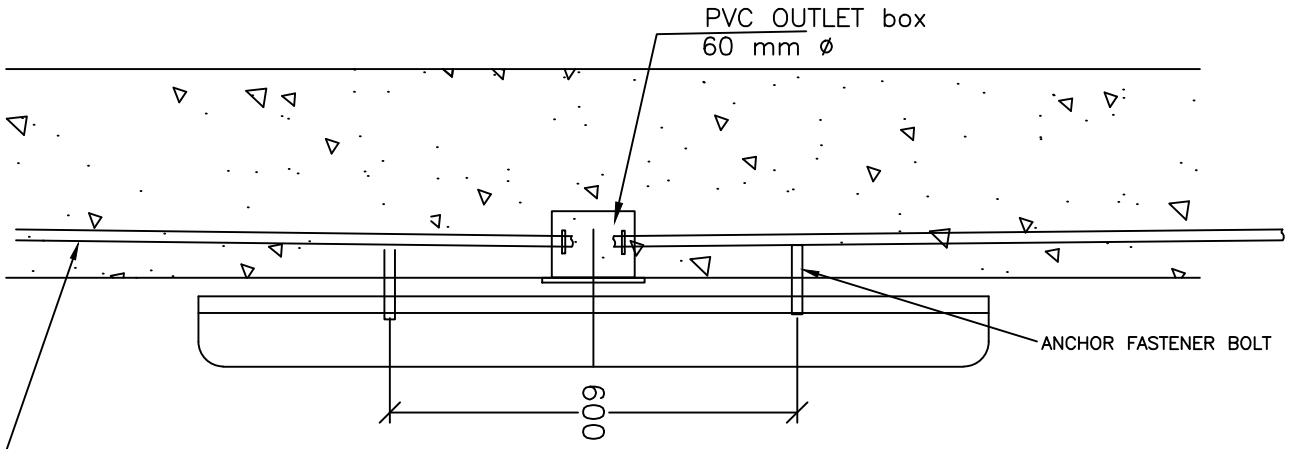
SOLA, AHMEDABAD-380060.
CONTACT: +91 8320322835 E-MAIL: vgstorsion@yahoo.co.in

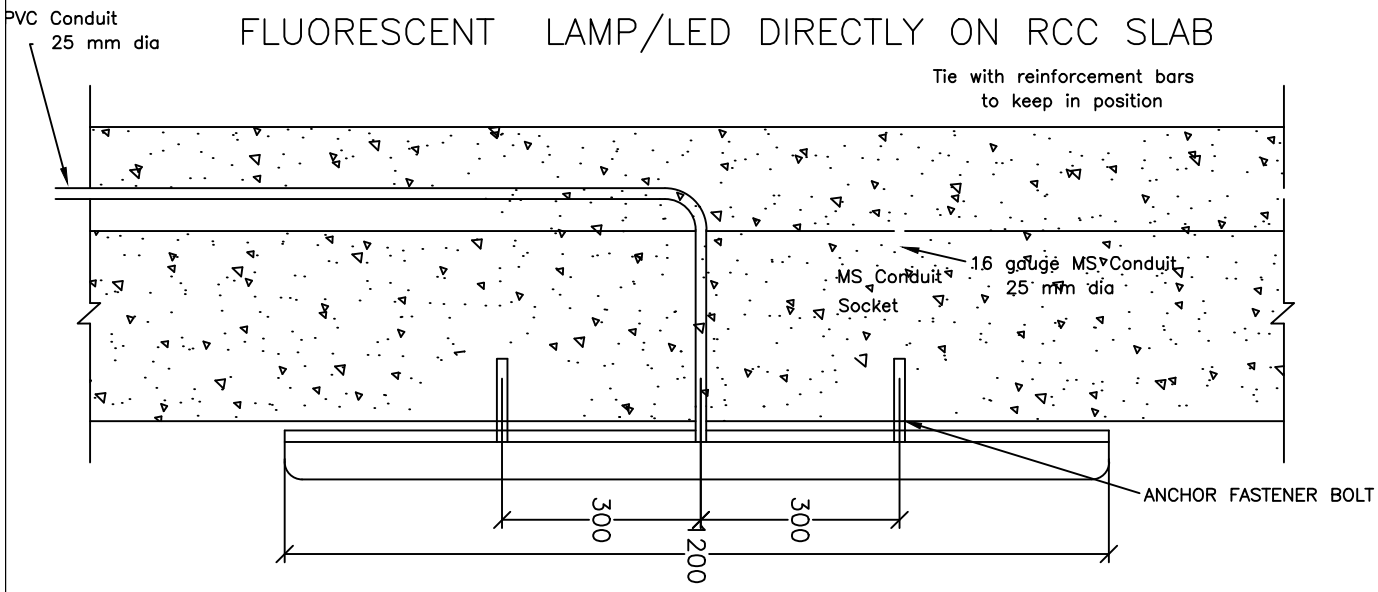
TITLE:
ROOF PLAN , BACK SIDE ELEVATION , SIDE ELEVATION

DWG NO.	AR-30-02	NAME OF BUILDING:- [30] FOUR-WHEELER PARKING
DEALT	NIMA	
PRJCT. CODE	2401	PROJECT NAME: **FARMER TRAINING CENTER & AI TRAINING CENTER_ COW SANCTUARY AT TUGLAKPUR MUZAFFARNAGAR, UP.**
CHCKD. BY		
DATE	24.01.2024	
SCALE	N.T.S	

