



Maharashtra Pollution Control Board

महाराष्ट्र प्रदूषण नियंत्रण मंडळ

MAHARASHTRA POLLUTION CONTROL BOARD, MUMBAI

TENDER DOCUMENTS

FOR THE WORK OF

INTERIOR, CIVIL, WATER SUPPLY, SANITARY, ELECTRICAL, FIRE FIGHTING, HVAC WORK & ALLIED WORK IN MAHARASHTRA POLLUTION CONTROL'S OFFICE AT CHANDRAPUR DIST. CHANDRAPUR

Estimated Amount : ₹. 1,98,87,900.00

Earnest Money : ₹. 1,00,000.00

Prepared By

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Cost of blank Tender Rs 1000/-

Member Secretary
Maharashtra Pollution Control Board, Mumbai

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DISCLAIMER

1. Detailed Time Table for the various activities to be performed in e-tendering process by the Tenderer for quoting their offer is given in this Tender Document under "Tender Schedule". Contractor should carefully note down the cut-off dates for the carrying out each e-tendering process / activity.
2. Every effort is being made to keep the Website upto date and running smoothly 24 x 7 by the Government and the Service Provider. However, Government takes no responsibility, and will not be liable for, the website being temporarily unavailable due to any technical issue at any point of time.
3. In that event MPCB will not be liable or responsible for any damages or expenses arising from any difficulty, error, imperfection or inaccuracy with this Website. It includes all associated services, or due to such unavailability of the Website or any part thereof or any contents or any associated services.
4. Tenderers must follow the time table of e-tendering process and get their activities of e-tendering processes done **well in advance** so as to avoid any inconvenience due to unforeseen technical problem if any.
5. MPCB will not be responsible for any incomplete activity of e-tendering process of the tenderer due to technical error/ failure of website and it cannot be challenged by way of appeal, arbitration and in the Court of Law. **Contractors must get done all the e-tendering activities well in advance.**

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MAHARASHTRA POLLUTION CONTROL BOARD, MUMBAI

E-TENDER NOTICE NO. _____ of 2018-19 ONLINE TENDER No. _____

Online "Item Wise Tenders" (e-tender) for the following work are invited by the Maharashtra Pollution Control Board, Mumbai E-mail: ee@mpcb.gov.in Website : <http://mpcb.gov.in> Phone - 022-24010706 On Government of Maharashtra Electronic Tender Management System <https://maharashtra.etenders.in>

The details can be viewed and downloaded online directly from the Government of Maharashtra e-tendering portal <https://maharashtra.etenders.in> as per online tender schedule.

Sr No	Name of Work	Estimated Cost in Rupees	Time limit in Calendar Months	Earnest Money	Cost of Blank Tender	Class of Contractor
1.	INTERIOR, CIVIL, WATER SUPPLY, SANITARY, ELECTRICAL, FIRE FIGHTING, HVAC WORK & ALLIED WORK IN MAHARASHTRA POLLUTION CONTROL'S OFFICE AT CHANDRAPUR DIST. CHANDRAPUR	Rs. 1,98,87,900/-	06 (Six) Calendar Months	Rs.1,00,000/-	Rs. 1,000/- + GST	Class III & Above (PWD)

For more details on the tender and bidding process you may please visit the above mentioned portal.

Document tender fees and EMD shall be paid from contractor's bank account through online mode RTGS/NEFT/DD/FDR only. The said amount of earnest money shall not carry any interest whatsoever. **EMD exemption certificate will not be accepted. vide GR No. CAT/06/2014/LTN 242/Bidg.2, dt. 24/2/2016**

NOTE :

1. All eligible/interested contractors are mandated to get enrolled on e-Tendering portal (<https://maharashtra.etenders.in>)
2. To process the tenders online, to encrypt their bid and to sign the bid hashes, bidders are required to obtain digital certificate. For details bidders be contact Help Desk.
3. Contractors can contact **Help Desk** for any clarification of their doubts regarding the process of Electronic Tendering System. Help Desk at through Email ID support.gom@nextenders.com or Phone No. 020-25315555

Member Secretary,
Maharashtra Pollution Control Board,
Mumbai

Contractor

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Member Secretary

TENDER NOTICE

The Maharashtra Pollution Control Board , Mumbai invites sealed Item rate E-Tenders in two bid systems (Technical & Financial bid) for Interior, Civil, water supply, sanitary, Electrical, Firefighting,HVAC and Furnishing work in Maharashtra Pollution control's office at Chandrapur, Dist. Chandrapur from Contractor/Agency/Firm/Company of Class III & above registered with PWD,CPWD, or equivalent Government bodies in two envelope systems. The details are as under in two envelope systems. The details are as under

S. No.	Particulars	Estimated cost of the work	Earnest money deposit (in Rs)	Time limit for completion	Cost of tender document(including all taxes)
1	Civil, water supply, sanitary, Electrical, Firefighting,HVAC and Furnishing work in Maharashtra Pollution control's office at Chandrapur, Dist. Chandrapur	Rs. 19887900/-	Rs.100000/-	6 Months (including rainy reason)	Rs. 1000 /- + GST

Schedule for E-Tendering Activity

Sr. No.	Activity	Performed By	Start		Expiry	
			Date	Time	Date	Time
1	Release of Tender	Department	01/02/2019	11.00	01/02/2019	17.00
2	Tender Download	Bidders	01/02/2019	17.01	11/02/2019	17.00
3	Bid Preparation		01/02/2019	17.01	14/02/2019	17.00
4	Superhash Generation & Bid Lock	Department	15/02/2019	11.01	15/02/2019	17.00
5	Control Transfer of Bid	Bidder	15/02/2019	17.01	16/02/2019	17.00
6	Envelope 1 Opening	Department	20/02/2019	14.00	20/02/2019	17.00
7	Envelope 2 Opening		25/02/2019	14.00	25/02/2019	17.00

Pre-Bid conference will be scheduled on 12/02/2019, 2:30PM at MPC Board, Head Quarter, Sion, Mumbai - 22. The tender document is uploaded / released on Government of Maharashtra,(GOM) e-tendering website <https://maharashtra.etenders.in>. Tender document and supporting documents may be purchased and downloaded from following link of Organizations of Government of Maharashtra on e-Tendering website of Government of Maharashtra, <https://allgom.maharashtra.etenders.in> by making payment through Online Payment Modes i.e. Net Banking, Debit Card and Credit Card

**The Member Secretary,
The Maharashtra Pollution Control Board,
Mumbai.**

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**COPIES OF
PUBLISHED
TENDER NOTICE
ON**

- **WEB SITE**
- **NIT**
- **NEWS PAPERS**

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MAHARASHTRA POLLUTION CONTROL BOARD, MUMBAI

NAME OF WORK: INTERIOR, CIVIL, WATER SUPPLY, SANITARY, ELECTRICAL, FIRE FIGHTING, HVAC WORK & ALLIED WORK IN MAHARASHTRA POLLUTION CONTROL'S OFFICE AT CHANDRAPUR DIST. CHANDRAPUR

- 1) Name of Contractor. :
- 2) Date of receipt of Tender. :
- 3) No. & Date of Work Order :
- 4) Amount put to Tender : **₹. 1,98,87,900.00**
- 5) Rate Quoted. :
- 6) Amount of Contract. :
- 7) Date of Commencement. :
- 8) Time stipulated for completion of work. : **Six (06) Calendar months (Including monsoon)**
- 9) Date of completion as per Agreement :
- 10) Actual date of completion. :
- 11) Reference to sanction of extension of time :
 - 1) _____
 - 2) _____
 - 3) _____

Certified that this original agreement contains
Pages 1 to _____
Fly leaves _____ Nos.
Drawings _____ Nos.

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DETAILS OF WORK

NAME OF WORK: INTERIOR, CIVIL, WATER SUPPLY, SANITARY, ELECTRICAL, FIRE FIGHTING, HVAC WORK & ALLIED WORK IN MAHARASHTRA POLLUTION CONTROL'S OFFICE AT CHANDRAPUR DIST. CHANDRAPUR

Estimated cost put to tender : ₹. 1,98,87,900.00.
 Earnest money : ₹. 1,00,000/- (₹. One Lakh Only)

The EMD applicable amount shall be paid via online mode only.

Total Security Deposit 2 % (Two Percent)

1)	Initial Security Deposit (1%)	₹. 1,99,000.00
2)	Further Security Deposit to be deducted from bills (1%)	₹. 1,99,000.00
	Total Security Deposit (2%)	₹. 3,98,000.00

TO BE FILLED BY THE CONTRACTOR

I/WE have quoted my/our offer in "Itemwise Rate" in words as well as in figures.

I/WE further undertake to enter into contract In Regular Form with **Member Secretary, Maharashtra Pollution Control Board, Mumbai.**

Name & Signature of Contractor /
 Power of Attorney holder
 with complete address.

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NAME OF WORK: INTERIOR, CIVIL, WATER SUPPLY, SANITARY, ELECTRICAL, FIRE FIGHTING,HVAC WORK & ALLIED WORK IN MAHARASHTRA POLLUTION CONTROL'S OFFICE AT CHANDRAPUR DIST. CHANDRAPUR

Estimated cost put to tender : ₹. 1,98,87,900.00.

Earnest money : ₹. 1,00,000/-

Completion time : 06 (Six) Months

TENDER SCHEDULE

Cost of Tender Form : Rs. 1,000/-

Period for Purchasing tender Forms : As Per Online Tender Schedule

Last date and time for bid submission : As Per Online Tender Schedule

Date and time for Opening of Tender) : As Per Online Tender Schedule

:

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MAHARASHTRA POLLUTION CONTROL BOARD, MUMBAI**DETAILED TENDER NOTICE**

1. Item wise tenders for the following work are invited from **Contractor Registered with PWD, CPWD or equivalent government bodies in appropriate class** by the Member Secretary, Maharashtra Pollution Control Board, Mumbai. The Name of Work, Estimated Cost, Earnest Money, Security Deposit, Time limit for Completion etc. are as under

Sr No.	Name of Work	Estimated Cost in Rupees	Earnest Money	Security Deposit	Time limit in Calendar Months
	INTERIOR, CIVIL, WATER SUPPLY, SANITARY, ELECTRICAL, FIRE FIGHTING, HVAC WORK & ALLIED WORK IN MAHARASHTRA POLLUTION CONTROL'S OFFICE AT CHANDRAPUR DIST. CHANDRAPUR	₹.1,98,87,900/-	₹. 1,00,000/-	₹.3,98,000/-	06 (Six) Calendar Months

- 1.1 The tender document is uploaded / released on Government of Maharashtra,(GOM) e-tendering website <https://maharashtra.etenders.in>. Tender document and supporting documents may be purchased and downloaded from following link of Organizations of Government of Maharashtra on e-Tendering website of Government of Maharashtra, <https://allgom.maharashtra.etenders.in> by making payment through Online Payment Modes i.e. Net Banking, Debit Card and Credit Card
- 1.2 The tender form, conditions of contract, specifications & contract drawings can be downloaded online using payment gateway. The EMD applicable amount shall be paid via online mode only. Bids will be opened as per tender schedule, in the presence of such intending tenderers or his/their authorized representatives who may be present at time.

Contractor**Consultant****Member Secretary**

- 1.3** The offer shall remain open for acceptance for minimum period of 90 days from the date of opening of Envelope No. 2 (Financial Bid) and thereafter until it is withdrawn by the contractor by notice in writing duly addressed to the authority.
- 1.4** The tender notice shall form a part of contract agreement.
The tenders are invited on the departmental designs only
- 1.5** The tenderer if firm or company shall in their forwarding letter mention names of all the partners of the firm or company (as the case may be) and the name of the partner who holds the power of attorney in any, authorizing him to conduct transaction on behalf of the firm or company.
- 1.6** The right is reserved to revise or amend the contract documents prior to the date notified for the receipt of the tenders or extended date. Such deviations, amendments or extensions, if any, shall be communicated in the form of corrigendum by letter or / and by notice in News paper as may be considered suitable
- 1.7** The tenderer shall enter his "Item rates" in words and figures. In case there is difference between amount written in figures and words, the lower offer will be taken as final.
- 1.8** No pages should be removed from, added in or replaced in the tender documents.

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- 1.9** Right is reserved to reject any or all tenders without assigning any reasons thereof.
- 1.10** Tenders which do not fulfill any or all conditions or are incomplete in any respect are liable for summary rejection.
- 1.11** The tenderer may, in forwarding letter, mention any points he may wish to make clear but right is reserved to reject the same in the whole of the tenders if the same become conditional tender thereby.

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GENERAL

- a) **Time Limit**: The work is to be completed within time limit as specified in the Notice inviting tender which shall be reckoned from the date of written order of commencing the work and shall be inclusive of monsoon period.
- b) **Tender Rate** : No alteration in the form of tender and the schedule of tender and no additions in the scope or special stipulation will be permitted. Rates quoted for the tender shall be taken as applicable to all leads and lifts.
- c) **Tender Units** : The tenderers should particularly note the unit mentioned in the Schedule "B" on which the rates are based . No change in the units shall be allowed. In the case of difference between rates written in figures and words , the correct rate will be the one, which is lower of the two.
- d) The Income Tax @ 2% or percentage in force from time to time or at the rate as intimated by the competent Income Tax authority shall be deducted from bill amount whether measured bill, advance payment or secured advance.

2.0 EARNEST MONEY :

- 2.1 Earnest money of **Rs.1,00,000/- in words (Rs. One Lakh only)** shall be paid via online using NEFT/RTGS/DD/FDR or payment gateway mode. The said amount of earnest money shall not carry any interest whatsoever. EMD exemption certificate will not be accepted. vide GR No. CAT/06/2014/LTN 242/Bldg.2, dt. 24/2/2016
- 2.2 Tender of those who do not deposit earnest money in one of the above acceptable forms shall be summarily rejected. Earnest money in any other form of cash or cheque will not be accepted.
- 2.3 The amount of earnest money will be refunded to the unsuccessful tenderer on deciding about the acceptance or otherwise of the tender or on expiry of the validity period whichever is earlier.

In case of the successful tenderer, it will be refunded on his paying the initial security deposit and completing the tender documents or will be transferred towards a part of security deposit to be paid after awarding of the work. If successful tenderer does not pay the security deposit in the prescribed time limit and complete the agreement bond, his earnest money deposit will be forfeited to the Board.

- 2.4 Earnest money of the un-successful tenderers will be refunded on their application only after an intimation of rejection of their tender is sent to them or on the expiry of the validity period whichever is earlier.

3.0 TENDERING PROCEDURE: -

3.1 Blank Tender Forms.

Tender Forms can be **downloaded** from the e-tendering Portal of MPCB , Government of Maharashtra i.e. <http://maharashtra.etenders.in/allgom> after paying tender fees via online mode as per the Tender Schedule.

3.2 Pre-Tender Conference

3.2.1 Contractors may raise any queries Online (Please refer online tender notice). Pre-tender conference is open to all prospective tenderers who have downloaded tender form before the date of Pre-tender Conference. Wherein prospective Tenderers will have an opportunity to obtain clarifications regarding the work and the Tender Conditions. The prospective tenderers may also post their queries only using post query option for the tender.

3.2.2 The prospective tenderers are free to ask for any additional information or clarification concerning the work in writing only, and the reply to the same shall be uploaded on the portal <http://maharashtra.etenders.in> and this clarification referred to as Common Set of Conditions/Deviations (C.S.D.), shall form part of tender documents and which will also be common and applicable to all tenderers. The point/points if any raised in writing and/or verbally/ online by the contractor in pretender conference and not finding place in C.S.D. issued after the pre- bid conference, is/are deemed rejected. In such case the provision in NIT shall prevail. No individual correspondence will be made thereafter with the contractor in this regard.

3.2.3 The tender submitted by the tenderer shall be based on the clarification, additional facility offered (if any) by the Department, and this tender shall be unconditional. Conditional tenders shall be summarily REJECTED.

3.2.4 All tenderers are cautioned that tenders containing any deviation from the contractual terms and conditions, specifications or other requirements and conditional tenders will be treated as non responsive. The tenderer should clearly mention in forwarding letter that his offer (in envelope No. 1& 2) does not contain any conditions, deviations from terms and conditions stipulated in the tender.

3.2.5 Tenderers should have valid Class II / III Digital Signature Certificate (DSC) obtained from any Certifying Authorities. In case of requirement of DSC, interested Bidders should go to <http://maharashtra.etenders.in/mah/DigitalCerti.asp> and follow the

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procedure mentioned in the document 'Procedure for application of Digital Certificate'.

3.2.6 The Tenderers have to make a payment of Rs .1092/- online as service charges for the use of Electronic Tendering during Online Bid Data Decryption and Re-encryption stage of the Tender.

3.2.7 For any assistance on the use of Electronic Tendering System, the Users may call the below numbers:

Landline **No. - 020-30187500**

3.2.8 Tenderers should install the Mandatory Components available on the Home Page of <http://maharashtra.etenders.in> under the section '**Mandatory Components**' and make the necessary Browser Settings provided under section '**Internet Explorer Settings**'

3.3 Guidelines to Bidders on the operations of Electronic Tendering System of MPCB. <http://maharashtra.etenders.in>

A. Pre-requisites to participate in the Tenders processed by MPCB:

1. Enrolment and Empanelment of Contractors on Electronic Tendering System:

The Contractors interested in participating in the Tenders of MPCB processed using the Electronic Tendering System shall be required to enroll on the Electronic Tendering System to obtain User ID.

After submission of application for enrolment on the System, the application information shall be verified by the Authorized Representative of the Service Provider. If the information is found to be complete, the enrolment submitted by the Vendor shall be approved.

For participating in Limited and Restricted tenders the registered vendors have to apply for empanelment on the sub-portal of MPCB in an appropriate class of registration. The empanelment will have to be approved by the respective officer from the MPCB. Only empanelled vendors will be allowed to participate in such tenders.

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The Contractors may obtain the necessary information on the process of enrolment and empanelment either from Helpdesk Support Team or may visit the information published under the link Enrol under the section E-Tendering Toolkit for Bidders on the Home Page of the Electronic Tendering System.

2. Obtaining a Digital Certificate:

The Bid Data that is prepared online is required to be encrypted and the hash value of the Bid Data is required to be signed electronically using a Digital Certificate (Class – II or Class – III). This is required to maintain the security of the Bid Data and also to establish the identity of the Contractor transacting on the System.

The Digital Certificates are issued by an approved Certifying Authority authorized by the Controller of Certifying Authorities of Government of India through their Authorized Representatives upon receipt of documents required to obtain a Digital Certificate.

Bid data / information for a particular Tender may be submitted only using the Digital Certificate which is used to encrypt the data / information and sign the hash value during the Bid Preparation and Hash Submission stage. In case during the process of preparing and submitting a Bid for a particular Tender, the Contractor loses his/her Digital Signature Certificate (i.e. due to virus attack, hardware problem, operating system problem); he / she may not be able to submit the Bid online. Hence, the Users are advised to store his / her Digital Certificate securely and if possible, keep a backup at safe place under adequate security to be used in case of need.

In case of online tendering, if the Digital Certificate issued to an Authorised User of a Partnership Firm is used for signing and submitting a bid, it will be considered equivalent to a no objection certificate / power of attorney to that User to submit the bid on behalf of the Partnership Firm. The Partnership Firm has to authorize a specific individual via an authorization certificate signed by a partner of the firm (and in case the applicant is a partner, another partner in the same form is required to authorise) to use the digital certificate as per Indian Information Technology Act, 2000.

Unless the Digital Certificate is revoked, it will be assumed to represent adequate authority of the Authority User to bid on behalf of the Firm for the Tenders processed on the Electronic Tender Management System of Government of Maharashtra as per Indian Information Technology Act, 2000. The Digital Signature of this Authorized User will be binding on the Firm. It shall be the responsibility of Partners of the Firm to inform the Certifying Authority or Sub Certifying Authority, if the Authorized User changes, and apply for a fresh Digital Signature Certificate. The procedure for application of a Digital Signature Certificate will remain the same for the new Authorised User.

The same procedure holds true for the Authorized Users in a Private / Public Limited Company. In this case, the Authorisation Certificate will have to be signed by the Director of the Company or the Reporting Authority of the Applicant.