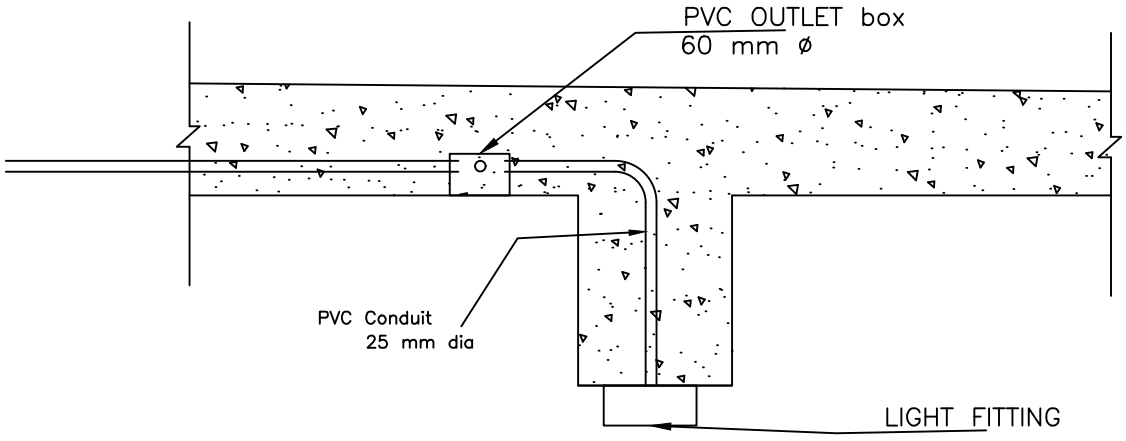
NDDB ANAND	FIXING DETAILS FOR FLUORESCENT LIGHT FITTINGS	DRG. NO. SK – 16 PVC



FIXING DETAILS FOR LIGHT FITTING SUITABLE FOR 40/36W FLUORESCENT LAMP/LED DIRECTLY ON RCC SLAB

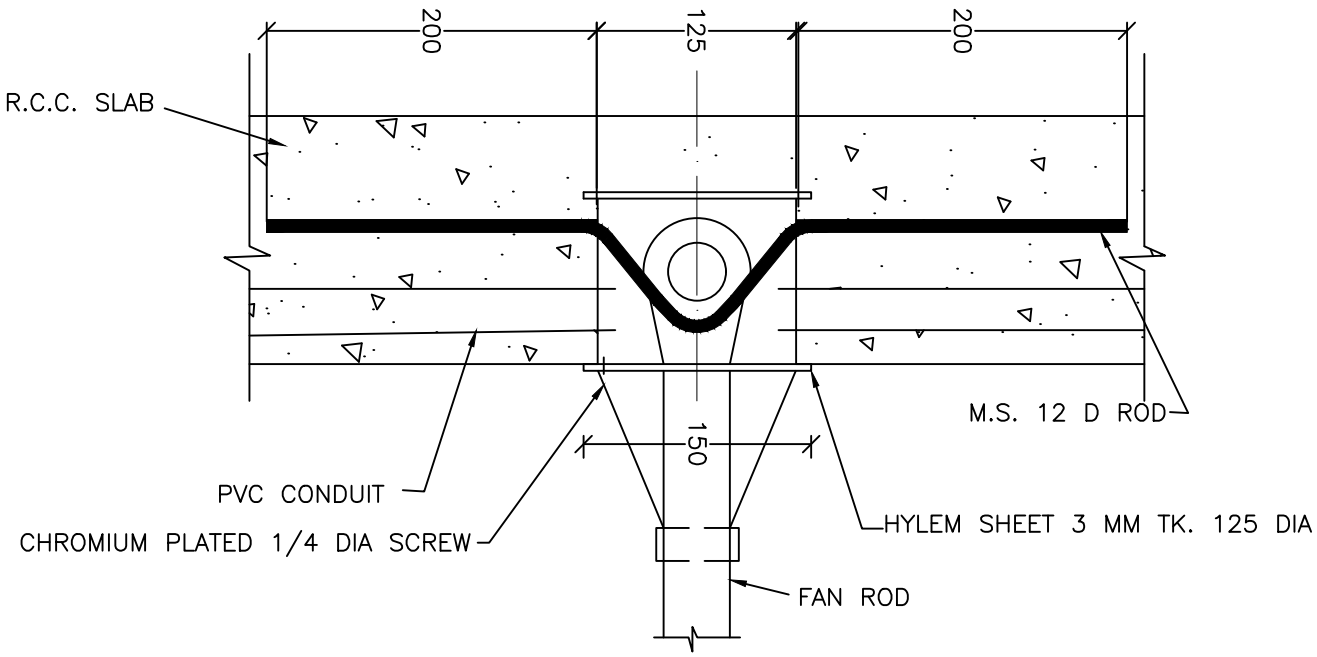


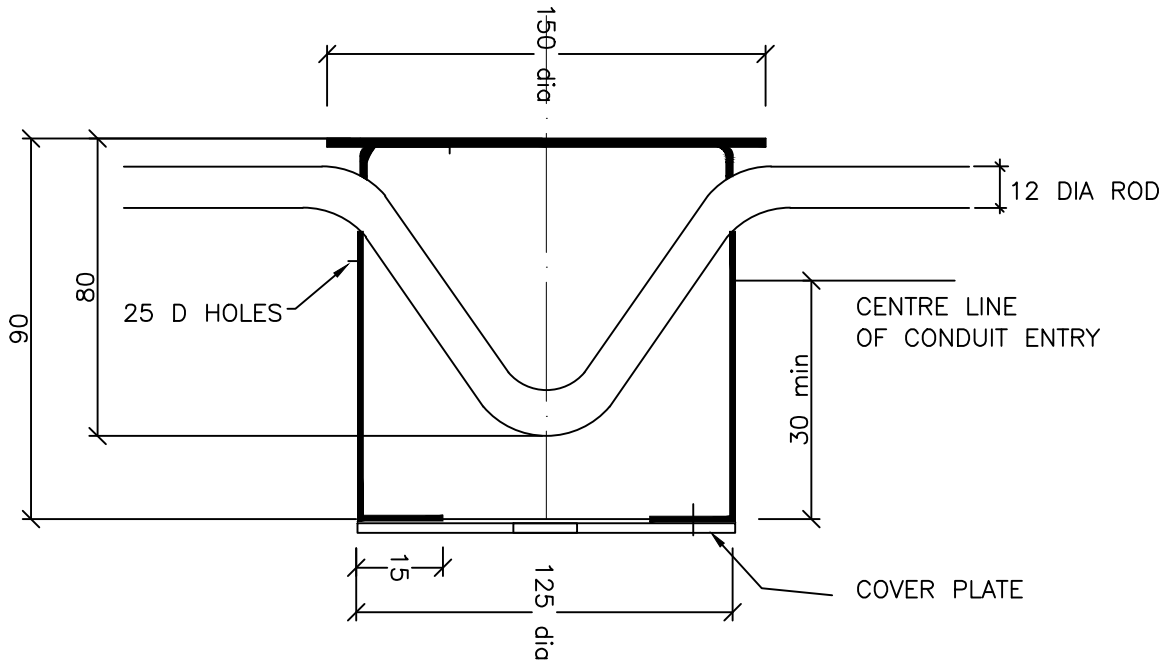
FIXING DETAILS FOR LIGHT FITTING SUITABLE FOR 40/36W FLUORESCENT LAMP/LED DIRECTLY ON RCC BEAM



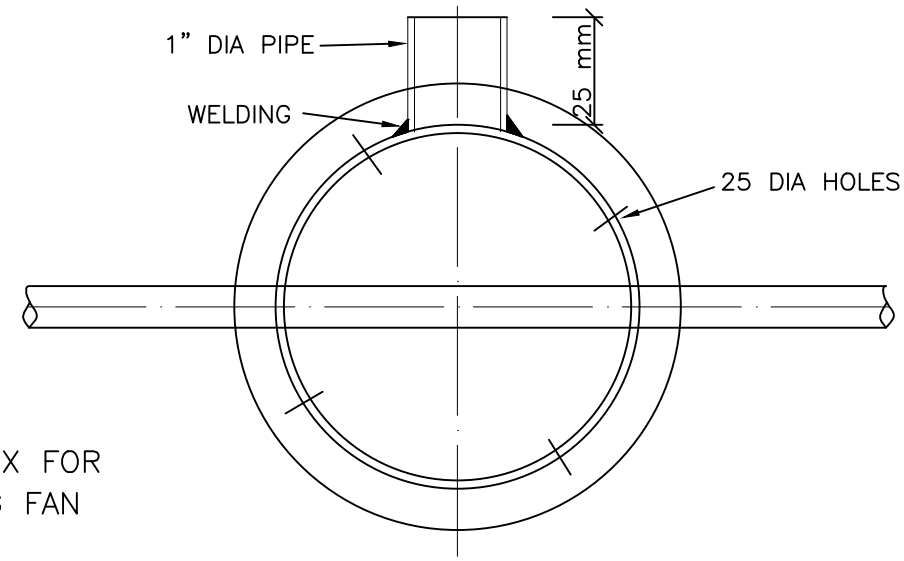
FIXING DETAILS FOR LIGHT FITTING SUITABLE FOR 40/36W FLUORESCENT LAMP HANGING FROM RCC SLAB

NDDB ANAND	OUTLET BOX & INSTALLATION DETAILS FOR CEILING FAN	DRG. NO. SK – 17 PVC



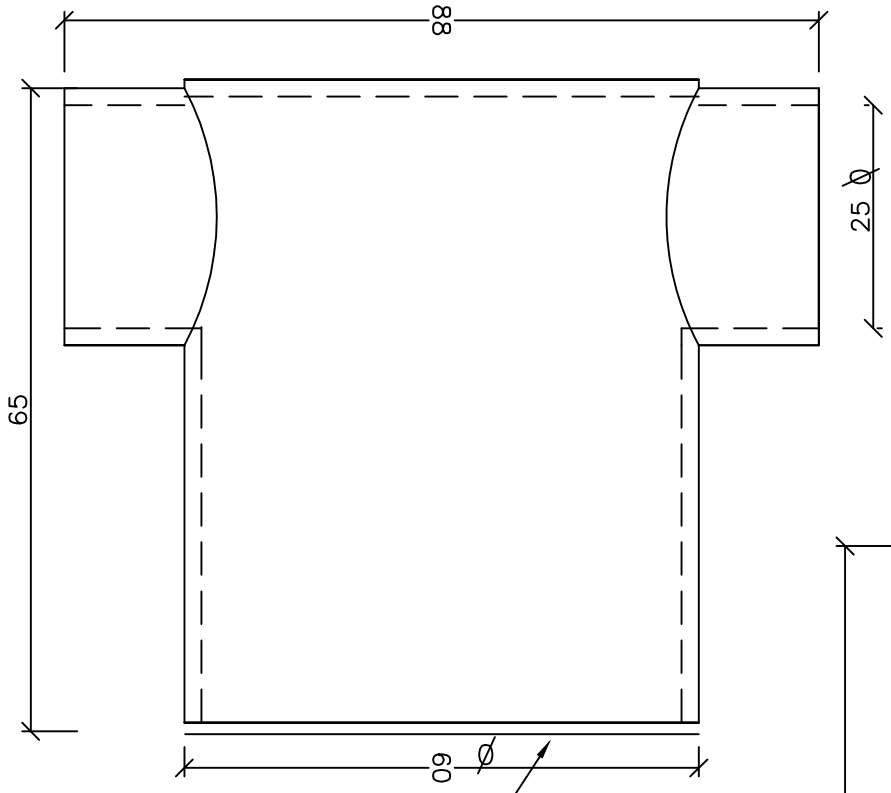


ELEVATION (SECTIONAL)



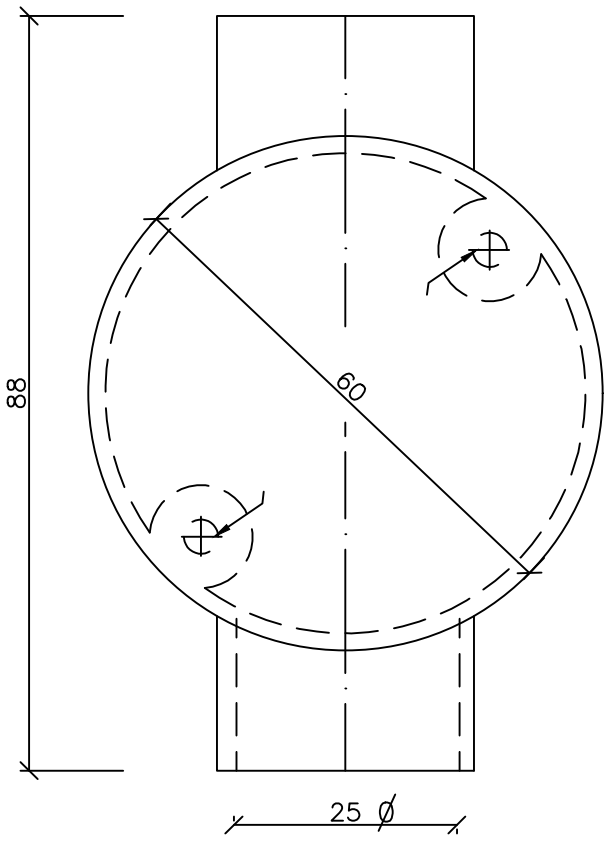
DETAILS OF PVC BOX FOR
INSTALLING CEILING FAN

NDDB ANAND	DETAILS OF OUTLET BOX FOR INSTALLATION OF LIGHT FITTING ON SLAB.	DRG. NO. SK – 18 A PVC

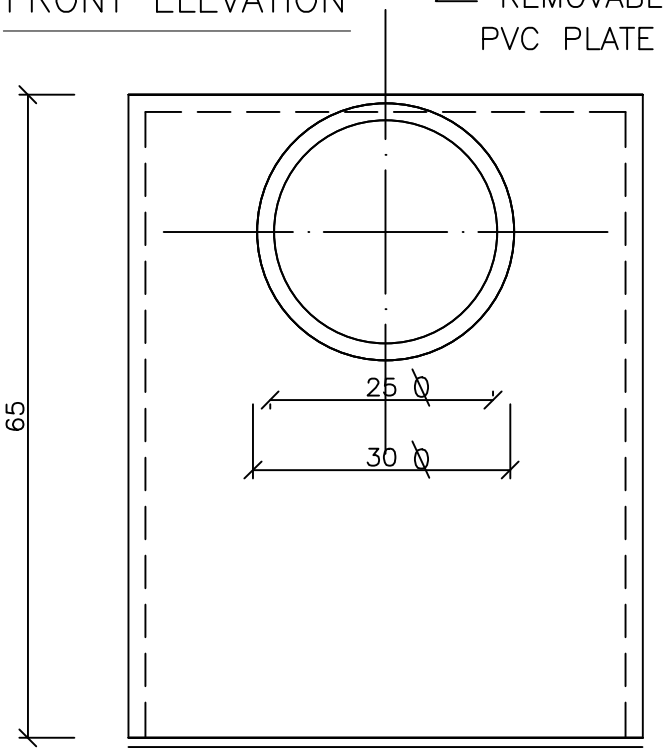


FRONT ELEVATION

REMOVABLE PVC PLATE



PLAN



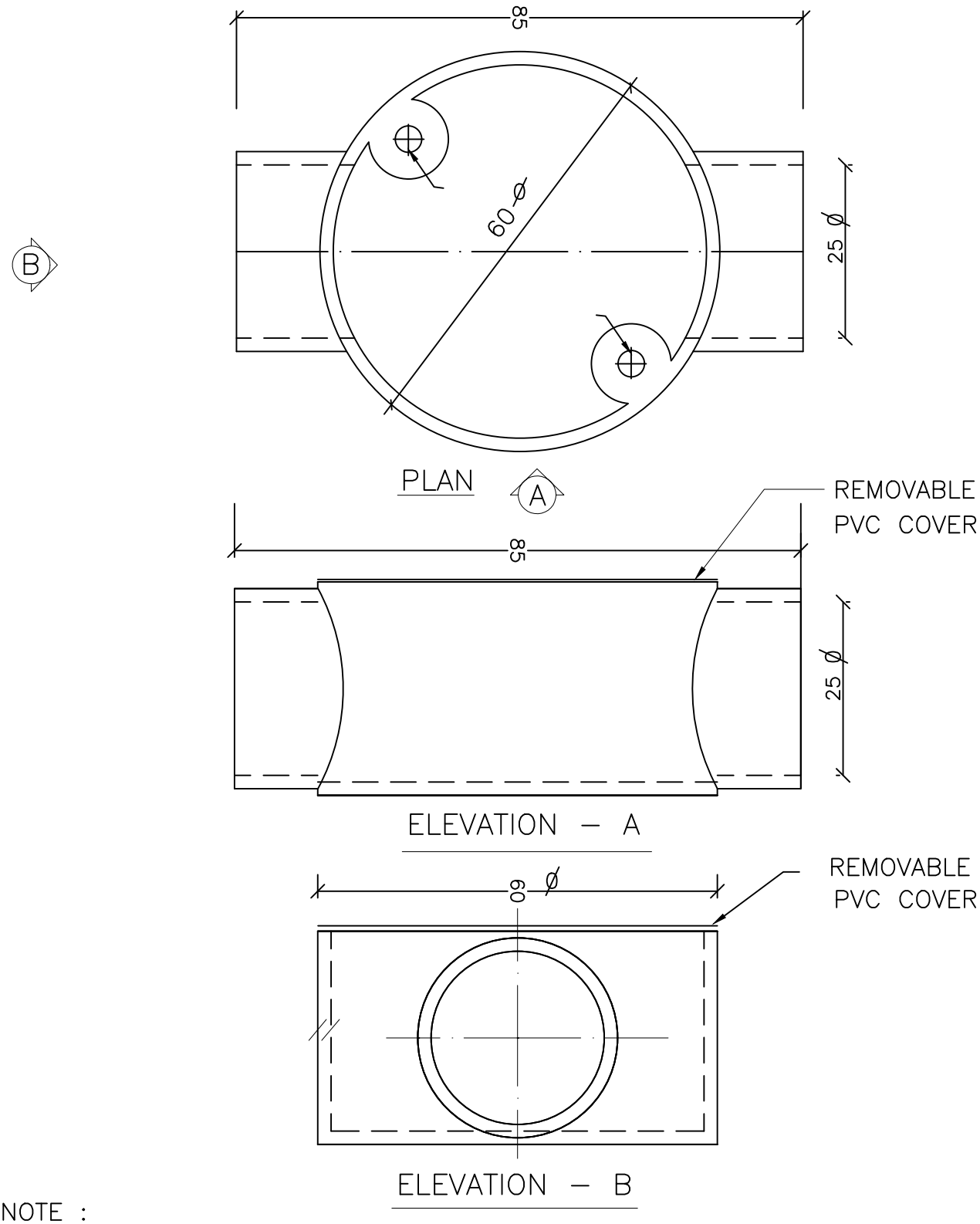
SIDE ELEVATION

NOTE :

REMOVABLE PVC PLATE

1. BOX CAN BE 2,3 OR 4 WAY TYPE DEPENDING ON REQUIREMENT.

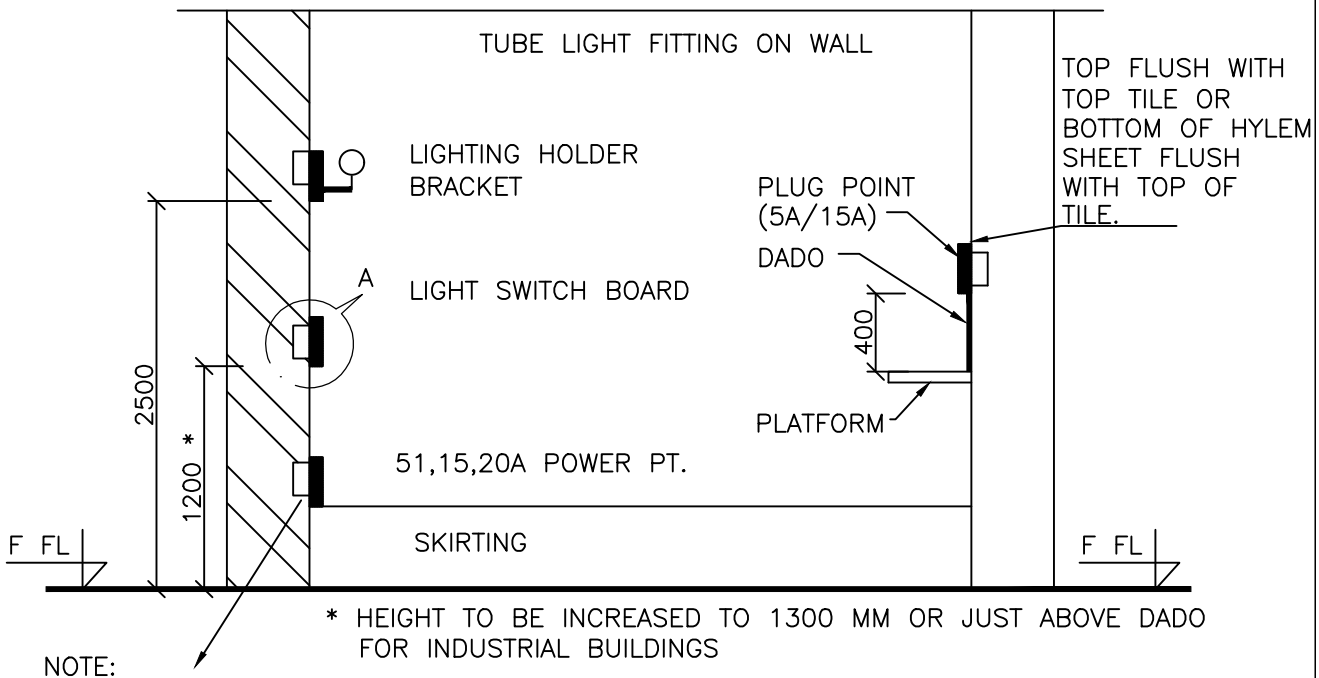
NDDB ANAND	DETAILS OF OUTLET BOX FOR INSTALLATION OF LIGHT FITTING ON WALL.	DRG. NO. SK – 18 B PVC



NOTE :

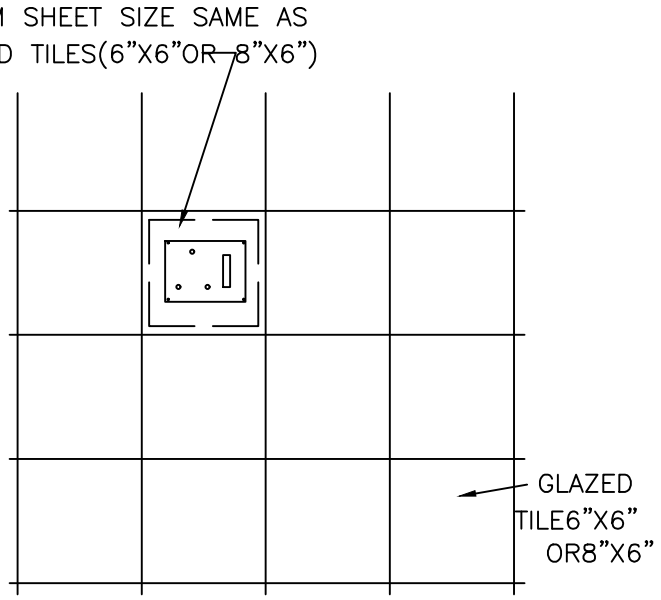
1. BOX CAN BE 2,3 OR 4 WAY TYPE, DEPENDING ON REQUIREMENT.

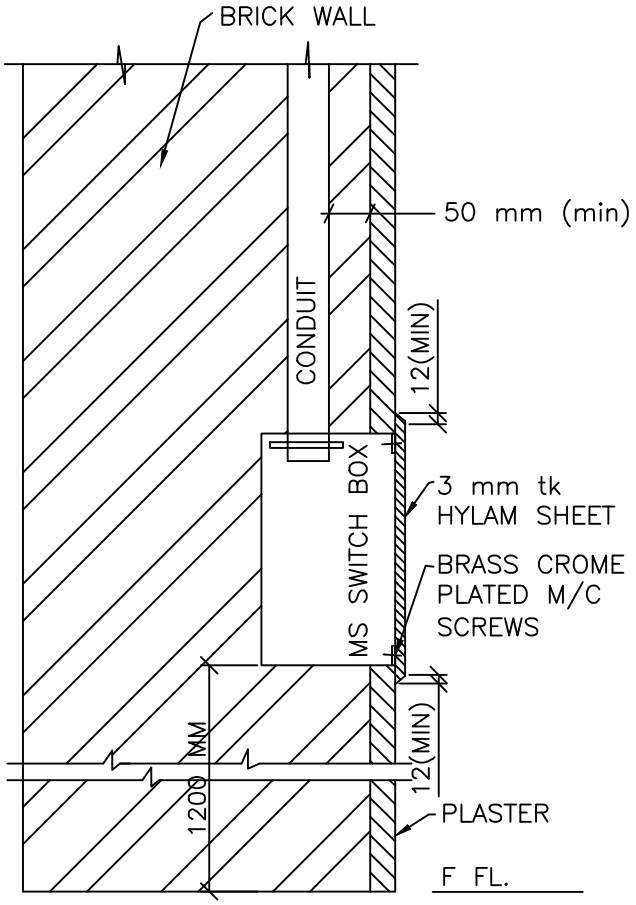
NDDB ANAND	INSTALLATION TIPS FOR LIGHTING SWITCH BOARD	DRG. NO. SK – 20



NOTE:

6,16,20 A POWER POINT IN AREA WHERE THERE ARE WATER SPREADING ON FLOORS (SUCH AS PRODUCTION BLOCK OF DAIRIES,BATHROOM ETC) TO BE LOCATED AT 1200 MM HEIGHT FROM FLOOR.