For information on the process of application for obtaining Digital Certificate, the Contractors may visit the section Digital Certificate on the Home Page of the Electronic Tendering System.

3. Recommended Hardware and Internet Connectivity:

To operate on the Electronic Tendering System, the Contractors are recommended to use Computer System with at least 1 GB of RAM and broadband connectivity with minimum 512 kbps bandwidth

4. Set up of Computer System for executing the operations on the Electronic Tendering System:

To operate on the Electronic Tendering System of Government of Maharashtra, the Computer System of the Contractors is required be set up. The Contractors are required to install Utilities available under the section Mandatory Installation Components on the Home Page of the System.

The Utilities are available for download freely from the above mentioned section. The Contractors are requested to refer to the E-Tendering Toolkit for Bidders available online on the Home Page to understand the process of setting up the System, or

alternatively, contact the Helpdesk Support Team on information / guidance on the process of setting up the System.

5. Payment for Service Provider Fees:

In addition to the Tender Document Fees payable to *MPCB, Government of Maharashtra*, the Contractors will have to pay Service Providers Fees of **Rs.1,092/-** through **online payments** gateway service available on Electronic Tendering System. For the list of options for making online payments, the Contractors are advised to visit the link E-Payment Options under the section E-Tendering Toolkit for Bidders on the Home Page of the Electronic Tendering System

B. Steps to be followed by Contractors to participate in the e-Tenders processed by MPCB

1. Preparation of online Briefcase:

All Contractors enrolled on the Electronic Tendering System of Government of Maharashtra are provided with dedicated briefcase facility to store documents / files in digital format. The Contractors can use the **online briefcase** to store their scanned copies of frequently used documents / files to be submitted as a part of their bid response. The Contractors are advised to store the relevant documents in the briefcase before starting the Bid Preparation and Hash Submission stage.

In case, the Contractors have multiple documents under the same type (e.g. multiple Work Completion Certificates) as mentioned above, the Contractors advised to either create a single **.pdf** file of all the documents of same type or compress the documents in a single compressed file in **.zip** or **.rar** formats and upload the same.

It is mandatory to upload the documents using the briefcase facility. Therefore, the Contractors are advised to keep the documents ready in the briefcase to ensure timely bid preparation.

Note: Uploading of documents in the briefcase does not mean that the documents are available to MPCB at the time of Tender Opening stage unless the documents

are specifically attached to the bid during the online Bid Preparation and Hash Submission stage as well as during Decryption and Re-encryption stage.

2. Online viewing of Detailed Notice Inviting Tenders:

The Contractors can view the Detailed Tender Notice along with the Time Schedule (Key Dates) for all the Live Tenders released by MPCB on the home page of MPCB e-Tendering Portal on <http://maharashtra.etenders.in> under the section Recent Online Tender.

3. Download of Tender Documents:

The Pre-qualification / Main Bidding Documents are available for free downloading. However to participate in the online tender, the bidder must purchase the bidding documents **via online mode by filing the cost of tender form fee.**

4. Online Bid Preparation and Submission of Bid Hash (Seal) of Bids:

Bid preparation will start with the stage of EMD Payment which bidder has to pay online using any one online pay mode as RTGS , NEFT or payment gateway .

For EMD payment, If bidder use NEFT or RTGS then system will generate a challan (in two copies). with unique challan No specific to the tender. Bidder will use this challan in his bank to make NEFT/RTGS Payment via net banking facility provided by bidder's bank.

Bidder will have to validate the EMD payment as a last stage of bid preparation. If the payment is not realised with bank, in that case system will not be able to validate the payment and will not allow the bidder to complete his Bid Preparation stage resulting in nonparticipation in the aforesaid e-tender.

Note:

*** Realisation of NEFT/RTGS payment normally takes 2 to 24 hours, so it is advised to make sure that NEFT/RTGS payment activity should be completed well before time.**

*** NEFT/RTGS option will be depend on the amount of EMD.**

*** Help File regarding use of e-payment gateway can be downloaded from e-tendering portal.**

Submission of Bids will be preceded by online bid preparation and submission of the digitally signed Bid Hashes (Seals) within the Tender Time Schedule (Key Dates)

published in the Detailed Notice Inviting Tender. The Bid Data is to be prepared in the templates provided by the Tendering Authority of MPCB. The templates may be either form based, extensible tables and / or uploadable documents. In the form based type of templates and extensible table type of templates, the Contractors are required to enter the data and encrypt the data using the Digital Certificate. In the uploadable document type of templates, the Contractors are required to select the relevant document / compressed file (containing multiple documents) already uploaded in the briefcase.

Notes:

- a. The Contractors upload a single document or a compressed file containing multiple documents against each unloadable option.
- b. The Hashes are the thumbprint of electronic data and are based on one – way algorithm. The Hashes establish the unique identity of Bid Data.
- c. The bid hash values are digitally signed using valid Class – II or Class – III Digital Certificate issued any Certifying Authority. The Contractors are required to obtain Digital Certificate in advance.
- d. After the hash value of bid data is generated, the Contractors cannot make any change / addition in its bid data. The bidder may modify bids before the deadline for Bid Preparation and Hash Submission as per Time Schedule mentioned in the Tender documents.
- e. This stage will be applicable during both, Pre-bid / Pre-qualification and Financial Bidding Processes.

5. Close for Bidding (Generation of Super Hash Values):

After the expiry of the cut – off time of Bid Preparation and Hash Submission stage to be completed by the Contractors has lapsed, the Tender will be closed by the Tender Authority.

The Tender Authority from MPCB shall generate and digitally sign the Super Hash values (Seals).

6. Decryption and Re-encryption of Bids (submitting the Bids online):

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After the time for generation of Super Hash values by the Tender Authority from MPCB has lapsed, the Contractors have to make the online payment of **Rs. 1,092/-** towards the fees of the Service Provider.

After making online payment towards Fees of Service Provider, the Contractors are required to decrypt their bid data using their Digital Certificate and immediately re-encrypt their bid data using the Public Key of the Tendering Authority. The Public Key of the Tendering Authority is attached to the Tender during the Close for Bidding stage.

Note: The details of the Processing Fees shall be verified and matched during the Technical Opening stage.

At this time, the Contractors are also required to upload the files for which they generated the Hash values during the Bid Preparation and Hash Submission stage.

The Bid Data and Documents of only those Contractors who have submitted their Bid Hashes (Seals) within the stipulated time (as per the Tender Time Schedule), will be available for decryption and re-encryption and to upload the relevant documents from Briefcase. A Contractor who has not submitted his Bid Preparation and Hash Submission stage within the stipulated time will not be allowed to decrypt / re-encrypt the Bid data / submit documents during the stage of Decryption and Re-encryption of Bids (submitting the Bids online).

7. Short listing of Contractors for Financial Bidding Process:

The Tendering Authority will first open the Technical Bid documents of all Contractors and after scrutinizing these documents will shortlist the Contractors who are eligible for Financial Bidding Process. The shortlisted Contractors will be intimated by email.

8. Opening of the Financial Bids:

The Contractors may remain present in the Office of the Tender Opening Authority at the time of opening of Financial Bids. However, the results of the Financial Bids of all Contractors shall be available on the MPCB e-Tendering Portal immediately after the completion of opening process.

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9. Tender Schedule (Key Dates):

The Contractors are strictly advised to follow the Dates and Times allocated to each stage under the column “Contractor Stage” as indicated in the Time Schedule in the Detailed Tender Notice for the Tender. All the online activities are time tracked and the Electronic Tendering System enforces time-locks that ensure that no activity or transaction can take place outside the Start and End Dates and Time of the stage as defined in the Tender Schedule. At the sole discretion of the Tender Authority, the time schedule of the Tender stages may be extended

C) TERMS AND CONDITIONS FOR ONLINE-PAYMENTS

The Terms and Conditions contained herein shall apply to any person (“User”) using the services of MPCB Maharashtra, hereinafter referred to as “Merchant”, for making Tender fee and Earnest Money Deposit (EMD) payments through an online Payment Gateway Service (“Service”) offered by ICICI Bank Ltd. in association with E Tendering Service provider and Payment Gateway Service provider through MPCB Maharashtra website i.e. <http://maharashtra.etenders.in>. Each User is therefore deemed to have read and accepted these Terms and Conditions.

Privacy Policy

The Merchant respects and protects the privacy of the individuals that access the information and use the services provided through them. Individually identifiable information about the User is not willfully disclosed to any third party without first receiving the User’s permission, as covered in this Privacy Policy.

This Privacy Policy describes Merchant’s treatment of personally identifiable information that Merchant collects when the User is on the Merchant’s website. The Merchant does not collect any unique information about the User (such as User’s name, email address, age, gender etc.) except when you specifically and knowingly provide such information on the Website. Like any business interested in offering the highest quality of service to clients, Merchant may, from time to time, send email to the User and other communication to tell the User about the various services, features, functionality and content offered by Merchant’s website or seek voluntary information from the user.

Please be aware, however, that Merchant will release specific personal information about the User if required to do so in the following circumstances:

- a) in order to comply with any valid legal process such as a search warrant, statute, or court order, or available at time of opening the tender
- b) if any of User's actions on our website violate the Terms of Service or any of our guidelines for specific services, or
- c) to protect or defend Merchant's legal rights or property, the Merchant's site, or the Users of the site or;
- d) to investigate, prevent, or take action regarding illegal activities, suspected fraud, situations involving potential threats to the security, integrity of Merchant's website/offerings.

General Terms and Conditions For E-Payment

1. Once a User has accepted these Terms and Conditions, he/ she may register on Merchant's website and avail the Services.
2. Merchant's rights, obligations, undertakings shall be subject to the laws in force in India, as well as any directives/ procedures of Government of India, and nothing contained in these Terms and Conditions shall be in derogation of Merchant's right to comply with any law enforcement agencies request or requirements relating to any User's use of the website or information provided to or gathered by Merchant with respect to such use. Each User accepts and agrees that the provision of details of his/ her use of the Website to regulators or police or to any other third party in order to resolve disputes or complaints which relate to the Website shall be at the absolute discretion of Merchant.

3. If any part of these Terms and Conditions are determined to be invalid or unenforceable pursuant to applicable law including, but not limited to, the warranty disclaimers and liability limitations set forth herein, then the invalid or unenforceable provision will be deemed superseded by a valid, enforceable provision that most closely matches the intent of the original provision and the remainder of these Terms and Conditions shall continue in effect.
4. These Terms and Conditions constitute the entire agreement between the User and Merchant. These Terms and Conditions supersede all prior or contemporaneous communications and proposals, whether electronic, oral, or written, between the User and Merchant. A printed version of these Terms and Conditions and of any notice given in electronic form shall be admissible in judicial or administrative proceedings based upon or relating to these Terms and Conditions to the same extent and subject to the same conditions as other business documents and records originally generated and maintained in printed form.
5. The entries in the books of Merchant and/or the Payment Gateway Service Providers kept in the ordinary course of business of Merchant and/or the Payment Gateway Service Providers with regard to transactions covered under these Terms and Conditions and matters therein appearing shall be binding on the User and shall be conclusive proof of the genuineness and accuracy of the transaction.
6. **Refund For Charge Back Transaction:** In the event there is any claim for/ of charge back by the User for any reason whatsoever, such User shall immediately approach Merchant with his/ her claim details and claim refund from Merchant alone. Such refund (if any) shall be effected only by Merchant via payment gateway or by means of a demand draft or such other means as Merchant deems appropriate. No claims for refund/ charge back shall be made by any User to the Payment Gateway Service Provider(s) and in the event such claim is made it shall not be entertained.

7. In these Terms and Conditions, the term “**Charge Back**” shall mean, approved and settled credit card or net banking purchase transaction(s) which are at any time refused, debited or charged back to merchant account (and shall also include similar debits to Payment Gateway Service Provider's accounts, if any) by the acquiring bank or credit card company for any reason whatsoever, together with the bank fees, penalties and other charges incidental thereto.
8. Refund for fraudulent/duplicate transaction(s): The User shall directly contact Merchant for any fraudulent transaction(s) on account of misuse of Card/ Bank details by a fraudulent individual/party and such issues shall be suitably addressed by Merchant alone in line with their policies and rules.
9. Server Slow Down/Session Timeout: In case the Website or Payment Gateway Service Provider's webpage, that is linked to the Website, is experiencing any server related issues like 'slow down' or 'failure' or 'session timeout', the User shall, before initiating the second payment,, check whether his/her Bank Account has been debited or not and accordingly resort to one of the following options:
 - i. In case the Bank Account appears to be debited, ensure that he/ she does not make the payment twice and immediately thereafter contact Merchant via e-mail or any other mode of contact as provided by Merchant to confirm payment.
 - ii. In case the Bank Account is not debited, the User may initiate a fresh transaction to make payment.

However, the User agrees that under no circumstances the Payment Gateway Service Provider shall be held responsible for such fraudulent/duplicate transactions and hence no claims should be raised to Payment Gateway Service Provider. No communication received by the Payment Gateway Service Provider(s) in this regard shall be entertained by the Payment Gateway Service Provider.

Limitation of Liability

1. Merchant has made this Service available to the User as a matter of convenience. Merchant expressly disclaims any claim or liability arising out of the provision of this Service. The User agrees and acknowledges that he/ she shall be solely responsible for his/ her conduct and that Merchant reserves the right to terminate the rights to use of the Service immediately without giving any prior notice thereof.
2. Merchant and/or the Payment Gateway Service Providers shall not be liable for any inaccuracy, error or delay in, or omission of (a) any data, information or message, or (b) the transmission or delivery of any such data, information or message; or (c) any loss or damage arising from or occasioned by any such inaccuracy, error, delay or omission, non-performance or interruption in any such data, information or message. Under no circumstances shall the Merchant and/or the Payment Gateway Service Providers, its employees, directors, and its third party agents involved in processing, delivering or managing the Services, be liable for any direct, indirect, incidental, special or consequential damages, or any damages whatsoever, including punitive or exemplary arising out of or in any way connected with the provision of or any inadequacy or deficiency in the provision of the Services or resulting from unauthorized access or alteration of transmissions of data or arising from suspension or termination of the Services.
3. The Merchant and the Payment Gateway Service Provider(s) assume no liability whatsoever for any monetary or other damage suffered by the User on account of:
 - (i) the delay, failure, interruption, or corruption of any data or other information transmitted in connection with use of the Payment Gateway or Services in connection thereto; and/ or
 - (ii) any interruption or errors in the operation of the Payment Gateway.
4. The User shall indemnify and hold harmless the Payment Gateway Service Provider(s) and Merchant and their respective officers, directors, agents, and employees, from any claim or demand, or actions arising out of or in connection with the utilization of the Services.

The User agrees that Merchant or any of its employees will not be held liable by the User for any loss or damages arising from your use of, or reliance upon the information contained on the Website, or any failure to comply with these Terms and Conditions where such failure is due to circumstance beyond Merchant's reasonable control.

Miscellaneous Conditions:

1. Any waiver of any rights available to Merchant under these Terms and Conditions shall not mean that those rights are automatically waived.
2. The User agrees, understands and confirms that his/ her personal data including without limitation details relating to debit card/ credit card transmitted over the Internet may be susceptible to misuse, hacking, theft and/ or fraud and that Merchant or the Payment Gateway Service Provider(s) have no control over such matters.
3. Although all reasonable care has been taken towards guarding against unauthorized use of any information transmitted by the User, Merchant does not represent or guarantee that the use of the Services provided by/ through it will not result in theft and/or unauthorized use of data over the Internet.
4. The Merchant, the Payment Gateway Service Provider(s) and its affiliates and associates shall not be liable, at any time, for any failure of performance, error, omission, interruption, deletion, defect, delay in operation or transmission, computer virus, communications line failure, theft or destruction or unauthorized access to, alteration of, or use of information contained on the Website.
5. The User may be required to create his/ her own User ID and Password in order to register and/ or use the Services provided by Merchant on the Website. By accepting these Terms and Conditions the User agrees that his/ her User ID and Password are very important pieces of information and it shall be the User's own responsibility to keep them secure and confidential. In furtherance hereof, the User agrees to;

- i. Choose a new password, whenever required for security reasons.
- ii. Keep his/ her User ID & Password strictly confidential.
- iii. Be responsible for any transactions made by User under such User ID and Password.

The User is hereby informed that Merchant will never ask the User for the User's password in an unsolicited phone call or in an unsolicited email. The User is hereby required to sign out of his/ her Merchant account on the Website and close the web browser window when the transaction(s) have been completed. This is to ensure that others cannot access the User's personal information and correspondence when the User happens to share a computer with someone else or is using a computer in a public place like a library or Internet café.

Debit/Credit Card, Bank Account Details

1. The User agrees that the debit/credit card details provided by him/ her for use of the aforesaid Service(s) must be correct and accurate and that the User shall not use a debit/ credit card, that is not lawfully owned by him/ her or the use of which is not authorized by the lawful owner thereof. The User further agrees and undertakes to provide correct and valid debit/credit card details.
2. The User may make his/ her payment(Tender Fee/Earnest Money deposit) to Merchant by using a debit/credit card or through online banking account. The User warrants, agrees and confirms that when he/ she initiates a payment transaction and/or issues an online payment instruction and provides his/ her card / bank details:
 - i. The User is fully and lawfully entitled to use such credit / debit card, bank account for such transactions;
 - ii. The User is responsible to ensure that the card/ bank account details provided by him/ her are accurate;
 - iii. The User is authorizing debit of the nominated card/ bank account for the payment of Tender Fee and Earnest Money Deposit
 - iv. The User is responsible to ensure sufficient credit is available on the

nominated card/ bank account at the time of making the payment to permit the payment of the dues payable or the bill(s) selected by the User inclusive of the applicable Fee.

Personal Information

3. The User agrees that, to the extent required or permitted by law, Merchant and/ or the Payment Gateway Service Provider(s) may also collect, use and disclose personal information in connection with security related or law enforcement investigations or in the course of cooperating with authorities or complying with legal requirements.
4. The User agrees that any communication sent by the User vide e-mail, shall imply release of information therein/ therewith to Merchant. The User agrees to be contacted via e-mail on such mails initiated by him/ her.
5. In addition to the information already in the possession of Merchant and/ or the Payment Gateway Service Provider(s), Merchant may have collected similar information from the User in the past. By entering the Website the User consents to the terms of Merchant's information privacy policy and to our continued use of previously collected information. By submitting the User's personal information to us, the User will be treated as having given his/her permission for the processing of the User's personal data as set out herein.
6. The User acknowledges and agrees that his/ her information will be managed in accordance with the laws for the time in force.

Payment Gateway Disclaimer

The Service is provided in order to facilitate payment of Tender Fees/Earnest Money Deposit online. The Merchant or the Payment Gateway Service Provider(s) do not make any representation of any kind, express or implied, as to the operation of the Payment Gateway other than what is specified in the Website for this purpose. By accepting/ agreeing to these Terms and Conditions, the User expressly agrees that his/ her use of the aforesaid online payment service is entirely at own risk and responsibility of the User.

3.6 ENVELOPE NO. 1: (DOCUMENTS)

The first Envelope clearly marked as “**Envelope No.1**” shall contain the following documents:

3.6.1 Scanned Copy of Forwarding letter

3.6.2 Earnest money of the value of **Rs.1,00,000/-** shall be paid via online using NEFT/RTGS or payment gateway mode only.

- (i) EMD exemption Certificate will not be accepted.
- (ii) After Tender opening, the EMD of the unsuccessful bidder will be returned to account provided by the bidder during the bid preparation as given in challan under Beneficiary Account Number.

3.6.3 Scanned Copy of Certificate in Original as a registered **CONTRACTOR REGISTERED WITH PWD, CPWD OR EQUIVALENT GOVERNMENT BODIES IN APPROPRIATE CLASS** (A Valid Registration / Incorporation shall be attached).