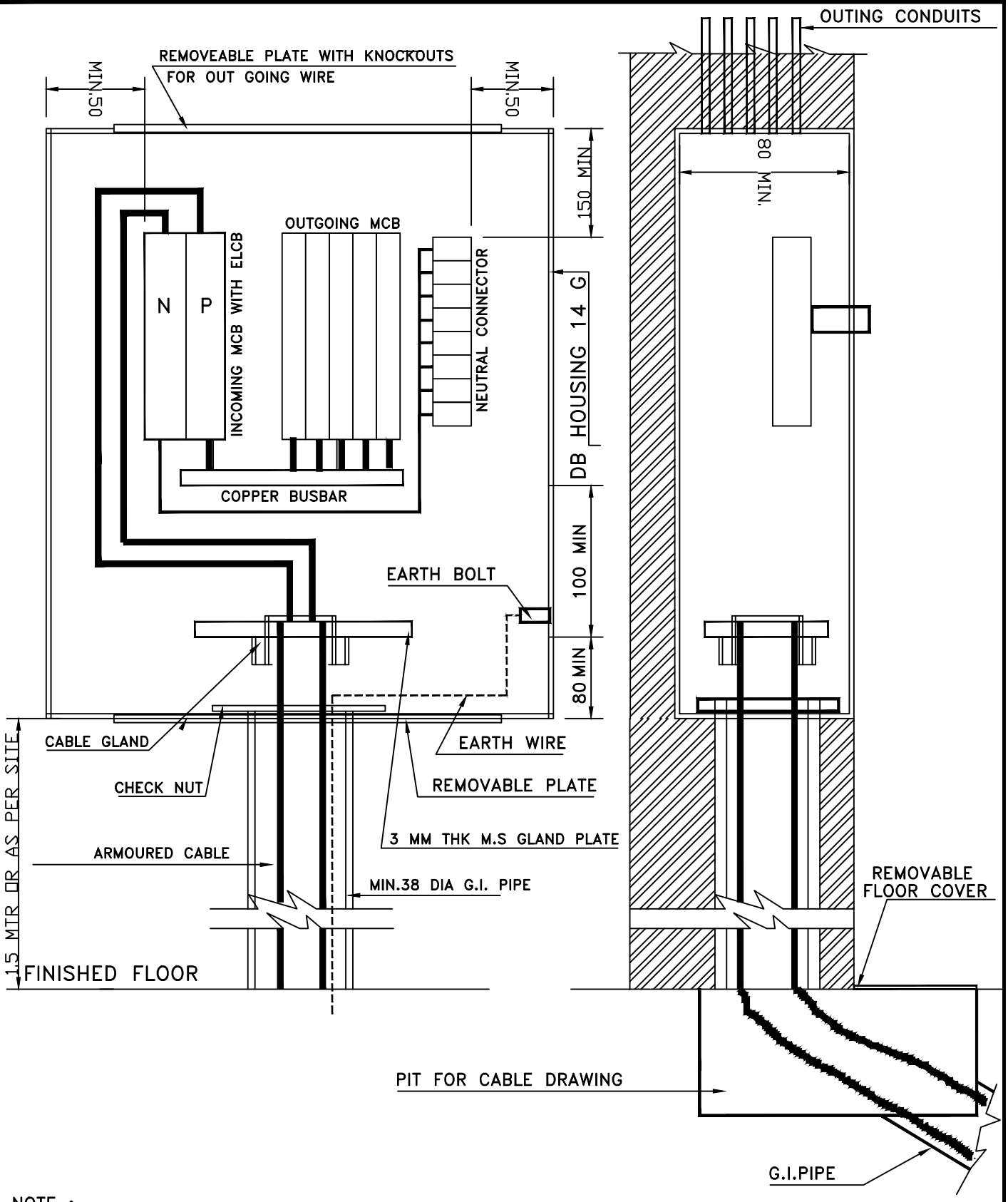


DETAIL : A

NOTE :–

1. MS BOXES SIZES & LOCATION TO BE SELECTED SUCH THAT THERE IS NO CUTTING OF GLAZED TILES IS THERE.
2. CHECK SIZE OF TILES BEING USED IN THE PROJECT & SELECT SWITCH BOX SIZE ACCORDINGLY

N.D.D.B. NOIDA	ELECTRICAL STANDARD TERMINATION OF ARMOURED CABLE IN CONCEALED DB	SKETCH NO. 24



NOTE :-

(1) ALL DIMENSIONS ARE IN MM. DO NOT SCALE THE SKETCH

(2) RATING AND NO.OF INCOMING AND OUTGOING MCB SHALL BE AS PER ACTUAL REQUIREMENT. ABOVE DETAILS ARE ONLY TYPICAL.

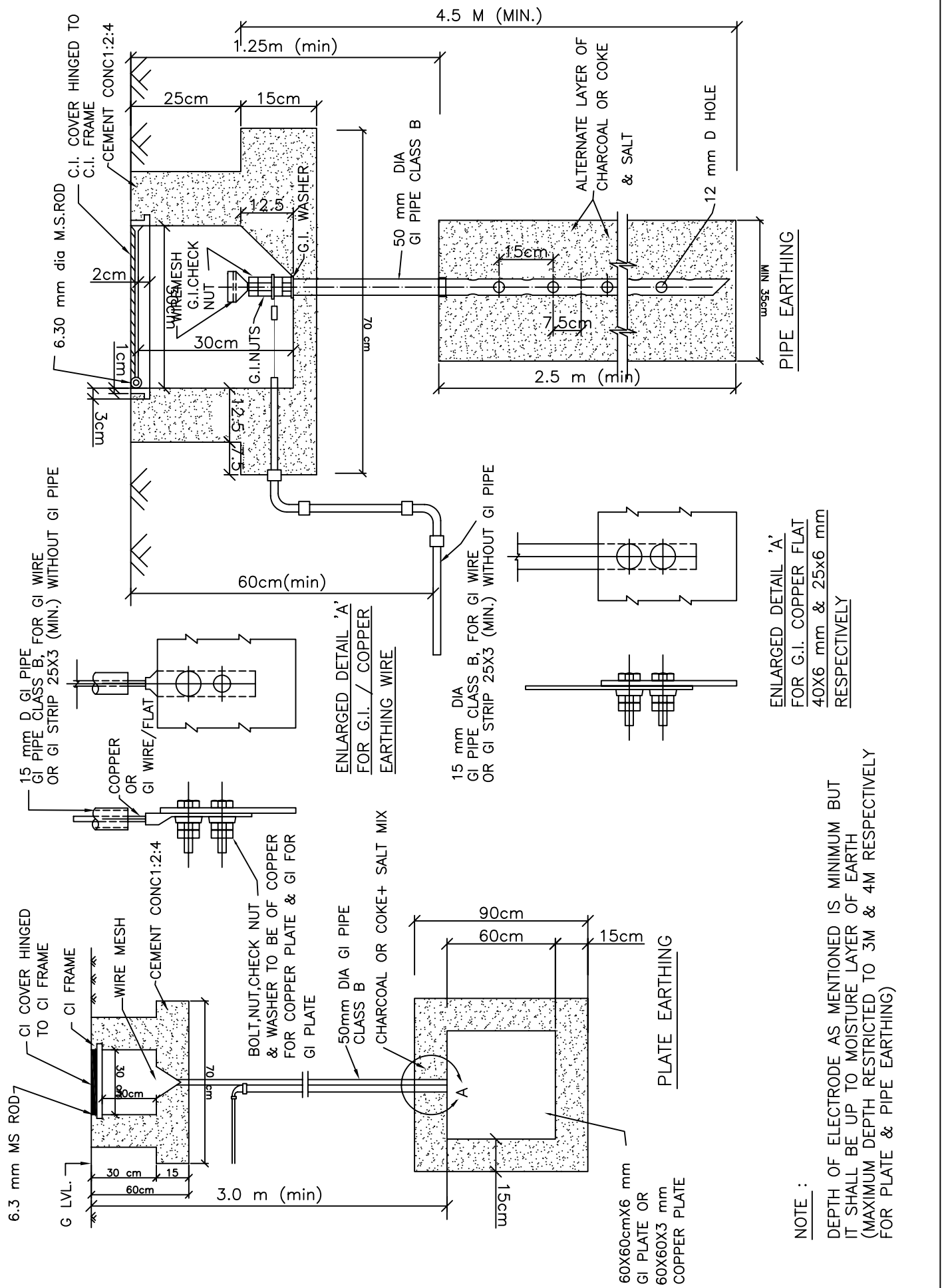
(3) HEIGHT AND WIDTH OF DB SHALL BE SUFFICIENT TO ACCOMMODATE ALL INCOMING AND OUTGOING MCB, WITH CRITICAL MINIMUM CLEARANCE SPECFIED ABOVE.

(4) PIT IN FLOOR FOR FACILITATING DRAWING OF ARMOURED CABLE CAN BE OMITED IF SIZE OF CABLE AND LOCATIONS OF DB DOES NOT REQUIRE IT.

S.M.PANCHA-05051997

PC FILE NAME STDPANEL.DWG

NDDB DELHI	EARTHING PIT DETAILS (EXTRACT FROM ISI 3043–1987)	DRG. NO. SK – 25

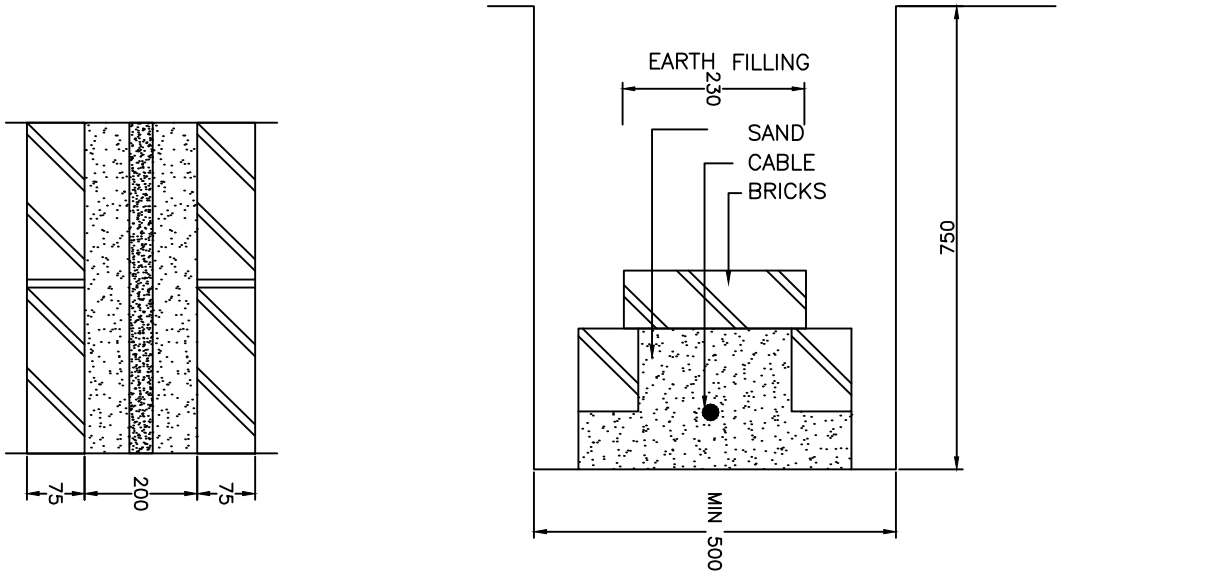


NOTE :

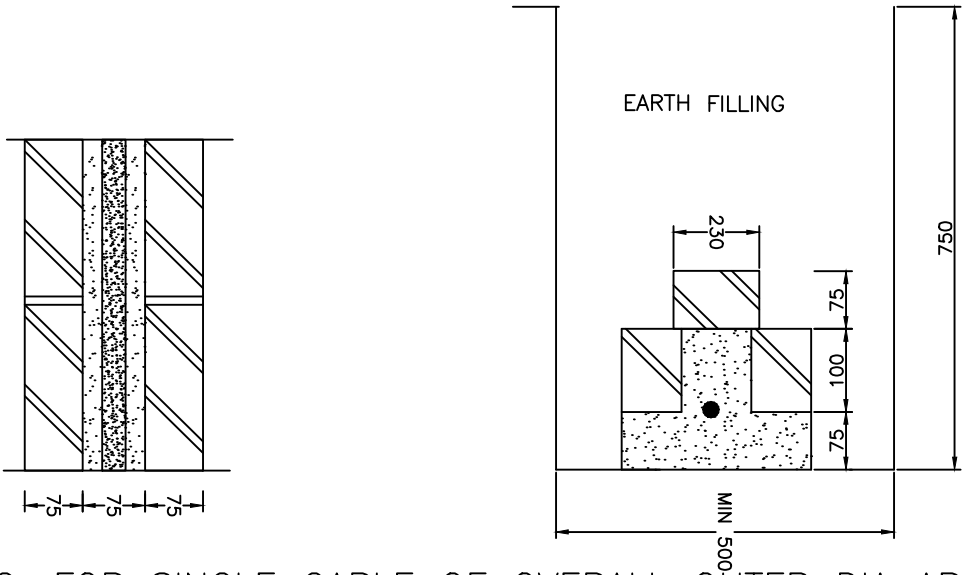
DEPTH OF ELECTRODE AS MENTIONED IS MINIMUM BUT IT SHALL BE UP TO MOISTURE LAYER OF EARTH (MAXIMUM DEPTH RESTRICTED TO 3M & 4M RESPECTIVELY FOR PLATE & PIPE EARTHING)

NDDB ANAND	LAYING OF CABLES (UNDER GROUND)	DRG. NO. SK - 26

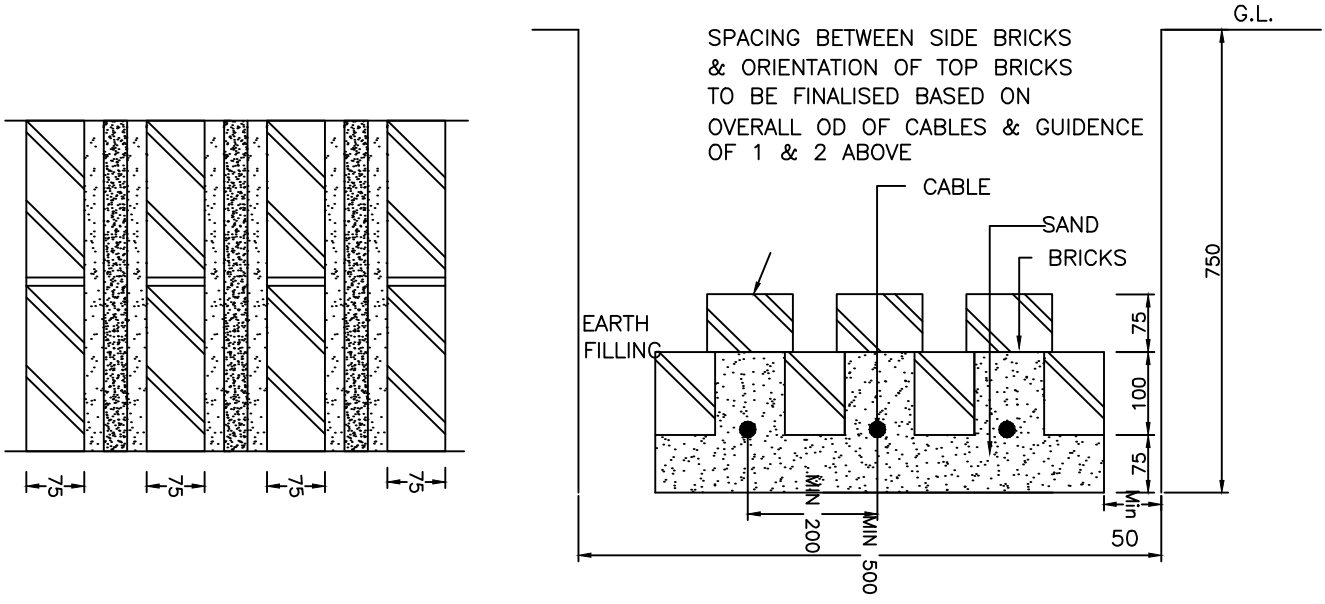
ALL DIMENSION ARE IN MM



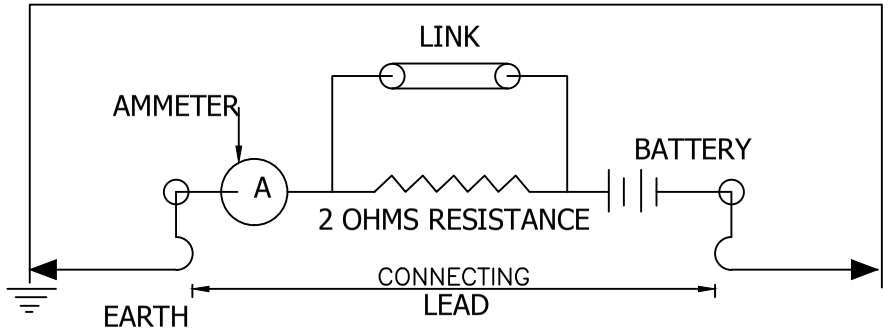
1 . FOR SINGLE CABLE OF OVERALL OUTER DIA UPTO 25 MM



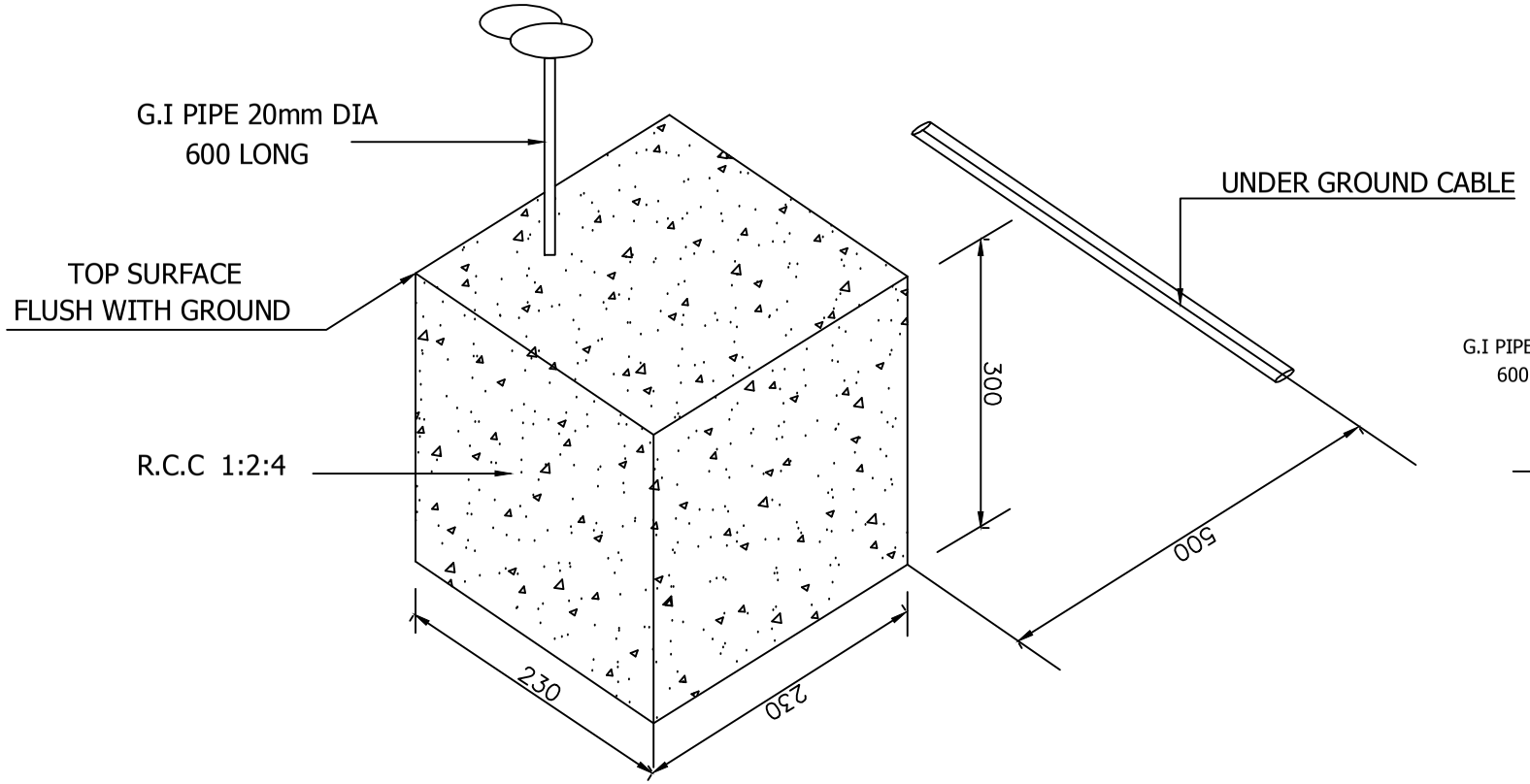
2. FOR SINGLE CABLE OF OVERALL OUTER DIA ABOVE 25 MM



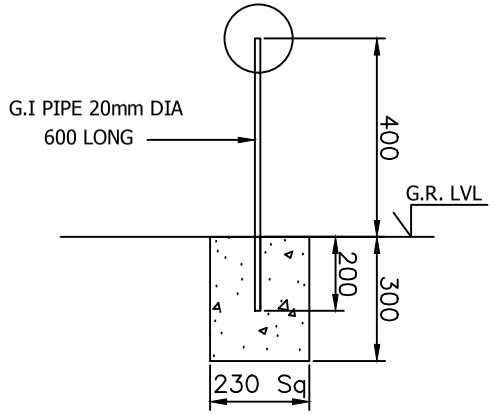
3. FOR GROUPING OF CABLE IN SAME TRENCH (TYPICAL)