3.6.4 Scanned Copy of details of Income Tax Circle or ward of the district in which the tenderer is assessed to Income Tax, Tenderer’s PAN No. and complete postal address with Pin Code and telephone Numbers. **Copy of original Income Tax Return for the immediate previous financial year.**

3.6.5 Scanned Copy of valid Registration Certificate under **Goods and Services Tax Act** issued by Competent Authority.

3.6.6 Scanned Copy of Valid Professional Tax Registration Certificate in the form of PTR and PTE Under Section(1) Section (5) of Maharashtra State Tax of Profession , Trade, Callings, Employment Act.1975 Rule 3(2) for employees including Technical personal from the Professional Tax office of the Concerned District of Maharashtra

3.6.7 Scanned Copy of the List of Modern Machinery immediately available with the tenderer for use on this work and the machinery proposed to be utilized on this work which is not immediately available and manner in which it is proposed to be procured (In the proforma of Form No. 2 & 2-A)

3.6.8 LIST OF MACHINERY TO BE USED ON THE WORK

(1) **Owned Machinery**

- I. _____
- II. _____
- III. _____
- IV. _____
- V. _____
- VI. _____

3.6.9 Details of work done during last three years with the value of work unfinished.
(Information to be given in Form No. VI)

3.6.10 Details of work of similar type carried out by the contractor. (In Form No. III)

3.6.11 Copy of details of the work in hand and works tendered for **(In the proforma of Form No. I)**

3.6.12 Details of works carried out in the Interior, Backward and Hilly Area during the preceding 5 years (in Form No. IV) (if applicable)

3.6.13 Details of technical personnel on the rolls of the tenderer. (In the proforma of Form No. V)

3.6.14 Scanned Copy of original Registered Partnership Deed, Memorandum of Articles of Association, if the tenderer is a Partnership Firm , Joint Stock Company and Power of Attorney and Firm Registration Certificate if any.

3.6.15 Affidavit in respect of genuineness of documents contained in the Envelope No. 1 in the prescribed proforma provided with Tender Set. **(Annexure-III on Page No.40)**

3.6.16 The tenderer will be qualified only if their available bid capacity is more than the total estimated value of works for which he has offered his bid. The available bid capacity will be calculated as under :

$$\text{Assessed available bid Capacity} = (A \times N \times 2) - B$$

A = **Maximum** value of civil engineering work executed in any one year during the last three years **(updated 2018-19 price level)** taking into account the completed as well as work in progress .

N = Number of years prescribed for completion of the work for which bid are invited

B = Value of existing commitments at price level of **2018-19** and on going works to be completed to be completed during next **Six (06)** months (period of completion of work for which the bid is invited)

Note : The Statement showing the value of existing commitments and on going works as well as the stipulated period of completion remaining for each of the work listed should be counter signed by the officer not below the rank of Executive Engineer/ Divisional Accounts officer

3.6.17 To qualify for the award of the contract each tenderer in his name should have

- a) Achieved **minimum** financial turnover during last 5 years (in all classes of civil engineering construction and interior work only) of Rs.150 lakh in any one year. In support of this scanned copy of Annual report certified by the chartered Accountant should be produced.
- b) Satisfactory completed (from start to finish) during last **seven** years as a prime contractor of at least **one similar work (Interior, Civil, Water Supply, Sanitary, Electrical, Fire Fighting)** value not less than **₹. 60.00 lakhs** in not more than one contract **of 2018-19 price level**. Financial turnover and cost of completed works of previous years shall be given weightage of 10% per year based on Rupee value to bring them to 2018-19 price level. (In Form No. VII)
- c) Executed in any one year (during last three years) the following minimum quantities of work **(In Form No. VIII)** (Approximately 30% of tendered quantity)

- i) _____
- ii) _____

(Note : Quantity certificate should be signed by not below the rank of Executive Engineer. Scanned copy of Certificate should be attached.)

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Member Secretary

3.7 ENVELOPE NO. 2: TENDER (Financial Bid):

The second online envelope "Envelope No.2" shall contain only the main tender including the Common Set of Conditions / Deviation issued by the Department after the pre-tender Conference. A tender submitted without this would be considered as invalid.

The tenderer should quote his offer duly in terms of "Item wise Rate" of estimated rates at the appropriate place of tender documents to be submitted only in Envelope No.2 He should not quote his offer anywhere directly or indirectly in Envelope No. 1. The contractor shall quote for the work as per details given in the main tender and also based on the detailed set of conditions issued / Additional stipulations made by MPCB in Addendum uploaded on Board's website after Pre-Tender Conference. His tender shall be unconditional.

3.8 SUBMISSION OF TENDER:

Refer to Section '**Guidelines to Bidders on the operations of Electronic Tendering System of MPCB**' for details.

3.9 **OPENING OF TENDERS:**

On the date specified in the tender schedule, following procedure will be adopted for opening of the tender:

A) ENVELOPE NO.1: (Documents)

First of all, **Envelope No. 1** of the tender will be opened online to verify its contents as per requirements. If the various documents contained in this envelope do not meet the requirements of the Department, a note will be recorded accordingly by the tender opening authority and the said tenderer's **Envelope No.2 (Financial Bid)** will not be considered for further action, but the same will be recorded.

The Decision of the tender Opening Authority in this regard will be final and binding on the contractor.

B) ENVELOPE NO.2: (Financial Bid)

The envelope 2, shall not be opened till the completion of evaluation of technical bids. The envelope 2, of only technically qualified Bidders as mentioned above will be opened. This envelope shall be opened online as per the date and time given in detailed tender schedule (if possible), through e-Tendering procedure only.

4.0 **EARNEST MONEY**

- (a) Earnest money shall be paid via online using NEFT/RTGS or payment gateway mode After Tender opening, the EMD of the unsuccessful bidder will be returned to account provided by the bidder during the bid preparation as given in challan under Beneficiary Account Number.
- (b) The amount will be refunded to the unsuccessful tenderers on deciding about the acceptance or otherwise of the tender. In case of successful tenderer, it will be refunded on his paying initial Security Deposit and completing the tender documents.

5.0 **SECURITY DEPOSIT**

The successful tenderer shall have to pay 50% initial security deposit in shape of National Saving Certificate or Fixed Deposit Receipt or Bank Guarantee payable at Aurangabad pledged in favour of **Maharashtra Pollution Control Board, Mumbai** or Bank Guarantees from a Nationalised /Scheduled Banks payable at Mumbai in the enclosed form and complete the contract documents failing which his earnest money will be forfeited to board. The balance 50% security deposit will be recovered from the R.A. bill at 1 % of the bill amount. Amount of total Security Deposit to be paid shall be 2 % of the cost of accepted tender or estimated cost put to tender whichever is higher.

Initial Security Deposit may be in Bank Guarantee Form in format of tender document for full period of completion of work and it should be extendable upto expiry of valid extension if any as directed by Engineer-in charge.

All compensation or other sums payable by the Contractor under the terms of this contract or any other contract or on any account may be deducted from his Security Deposit or from any sums which may be due to him or may become due to him by Government on any account and in the event of the security being reduced by reason of any such above noted deductions, the Contractor shall within 10 days of receipt of notice of demand from the Engineer-in-charge make good the deficit.

There shall be no liability on the Department to pay any interest on the Security Deposited by or recovered from the Contractor.

The Security Deposit shall be refunded after completion of defect liability period prescribed for this contract in accordance with the provisions in Clause 1 and 20 of the contract.

6. _____ CONDITION FOR PAYMENT OF ADDITIONAL PERFORMANCE SECURITY DEPOSIT IF THE OFFER IS RECEIVED LOWER MORE THAN 1% BELOW (As per G R. 26.11.2018)

In case lowest successful bidder's offer found more than 1.00% below the estimated cost put to tender, in that case, the tenderer shall have to pay Additional Performance Security deposit drawn in favour of the concerned **Member Secretary, Maharashtra Pollution Control Board, Mumbai** (in form of Demand Draft only) within 8 (eight) days (in no case limit of 8 days will be increased) from the date of opening of Financial bid i.e 2nd envelope as specified below;

- a. There is no need to pay additional performance security deposit, if the tenderers offer is upto 1% (one percent) below the estimated cost put to tender.
- b. If Tenderer's offer is upto 10% below the estimated cost put to tender, then the Additional performance security deposit shall be 1% of the estimated cost put to tender
- c. If the tenderers offer is upto 15% percent below the estimated cost put to tender, tenderer shall have to submit 1% plus the percentage by which tender offer is more than 10% below of the amount put to tender.
(e.g if tenderer offered 14% below, he have to submit (14%-10%) + 1% i.e total 5% of the estimated cost put to tender or minimum Rs. 1000/- whichever is higher.
- d. If the tenderer offer is more than 15% below the estimated cost put to tender, the tenderer have to submit additional performance security deposit as specified below ;

	For Offer upto 10% below the estimated cost put to tender	1 %
	For Offer upto 15% below the estimated cost put to tender (15% - 10% = 5%)	5 %
	More than 15% tenderer have to submit (e.g if tenderer offered 19% below, he has to submit (19%-15% = 4% x 2 = 8%))	8 %
	Total (1% + 5% + 8%)	14 %

- e. If the calculated amount of additional Performance Security deposit is less than Rs 1000/- then the performance security deposit shall be Rs, 1000/- minimum of the estimated cost put to tender
- f. Amount of Additional Performance Security Should be rounded upto two decimal only
- g. All above Demand Draft shall be either of Government Bank or Scheduled Bank drawn in favour of Concerned **Member Secretary, Maharashtra Pollution Control Board, Mumbai** only. In respect of Demand Draft it's duly mentioning the MICR and IFSC code of said bank shall be mentioned specifically on the said Demand Draft
- h. Successful Tenderer's Additional Performance Security will be refunded immediately upon the Certificate of satisfactorily completion of works issued by Member Secretary, Maharashtra Pollution Control Board, Mumbai. In all other cases additional Performance Security shall be forfeited to board
- i. In case of lowest successful bidder whose offer found more than 1% below fails or neglects to deposit the Additional performance Security within 8 (eight) specified days, then his EMD shall be forfeited to board and 2nd lowest tenderer will become lowest and will be negotiated for award of work
- j. The said amount of Additional Performance Security shall not carry any interest whatsoever

Return of Additional Security

The additional performance security shall be returned immediately upon satisfactory completion of work; the certificate of which shall be issued by the EE before releasing the additional security.

7.0 DOWLOADING OF TENDER DOCUMENT

Information regarding contract as well as blank tender forms can be downloaded from the e-tendering website upon providing the details of the payment of cost as detailed in the N.I.T.

8.0 The tenders who do not fulfil the condition of the notification and the general rules and directions for the guidance of contractor in the agreement form or are incomplete in any respect are likely to be rejected without assigning any reason therefore.

9.0 (a) The Tenderers shall be presumed to have carefully examined the drawings, conditions and specifications of the work and have fully acquainted themselves with all details of the site, the conditions of rock and its joints, pattern, river, weather characteristics, labour conditions and in general with all the necessary information and data pertaining to the work, prior to tendering for the work.

9.0 (b) The data whatsoever supplied by the Board along with the tender documents are meant to serve only as guide for the tenderers while tendering and the Board accepts no responsibility whatsoever either for the accuracy of data or for their comprehensiveness.

10.0 The quarries for extraction of metal, murum etc. provided in the sanctioned estimate are as per survey conducted by the Engineer In Charge. The Contractor should however examine these quarries and see whether full quantity of materials required for execution of the work strictly as per specification are available in these source before quoting the rates. In case the materials are not available due to reasons whatsoever, the contractor will have to bring the

materials from any other source with no extra cost to Board. The rates quoted, should therefore be for all leads and lifts from wherever the materials are brought at site of work and inclusive of royalty to be paid to the Revenue.

11.0 POWER OF ATTORNEY:

If the tenderers are a firm or company, they should in their forwarding letter mentioning the name of all the partners together with name of person who holds the power of attorney authorizing him to conduct all transactions on behalf of the body, along with the tender.

12.0 The contractor or the firms tendering for the work shall inform the MPCB if they appoint their authorized agent on the work.

13.0 No foreign exchange will be released by the MPCB for the purchase of plants and machinery for the work by the Contractor.

14.0 Any dues arising out of contract will be recovered from the contractor as arrears of land revenue if not paid amicably, moreover, recovery of MPCB dues from the contractors will be affected from the payment due to the contractor from any other MPCB works under execution with them.

15.0 All pages of tender documents, specifications corrections slips etc. shall be initialed by the tenderer. The tenderer should bear full signature of the tenderer or his authorized power of attorney holder in the case of firm.

16.0 The Income Tax at 2.00 % including surcharge or percentage in force from time to time or at the rate as intimated by the competent Income Tax authority shall be deducted from bill amount whether measured bill, advance payment or secured advance.

17.0 The successful tenderer will be required to produce, to the satisfaction of the specified concerned authority a valid concurrent license issued in his favour under the provisions of the Contract Labour (Regulation and Abolition) Act 1970 for starting the work. On failure to do so, the acceptance of the tender shall be liable to be withdrawn and also liable for forfeiture of the earnest money.

Contractor

Consultant

Member Secretary

18.0 The tenderer shall submit the list of apprentices engaged by the Contractor under Apprentice Act.

19.0 VALIDITY PERIOD:

The offer shall remain open for acceptance for minimum period of 90 days from the Date of opening of Envelope No.2 (Financial Bid) and thereafter until it is withdrawn by the contractor by notice in writing duly addressed to the authority opening the tender and sent by Registered Post Acknowledgment due.

20.0 After completion of the e-tendering process, the successful bidder will have to submit the hard copy of downloaded tender document and drawings duly signed on each page by the contractor or his authorised signatory. The tender should bear full signature of the tenderer, or his authorized power of attorney holder in case of Firm.

22.0 Joint Venture Is not allowed

23.0 The Goods and Services Tax @ 2 % of the contract amount will be recovered from the bill of the registered contractors who are registered under Act. (1% CGST + 1 % SGST)

24.0 Contractor shall submit a certificate to the effect that “All the payments to the labour /staff are made in bank accounts of staff linked to Unique Identification Number (AADHAR CARD).” The certificate shall be submitted by the contractor within 60 days from the commencement of contract. If the time period of contract is less than 60 days then such certificates shall be submitted within 15 days from the date of commencement of contract.

25.0 Condition Regarding GST:

As per government of maharashtra P.W Department english circular No. Sankirna -2017/C.R.121 (Part-ii) / building-2 dt-19/09/2017 & dt. 23.10.2017 GST shall be payable on the accepted contract value at prevailing rates seperately. Contractor shall quote his offer excluding GST.

26.0 Clause - 38 : Claims for Quantities Entered in the tenders

Excess quantity of any work shall be executed by prior permission of competent authority. The Quantities Shall be payable at accepted tender rates only

27.0 No negotiations will be held for rates, terms and conditions therefore, bidders have to quote their comparative rates.

28.0 OTHER CONDITIONS :

- 1) The contractor shall submit the “**Hard Copy**” of the tender documents within 72 hours from the date of bid lock (In case of www.maharashtra.etenders.in). The hard copy shall invariably contain all the documents which are submitted online.
The Hard Copy Shall be submitted to any of the below mentioned office ;
 - a. Member Secretary, Maharashtra Pollution Control Board, Mumbai
Kalpataru Point, Third floor, Opp. Cine planet Cinema, Sion Circle, Sion(E),
Mumbai -400022
- 2) The contractor shall submit only those documents which are required /asked in the tender documents. Uploading of unnecessary attachments with the tender should be avoided.
- 3) This hard copy shall be referred/opened only in case of any problem / discrepancy in online tender opening process.
- 4) The contractor shall submit valid proof of deduction and payment of Profession Tax of “technical persons employed by the contractor”

ANNEXURE - III

AFFIDAVIT (ON RS.500/- STAMP PAPER)

Iage..... address
..... (Authorized signatory to sign the contract), hereby
submit, vide this affidavit in truth, that I am the owner of the contracting firm
..... / authorized signatory and I am submitting the documents
in envelope no.1 for the purpose of scrutiny of the contract. I hereby agree to the
conditions mentioned below:-

1. I am liable for action under Indian Penal Code for submission of any false / fraudulent paper/information submitted in envelope no.1.
2. I am liable for action under Indian Penal Code if during contract period and defect liability period, any false information, false bill of purchases supporting proof of purchase, proof of testing submitted by my staff, subletting company or by myself, I will be liable for action under Indian Penal Code.
3. I am liable for action under Indian Penal Code if any paper are found false / fraudulent during contract period and even after the completion of contract (finalization of final bill).

(Signature of Contractor)

(Seal of Company)

Contractor

Consultant

Member Secretary

FORM - 1

STATEMENT OF LIST OF WORKS IN HAND AND WORKS TENDERED FOR AS ON LAST DATE OF SUBMISSION OF THIS TENDER

NAME OF CONTRACTOR:.....

(i) WORKS IN HAND

Sr. No.	Name of work	Agreement No.	Tendered Amount.	Date of commencement.	Stipulated date of completion.	Value of work already done.	Value of Balance work to be executed during next Six months	Probable date of completion.	Remarks
1	2	3	4	5	6	7	8	9	10
SAMPLE FORM									

(ii) WORKS TENDERED FOR

Sr. No.	Name of work	Name and Address of Client.	Tendered Amount.	Time limit	Probable date when decision is expected	Other relevant details, if any.
1	2	3	4	5	6	7
SAMPLE FORM						

Note : This is only a standard form. Details are to be furnished in this format in the form of type written statements which shall be enclosed in Envelope No.1 duly singed. The documentary proof of work in hand and work tender for shall also be submitted with this statement duly attested by Gazetted officer

Signature of Contractor

Contractor

Consultant

Member Secretary

FORM - II
STATEMENT SHOWING THE DETAILS OF OWNED PLANTS AND MACHINERY IMMEDIATELY AVAILABLE WITH TENDERER FOR THIS WORK

NAME OF CONTRACTOR:

Sr. No.	Name of equipment	No. of Units	Kind and make	Capacity	Age and condition.	Present Location.	Remarks.
1	2	3	4	5	6	7	8
SAMPLE FORM							

Note : This is only a standard form. Details are to be furnished in this format in the form of type written statements which shall be enclosed in Envelope No.1 duly signed.
The documentary proof of **Own** Plant & machinery shall be submitted with this statement duly attested by Gazetted officer

Contractor

Consultant

Member Secretary

FORM – III

**STATEMENT SHOWING THE DETAILS OF WORKS OF SIMILAR TYPE 30% MAGNITUDE CARRIED OUT BY THE
CONTRACTOR DURING LAST YEARS (2013,14,2014-15, 2015-16 ,2016-17,2017-18)**

NAME OF CONTRACTOR:

Sr. No.	Name of work	Name and address of the organization for whom the work was done.	Place and country	Agreement No. and Date.	Date of commencement	Tendered cost.	Total Cost of work done.	Actual date of completion	Remarks (Principal features in brief.)
1	2	3	4	5	6	7	8	9	10
SAMPLE FORM									

Signature of Contractor

Note : This is only a standard form. Details are to be furnished in this format in the form of type written statements which shall be enclosed in Envelope No.1 duly signed. The Documentary proof of Similar type and magnitude shall be submitted with this statement.

Contractor**Consultant****Member Secretary**

FORM- V**STATEMENT SHOWING DETAILS OF TECHNICAL PERSONNEL AVAILABLE WITH CONTRACTOR WHICH CAN
BE SPARED EXCLUSIVELY FOR THIS WORK****NAME OF CONTRACTOR :**

Sr. No.	Name of Person	Designation	Qualification.	Whether working in field or in office.	Professional Experience of execution of similar works.	Period for which the person is working with the tenderer.	Remarks.
1	2	3	4	5	6	7	8
SAMPLE FORM							

Note : This is only a standard form. Details are to be furnished in this format in the form of type written statements which shall be enclosed in Envelope No.1 duly signed. The Documentary proof of technical person shall be attached with this statement.

Signature of Contractor.**Contractor****Consultant****Member Secretary**

(46)

FORM - VI
STATEMENT SHOWING WORK DONE IN ALL CLASSES OF CIVIL ENGINEERING CONSTRUCTION WORKS
DURING LAST THREE YEARS.

NAME OF CONTRACTOR :

Sr. No.	Name of Work	Amount put to tender / tendered cost.	Agreement No.	Date of commencement of work.	Amount of work done during each of last three years.					Total amount of work still remaining to be executed in next Six months	Remarks.
					2013-14	2014-15	2015-16	2016-17	2017-18		
1	2	3	4	5						9	10
SAMPLE FORM											
		Grand total									

Outward No. and date of

Certificate issuing authority.