CIR DIAGRAM FOR EARTH CONTINUITY TEST



CABLE MARKER

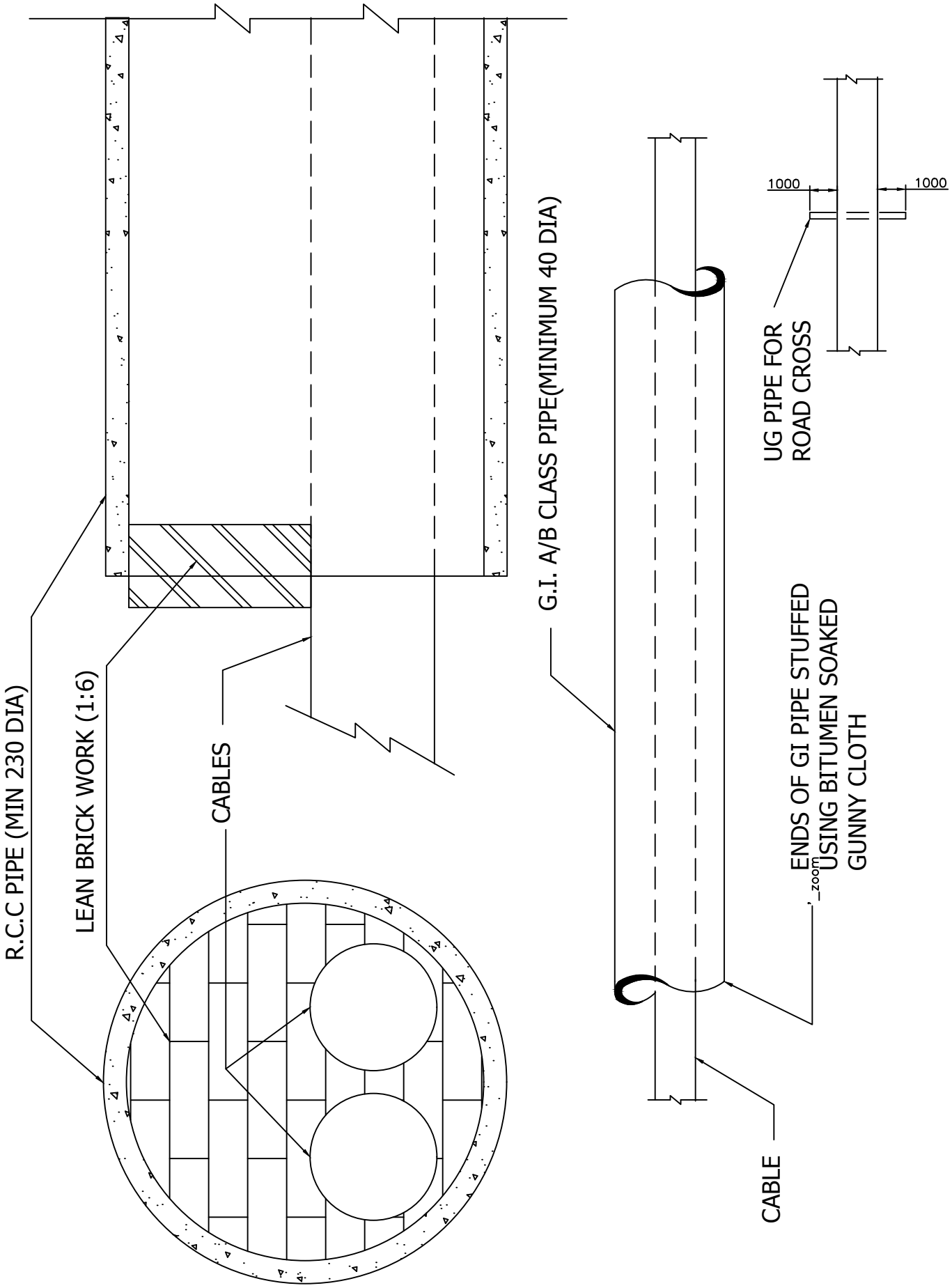


NDDB
ANAND

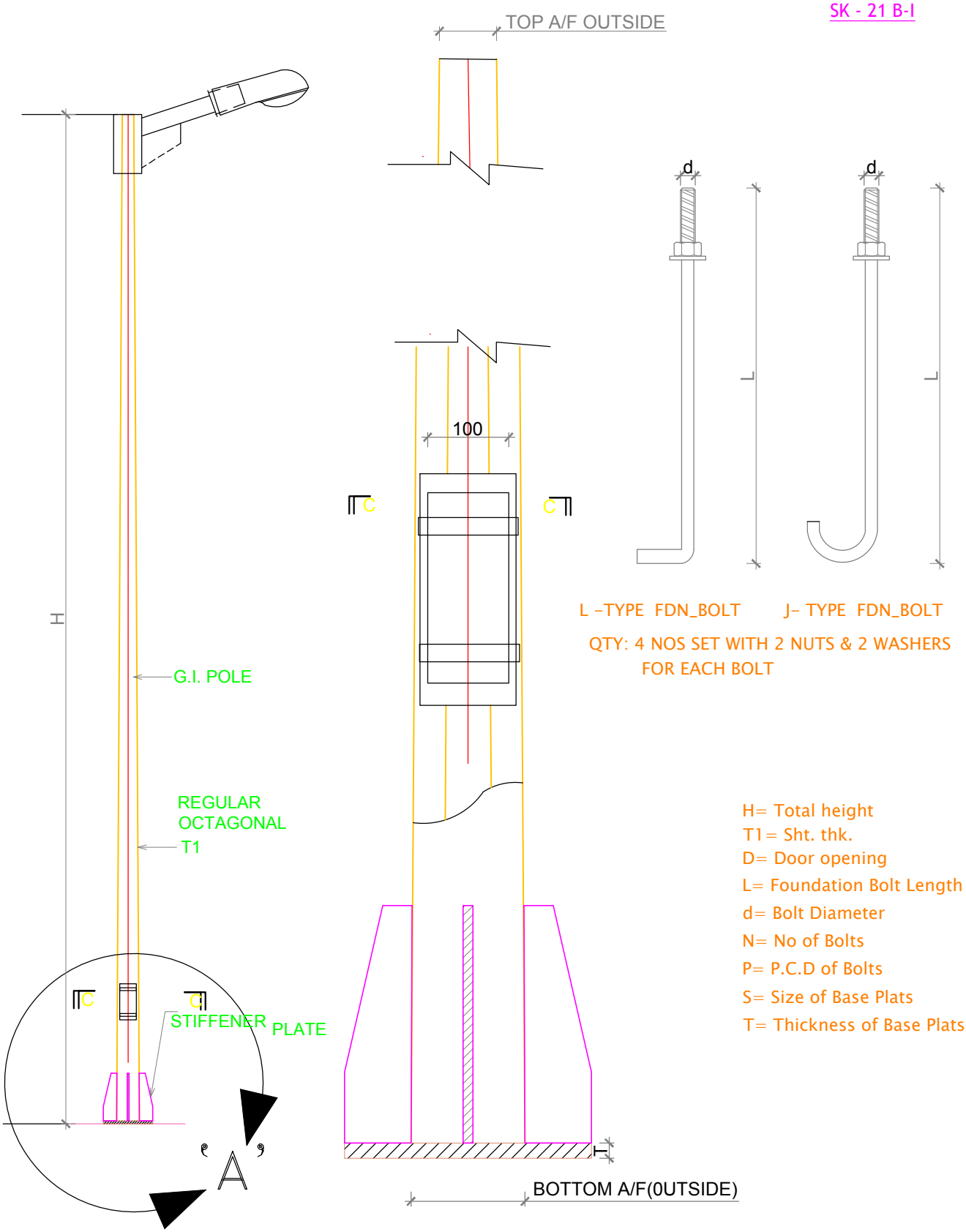
MISCELLANEOUS DETAILS
ROUT MARKER FOR UNDERGROUND
CABLE & CKT DIAGRAM FOR EARTH
CONTINUATION TEST

DRG. NO.
SK - 27

NDDB ANAND	LAYING OF CABLES IN R.C.C./G.I. PIPES	DRG. NO. SK - 30



SK - 21 B-I



L –TYPE FDN_BOLT J– TYPE FDN_BOLT

QTY: 4 NOS SET WITH 2 NUTS & 2 WASHERS FOR EACH BOLT

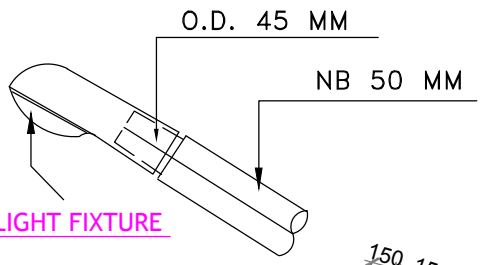
H= Total height
T1= Sht. thk.
D= Door opening
L= Foundation Bolt Length
d= Bolt Diameter
N= No of Bolts
P= P.C.D of Bolts
S= Size of Base Plats
T= Thickness of Base Plats

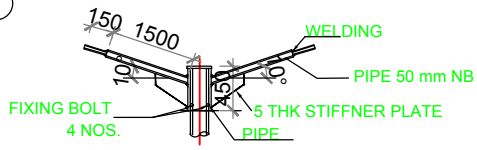
DOOR ORIENTATION
DETAIL AT "A"

* THIS DRAWING IS TO BE READ IN CONJUNCTION STREET LIGHT SPECIFICATION DRAWINGS.