Note : This is only a standard form. Details are to be furnished in this format in the form of type written statements which shall be enclosed in Envelope No.1 duly signed. The Documentary proof of work done shall be attached with this statement.

Contractor

Consultant

Member Secretary

(47)

FORM - VII

Maximum value of Civil Engineer works in any one year during last 3 years.

Name of Tenderer :

Sr No	Name of Work	Tender Cost	Civil Work Executed During					Remarks
			2013-14	2014-15	2015-16	2016-17	2017-18	
								In support of the details entered in this statement ,the tenderer shall attach the attested copies of the works done certificates signed by the authority not below the rank of Executive Engineer.
		Total						
		Multiplying factor for updating	1.61	1.46	1.33	1.21	1.10	
		Grand Total						

(1) Tenderer shall work out this Bid capacity on basis of highest amount "A" i.e. the total cost of work done in any one year out of the last five years and the amount "B" i.e. the total cost of works in hand as per Statement No. 1 and shall work out the Bid Capacity as below.

$$\text{Bid Capacity} = (A*N*2)-B$$

Contractor

Consultant

Member Secretary

FORM- VIII
STATEMENT SHOWING QUANTITIES OF WORK EXECUTED DURING LAST FIVE YEARS
(2013-14,2014-15,2015-16,2016-17 & 2017-18)

NAME OF CONTRACTOR

Sr. No.	Name of Work.	Year.	Agreement No.	Quantity of work performed.					Remark
				5	6	7	8	9	
1	2	3	4	5	6	7	8	9	
		2013-14							
		2014-15							
		2015-16							
		2016-17							
		2017-18							

Note : This is only a standard form. Details are to be furnished in this format in the form of type written statements which shall be enclosed in Envelope No.1 duly signed. The Documentary proof of quantities of work executed shall be attached with this statement.

Contractor

Consultant

Member Secretary

GUARANTEE BOND FOR SECURITY DEPOSIT (REVISED)**(On Stamp Paper Worth Rupees 100/-)**

In consideration of the Governor of Maharashtra (here in after referred to as "Maharashtra Pollution Control Board") having agreed to exempt _____ (herein after referred to as "The Contractor") from depositing with the MPCB in cash the Sum of ₹. _____ (Rupees _____ Only) being the amount of Security Deposit payable by the contractor to the MPCB under the terms and conditions of the "Agreement dated the _____ day of _____ and made between the MPCB of the one part and the contractor of the other part (hereinafter referred to as "the said Agreement") for _____ as security for the observance and performance by the contractor of the terms and conditions of the said Agreement, on the Contractor furnishing to the MPCB a Guarantee in the prescribed form of a Scheduled Bank in India being in fact these presents in the like Sum of ₹. _____ (Rupees _____ Only) We _____ BANK/LIMITED registered in India under _____ Act and having one of our Local Head Office at _____ do hereby.

1) GUARANTEE TO THE BANK :-

- a) Due performance and observance by the contractor of the terms covenants and conditions on the part of the contractor contained in the said Agreement, and
 - b) due and punctual payment by the Contractor to the MPCB of all sums of money, losses, damages, costs, charges, penalties and expenses payable to the MPCB by the contractor under or in respect of the said Agreement.
- 2) Undertake to pay to the MPCB on demand and without demur and notwithstanding any dispute raised by the Contractor(s) in any suit or proceeding filed in any Court or Tribunal relating thereto the said Sum of ₹. _____ (Rupees _____ only) or such less sum as may be demanded by the MPCB from us our liability herein under being absolute and unequivocal and agree that.
- 3) a) the guarantee herein contained shall remain in full force and effect during the subsistence of the said agreement and that

Contractor**Consultant****Member Secretary**

the same will continue to be enforceable till all the dues of the MPCB under or by virtue of the said Agreement have been duly paid and its claims satisfied or discharged and till the MPCB certifies that the terms and conditions of the said Agreement have been fully properly carried out by the contractor.

b) We shall not be discharge or released from the liability under this Guarantee by reasons of

- i) any change in the constitution of the MPCB or the Contractor or
- ii) any agreement entered into between the MPCB and the contractor with or without our consent :
- iii) any forbearance or indulgence shown to the contractor.
- iv) any variation in the terms covenants or conditions contained in the said Agreement :
- v) Any time given to the contractor or
- vi) any other conditions or circumstances under which in law, a surety would be discharged :

c) Our liability here under shall be joint and several with that of the contractor as if we were the Principal debtors in respect of the said Sum of ₹. _____ (Rupees _____ Only) And

d) We shall not revoke this guarantee during its currency except with the previous consent in writing of the MPCB. This Guarantee Shall be valid upto_____.

IN WITNESS WHEREOF the common Seal of _____ day of _____ 2016. The Common seal of _____ was pursuant to the resolution of the Board of Directors of the Company dated the _____ day of _____ herein affixed in the presence of who, in token thereof, have hereto set their respective hand in the presence of

1) _____

2) _____

Contractor

Consultant

Member Secretary

NAME OF WORK : INTERIOR, CIVIL, WATER SUPPLY, SANITARY, ELECTRICAL, FIRE FIGHTING,HVAC WORK & ALLIED WORK IN MAHARASHTRA POLLUTION CONTROL'S OFFICE AT CHANDRAPUR DIST. CHANDRAPUR

DECLARATION OF THE CONTRACTOR

I / We hereby declare that I / We have made myself / ourselves thoroughly conversant with the local conditions regarding all materials (such as stone, murum, and sand etc.) and labour of which I/We have based my / our rates for this work. The specifications, conditions and lead of materials to be used on this work have been carefully studied and understood by me / us before submitting this tender. I / We undertake to use only the best materials approved by the **Member Secretary,Maharashtra Pollution Control Board, Mumbai** in charge of the work or his duly authorized representative, before starting the work and to abide by his decision.

I hereby undertake to pay the labourers engaged on the work as per Minimum Wages, Act 1948 applicable to the zone concerned.

TO BE FILLED BY THE CONTRACTOR

I/WE have quoted my/our offer in "Item wise" in words as well as in figures.

I/WE further undertake to enter into contract in regular form with **Member Secretary,Maharashtra Pollution Control Board, Mumbai**

Name & Signature of Contractor / Power of Attorney holder with complete address

Contractor

Consultant

Member Secretary

GENERAL DESCRIPTION AND SCOPE OF WORK

1. The Work Consist of “**INTERIOR, CIVIL, WATER SUPPLY, SANITARY, ELECTRICAL, FIRE FIGHTING,HVAC WORK & ALLIED WORK IN MAHARASHTARA POLLUTION CONTROL’S OFFICE AT CHANDRAPUR DIST. CHANDRAPUR ”**

Scope of Work includes,

Refer Schedule “B” / BOQ & “Specifications” for item wise description and specifications

Contractor

Consultant

Member Secretary

MAHARASHTRA POLLUTION CONTROL BOARD, MUMBAI

NAME OF WORK : INTERIOR, CIVIL, WATER SUPPLY, SANITARY, ELECTRICAL, FIRE FIGHTING,HVAC WORK & ALLIED WORK IN MAHARASHTRA POLLUTION CONTROL'S OFFICE AT CHANDRAPUR DIST. CHANDRAPUR

GENERAL RULES AND DIRECTIONS FOR THE GUIDANCE OF CONTRACTORS

1. All works proposed to be executed by contract shall be notified in a form of invitation to tender Online E-Tendering System also pasted on a board hung up in the office of the Member Secretary, Maharashtra Pollution Control Board, Mumbai, and signed by the Member Secretary, Maharashtra Pollution Control Board, Mumbai

This form will state the work to be carried out as well as the date for submitting and opening tenders and the time allowed for carrying out the work as per e-tendering schedule, also the amount of earnest money to be deposited with the tender, and the amount of the security deposit to be deposited by the successful tenderer and the percentage, if any, to be deducted from bills, It will also state whether a refund of a quarry fees, royalties, and ground rents will be granted. Copies of the specifications, designs and drawings estimated rates, scheduled rates and any other documents required in connection with the work shall be signed by the Member Secretary, Maharashtra Pollution Control Board, Mumbai, for the purpose of identification and shall also be open for inspection by contractors at the office of the Member Secretary, Maharashtra Pollution Control Board, Mumbai, during office hours.

Contractor

Consultant

Member Secretary

In the event of the tender being submitted by a firm, it must be signed separately by each partner thereof, or in the event of the absence of any partner, it shall be signed on his behalf by a person holding a power of attorney authorizing him to do so.

2. (i) The contractor shall pay as per e-tendering schedule the sum of **Rs.1,00,000/- (Rs. One Lakh only)** as and by way of earnest money. Earnest money shall be paid via online mode using NEFT/RTGS or payment gateway mode.
- (ii) In the event of his tender being accepted, subject to the provisions of sub-clause(iii) below, the said amount of earnest money shall be appropriated towards the amount of security deposit payable by him under conditions of General conditions of contract.
- (iii) If, after submitting the tender, the contractor withdraws his offer, or modifies the same, or if after the acceptance of his tender the contractor fails or neglects to furnish the balance of security deposit without prejudice to any other rights and powers of the Government, hereunder, or in law, Government shall be entitled to forfeit the full amount of the earnest money deposited by him.
- (iv) In the event of his tender not being accepted, the amount of earnest money deposited by the contractor, shall unless it is prior thereto forfeited under the provisions of sub-clause (iii) above, be refunded to him on his passing receipt thereof.

Contractor

Consultant

Member Secretary

3. Receipts for payments made on account of any work, when executed by a firm, shall also be signed by all the partners except where the contractors are described in their tender as firm, in which case the receipts shall be signed in the name of the firm by one of the partners, or by some other person having authority to give effectual receipts for the firm.
4. Any person who submits a E-tender shall fill up the usual printed form stating at what the rates specified item in Bill of Quantities (Memorandum showing items of work to be carried out) he is willing to undertake the work. Only one rate shall be named. Tenders which propose any alteration in the work specified in the said form of invitation to tender, or in the time allowed for carrying out the work, or which contain any other conditions of any sort will be liable to rejection. No printed form of tender shall include a tender for more than one work, but if Contractor who wish to tender for two or more works shall submit a separate tender for each. Tender shall have the name and the number of work to which they refer written outside the envelope.
5. The **Member Secretary, Maharashtra Pollution Control Board, Mumbai** shall open tenders as per **e-tendering schedule** and intimated the results through e-mail . In the event of a tender being accepted, the contractor shall, for the purpose of identification, sign copies of the specifications and other documents mentioned in Rule 1.
In the event of tender being rejected, the department / board shall refund the amount of earnest money deposited by the contractor online
6. The officer competent to dispose off the tender shall have the right of rejecting all or any of the tenders without assigning any reason.
7. No receipt for any payment alleged to have been made by a contractor in regard to any matter relating to this tender or the contract shall be valid and binding on MPCB unless it is signed by the Member Secretary, Maharashtra Pollution Control Board, Mumbai

Contractor

Consultant

Member Secretary

8. The memorandum of work to be tendered for and the schedule of materials to be supplied by the **Maharashtra Pollution Control Board** and their rates shall be filled in and completed by the office of the Member Secretary, Maharashtra Pollution Control Board, Mumbai, before the tender form is issued. If a form issued to an intending tenderer has not been so filled in and completed he shall request the said office to have this done before he completes and delivers this tender.
9. All work shall be measured net by standard measure and according to the rules and customs adopted by the Public Works Department and without reference to any local custom.
10. Under no circumstances shall any contractor be entitled to claim enhanced rates for any items in this contract.
11. Every registered contractor should produce along with his tender certificate of Registration as approved contractor in the appropriate class and renewal of such registration with date of expiry. (Copies to be attested by a Gazetted Officer)
12. All corrections and additions or pasted slips should be initialed.
13. The measurements of work will be taken according to the usual methods in use in the Public Works Department and no proposals to adopt alternative methods will be accepted. The Member Secretary, Maharashtra Pollution Control Board, Mumbai's decision as to what is "the method in use in the Public Works Department" will be final.

Contractor

Consultant

Member Secretary

14. The tendering contractor shall furnish a declaration along with the tender showing all works for which he has already entered into contract and the value of the work that remains to be executed in each case on the date of submitting the tender. (with certificate from the head of the office concerned).
15. Every tenderer shall furnish along with the tender, information regarding the Income tax circle or ward of the district in which he is assessed to income tax the reference to the number of the assessment year.
16. No foreign Exchange would be released by the MPCB for the purchase of plant and Machinery required for the Execution of the Work Contracted for.
17. The contractor will have to construct shed for storing controlled and valuable materials brought by him at work site at contractors cost. The material will be taken for use in the presence of the MPCB person. No material will be allowed to be removed from the site of work.
18. Successful tenderer will have to produce to the satisfaction of the accepting authority a valid and current license issued in his favour under the provision of Contract Labour (Regulation and Abolition) Act 1970 before starting work, failing which acceptance of the tender will be liable for withdrawal and earnest money will be forfeited to MPCB.
19. The contractor shall comply with the provision of the Apprentices Act 1961. and the rules and orders issued there under from time to time. If he fails to do so, his failure will be breach of contract and the Member Secretary, Maharashtra Pollution Control Board, Mumbai, may in his discretion cancel the contract. The contractor shall also be liable for any pecuniary liability arising on account of any violation by him of the provisions of the Act

Contractor

Consultant

Member Secretary

TENDER FOR WORKS

I/We hereby tender for the execution, for the Government of Maharashtra (herein before and hereinafter referred to as “**Government**”) of the work specified in the under written memorandum within the time specified in such memorandum at that rate quoted by me at appropriate place provided online in financial bid “Item Wise Rate entered in **BOQ** (Memorandum showing items of work to be carried out) and in accordance in all respects with the specifications, designs, drawings, and instructions in writing referred to in Rule - I hereof and in Clause 13 of the annexed conditions of contract and agree that when materials for the work are provided by the Government, such materials and the rates to be paid for them shall be as provided in hereto.

** In figures as well
as in words*

Contractor

Consultant

Member Secretary

MEMORANDUM

1. (a) General Description:

(a) If several sub works are included they should detailed in a separate list.

INTERIOR, CIVIL, WATER SUPPLY, SANITARY, ELECTRICAL, FIRE FIGHTING, HVAC WORK & ALLIED WORK IN MAHARASHTRA POLLUTION CONTROL'S OFFICE AT CHANDRAPUR DIST. CHANDRAPUR

(b) Estimated cost. ₹. 1,98,87,900.00

(c) Earnest Money ₹. 1,00,000.00

(d) Security Deposit.

i) Initial (not less than the amount of earnest money. ₹. 1,99,000.00

ii) To be deducted from current bills. ₹. 1,99,000.00

Total ₹.3,98,000.00

(e) Percentage if any to be deducted from bills so as to make up the total amount required as security deposit by the time, the half the work, as measured by the costs is done (2 %) **Two Percent.**

(f) Give schedule where necessary showing dates by which the various items are to be completed.

(f) Time allowed for the work from date of written order to commence.

(06) Six Calendar Months (including monsoon)

Contractor

Consultant

Member Secretary

2. I/We agree that this offer shall remain open for acceptance for a minimum period of **90 days (Ninety Days)** from the date fixed for opening the “same” means envelope No.2 and thereafter until it is withdrawn by me/us by notice in writing duly addressed to the authority opening the tenders and sent by registered post A.D. or otherwise delivered at the office of such authority. The sum of **₹. 1,00,000.00 (₹. One Lakh Only)** representing the earnest money is herewith forwarded. The amount of earnest money shall not bear interest and shall be liable to be forfeited to the MPCB should I/We fail to :

- (i) abide by the stipulation to keep the offer open for the period mentioned above or
- (ii) Sign and complete the contract documents as required by the Engineer and furnish the security deposit as specified in item (d) of the memorandum contained in paragraph (i) above within the limit laid down in clause (I) of annexed General conditions of contract. The amount of earnest money may be adjusted towards the security deposit or refunded to me / us if so desired by me/us in writing, unless the same or any part thereof has been forfeited as aforesaid.

Contractor

Consultant

Member Secretary

3. I/We have secured exemption from payment of earnest money after executing the necessary bond in favour of the MPCB and a copy of which is (exemption certificate with bond) enclosed herewith, and on occasions for forfeiture of earnest money for this work arise due to reasons mentioned above (I) abide by the stipulations to keep the offer open for the period mentioned above or (ii) sign and complete the contract documents and furnish the security deposit as specified in item (d) of the Memorandum contained in Paragraph (i) above within the time limit laid down in clause (I) of the annexed General conditions of contract the amount payable by me / us at the option of the Engineer, be recovered out of the amount deposited in compliance for the exemption in so far as the same may extend in terms of the said bond and also in the event of the deficiency out of any other money which is due to be paid to me/us by the MPCB under any other contract or transaction of whatsoever or otherwise.

4. Should this tender be accepted I/We hereby agree to abide by and fulfill all the terms and provisions of the conditions of contract annexed hereto so far as applicable and in default there of to forfeit and pay to MPCB the sums of money mentioned in the said conditions.

Contractor

Consultant

Member Secretary

Amount to be specified in words and figures.

Strike out (a) if no cash security deposit is to be taken..

The Earnest Money Deposit of ₹.1,00,000/- is herewith forwarded presenting the earnest money (a) the full value of which is to be absolutely forfeited to MPCB should I/We not deposit the full amount of security deposit in the above memorandum, in accordance with clause 1(A) of the said conditions, otherwise the said sum of ₹.1,00,000/- Shall be refunded.

Contractor

Signature of contractor before submission of tender

Address :

.....

Dated the day of 2019

Witness :

Signature of Witness to Contractor's Signature.

Address :

.....

Occupation :

The above tender is here by accepted by me for and on behalf of the Governor of Maharashtra

Signature of the Officer by whom accepted.

**Member Secretary
Maharashtra Pollution Control Board
Mumbai**

Dated : day of 2019

Contractor

Consultant

Member Secretary

ADDITIONAL GENERAL CONDITIONS AND SPECIFICATIONS

Note : These are to apply as additional specification and conditions unless otherwise already provided for contradictorily elsewhere in this contract.

1. CONTRACTOR TO STUDY SITE CONDITIONS

The contractor shall be deemed to have carefully examined the work and site conditions including labour, the general and the special conditions, specifications, schedules and drawings and shall be deemed to have visited the site of work and to have fully informed himself regarding the local conditions and carried out his own investigation to arrive at the rates quoted in the tender system. In this regard, he will be given necessary information to the best of the knowledge of MPCB but without any guarantee about it. If he shall have any doubt as to the meaning of any portions of these general conditions or the special conditions, or the scope of work or of the specifications and drawings or any other matter concerning the contract, he shall in good time, before submitting his tender, set forth the particulars thereof and submit them to the **Member Secretary, Maharashtra Pollution Control Board, Mumbai** in writing order, that such doubts may be clarified authoritatively before tendering. Once a tender is submitted by the tendering system, the matter will be decided according to tender conditions in the absence of such authentic pre-clarification.

2.A COMPETENCY OF TENDER

The Work will be awarded only to those contractors who are considered to be substantially responsive bidders, capable of performing the class of work to be completed. Before passing the final award any or all bidders may have to show that he has the necessary experience, facilities, ability and financial resourced to execute the work in satisfactory manner and also within the stipulated time.

2(B). The Bidder / Contractor Shall be liable solely for action under Indian Penal code (IPC) for Submission of any false / fraudulent paper/information submitted in envelop No.1 of bid Document. The contractor shall also be liable solely for action under IPC for submission of any false information, false bill of purchases supporting proof of purchase proof of testing submitted by his staff, subletting company or by himself during and after contract period-till final bill. The undertaking for this effect shall be submitted in Annexure-III enclosed herewith.

Contractor

Consultant

Member Secretary

2. INDEMNITY:

The contractor shall indemnify the Government against all actions, suits, claims and demands brought or made against it in respect of anything done or committed to be done by the contractor in execution of or in connection with the work of this contract and against any loss or damage to the Government in consequence of any action or suit being brought against the Contractor for anything done or committed to be done in the execution of the works of this contract.

3. DEFINITIONS:

Unless Excluded by or repugnant to the context.

- (a) The expression "Government" as used in the tender documents shall mean the **MPCB** of the Government of Maharashtra.
- (b) The expression "**Engineer**" or "**Engineer-in-charge**" as used in the tender papers shall mean the **Engineer in Charge / Consultant / Architect** in charge of the work.
- (e) The expression "**Contractor**" used in the tender papers shall mean the successful tenderer i.e. the tenderer whose tender has been accepted, and who has been authorized to proceed with the work.
- (f) The expression "**Contract**" as used in tender papers shall mean the deed of contract together with or its original accompaniment and those later incorporated in it by mutual consent between MPCB and contractor.
- (h) "**Drawing**" shall mean the drawings referred to in the specifications and any modifications of such drawings approved in writing by Engineer and such other drawings as may from time to time be furnished or approved in writing by the Engineer.

- (i) **"Engineer's representative"** shall mean an assistant of the Engineer notified in writing to the contractor by the Engineer.
- (j) **"Provisional items"** shall mean items for which approximate quantities have been included in the tender documents.
- (k) The **"Site"** shall mean the lands and/or other places, on, under in or through which the work is to be executed under the contract including any other lands or places which may be allotted by Government or used for the purpose of contract.
- (l) The **"work"** shall mean the works to be executed in accordance with the contract or part(s) thereof as the case may be and shall include all extra, additional, altered or substituted works as required for performance of the contract.
- (m) The **"Contract sum"** shall mean the sum for which the tender is accepted.
- (n) The **"Accepting Authority"** shall mean the officer competent to accept the tender.
- (o) The **"Day"** shall mean a day of 24 hours from midnight to midnight irrespective of the number of hours worked in any day in that day.
- (p) **"Temporary works"** shall mean all temporary works of every kind required in or about the execution, completion, or maintenance of the works.

Heading and marginal notes, if any, to the general conditions shall not be deemed to form part thereof or be taken into consideration in the interpretation or construction thereof of the contract.

Wherever there is mention of **"Schedule of Rates"** or **"DSR"** shall mean as "The Schedule of the rates of the P.W.D in the jurisdiction of which the work lies."

4. ERRORS, OMISSIONS AND DISCREPANCIES:

- a. In case of errors omissions and /or disagreement between written and scaled dimensions on the drawing or between drawings and specifications etc. the following order of preference shall apply.
- (i) Between actual scaled and written dimensions or descriptions on a drawing the latter shall be adopted.
 - (ii) Between the written or shown description of dimensions in the drawings and the corresponding one in the specifications, the latter shall apply.
 - (iii) Between the quantities shown in schedule of quantities and those arrived at from the drawings, the latter shall be preferred
 - (iv) Between the written description of the items in the schedule of quantities and the detailed description in the specifications of the same items, the latter shall be adopted.
- b. In case of discrepancy between rate quoted in figures and words, the lowest of the two will be considered for acceptance of the tender.
- c. In all cases of omissions and /or doubts or discrepancies in the dimensions or descriptions of any item or specification, reference shall be made to the **Member Secretary, Maharashtra Pollution Control Board, Mumbai.** whose elucidation, elaboration or decision shall be considered as authentic. The contractor shall be held responsible for any errors that may occur in the work through lack of such reference and precaution.
- d. The special provision in detailed specifications and wording of any item shall gain precedence over corresponding contradictory provisions (if any) in the standard specification of Public Works Departments Hand Book where reference to such specifications is given without reproducing the details in contract.

5. METHODOLOGY OF CONSTRUCTION AND CONSTRUCTION EQUIPMENTS:

(A) METHODOLOGY OF CONSTRUCTION :

5.1 Construction Machinery / Equipments:

5.1.1 The methodology and equipments to be used on the project shall be furnished by the Contractor to the Engineer-In-Charge well in advance of commencement of work and approval of the Engineer-In-Charge obtained prior to its adoption and use.

5.1.2 The Contractor shall give, a trial run of the equipment for establishing its capability to achieve the laid down specifications and tolerance to the satisfaction of the Engineer-in-Charge before commencement of work, if so desired by the Engineer- In-Charge.

5.1.3 All equipments provided shall be of proven efficiency and shall be operated and maintained at all times in the manner acceptable to the Engineer-In-Charge.

5.1.4 No equipment or personnel shall be removed from the site without permission of the Engineer-In-Charge .

5.2 The contractor shall furnish at least 15 days in advance, his program of commencement of items of work, the details of actual methods that would be adopted by the contractor for the execution of various items of work such as well sinking, cast-in-situ superstructure for bridge work, Earth work, W.B.M., black topping items for road works supported by necessary detailed drawing and sketches including those of the plant and machinery that would be used, their locations arrangements for conveying and handling materials etc. and obtain prior approval of the Engineer in charge well in advance of starting of such items of work. The Engineer in charge reserves the right to suggest modifications or make complete change in the method proposed by the contractor, whether accepted previously or not at any stage of the work, to obtain the desired accuracy, quality and progress of the work which shall be binding on the contractor, and no claim on account of such change in method of execution will be entertained by Government so long as specification of the item remain unaltered. The sole responsibility for safety and adequacy of the methods adopted by the contractor,

Contractor

Consultant

Member Secretary

will however rest on the contractor irrespective of any approval given by the Engineer.

- 5.3 Abrasion Testing Machine for Tiles of standard make confirming to IS – 1237 & 1706 with suitable thickness measuring device to measure wear of the tile. It shall be suitable for operation on 415 v/50 Hz, 3 phase AC supply.

6. WORKING METHODS:

Contractor shall submit, within times stipulated time by the Engineer, in writing the details of actual methods that would be adopted by the contractor for the execution of any item as required by Engineer, at each of the locations, supported by necessary detailed drawings and sketches including those of the Plant and Machinery that would be used, their locations, arrangement for conveying and handling materials etc. And obtain prior approval of the Engineer-in-charge well in advance of starting of such item of work The Engineer-in-charge reserves the right to suggest modifications or make complete changes in the method proposed by the contractor, whether accepted previously or not, at any stage of the work. to obtain the desired accuracy, quantity and progress of the work which shall be binding on the contractor, and no claim on account of such change in method of execution will be entertained by Government so long as specifications of the item remain unaltered.

6.1 PROGRESSIVE METHODOLOGY.

The work methodology as described above shall then be followed for next 200mts. and thus progressively for entire length of road.

7. PROGRESS SCHEDULE:

- 7.1 The contractor shall furnish within the period stipulated in writing by the Engineer-in-charge, of the order to start the work, a progress schedule in quadruplicate indicating the date of actual start, the monthly progress expected to be achieved and the anticipated completion date of each major item of work to be done by him, also indicating dates of procurement and setting up of materials, plant and machinery. The schedule is to be such as is practicable of achievement towards the completion of the whole work in the time limit, the particular items, if any, on the due dates specified in the contract and shall have the approval of the Engineer-in-charge. No revised schedule shall be operative without such acceptance in writing. The Engineer is

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further empowered to ask for more detailed schedule or schedules say week by week for any item, in case of urgency of work as will be directed by him and the contractor shall supply the same as and when asked for.

7.2 The Contractor shall furnish sufficient plant, equipment and labour as may be necessary to maintain the progress of schedule. The working and shift hour's restricted to one shift a day for operations to be done under the Government supervision shall be such as may be approved by the Engineer-in-charge. They shall not be varied without the prior approval of the Engineer. Night work which requires supervision shall not be permitted except when specifically allowed by Engineer each time, if requested by the Contractor. The Contractor shall provide necessary lighting arrangements etc. For night work as directed by Engineers without extra cost.

7.3 Further, the contractor shall submit the progress report of work in prescribed forms and charts etc. At periodical intervals, as may be specified by the Engineer-incharge. Schedule shall be in form of progress charts, forms, progress statement and/or reports as may be approved by the Engineer.

7.4 The contractor shall maintain proforma, charts, details regarding machinery, equipment, labour, materials, personnel etc. As may be specified by the Engineer and submit periodical returns thereof as may be specified by the Engineer-in-charge.

7.5 PRIORITIES OF WORKS TO BE EXECUTED:

Priorities for items to be executed shall be determined periodically keeping in view of the final time limit allowed for the work and all the time schedule fixed for intermediate stages of work.

7.6 Revised Programme of Work in case of slippage:

In case of slippage from the approved work programme at any stage, the contractor shall furnish revised programme to make up slippage within the stipulated time schedule and obtain the approval of the Engineer-in-charge to the revised programme.

7.7 Action in case disproportionate progress:

In case of extremely poor progress of the work or any item at any stages of work which in the opinion of the Engineer-In-Charge cannot be made good by the Contractor considering his available resources, the Engineer-In-Charge will get it accelerated to make up the lost time through any other agency, and recover the additional cost incurred, If any, in getting the work done from the Contractor after informing him about the action envisaged by him.

8. TREASURE-TROVE:

In the event of discovery by the contractor or his employees, during the progress of the work of any treasure, fossils, minerals or any other articles of value or interest, the contractor shall give immediate intimation thereof to the Engineer and forthwith hand over to the Engineer such treasure or things which shall be the property of Government.

9. AGENT AND WORK ORDER BOOK:

The contractor shall himself manage the work or engage an authorized all time agent on the work capable of managing and guiding the work and understanding the specifications and contract conditions. A qualified and experienced Engineer shall be provided by the contractor as his agent for technical matters in case the Engineer-in- charge considers this as essential for the work and so directs the contractor. He will take orders as will be given by the Engineer In Charge, or his representative and shall be responsible for carrying them out. This agent shall not be changed without prior intimation of the Engineer In Charge and his representative on the work site. The contractor shall supply to the Engineer the details of all supervisory and other staff employed by the contractor and notify changes when made, and satisfy the Engineer regarding the quantity and sufficiency of the staff thus employed. The Engineer in charge has the

unquestionable right to ask for changes in the quality and strength of contractor's supervisory staff and to order removal from work of any of such staff. The contractor shall comply with such orders and effect replacements to the satisfaction of the Engineer in charge.

A work order book shall be maintained on site and it shall be the property of Government and the contractor shall promptly sign orders given therein by Engineer In Charge, or his representative and his superior officers, and comply with them.

The compliance shall be reported by the contractor to the Engineer in good time so that it can be checked. The blank work order book with machine numbered pages will be provided by the MPCB free of charge for this purpose. The contractor will be allowed to copy out instructions therein from time to time.

10. SETTING OUT:-

Setting out:

The Engineer-in-charge shall furnish the Contractor with only the four corners of the work site and a level bench mark and the Contractor shall set out the works and shall provide an efficient staff for the purpose and shall be solely responsible for the accuracy of such setting out.

The Contractor shall provide, fix and be responsible for the maintenance of all stacks, templates, level marks, profiles and other similar things and shall take all necessary precautions to prevent their removal or disturbance and shall be responsible for the consequence of such removal or disturbance should the same take place and for their efficient and timely reinstatement. The Contractor shall also be responsible for the maintenance of all existing survey marks, boundary marks, distance marks and centre line marks, either existing or supplied and fixed by the Contractor. The work shall be set out to the satisfaction of the Engineer-in-charge.

The approval thereof or joining with the Contractor by the Engineer-in-charge in setting out the work, shall not relieve the Contractor of any of his responsibilities.

Before beginning of the work, the Contractor shall at his own cost provide all necessary reference and level posts, pegs, bamboos, flags, ranging rods, strings

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and other material for proper lay out of the work in accordance with the scheme for bearing marks acceptable to the Engineer-in-charge. The centre, longitudinal or face lines and cross lines shall be marked by means of small masonry pillars. Each pillar shall have distinct mark at the centre to enable the theodolite to be set over it. No work shall be started until all these points are checked and approved by the Engineer-in charge n writing but such approval shall not relieve the Contractor of any of his responsibilities. The Contractor shall also provide all labour, material and other facilities, as necessary, for the proper checking of layout and inspection of the points of works under construction.

Pillars bearing geodetic marks located at the sites of units of works under construction should be protected and fenced by the Contractor.

On completion of works, the Contractor must submit the geodetic documents according to which the work was carried out.

10.2 RESPONSIBILITIES FOR LEVEL AND ALIGNMENT :

The contractor shall be entirely and exclusively responsible for the horizontal and vertical alignment, the levels and corrections of every part of the work and shall rectify effectively any errors or imperfections therein. Such rectification shall be carried out by the contractor, at his own cost, when instructions are issued to that effect by the Engineer-in-charge.

10.3 LEVELLING INSTRUMENTS:

If measurement of items of the works are based on volumetric measurements calculated from levels taken before and after construction of items, a large number of leveling staves, tapes etc. will have to be kept available by the contractor at the site of work for this purpose. Lack of such leveling staves, tapes etc in required numbers may cause delay in measurements and the work. The contractor will have therefore to keep sufficient number of these instruments readily available at site and in good working conditions.

10.4 To carry out activities mentioned above 10.1, 10.2 & 10.3

Contractor shall make all necessary arrangements to carry out all necessary detail surveys required as per the Specifications / Tender Conditions, during currency of work / project, and deliver desired outputs in printed / soft as instructed by engineer in charge at different stages of works as instructed by the engineer in-charge during the currency of the project, that is from start to finish of the work/project. To carry out such surveys and deliver desired outputs in printed form / soft copy as instructed by engineer in charge as mentioned above.

The Contractor shall appoint a survey agency with the approval of the engineer in charge, for that, Contractor shall submit list of three survey agencies to engineer in charge , along with the payment of his security deposit (as required under the clause one contract) . The engineer in charge on receipt of such list will select one survey agency out of three and communicate it, along with the work order to contractor. Contractor should appoint survey agency as selected by the engineer incharge. The survey agency shall not be changed without permission of the engineer in charge. The survey agency and / or contractor shall have

- 1) Latest survey instruments and/or equipments viz. total station, auto levels, plotter etc.
- 2) Auto CAD, non-auto CAD base software to deliver desired outputs based on survey carried out using (1) above, in printed/soft copy as instructed by engineer in charge.
- 3) Necessary trained manpower to work on and deliver as (1) and (2) above.

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For appointing survey agency, to carry out such surveys and deliver desired outputs in printed/soft as instructed by engineer in charge as mentioned above the Contractor shall not be paid separately. His offer shall be inclusive of all.

11 AUTHORITIES OF THE ENGINEER IN CHARGE'S REPRESENTATIVE:

The duties of the representative of the Engineer-in-charge are to watch and supervise the work and test and examine any material to be used for workmanship employed in connection with the works.

The Engineer-in-charge may from time to time, in writing delegate to his representative any of the powers and authorities vested in the Engineer-in-charge and shall furnish to the contractor a copy of all such delegations of powers and authorities. Any written instructions or approval given by the representative of the Engineer-in-charge to the contractor within the terms of such delegations (but not otherwise) shall bind the contractor and the MPCB as though it had been given by the Engineer-in-charge, provided always as follows.

Failure of the representative of the Engineer-in-charge to disapprove any work or materials shall not prejudice the power of the Engineer-in-charge thereafter to disapprove such work or materials and to order to putting down, removal or breaking up thereof.

12) INITIAL MEASUREMENTS FOR RECORD

Where for proper measurement of the work, it is necessary to have an initial set of levels or other measurements taken, the same as recorded in the authorized field book or measurement book of Government by the Engineer or his authorized representative will be signed by the contractor who will be entitled to have a true copy of the same made at his cost. Any failure on the part of the contractor to get such levels etc. Recorded before starting the work, will render him liable to accept the decision of the Engineer as to the basis of taking measurements.

Like-wise the contractor will not cover any work which will render its subsequent measurements difficult or impossible without first getting the same jointly measured by himself; and the authorized representative of the Engineer In Charge. The record of such measurements on the Government side will be signed by the Contractor and he will be entitled to have a true copy of the same made at his cost.

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13 HANDING OVER OF WORK:-

All the work and materials before finally taken over by Government will be the entire liability of the Contractor for guarding, maintaining and making good any damages of any magnitude interim payments made for such work will not alter this position. The handing over by the Contractor and taking over by the Engineer In Charge or his authorized representative will be always in writing, copies of which will go to the Engineer In Charge or his authorized representative and the contractor. It is, however understood that before taking over such work, Government will not put it into regular use as distance from casual or incidental one, except as specially mentioned elsewhere in this contract, or as mutually agreed to.

14. ASSISTANCE IN PROCURING PRIORITIES, PERMITS ETC. :-

The Engineer, on a written request by the contractor, will if in his opinion, the request is reasonable and in the interest of work and its progress, assist the contractor in Securing, the priorities for deliveries, transport permits for controlled materials etc., where such are needed. The Government, will not, however be responsible for the non-availability of such facilities or delay in this behalf and no claims on account of such failures or delays shall be allowed by the Government. The Contractor shall have to make his own arrangement for machinery required for the work. Such machinery conveniently available with the MPCB may be spared as the rules in force on recovery of necessary Security Deposit and rent with Agreement in the prescribed Signature of Contractor form. Such an Agreement shall be independent of this contract and the supply of machinery shall not form a ground for any claim or extension of time limit for this work.

16 CO-ORDINATION

When several agencies for different sub-works of the project are to work simultaneously on the project site, there must be full co-ordination and co-operation between different contractors to ensure timely completion of the whole project smoothly. The scheduled dates for completion specified in each contract shall, therefore, be strictly adhered to. Each contractor may make his independent arrangements for water, power, housing etc. if they so desire, on the other hand the contractors are at liberty to come to mutual agreement in this behalf and make joint arrangement with the approval of the Engineer. No single contractor shall take or cause to be taken any steps or action that may cause disruption, discontent or disturbance to work, labour or arrangements etc. of other contractors in the project localities. Any action by any contractor which the Engineer in his unquestioned discretion may consider as infringement of the above code would be considered as a breach of the contract conditions and shall be dealt with accordingly.

In case of any dispute or disagreement between the contractors, the Engineer's decision regarding the co-ordination, co-operation and facilities to be provided by any of the contractors shall be final and binding on the contractors concerned and such a decision or decisions shall not vitiate any contract nor absolve the contractor(s) of his/their obligations under the contract nor form the grounds for any claim or compensation.

17. PATENTED DEVICE

Whenever the contractor desires to use any designed devices, materials or process covered by the letter of patent or copy right, the right for such use shall be secured by suitable legal arrangement and agreement with patent owner and the copy of their agreement shall be filed with the Engineer-in-charge if so desired by the letter.

18. PAYMENT

The contractor must understand clearly that the rates quoted are for completed work and include all cost due to labour, scaffolding, plant, machinery, supervision, power, royalties, taxes etc. and should also include all expenses to cover the cost of height work as and when required and no claim for additional payment beyond the prices or rates quoted will be entertained. The mode of measurement has been indicated in the specifications. If there is any ambiguity or doubt in this respect, the decision of Engineer In Charge will be final.

No of Bills : 3 Running Account Bills Each of 40 Lakh and One Final Bill

19. SUPERVISION AND INSPECTION OF WORKS AND QUALITY CONTROL:-

19.1 SUPERVISION :-

The Contractor shall either himself supervise the execution of the works or shall appoint the competent agent approved by the Engineer-in-charge, to act on his behalf. If in the opinion of the Engineer-in-charge, the Contractor has himself no sufficient knowledge and experience of receiving instructions or cannot give his full attention to the works, the Contractor shall at his own expenses employ as his accredited agent & qualified Engineer approved by the Engineer-in-charge. Orders given to the Contractor's agent shall be considered to have the force as if these had been given to the Contractor himself. If the Contractor fails to appoint a suitable agent as directed by the Engineer-in-charge, the Engineer-incharge shall have full power to suspend the execution of the work until such date a suitable agent is appointed and the Contractor shall be responsible for the delay so caused to the works and the Contractor shall not be entitled for

19.2 INSPECTION:-

The Contractor shall inform the Engineer-in-charge in writing -when any portion of the work is ready for inspection giving him sufficient notice to enable him to inspect the same without affecting the further progress of the work. The work shall not be considered to have been completed in accordance with the terms of the contract until the Engineer-in-charge shall have certified in writing to that effect. Approval of materials or workmanship or approval of part of the work during the progress of execution shall not bind the Engineer-in-charge or in any way affect him even to

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reject the work which is alleged to be completed and to suspend the issue of his certificate of completion until such alteration and modifications or reconstruction have been effected at the cost of the Contractor as shall enable him to certify that the work has been completed to his satisfaction.