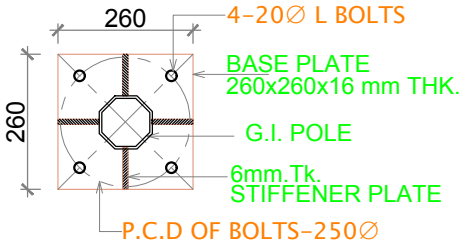
SKETCH NO. 21 B-I
NDDB\ANAND
02.01.2018

SK - 21 B-II

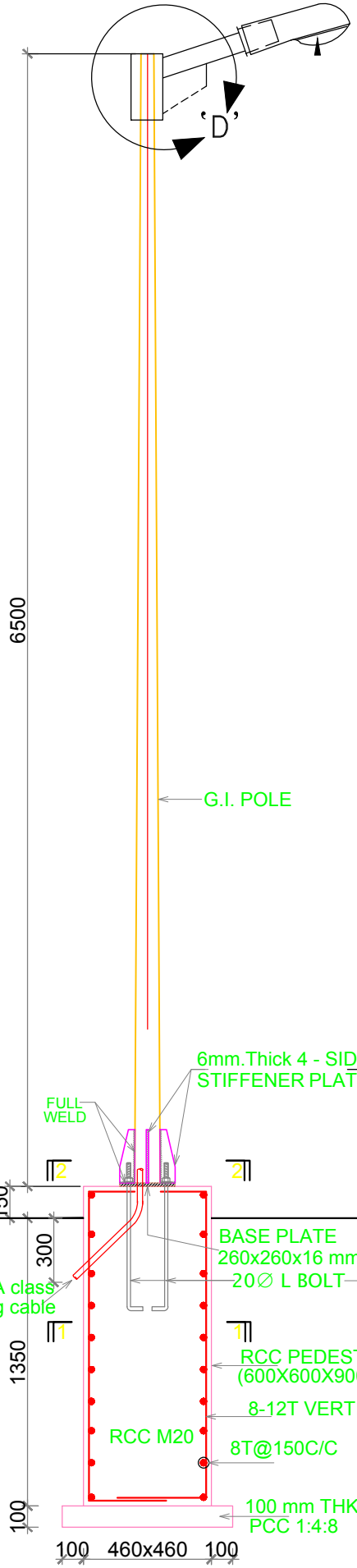


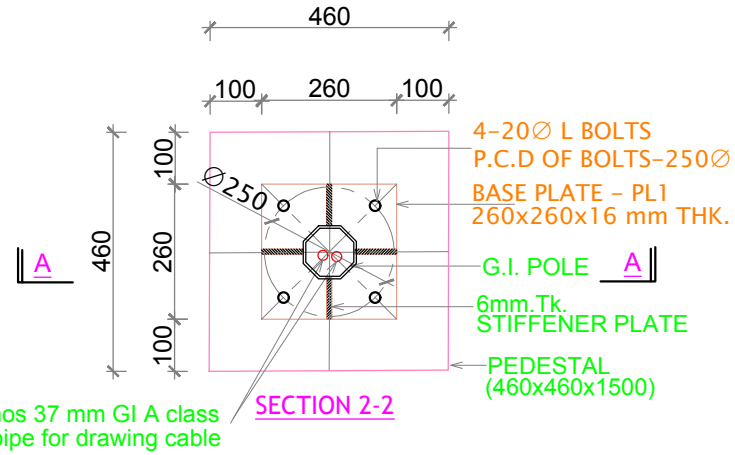


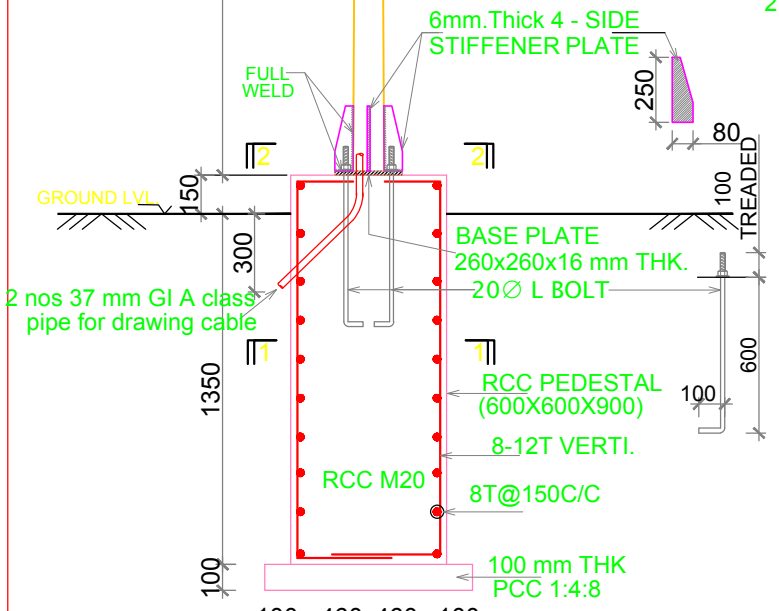
STREET LIGHT POLE
DETAIL `D'



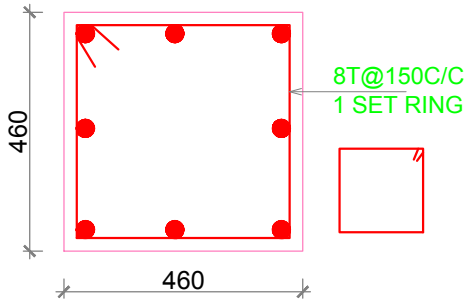
TYP. BASE PLATE DETAIL







SECTION : A-A (ELEVATION)
FOR 6.50 M HEIGHT LIGHTING POLE

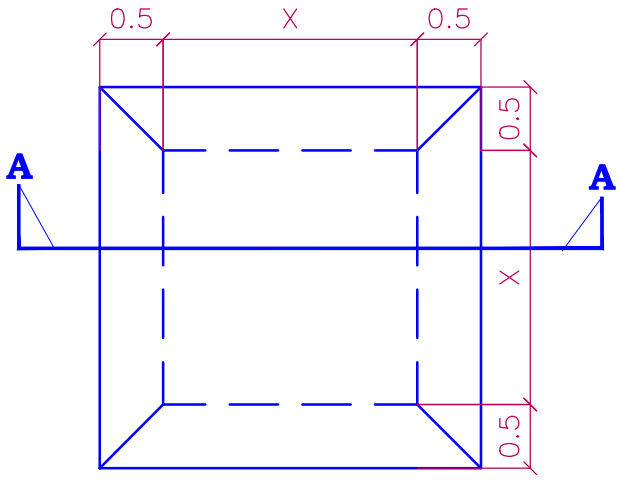


8-12T
SECTION 1-1

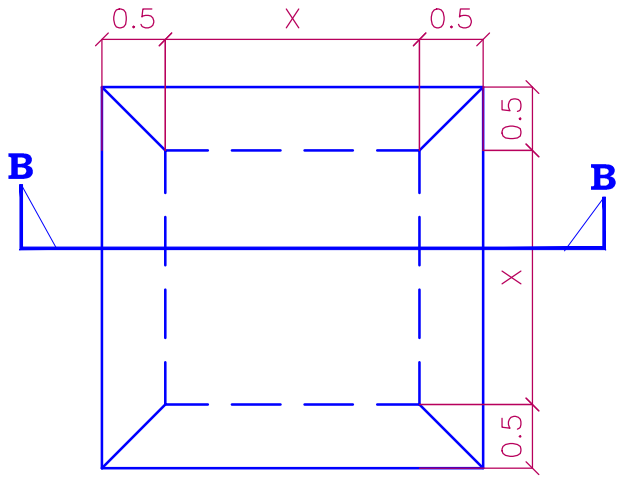
NOTES
* THIS DRAWING IS TO BE READ IN CONJUNCTION STREET LIGHT SPECIFICATION DRAWINGS.
* ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE SPECIFIED.
* ALL CONCRETE MIX M:20.

SKETCH NO. 21 B-II
NDDB\ANAND
02.01.2018

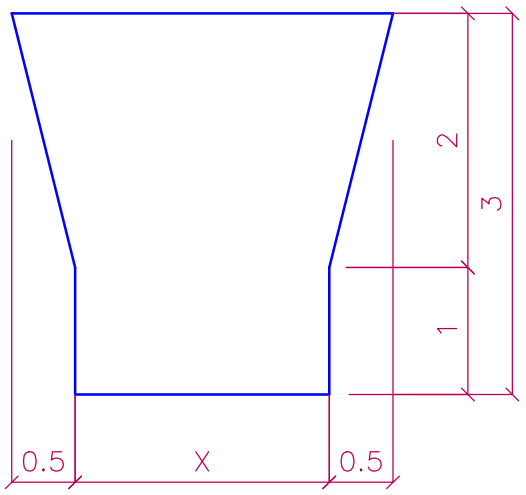
EXCAVATION: MODE OF MEASUREMENT FOR EXCAVATION DEEPER THAN 2 METERS DEPTH OF 3.0M, 4.0M, 5.0M & 6.0M