The Contractor shall provide at his cost necessary ladders and such arrangements as to provide necessary facilities and assistance for proper inspection of all parts of the work at his own cost.

19.3 TEMPORARY QUARTERS:

i) The contractor shall at his own expense maintain sufficient experienced supervisory staff etc. Required for the work and shall make his own arrangement, provide housing for them with all necessary arrangements, including fire preventive measures etc. as directed by the Engineer-in- charge.

ii) The contractor shall provide, furnish, maintain and remove on completion of the work, a suitable office on the work-site for the use of Engineer In Charge's representative. The covered area for office exclusive of varandha should not be less than 24 Square Metre and height 3.0 meter It have Brick masonry walls and asbestos or corrugated iron roof, paved floor should be 18" above ground level. He should provide a basket type latrine, urinals and keep them clean, daily. The contractor shall have provide Laboratory (with ref. books & I.S. codes) at site of size 6.0 m x 6.0m minimum and height 3.0 meter at work site. The office and Laboratory structures shall be semi-permanent type. This will be supposed to be included in his rates.

19.4 SAFETY MEASURES AND AMENITIES:

While executing the work, necessary precautions regarding safety of labour, supervisory staff, public and traffic users shall be taken by the agency according to rules and regulations specified by the Government of India /Government of Maharashtra and as directed by District Court, Jalna

1) The contractor shall take all necessary precautions for the safety of the workers and preserving their health while working in such job as require special protection and precautions. The following are some of the requirements listed, though no

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exhaustive. The contractor shall also comply with the directions issued by the Engineer in this behalf from time to time and at all times.

2) Labour License : It shall be obligatory on the part of the contractor to obtain the necessary labour License from the labour department within fortnight of issue of work order.

3) Providing protective foot-wear to workers, in situations like mixing and placing of mortar of concrete in quarries and places where the work is done under too much of wet condition as also for movements over surfaces infected with Dyster growth etc.

4) Providing protective headwear to workers, working in quarries etc. to protect them against accidental fall of materials from above.

5) Taking such normal precautions like providing hand rails at the edges of the floating platform or barges, not allowing nails or metal parts or useless timber to spread around etc.

6) Supporting workmen with proper belts, ropes etc. when working on any masters, cranes grabs, hoist, dredgers etc.

7) Taking necessary steps towards training the workers concerned in the use of machinery before, they are allowed to handle it independently and taking all necessary precautions in and around the areas where machines, hoists and similar units are working.

8) Providing adequate number of boats (of at all required for playing water) to prevent overload and over-crowding.

9) Providing life belts to all men working in such situation from where they may accidentally fall into the water, equipping the boats with adequate number of life belts etc.

10) Avoiding bare live wires etc. As would electrocute workers.

11) Making all platforms, staging and temporary structures sufficiently strong so as not to cause inconvenience and risk to the workmen and supervisory staff.

12) Providing sufficient first aid trained staff and equipment to be available quickly at the work site to render immediate first aid treatment in case of accidents due to suffocations, dropping and other injuries.

13) Take all necessary precautions with regard to use of divers.

14) Providing full length gum boots, leather hand gloves with fire proof pron to cover the chest and back reaching upto knees and protective goggles or the eyes to the labourers working with hot asphalt handling vibrator in cement concrete and also where use of any or all these items is beneficial in the interest of health and well being of the labours in the opinion of the Engineer.

20. EXPLOSIVES :-

The Contractor shall at his own expense construct and maintain proper magazines, if such required for the storage of explosives for use in connection with the works, and such magazine, being situated constructed and maintained in accordance with the Government Rules applicable in that behalf. The contractor shall at his own expenses obtain such Licenses as may be necessary for storage of explosives are approved by the Engineer, the Government shall not be incurring any responsibility whatever in connection with storage and use of explosives on the size or any accident or occurrence whatsoever in connection therewith, all operations in or for which explosives are deployed being at the risk of the contractor and upon his sole responsibility and the contractor here by gives to Government an absolute indemnity in respect thereof.

21. DAMAGE BY FLOODS OR ACCIDENTS :-

The contractor shall take all precautions against damage by floods or like or from accident etc. No compensation will be allowed to the Contractor on this account or for correcting and repairing any such damage to the work during construction. The contractor shall be liable to make good at his cost any plant or materials belonging to the Government, lost or damaged by floods or from any other cause which is in his charge.

22. RELATION WITH PUBLIC AUTHORITIES :-

The contractor shall comply with all rules, regulation, bye-laws and direction given from time also by any local public authority in connection with this work and shall himself pay fees or charges which are leviable on him without any extra to the Department.

23. POLICE PROTECTION:

For the Special Protection of camp and the contractor's works, the MPCB will help the contractor as far as possible to arrange for such protection with the concerned authorities if so required by the Contractor in writing. The full cost of such protection shall be borne by the contractor.

24 MEDICAL AND SANITARY ARRANGEMENTS TO BE PROVIDED FOR LABOUR EMPLOYED ON THE CONSTRUCTION BY THE CONTRACTOR

- a) The contractor shall provide an adequate supply of potable water for use of labourers on work and in Camps.

- b) The contractor shall construct trench or semi permanent latrines for the use of the Labourers. Separate latrines shall be provided for men and women.

- c) The contractor shall build sufficient number of huts on a suitable plot of land for use of the Labourers according to the following specifications :-

1. Huts of Bamboos and Grass may be constructed.

A good site not liable to submergence shall be selected on high ground remote from jungle but well provided with trees, shall be chosen where it is available. The neighborhood of tank, jungle, grass or woods should be particularly avoided. Camps should not be established close to large cuttings of earth work. The lines of huts shall have open spaces of at least ten meters between rows. When a good natural site cannot be procured, particular attention should be given to the drainage. There should be no overcrowding. Floor space at the rate of 30 Sq.ft. Per head shall be provided. Care should be taken to see that the huts are kept clean and in good order.

The Contractor must find his own land and if he wants Government land, he should apply for it and pay assessment for it, if made available by Government.

The contractor shall construct a sufficient number of bathing places. Washing places should also be provided for the purpose of washing clothes. The Contractor shall make sufficient arrangements for draining away the surface and sewage water as well as water from the bathing and washing places and shall dispose off this waste water in such way as not to cause any nuisance.

The contractor shall engage a Medical officer with a traveling dispensary for a Camp containing- 500 or more persons if there is no Government or other private dispensary situated within 8 kilometers from the Camp. In case of emergency the contractor shall arrange at his cost for transport for quick medical help to his sick worker.

The Contractor shall provide the necessary staff for effecting a satisfactory drainage system and cleanliness of the camp to the satisfaction of the Engineer. At least one sweeper per 200 persons should be engaged. The Assistant Director of Public Health shall be consulted before opening a labour camp and his instruction on matters such as water supply sanitary conveniences, the camp site accommodation and food supply shall be followed by the Contractor.

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2 . The contractor shall make arrangement for all anti-malaria measures to be provided for the labour employed on the work. The anti-malaria measure shall be provided as directed by the Assistant Director of Public Health.

25. QUARRIES :-

25.1 The quarrying operations shall be carried out by the Contractor with proper equipment such as compressors. Jack-hammers, drill bits, explosives etc. and sufficient number of workmen shall be employed so as to get the required out turn.

25.2 The Contractor shall carry out the works in the quarries in conformity with all the rules and regulations already laid down or may be laid down from time to time by Government. Any cost incurred by Government due to noncompliance of any rules or regulations or due to damages by the contractor shall be the responsibility of the Contractor. The Engineer- in-charge or his representative shall be given full facilities by the Contractor for inspection at all times of the working of the quarry, records maintained, the stocks of the explosives and detonators etc. so as to enable him to check that the working records and storage are all in accordance with the relevant rule. The Engineerin- charge or his representative shall at any time be allowed to inspect the works, buildings, and equipment at the quarters.

25.3 The Contractor shall maintain at its own cost, the book registers etc. required to be maintained under the relevant rules and regulations and as directed by the Engineer-in-charge. These books shall be open for inspection at all times by the Engineer-in-charge or his representative and the Contractor shall furnish the copies or extracts of books or register as and when required.

25.4 All quarrying operations shall be carried out by the Contractor in organized and expeditious manner systematically and with proper planning. The Contractor shall engage licensed blaster and adopt electric blasting and/or any other approved method which would ensure complete safety to all the men engaged in the quarry and its surroundings. The Contractor shall himself provide suitable magazines and arrange to pre and store explosive etc. as required under the rules at his own cost. The designs and the location of the magazine shall be got approved in advance from the Chief Inspector of Explosives and the rules and regulations in this

connection as laid down by the Chief Inspector of Explosives from' time to time shall be strictly adhered to by the Contractor. It is generally experienced that it takes time to obtain the necessary license for blasting & license for storage of material from the concerned authorities. The contractor must therefore take timely advance action for procuring all such licenses so that the work progress may not be hampered.

25.5 The approaches to the quarrying place from the existing public roads shall have to be arranged by the Contractor at his own cost, and the approach shall be maintained by the contractor at his own cost till the work is over.

25.6 The quarrying operations shall be carried out by the Contractor to the entire satisfaction of the Engineer-in-charge and the development of the quarry shall be made efficiently so as to avoid wastage of stones. Only such stones as are of the required quality shall be used on the work. Any stone such is in the opinion of the Engineer-in-charge, not in accordance with the specifications or of required quality will be rejected at any time, at the quarry or at the site of work. The rejected stones shall not be used on the work and such rejected materials shall be removed to the place shown at the Contractor's cost.

25.7 Since all stones quarried from Government quarry (if made available) by the contractor including the excavated over burden are the property of the Govt. no stones or earth shall be supplied by the Contractor to any other agencies or works are allowed to be taken away for any other works. All such surplus quarried materials not required for work under this contract shall be the property of the Govt. And shall be handed over by the Contractor to Government free of cost at quarry site duly heaped at the spots indicated by the Engineer-in charge. The contractor will be entitled to the refund of royalty if any, paid by him for such quantity handed over to Govt. for which necessary certificate will be issued by Engineer In Charge as per usual procedure, if however, the Government does not required such surplus material the contractor may be allowed to dispose off or such surplus material elsewhere with prior written permission of Engineer-in-charge. Leaving off a quarry face or opening of a new quarry face shall be done only on the approval of the Engineer-in-charge.

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25.8 Quarrying permission will have to be directly obtained by the Contractor, from the Collector of the District concerned for which purpose the MPCB will render necessary assistance. All quarry fees, royalty charges, octroi duties, ground rent for staking material etc. and charges shall be paid directly to Revenue MPCB by the contractor as per rules in force. If it is not paid by contractor the same will be recovered from his bills.

25.9 The contractor will be permitted to erect at his own risk and cost at the quarry site if suitable vacant space of Government area is available for the purpose, his own structures for stores, offices etc. At places approved by the Engineer- in-charge. On completion of the work the contractor shall remove all the structures erected by him and restore the site to its original condition.

25.10 The Contractor shall not use any Sand in the quarry either for cultivation or for any other purpose except that required for breaking or stacking or transporting stones.

26 TRAFFIC REGULATION / ARRANGEMENT FOR TRAFFIC DURING CONSTRUCTION

Action for arrangement for traffic during construction will be taken by the Contractor as envisaged in the contract documents and spelt out in clause 112 of MORTH Specification for Road and Bridge Work (2001)

26.1 Unless separately provided for in the contract, the Contractor shall have to make all necessary arrangements for regulating traffic, day to night during the period of construction to the entire satisfaction of the Engineer. This includes the construction and maintenance of diversions if necessary. The contractor shall have to provide necessary caution board, barricades, flags, light and watchmen etc. So as to comply with the latest Motor Vehicles rules and Regulation and for Traffic Safety and he shall be responsible for all claims from accidents which may arise due to his negligence whether in regulating the traffic or in stacking material on the roads, or due to any other reasons.

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26.2 It is to be clearly understood that whatever work carried out by the Contractor for construction of diversion road including earthwork, W.B.M. bituminous surface dressing. R.C.C pipe drains etc. Will be paid for only once. If due to flow of traffic, due to floods or due to any other cause, this diversion road and/or the R.C.C drain gets damaged it shall be repaired and maintained by the Contractor in good condition till completion of the whole work at his own expenses.

27. PROCUREMENT OF MATERIALS:-

27.1 Where suitable and approved P.W. Department's quarries exist, the Contractor or piece worker will be allowed if otherwise there is no objection to obtain the materials to the extent required for the work from the quarry. He will be however, liable to pay compensation. If any damage is caused to the quarry either deliberately or through negligence or for wastage of materials by himself or his staff or labour.

27.2 Where no suitable Government quarries exist or when the quantity of the material required cannot be obtained from a P.W. Department quarry the Contractor or pieceworker shall make his own arrangements to obtain the material from existing or a new quarry in Government waste land, private land or land belonging to other States or Talukas, etc. After opening the quarry but before starting collection the quarry shall be got approved by the Engineer-in-charge or his representatives. The Contractor or piece worker shall pay all royalty charges compensation etc. No claims or responsibility on account of any of obstructions caused to execution of the work by difficulties arising out of private owners of land will be entertained.

27.3 The rates in the tender include all incidental charges such as opening of a new quarry, opening out a new portion in an existing quarry, removing top soil and the unsuitable material, dewatering a quarry, cost of blasting powder and fuse, lift, lead, repairs to existing cart tracks, making new cart tracks, control charges, Central/State Government or Municipal taxes, Local Boards, Cess, etc.

27.4 The rates in the tender are for the delivery of the approved material on road side properly stacked at the places specified by the Engineer-in-charge and are inclusive of conveyance charges in respect of the leads and lifts. No claims on account of changes in lead will be entertained.

27.5 No material shall be removed from the land within the road boundary or from the land touching it without the written permission of the Engineer-in-charge of his authorised agent. If any materials is un-authorised obtained from such places the Contractor or piece worker shall have to make good the damages and pay such compensation, in addition as may be decided by the Engineer In Charge and will have to stop further collection.

27.6 Any material that falls on any P.W.D. Road from the cart etc. during conveyance shall be immediately picked up and removed by the Contractor or piece worker, failing which it will be got removed Departmentally at his cost. No heap shall be left prior to checking even temporarily on the road surface or in any way so as to cause any obstruction or danger to the traffic. The Contractor or the piece worker shall be liable to pay for any claims of compensation etc. arising out of any accident, etc. Any such materials causing obstruction or danger etc. will be got removed Departmentally at his cost and no claims for any loss or damage to the material, thus removed, will be entertained. The Contractor shall also be responsible for the damage or accident etc. arising out of any material that falls on the road or track, not in charge of the MPCB and shall attend to any complaint which may be received otherwise authorised by Engineer in writing. Collection and spreading shall not be carried out at the same time in one and the same mile or in to adjoin in Km. except with the return permission of the Engineer In Charge.

27.7 Unless otherwise directed, the materials shall be collected in the following orders availability of space :-

- 1) Rubble (if included in tender)
- 2) Metal
- 3) Soft murum
- 4) Hard murum

Shall be stacked on the side opposite for petty repairs and shall be stacked on the side opposite to metal for new layer. Where metal for two layers has to be stacked as in the case of new roads, the metal for each layer shall be stacked on the opposite sides of the road.

27.8 All road material shall be examined and measured before it is spread. The labour for measurements (and check measurements where ever carried out) shall be supplied by the contractor or place worker. Immediately after the measurements are recorded the stacks shall be marked by the contractor or piece worker by who wash or otherwise as may be directed by the Engineer In Charge to prevent from any authorised tampering with the stacks. If the contractor or piece worker fails to attend the measurements after receiving the notice from Sub-divisional officer or his subordinate stating date and time of the intention to measure work, shall be measured nevertheless and no complaint in this respect will be entertained later on. If the contractor or piece worker fails to supply sufficient labour for the materials required at the time of measurements or check measurements, after due notice has been given to him, the expenses incurred on account of employing MPCB labour or material etc. shall be charged against his account.

27.9 No deduction will made for voids.

27.10 The materials shall not be Stacked in place where it is liable to be damaged or lost due to traffic passing Over it, to be washed away by rain or floods, to be buried under the landslides etc. or slip down an embankment or hill side etc. No claims for any loss due to these and similar causes will be entertained.

27.11 Before stacking, the materials shall be free from all earth, rubbish vegetable matter and other extraneous substance and in the case of metal, screened to gauge, if so directed when ready. It shall be stacked entirely clear of the road way, on ground which has been cleaned of vegetation and leveled. On high banks, ghat roads etc. where it may not be practicable to stack it entirely clear of the roadway it may be stacked with the permission of the Engineer-in-charge on terms in such a way as to cause minimum danger and obstruction to the traffic or as may be directed by him.

27.12 The size of the stacks for materials other than rubble shall be 3.00m x 1 .50m x 0.80m or such other size as may be directed by the Engineer- in-charge and all but one stack in 200 M. shall be of the same uniform size and shall be uniformly distributed over whole lengths. One stack (at the end) in each 200 M may be of length different from the rest in order to adjust total quantity to be required but its width and height will be the same as those of the rest.

27.13 The Sub Divisional Officer shall supply the Contractor with statement showing furlong wise quantities that will be required and the order in which the collection is to be done. No materials in excess of requirements in that furlong shall be stacked. Any excess quantity shall be removed at the expenses of the Contractor or piece worker to where it is required before the material in thatfurlong is finally measured.

27.14 In slacking materials the deposition shall commence at the end of the KM fastest from the quarry and be carried continuously to the other end (unless otherwise directed by the Engineer In Charge). Stacking in one 200 M shall be completed before it is started in another, unless directed otherwise, in writing by the Engineer In Charge. Measurements of the materials stacked in a furlong will not be recorded until the full quantity required has been stacked.

27.15 All the materials such as asphalt, cement, steel etc. shall be procured by the contractor from approved Government Institutions or as directed by Engineer in charge only. The materials shall be brought at the site of work well in advance by the contractor. The contractor shall be responsible for all transportation and storage of the materials at the site and shall bear all the related costs. The Engineer shall be entitled at any time to inspect or reasonable assistance.(or such inspection as may be required)

27.16 After receiving bitumen, the authorized challan / gate pass should be obtained from the refinery mentioning the quantity of bitumen, rate of bitumen, date of delivery etc. And it should be handed over to the MPCB for each consignment.

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Similarly the invoice of cement etc. shall be given to the authorised representative of the Engineer in -charge immediately on procurement of the materials.

27.17 The day to day record of the receipt / utility balance of material should be kept by the contractor in the form of register for each material like asphalt, cement, steel at plant site / site of work / store and the same will be checked by the Engineer-in-charge or authorised Engineer at anytime. This register shall be signed daily by the contractor or his representative and representative of Engineer-in-charge. The contractor shall submit periodically as well as on completion of work an account of all materials used by him on the work to the Engineer-in-charge.

27.18 While transportation of bouzer, transport pass should be obtained from those corporation / municipality through whose limits the bouzer is passed and should be handed over to the authorised representative of the department.

27.19 The procurement of cement / steel etc. should be from authorized manufacturing company / institutions and vouchers regarding purchase thereof shall be submitted to the Engineer-in-charge. The material from any other source other than the approved institutions shall not be allowed unless written permission from the Engineer In Charge is taken. In such cases certificate for test, quality shall be produced by the contractor and samples of materials shall be tested from any Government laboratory by the contractor at his cost and the test results be supplied to the department. The materials not conforming to the required standard shall be removed at once from the Site of work by the contractor at his own cost. All the materials such as asphalt, cement etc. required for use In the work shall be confirmed from the concerned 1000 of M.O.R.T.H. specifications. These materials shall be used on work by the contractor only after the tests thereof are found satisfactory. The responsibility of carrying out tests to the frequencies specified for each material shall rest with the Contractor. The R.C.C. pipes required for the work shall be procured from the Maharashtra Small Scale Industrial Development Corporation only. The payment towards the item of providing and fixing NP2 / NP3 / NP4 Pipes will be released only after the contractor submits the bills of MSSIDC to authenticate that the pipes have been purchased from the MSSIDC. No payment

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toward the item of providing and laying of pipe will be released in absence of the submission of requisite documents.

27.20 Any consignment or part of consignment of cement which is dilapidated in any way shall not be used In the works and shall be removed from the site by the contractor without charge to the employer.

27.21 Cement shall be transported and handed and stored on the site such a manner as to avoid deterioration, contamination. Each consignment shall be stored separately so that it may be readily identified and inspected. Cement shall be used in the sequence in which it's delivered at site.

27.22 The contractor shall prepare and maintain proper records on the site in respect of deliver, handling, storage and use of cement and these records shall be made available for inspection by the Engineer at all times.

27.23 The contractor shall construct at his own cost shed / sheds as per directions of the Engineer-in-charge for storing the material and providing double locking arrangements. (one lock of MPCB and other of the Contractor) Materials shall be taken out from stores only in presence of authorised representative of the Engineer-in-charge. The store shed constructed on site shall be removed on completion of work. The contractor shall take all necessary steps to guard the materials brought by him.

27.24 Cement to be used in the works shall be any of the following types with the prior approval of the Engineer. Ordinary Portland cement conforming to IS 8 112 (latest edition) Ordinary / Portland cement conforming to IS 12269 (latest edition)

27.25 TMT FE-500 grade conforming to I.S. 1786 shall be used for reinforcement.

27.26 Bulk bitumen of IS grade VG-30 grade shall be used.

27.27 Asphalt VG-30 grade confirming to IS 8887 of 1995 shall be used for tack coat.

27.28 The contractor shall make his own arrangement for the self custody of the materials brought by him on the site of work.

27.29 The charges for conveying of the material from the place of the purchase by the contractor to the site of work and the actual spot of work shall be entirely borne by the contractor, No claim on this account shall be entertained.

27.30 Register showing dispatch of bituminous load from the plant, vehicle No., time of dispatch, temperature at the time of dispatch etc. shall be kept in prescribed form at hot mix plant site. Similarly register showing the time, temperature of the mix at the site shall be kept the authorised representative of the contractor shall fill both these registers. These shall be signed by the Contractor everyday in token of acceptance The maintenance of these registers does not absolve the contractor of his contractual obligation towards quality of the work.

27.31 The contractor should ensure that all safety precautions are observed by the labours while handling the materials and precautions. For their labour at the cost of the contractor and the contractor will bear all the expenses compensation etc. If any incident occur to the labour etc. no claim in this regard what-so-ever shall be entertained and the decision of the MPCB will be final and conclusive.

27.32 In case the materials become surplus owing to the change in the design of the work after the materials are brought by the contractor, no claim in this regard will be entertained and the contractor will be required to take away such materials from the site.

27.33 The contractor should arrange for weighment of the bouzer if desired by the Engineer in charge. The weighment shall be done in the presence of representative of the MPCB at the cost of the contractor.

27.34 The weight of the steel bars used on the work will be calculated on the basis of standard weight per unit length vide IS. 1732. No wastage of steel will be considered at all. Cut pieces of the steel irrespective of the length will be the

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property of the contractor and no claim whatsoever in this regard shall be entertained. The consignment of the steel brought by the contractor having weight less than the standard weight per unit length of the bar as mentioned above will not be accepted. For this purpose random sample will be tested by the Engineer In Charge and the decision of the Engineer In Charge shall be binding on the contractor, if the steel received is over weight (more than standard weight per running meter length) no extra payment will be made and no claim in this regard whatsoever shall be entertained

27.35 No claims on account of cement or steel rods used for ancillary works on Site of- work shall be entertained.

27.36 All the materials to be brought on site shall be brought only on working days and in presence of an authorized representative of the Engineer-in -charge.

27.37 All the materials such as cement, mild steel, H.Y.S.D. Bars, TMT Bars etc. required for execution of work shall be brought by the contractor at his own cost.

27.38 The contractor shall maintain the record of these materials (cement, steel etc.) in the prescribed proforma and registers as directed by Engineer-incharge. The sample of prescribed proforma is attached at the end. These registers shall be signed by both the contractors and representative of the Engineer-in- charge. These registers shall be made available for inspection, verification for the MPCB as and when required. These registers shall be in the custody of MPCB and shall be maintained by the Department.

27.39 The material required only for this work shall be kept in the go-down at site. No material shall be shifted outside of the go-down site except for the work for which this agreement is entered without prior approval of the Engineer-incharge.

27.40 The materials i.e. cement, steel etc. brought on the work site shall be accompanied with necessary company/manufacturing firm's test certificates. In addition these materials shall be tested as per frequency prescribed by the MPCB and the cost of such testing shall be borne by the contractor. If the test results are

satisfactory, then and then only the material shall be allowed to be used on the work. If the test results are not as per standards prescribed, these materials shall be immediately removed from the work site at the contractor's cost. In case of cement, if so requested by the contractor in writing, material shall be allowed to be used before receipt, of test results but this will be entirely at the risk and cost of the contractor.

27.41 The contractor shall produce sufficient documentary evidence i.e. bill for the purchase of materials brought on the work site at once if so required by the department.

27.42 All these materials i.e. cement, steel etc. shall be protected from any damages rains etc. by the contractors at his own cost.

27.43 The contractor will have to erect temporary shed of approved specifications for storing of above materials at work site at contractor's cost having double locking arrangements (By double lock it/s meant that go-down shall always be locked by two locks, one lock being owned and operated by contractor and other by Engineer-in charge or his authorised representative) and the door shall be open able only after both locks are opened.

27.44 If required, the weighment of cement bags I steel etc. brought by the contractor shall be carried out at his own cost.

27.45 The contractor shall not use cement and other material for the item to be executed outside the scope of this contract except for such ancillary small items as are connected and absolutely necessary for this work as may be decided by the Engineer-in-charge.

27.46 The Government shall not be responsible for the loss in cement and steel during transit to work site. The cement brought by the contractor at the work site store shall mean 50 Kilogram equivalent to 0.0347 cubic meter per bag by weight. The rate quoted should correspond to this method of reckoning. In case of ordinary

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I Controlled concrete, if cements found short, the shortage I shortages wilt be made good by the contractor at his cost.

27.47 Special Condition for B.T. work : In respect of Black Top Work, 15% (Fifteen Percent) payment of Black Top in a particular Km. shall be retained till completion of side berms / C.D. Works, 5th Km. stone, Km.stone, 200meter stone etc. in that km. After completion of other items satisfactorily, the withheld payment will be released finally.

27.48 For Grade –I /Grade-II / Grade –III / WBM and for BUSG work metal shall be supplied at site only after screening it on “mechanical vibratory screening unit”. The special “mechanical vibratory screening unit” arrangement shall consist of main input hopper to receive raw metal, conveyor belt to transport it to the “mechanical vibratory screening unit”. The “mechanical vibratory screening unit” shall have required number of trays, sieves/decks as directed by the Engineering in charge. The output of “mechanical vibratory screening unit” shall be conveyed to “storage Unit” where metal of different sizes, shall be stored separately. Metal so supplied shall undergo all the tests as per the specifications. As a input to the main input hopper, contractor may use hand broken metal or output of primary crusher / cone crusher of size or equivalent to not less than 24“x18” The metal so supplied from the “mechanical Vibratory screening unit” at site shall not exempt the contractor from carrying out tests as specified in the specifications.

28. MISCELLANEOUS:-

28.1 Rate shall be inclusive of General Tax and other taxes etc.

28.2 For providing electric wiring or water lines etc. recesses shall be provided if necessary, through walls, slabs, beams etc. and later on refilled up with bricks or stone chipping, cement mortar without any extra cost.

28.3 In case it becomes necessary for the due fulfillment of contract for the Contractor to occupy land outside the Dept. Limits, the Contractor will have to make

his own arrangements with the land owners and to pay such rents if any are payable as mutually agreed between them.

The MPCB will afford the Contractor all the reasonable assistance to enable him to obtain Govt. Land for Such purpose on usual terms and conditions as per rules of Government.

28.4 The special provision in detailed specifications or wording of any item shall gain precedence over corresponding contradictory provision (if any) in the standard specifications or P.W.D. Hand book where reference to such specifications is given without reproducing the details in contract.

28.5 Suitable separating Barricades and enclosures shall be provided to separate material brought by contractor and material issued by Government to contractor under Schedule "A" Same applies for the material obtained from different sources of supply.

28.6 It is presumed that the Contractor has gone carefully through the Standard Specifications of P.W.D. Hand Books and the Schedule of Rate of the Division and studied the site condition before arriving at rates quoted by him. Decision of the Engineer-in-charge shall .be final as regards interpretation of specifications.

28.7 The stocking a storage of construction material at site shall be in such a manner as to prevent deterioration or intrusion of foreign matter and to ensure the preservation of their quality, properties and fitness of the work. Suitable precautions shall be taken by the Contractor to protect, the material against atmospheric actions, fire and other hazards. The materials likely to be carried away by wind shall be stored in suitable stores or with suitable barricades and where there is likely hood of subsidence of soil, such heavy materials shall be stored on approved platform.

28.8 For Road and Bridge works, the contractor shall in addition to the specifications cited here, comply with requirements of relevant I.R.C. Code of Practice.

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28.9 The Contractor shall be responsible for making good the damages done to the existing property during construction by his men.

28.10 If it is found necessary from safety point of view to test any part of the structure, the test shall be carried out by the Contractor with the help of the MPCB at his own cost.

28.11 The contractor shall provide, maintain, furnish and remove on completion, temporary shed for office on work site for the use of Engineer In Charge's representative.

28.12 Defective work is liable to be rejected at any stage. The contractor, on no account can refuse to rectify the defects merely on reasons that further work has been carried out No extra payment shall be made for rectification.

28.13 General directions or detailed description of work, materials and items coverage of rates given in the specification are not necessarily repeated in the Bill of Quantities. Reference is however, drawn to the appropriate section clause(s) of the General Specifications in accordance with which the work is to be carried out.

28.14 In the absence of specific directions to the contractor, the rates and prices inserted in the items are to be considered as the full inclusive rates and prices for the finished work described there under and are to cover all labour materials, wastage, temporary work, plant, overhead charges and profits, as well as the general liabilities, obligations and risks arising out of the General conditions of contract.

28.15 All measurements will made in accordance with the methods indicated in the specification, and specification read in conjunction with the General Conditions of Contract.

28.16 The details shown on drawings and all other information pertaining to the work shall be treated and provisional only and are liable to variation as found necessary while preparing working drawing which will be supplied by the Government during execution. The contractor shall not, on account of such variation be entitled to any increase over the ones quoted in the tender which are on quantity basis.

28.17 The recoveries if any from contractor will be effected as arrears of land revenue through the Collector of the District.

28.18 Protection of underground telephone cable and aerial telephone wires and poles, transmission towers, electrical cables, and water supplying lines. It will therefore be the responsibility of the contractor to protect then carefully all such cases should be brought to the notice of the Engineer-in-charge by the contractor and also the concerned department, any damage what so ever done to these cables and pipe lines by the contractor shall be made good by him at his cost.

28.19 Public Utilities:

Action in respect of public utilities will be taken by the Contractor as envisaged in Clause 110 of Ministry's Specifications for Road and Bridge work (5th Revision, 2013).

29. PAYMENTS AND MEASUREMENTS:-

29.1 PAYMENT:

The contractor must understand clearly that the rates quoted are for completed work and include all costs due to labour, scaffolding, plant, machinery, supervision, power, Royalties, octroi, taxes etc. And should also include all expenses to cover the cost of night work if and when required and no claim for additional payment beyond the prices or rates quoted will be entertained. The mode of measurements has been indicated in the specification and in the schedule of payments, if there is any ambiguity or doubt in this respect the decision of Engineer In Charge will be final.

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29.2 Two payments in a month will be granted by the Engineer-in-charge for construction of Bridge, if the progress is satisfactory, and shall be made as per, accepted payment schedule.

29.3 Ground levels will be taken by the usual method and by Departmental staff in presence of contractor's representative. Required labour etc. for this shall be supplied by the contractor, in case of slushy portion, the ground levels shall be taken by erecting the leveling staff on wooden plank (0.5 x 0.5metre, 2.5 cm. thick) without claiming extra for cost of plank or by any other mutually agreed method.

30. PRELIMINARY ARRANGEMENTS: -

30.1 The Contractor if necessary construct temporary roads and maintain these in proper condition till the completion of the work at his own cost. If necessary, he shall also, at his own expenses make necessary arrangements for acquisition of land required by him in connection with the execution of the work.

30.2 The contractor shall have to makes at his own cost all preliminary arrangements for labour, water electricity and materials etc. immediately after getting the work order. No claim for any extra payment or application for extension of time on the grounds of difficulty in connection with the above matter, will be entertained,

30.3 The contractor shall at his own expenses, engage watchmen for guarding the materials and plant and machinery and the work during-day and night against any pilferage of damages and also for prohibiting trespassers or damage to them.

30.4 The contractor shall have to make his own arrangement for water required for any purpose on the work.

31. INSPECTION :-

31.1 The contractor shall inform the Engineer-in-charge in writing when any portion of the work is ready for inspection giving him sufficient notice to enable him to inspection to inspect the same without affecting the further progress of the work. The work shall not be considered to have been completed in accordance with the terms of the contract until the Engineer-in-charge shall have certified in writing to that effect. No approval of materials or workmanship or approval of part of the work during the progress of execution shall bind the Engineer-in-charge or in any way affect him even to reject the work which is alleged to be completed and to suspend the issue of his certificate of completion until such alterations and modifications or reconstruction have been effected at the cost of the contractor as shall enable him to certify that the work has been completed to his satisfaction.

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31.2 The contractor shall provide at his cost necessary ladders and such arrangements as to provide necessary facilities and assistance for proper inspection of all parts of the work at his own cost.

31.3 The contractor after completion of work shall have to clean the site, of all debris and remove all unused materials other than those supplied by the MPCB and all plant and machinery, equipment, tools etc. belonging to him within one month from the date of completion of the work, or otherwise the same shall be removed by the MPCB at his cost and the contractor shall not be entitled for payment of any compensation for the same.

32. ACCIDENT :-

In the event of an accident involving serious injuries or damages to human life or death of any of his employees and or labourers or tress passers, the same will be reported within 24 hours of the occurrence to the Engineer In Charge and the Commissioner of workmen's compensation.

33. PLANT:-

All constructional plant, provided by the contractor shall when brought on to the site be deemed to be exclusively intended for the construction of this work and the contractor shall not remove the same or any part thereof (Say for the purpose of moving it from one part of the site to another or the repairs etc.) without the consent in writing of the Engineer-in-charge which shall not be unreasonably with-held. The concreting shall be done by the ready mix batch type concrete mixer diesel or electrically operated with a minimum size of 200 litres with automatic water measuring system and integral weigher (Hydraulic or pneumatic type one). This RMC Plant may be of portable type.

34. EXCEPTED RISKS :-

34.1 The contractor shall be under no liability whatsoever by way indemnity or otherwise for or in respect of destruction of-or damage to the works (save work condemned under the provisions of specifications and conditions of this tender prior to the occurrence of any excepted risk hereinafter mentioned) or temporary works

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or to property whether of the MPCB or third parties or for or in respect of injury or loss of life which is the consequence whatever direct or indirect, were hostilities (whether were to declared or not) invasion, act of foreign enemies, rebellion, revolution, insurrection or military of usurped power. Civil war or riot, commotion or disorder otherwise than among the contractor's own employees or his piece worker and sub-agencies (hereinafter comprehensively referred to as "The said excepted risks") and the MPCB shall indemnify and save harmless the contractor against and' from the same and against and from all claims, demands proceedings, damages, costs charges and expenses, whatsoever arising there out or in connection therewith and shall compensate the contractor for any loss of or damage to property of the contractor used for intended to be used / or the purpose of the works and laying at site of work and occasioned either directly or indirectly by the said excepted risks.

34.2 If the works or temporary works or any materials (whether for the former or the later brought to site shall sustain destruction or damages by reasons of any of the said excepted risks, the contractor shall be entitled payment for any permanent works and for any materials so destroyed or damaged and shall be paid by the MPCB the cost of making good any such destruction or damages whatever to the works or temporary works and for replacing or making good such materials so far as may be necessary for the completion of the works on a prime costs basis as the Engineer-in-charge may certify to be reasonable. The contractor shall lodge his claim, in writing, supported by Engineer-in-charge immediately, but not later than 30 days of such occurrence of damage to works by excepted risk

34.3 Destruction, damage injury or loss caused by the explosion or impact whenever and wherever occurring of any mine bomb, shell, grenade or other projectile missile or ammunition or explosive or war resulting from action described in above shall be deemed to be a consequence of the. Said excepted Risk. foreign enemies, rebellion, revolution, insurrection or military of usurped power. Civil war or riot, commotion or disorder otherwise than among the contractor's own employees or his piece worker and sub-agencies (hereinafter comprehensively referred to as "The said excepted risks") and the MPCB shall indemnify and save harmless the contractor against and' from the same and against and from all claims, demands

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proceedings, damages, costs charges and expenses, whatsoever arising there out or in connection therewith and shall compensate the contractor for any loss of or damage to property of the contractor used for intended to be used / or the purpose of the works and laying at site of work and occasioned either directly or indirectly by the said excepted risks.

34.2 If the works or temporary works or any materials (whether for the former or the later brought to site shall sustain destruction or damages by reasons of any of the said excepted risks, the contractor shall be entitled payment for any permanent works and for any materials so destroyed or damaged and shall be paid by the MPCB the cost of making good any such destruction or damages whatever to the works or temporary works and for replacing or making good such materials so far as may be necessary for the completion of the works on a prime costs basis as the Engineer-in-charge may certify to be reasonable. The contractor shall lodge his claim, in writing, supported by Engineer-in-charge immediately, but not later than 30 days of such occurrence of damage to works by excepted risk

34.3 Destruction, damage injury or loss caused by the explosion or impact whenever and wherever occurring of any mine bomb, shell, grenade or other projectile missile or ammunition or explosive or war resulting from action described in above shall be deemed to be a consequence of the. Said excepted Risk.

35. ADDITIONAL WORKS SPECIFICATIONS :-

35.1 The whole work shall be carried out strictly in accordance with the approved detailed drawing (unless otherwise directed) description of the items, detailed specification of the M.O.S.T. for Bridge and Road Works 5th Revision,2013 standard Specification book II nod edition (with Indian Standard specification indicated therein) of P.W. Department, Government of Maharashtra subject to the additional specification given for the relevant items and in the best workmen like manner.

35.2 While adopting the relevant number and pages for different items of the M.O.S.T. Specifications for Bridges and Road Works 5th Revision, 2013Standard Specification Book, due care has been taken to indicate correct number and page

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for the various items. However if for some reasons or other it is noticed that the specification numbers and pages quoted are not pertinent, the contractor is bound to carry out the work in accordance with the correct relevant specifications for the item or items from the standard specification Book. After taking into account the description of the items, scope and spirit of the work.

35.3 It is to be definitely and clearly understood that the specifications stipulated shall be rigidly enforced and no relaxations shall be allowed. Extra charges or claims in respect of extra works shall not be entertained unless they are clearly outside the scope of the item and its specifications to which they relate or unless such works are ordered in writing by the Engineer In Charge and claimed for in specified manner before the same is taken in hand.

36. QUALITY ASSURANCE AND MAINTENANCE:-

36.1. The contractor to ensure the specified quality of work which will also include necessary surveys, temporary works etc. The contractor shall prepare a quality assurance plan and get the same approved from the Engineer-in-charge within one month from the date of work order. The contractor shall submit an organization chart of his technical personnel to be deployed on the work along with their' qualification, job descriptions defining the functions of reporting, supervising inspecting and approving. The contractor shall also submit a list of tools, equipment and the machinery and instruments which he proposes to use for the construction and for testing in the field and or in the laboratory and monitoring. The contractor shall modify/supplement the organisation chart and the list of machinery, equipment etc. as per the directions by the Engineer In Charge Engineer-In-Charge and shall deploy the personnel and equipment on the field as per the approved chart and list respectively. The contractor shall submit written method statements detailing his exact proposals of execution of the work in accordance with the specification. He will have to get those approved from the Engineer-in-charge. The quality of the work shall be properly documented through certificate, records, check-lists and logbooks of results etc. Such records shall be compiled from the beginning of the work and be continuously update and supplemented and this will be the responsibility of the contractor. The forms should be got approved from the Engineer In Charge-in-charge.