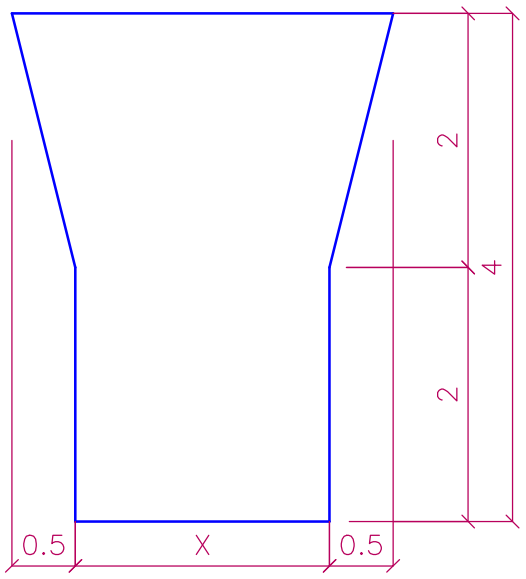
PLAN-1



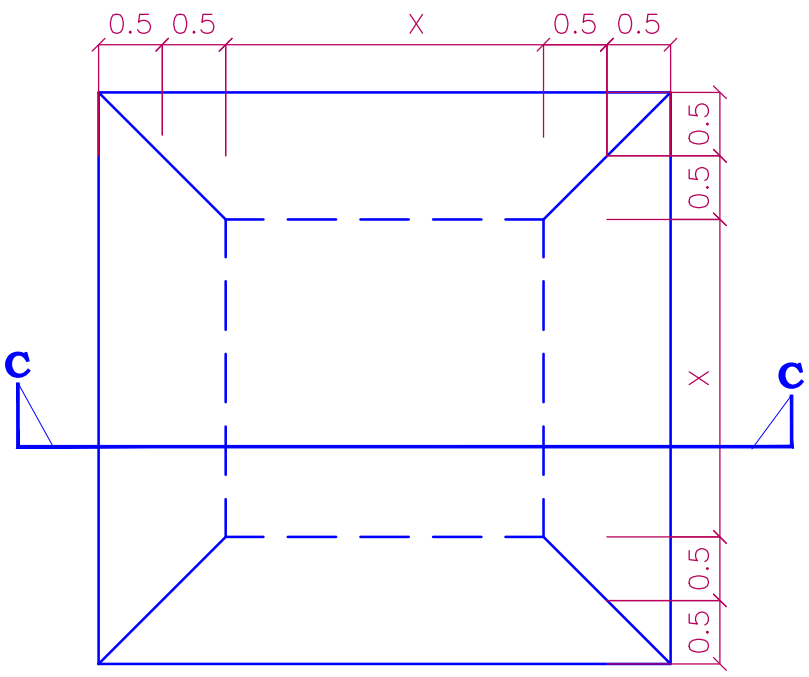
PLAN-2



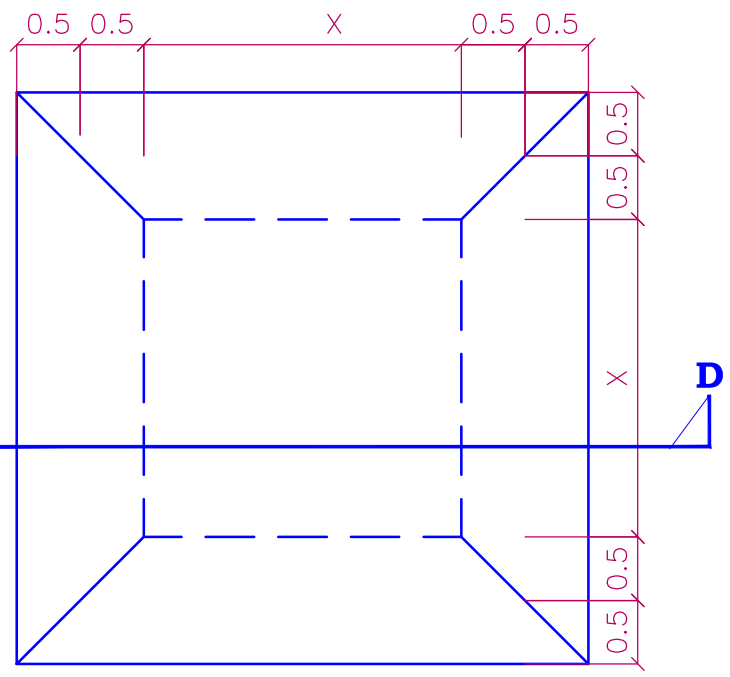
SECTION : A-A



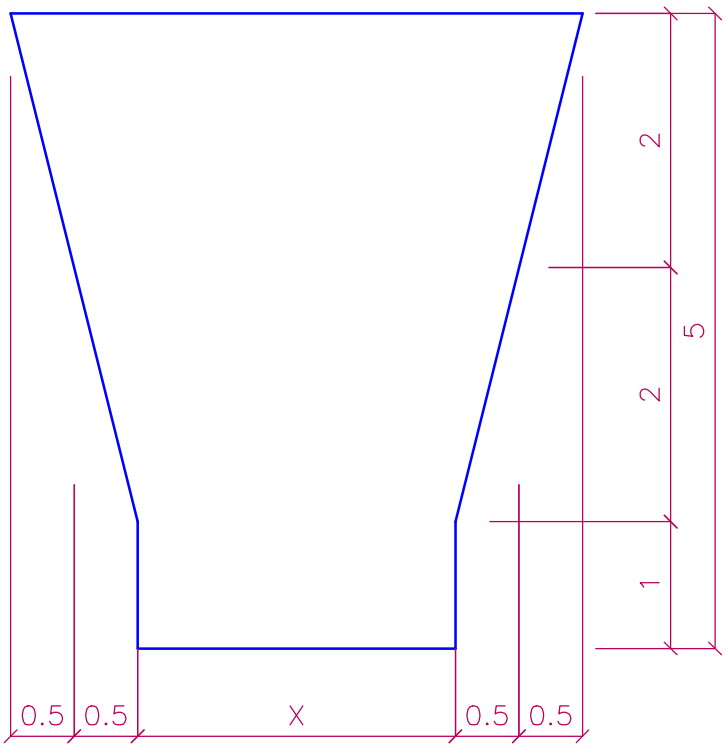
SECTION : B-B



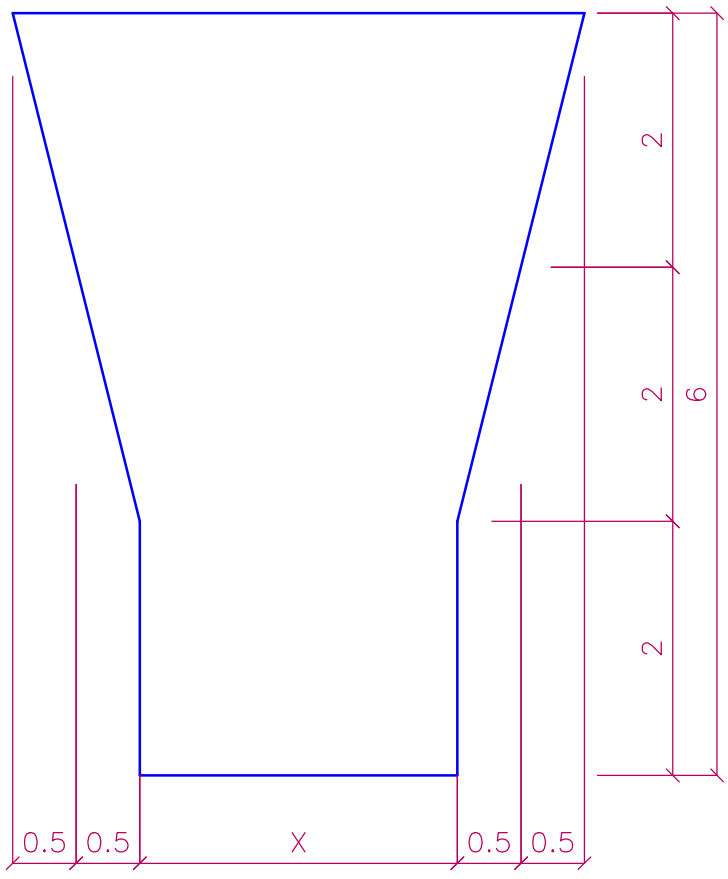
PLAN-3



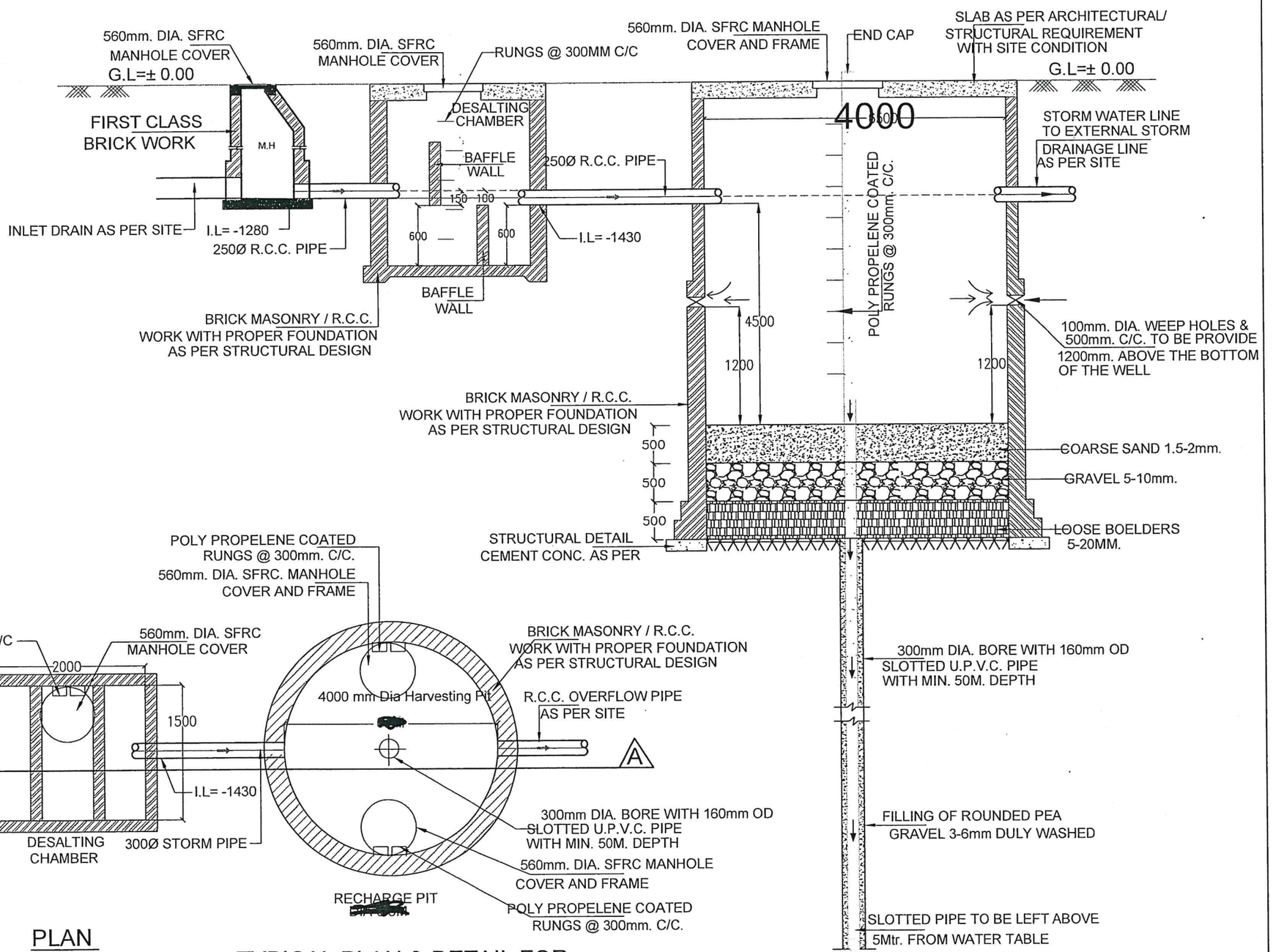
PLAN-4



SECTION : C-C



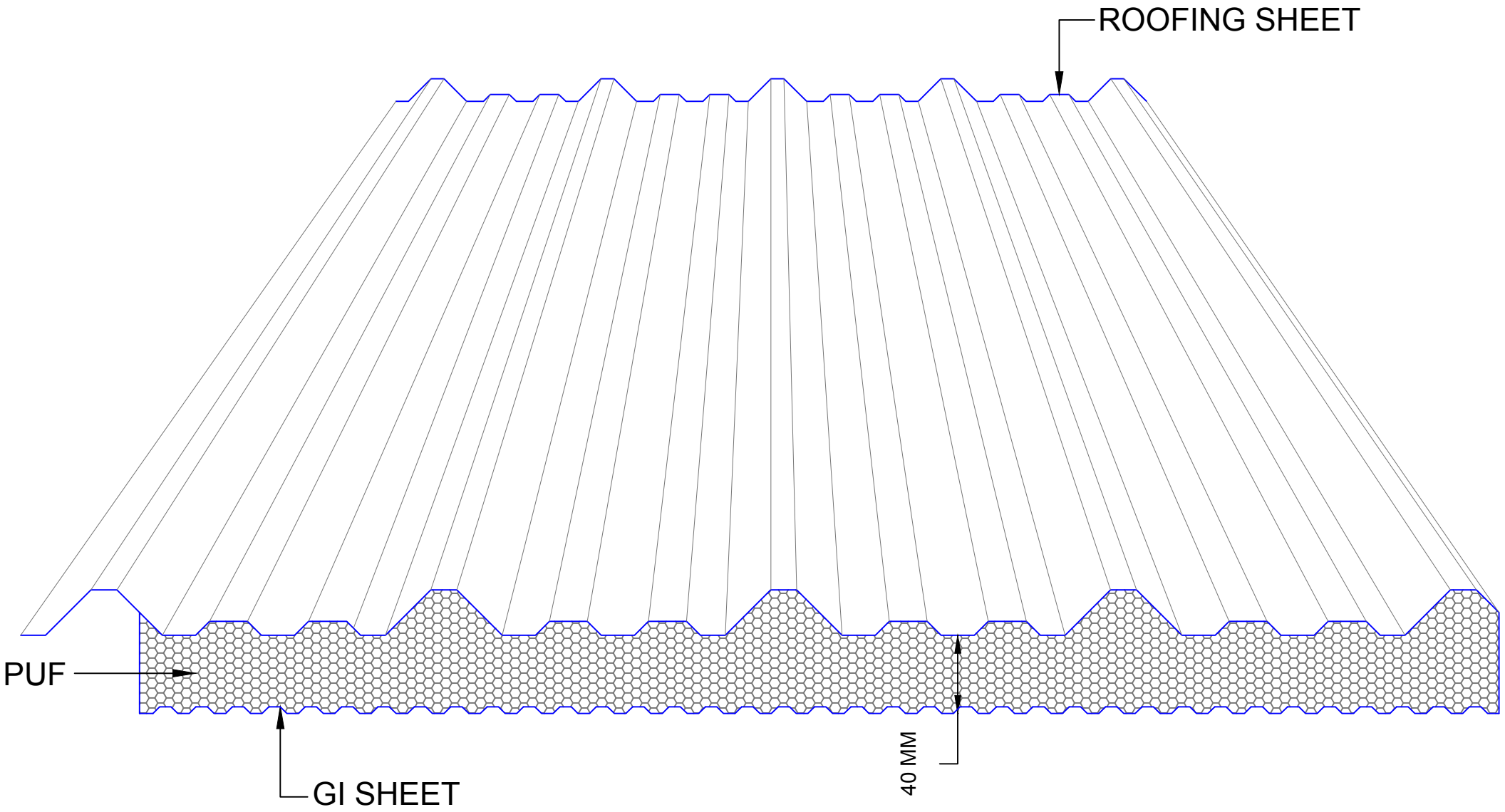
SECTION : D-D



PLAN

SECTION-A,A

TYPICAL PLAN & DETAIL FOR RAIN WATER HARVESTING SYSTEM



STANDARD DETAIL OF PUF ROOF PANEL