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36.2 Where the work is to be done on lump sum basis on contractor's design the contractor shall also prepare and submit a maintenance manual giving procedure for maintenance, with the periodicity of maintenance works including inspections, tools and equipment to be used, means of accessibility for all parts of the structure. The maintenance manual shall be approved by the Engineer- In-Charge. He shall also include the manual the specifications for maintenance work that would be appropriate. For his design and technique of construction This manual shall be submitted within the contract period.

37. TECHNICAL COMPLETION REPORT

The contractor shall submit Technical Completion Report along with his final bill, which shall include:

1. Detailed measurements
2. Working drawing
3. Details of material brought on site and consumed in the work, which shall also indicate standard consumption and deviation if any, with reasons.
4. Test Results of all materials used in the work with an abstract of total tests carried out and required as per frequency of tests as laid down in the relevant M.O.R.T.& H. Specifications.
5. Roughometer survey data as laid down in acceptance criteria. Design Calculations / Job-Mix Formula etc. Maintenance Manual.

38. CLAUSES IN THE CONDITION OF CONTRACT

- a) All materials and workmanship shall be of the respective type 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. All samples shall be supplied by the Contractor.
- b) No work is to be covered up or put out of view without the approval of the Engineer for his examination and measurements.
- c) During the progress of the works, the engineer shall have the power to order the removal from the site of any unsuitable material, substitution or proper suitable

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material and the removal and proper re-erection notwithstanding any previous test or interim payment therefore, and of any work which is in respect of materials or workmanship is not, in the opinion of the Engineer in accordance with the contract.

39. CONTRACTOR'S FACILITIES

According to the contract (see para1.3 above) , the Contractor is responsible for the quality of the entire construction work, and for this purpose he is required to have his own independent and adequate set up. To meet this requirement:-

a) The Contractor shall set up his own laboratory at locations(s) approved by the Engineer. The laboratory shall be equipped with modern and efficient equipment with sufficient standbys suitable to carry out the tests prescribed for different materials and work according to the specifications. The list of equipments to be procured and the facilities to be provided shall be got approved by the Engineer. The equipment shall be maintained in a workable condition to the satisfaction of the Engineer.

b) Sampling and testing procedures shall be in accordance with relevant standards of BIS (previously called ISI) or IRC. Frequency of testing shall be as laid down in the Ministry's Specifications for Road and Bridge Work, 4th Revision, 2001. In the absence of relevant Indian Standards, sampling and testing procedures shall be as approved by the Engineer.

c) The laboratory should be manned by a qualified Materials Engineer assisted by Materials Inspector / Technicians, and the set up should be got approved by the Engineer.

d) The Contractor should prepare printed proforma for according readings and results of each type of test, after getting the formats of the performance approved from the Engineer.

He should keep a daily record of all the tests conducted by him. Two copies of the test results should be submitted to the Engineer for his examination and approval, of which one copy will be returned to the Contractor for being kept at site of work.

e) The Material Engineer of the Contractor should keep close liaison with the Quality Control Unit of the Engineer and keep the latter informed of the sampling and testing programme so that the Engineer's representative could be present during this activity, if considered necessary.

40. DAY-TO-DAY QUALITY CONTROL OPERATIONS:

The day-to-day controls to be exercised by the Contractor and the Engineer are enumerated in the below paragraphs :-

41 IN CASE OF CEMENT CONCRETE WORKS

i) Besides manufacturer's test certificate for quality of cement, at least one set of physical and chemical tests should be conducted for each source of supply of verification. Where the quality is in doubt, or where the cement had been stored for long period or in improper condition, the Engineer shall call for testing the cement at more frequent intervals.

ii) Job mix formula worked out based on trials carried out in the Contractor's laboratory should be got approved by the Engineer.

iii) The mineral aggregates should be tested for their properties. Water to be used for mixing should be tested for chemical impurities.

iv) Checking for stability and sturdiness of formwork.

v) Ensuring that the crucial equipment like mixers and vibrators are in working order before start of work.

vi) Control on water cement ratio.

vii) Control on workability and time elapsed between mixing and placing of concrete.

viii) Control on compaction and finishing.

ix) Tests on cube samples at 7 to 28 days.

x) Check on provisions for adequate curing.

xi) In case of masonry work, control should be exercised on the quality of the material (e.g. stone, brick, sand, cement, etc.) as also on mortar proportions.

xii) For RCC work, quality of steel in each batch may be approved on the basis of test certificate. The reinforcement layout should be checked for conformity with approved drawings and bar bending schedules. All laps should be checked for conformity with the specification. The reinforcement should be free of oil and loose rust scale and should be properly tied with binding wire. The size and spacing of the bars as also the cover should be checked for correctness.

42. Defect Liability / Maintenance

If during the period of **12 (Twenty) Months** from the date of completion as certified by the Engineer-in-charge, the said work is defective in any manner whatsoever, the contractor shall forthwith on receipt of notice in that behalf from the **Engineer In Charge / Architect / MPCB Office**, duly commence execution and completely carry out at his cost in every respect all the work that may be necessary for rectifying and setting right the defects specified therein including dismantling and reconstruction of unsafe portion strictly in accordance with and in the manner prescribed and under the supervision of the Engineer In Charge / Architect / MPCB Office. In the event of the contractor failing or neglecting to commence execution of the said rectification work within the period prescribed thereof in the said notice and / or to complete the same as aforesaid as required by the said notice, the Engineer In Charge / Architect / MPCB Office, get the same executed and carried out by any other agency at the risk on account and at the cost of the contractor.

The contractor shall forthwith on demand pay to the MPCB the amount of such costs, charges and expenses sustained or incurred by the Government of which the certificate of the Engineer In Charge / Architect / MPCB Office, shall be final and binding on the contractor. The MPCB shall be entitled to deduct the same from any amount which may then be payable or which may thereafter become payable by the MPCB to the contractor either in respect of the said work or any other work whatsoever or from the amount of security deposit retained by MPCB .

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43. Liquidated Damages

Time is essence of the Contract. In case the said work is not completed within the stipulated period as mentioned above penalty towards liquidated damages shall be levied at the rate of 0.5 % (Half percent) per month or part thereof with a ceiling limit of 5% of the Contract Value.

The Contractor shall pay liquidated damages to the MPCB as mentioned above for each day that the Completion Date is later than the Intended Completion Date. The MPCB may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages does not affect the Contractor's liabilities.

The MPCB may, without prejudice to any other method of recovery deduct the amount of such damages from any monies due or to become due to the contractor. The payment or deduction of such damages shall not relieve the contractor from his obligation to complete the works on form any other of his obligations and liabilities under the contract.

If, before the Time for Completion of the whole of the Works or, if applicable, any Section, a Taking - Over Certificate has been issued for any part of the Works or of a Section, the liquidated damages for delay in completion of the remainder of the Works or of that Section shall, for any period of delay after the date stated in such Taking- Over Certificate, and in the absence of alternative provisions in the Contract, be reduced in the proportion which the value of the part so certified bears to the value of the whole of the Works or Section, as applicable. The provisions of this Sub-Clause shall only apply to the rate of liquidated damages and shall not affect the limit thereof.

44. Price Escalation

In any case no price escalations shall be allowed towards difference in material rate etc.

45. CONDITIONS RELATING TO INSURANCE OF CONTRACT WORK.

The Contractor shall take out Insurance Policy / Policies (viz . Contractor's All Risks Insurance Policy, Erection All Risks Insurance Policy etc. as directed by the Directorate of Insurance) so as to vide adequate insurance cover for execution of the awarded contract work for total contract value and complete contract period COMPULSORILY from the "Directorate of Insurance, Maharashtra State, Mumbai" only. Its postal address for correspondence is " 264, MHADA , First Floor, Opposite Kalanagar, Bandra (East), Mumbai 400 051. " (Telephone No. 022 –26590403 / 26590690 and Fax No. is 022-26592461 /26590403). Similarly all workmen's appointed to complete the contract work are required to insure under workmen's compensation Insurance Policy. Insurance Policy/ Policies taken out from any other company will not be accepted. If any contractor has not taken out the Insurance Policy from the Directorate of Insurance, Maharashtra State Mumbai or have effected insurance with any Insurance Company, the same will not be accepted and one percent (1%) of the tender amount or such amount of premium calculated by the Government Insurance Fund will be recovered directly from the amount payable to the Contractor for the executed contract work and paid to the Directorate of Insurance Fund, Maharashtra State, Mumbai. The Director of Insurance reserves the right to distribute the risks of insurance among the other insurers.

53. Building and Other Construction Workers Welfare Cess

As per Government of Maharashtra, Industry, Energy & Labour Deptt. G.R. No. BLA 2009/Pra.Kra.108/Kamgar-7A, dt. 17/6/2010& Public Works Department Circular No. BDG-2010/Pra.kra.277/Building-2, dated 28/09/2010, Building and Other Construction Workers Welfare Cess at one percent or at the rates amended from time to time as intimated by the competent authority under Building and Other Constructions Worker Welfare Act 1996 will be deducted from the Bill amount, whether measured Bill, advance payment or Secured Advance.

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46. Sub Contract

The bidder shall note that in any case or at any stage of work, he shall not be allowed to assign / sublet / sub contract any or all portion of the work to any other agency / contractor / firm.

47 ARBITRATOR

All dispute and difference of any kind whatever arising out of or in connection with the Contractor the carrying out of the work (whether during the progress of the works or after their completion and whether before or after the determination. Abandonment or breach of the Contract) shall be referred to and settled by the Architect who shall state his decision in writing. Such decision may be in the form of a Final Certificate or otherwise, The decision of the Architect with respect of any of the excepted matters shall be final and without appeal. But if either the Owner or the Contractor be dissatisfied with the decision of the Architect on any matter, question or dispute of any kind (except any of the excepted matters) or as to the withholding by the Architect of any certificate to which the Contractor may claim to be entitled then and in any such case either party (the Owner or the Contractor) may within 28 days after receiving notice of such decision give a written notice to the other party through the Architect requiring that such matters in dispute be Arbitrated upon. Such written notice shall specify the matters which are in dispute or difference of which such written notice has been given and no other shall be and is hereby referred to the Arbitration and final decision of a single Arbitrator being a Fellow of the Indian Institute or Architects to be agreed upon and appointed by both the parties or in case of disagreement as to the appointment of a single Arbitrator to the Arbitration of tow Arbitrators both being Fellows of the Indian Institute of Architects one to be appointed by each party, which Arbitrators shall before taking upon themselves the burden of reference appoint an Umpire.

The Arbitrator, the Arbitrators or the Umpire as the case may be shall have power to open up review and revise any certificate, opinion, decision, requisition or notice save in regard to the excepted matter referred to in clause 55 and to determine all matters in dispute which shall be submitted to him or them and of which notice shall have been given as aforesaid.

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Upon every or any such reference the cost of and incidental to the reference and Award respectively shall be in the direction of the Arbitrator or Arbitrators or the Umpire as the case may be who may determine the amount thereof or direct the same to be taxed as between Attorneys and Client or as between party and party and shall direct by whom and to whom and in what manner the same shall be borne and paid. This submission shall be deemed to be a submission to Arbitration within the meaning of the Indian Arbitration Act 1899 or any modification thereof for the time being in force. The Award of the Arbitrator or Arbitrators or the Umpire as the case may be shall be final binding on the parties. Such reference except as to the withholding by the Architect of any Certificates under clause 49 to which the Contractor claims to be entitled shall not be opened or entered upon until after the completion or alleged completion of the works or until after the practical cessation of the works arising from any cause unless with the written consent of the Owner and the Contractor. Provided always that the Owner shall not withhold the payment of an Interim Certificate nor the Contractor except with the consent in writing of the Architect in any way delay the carrying out of the works by reason of any such matters, question or dispute being referred to Arbitration but shall proceed with the work with all due diligence and shall, until the decision of the Arbitrator or Arbitrators or the Umpire as the case may be, given abide by the decision of the Architect and no Award of the Arbitrator or the Arbitrators or the Umpire as the case may be shall relieve the Contractor of his obligations to adhere strictly to the Architects instructions with regard to the actual carrying out of the works. The Owner and the Contractor hereby also agree that Arbitration under this clause shall be a condition precedent to any right of action under the Contract.

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48 SUSPENSION OF WORKS:

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 works so far as is necessary in the opinion of the Engineer. The extra cost (if any) incurred by the contractor in giving effect to the Engineer's instructions under this sub clause shall be borne and paid by the owner, provided it is justified and accepted by the owner, unless such suspension is

a) Otherwise provided for in the contract

or

b) Necessary for the proper execution of the works or by reasons of weather conditions or by some default on the part of the contractor

or

c) Necessary for the safety of the works or any part thereof.

Provided that the contractor shall not be entitled to recover any such extra cost unless he gives notice in writing of his intention to claim to the Engineer within one month of Engineer's order. The Engineer shall settle and determine the extra payment to be made to the contractor in respect of such claim as the Engineer shall consider fair and reasonable.

All work shall be measured net by standard measure and according to rules and custom and usual method in use in the MPCB /PWD and no proposals to adopt alternative method will be accepted. The Architect's decision as to what is the usual method in use in MPCB shall be final

49. Billing Method:

The contractor has to raise his R.A. bill periodically & there will be 3 R.A Bills of Rs. 40 Lakhs each and one Final Bill of Remaining Amount . The Contractor may submit his total 3 running bills and one final bill as the work progresses. He shall submit his final bill only on completion of work. The Contractor shall submit his running bills in duplicate to the Architect for his Scrutiny. With every running bill, the following documents shall be enclosed.

Measurement and abstract sheets duly certified by Architect / Owner's representative at site.

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A set of photographs showing the stage of work at the time.

Material test certificates and reports.

QA Check lists duly signed by Architect/ Owner's representative at site.

Rate analysis of extra items, if any, along with of supporting documents.

Covering letter giving noteworthy points, which will help the Architect in checking the bill.

The Contractor shall note that in absence of any of the above documents the Architect may refuse to process the bill and the Contractor will be wholly responsible for the delay in getting the payment.

Period of Honoring Interim Certificate : The Architect shall check and certify the running bills within 15 (fifteen) working days and the final bill within 1 month working days from the date of receipt of such bills and forward the same to the Owner for payment.

50 MOBILIZATION ADVANCE

No mobilization advance will be given.

51. MATERIALS, WORKMANSHIP AND TESTS :

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 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 materials used and shall supply samples of materials before incorporation in the works for testing as may be selected and required by the Engineer.

52 . CONTRACTOR TO SUPPLY SAMPLES:

The contractor shall carry out tests of materials or finished work as the Engineer in writing may require and shall supply free of cost samples necessary for this purpose. Unless an item rate is provided in the schedule of items for such tests, the cost incurred in this respect shall be borne by the contractor.

Owner's access to the works:

The owner, the Engineer and any person authorized by them shall at all times have access to the works and to the site and to the site and to all workshops and places where work is being prepared or where materials, manufactured articles and machinery are being obtained for the works and the contractor shall afford every facility for and every assistance in or in obtaining the right to such access.

Examination of the works:

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 or his authorized representative 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 any such work or foundations is or are ready or about to be ready for examination and the Engineer shall without unreasonable delay unless he considers it unnecessary and advises the contractor accordingly attend for the purpose or examining such work or of examining such foundations. The contractor shall uncover any part or parts of the works or make openings in or through the same as the 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 covered up or put out of view after compliance with the requirements of this sub clause 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 the owner but in any other case all such expenses shall be borne by the contractor and shall recoverable from him by the owner or may be deducted by the owner from any money due or which may become due to the contractor.

53 WORK TO BE EXECUTED IN ACCORDANCE WITH SPECIFICATIONS, DRAWINGS ETC.

The contractor shall execute the whole and every part of the work in the most Substantial and workman like manner and both as regards materials and in every other respect in strict accordance with specifications. The contractor shall also conform exactly, fully and faithfully to the designs drawing and instructions in writing relating to the work signed by the Authority and lodged in his office and to which the contractor shall be entitled to have access for the purpose of inspection at such office, or on the site of the work during office hours. The contractor will be entitled to receive three sets of contract drawings and working drawings as well as one certified copy of the accepted tender along with the work order free of cost. Further copies of the contract drawings and working drawings if required by him, shall be supplied at the rate of Rs. 300/- per set of contract drawings and Rs. 150/- per working drawings except where other wise specified. If work is found to deviate from the specifications or conditions mentioned in the tender, The OWNER/ARCHITECT can rescind the contractor, without giving any any explanation to the contractor on the short notice of 7(Seven days) to the contractor.

54. ACTION & COMPENSATION PAYABLE IN CASE OF BAD WORKS

If any time before the security deposit or any part thereof is refunded or anypart thereof is refunded to the contractor it shall appear to the Authority or his subordinate in charge of the work, that any work has been executed with unsound, imperfect or unskillful workmanship or with materials of inferior quality, or that any materials or articles provided by him for the execution of the work are unsound or of a quality inferior to that contracted for, or are otherwise not in accordance with contract it shall be lawful for the Authority to intimate this fact in writing to the contractor and then notwithstanding the fact that the work, materials or articles complained of may have been inadvertently passed, certified and paid for, the contractor shall be bound forthwith to rectify or remove and reconstruct the work so specified in whole or in part, as the case may require of if so required, shall remove the materials or articles so specified and provide other proper and suitable materials or articles at his own charge and cost, and in the event of his failing to do so within a period to be specified by the Authority in the

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written intimation aforesaid, the contractor shall be liable to pay compensation at the rate of 1% on the amount of the estimate for every day not exceeding 10 days during which the failure so continues and in the case of any such failure the Authority may rectify or remove, and re-execute the work or remove and replace the materials or articles complained of as the case may be at the risk and expense in all respects of the contractor should the Authority consider that any such inferior work or materials as described above may be accepted or made use of it shall be within his discretion to accept the same at such reduced rates as he may fix therefore. If the quality of work is found unsatisfactory the Authority has full right to rescind the contractor on a short notice, without giving any much explanation.(max a single warning will be given) His decision will be final and abiding to the contractor.

55. ACTION WHERE NO SPECIFICATION

In the case of any class of work for which there is no such specifications work shall be carried out in accordance with the PWD DSR specifications and in the event of there being no PWD specification then in such case the work shall be carried out in all respects in accordance with the instructions and requirements of the Authority in charge or Architect.

56 TERMINATION OF CONTRACT DUE TO DEATH:-

If the Contractor is an individual or proprietary concern and the individual or the proprietor dies or if the contractor is a partnership concern and one of the partners dies then unless the accepting authority is satisfied that the legal representatives of the individual contractor or of the proprietor of the proprietary concern and in the case of partnership, the surviving partners are capable of carrying out and completing the Contract the accepting authority shall be entitled to cancel the contract as to its incomplete part without the owner being in any way liable to payment of any compensation to the estate of the deceased contractor and/or to the surviving partners of the Contractor's firm on account of the cancellation of the Contract. The decision of the Accepting authority that the legal representative of the deceased contractor or the surviving partners of the contractor firm cannot carry out and complete the contract, shall be final and binding on the parties. In the event of

such cancellation, the owner shall not hold the estate of the deceased contractor and/or surviving partners of the contractors firm liable in damages for not completing the contract.

57. CANCELLATION OF CONTRACT IN FULL OR IN PART:-

If the contractor:-

At any time makes default in proceeding with the works with due diligence and continuous to do so after a notice in writing of 7 days from the Owner; or

Commits default in complying with any of the terms and conditions of the Contract and does not remedy if or take effective steps to remedy it within 7 days after a notice in writing is given to him in that behalf by the Owner.

Fails to complete the works or items of work with individual dates of completion, on or before the date (s) of completion, and does not complete them within the period specified in a notice given in writing in that behalf by the Owner; or

Shall offer or give or agree to give any person in owner's service or to any other person on his behalf any gift or consideration of any kind as an inducement or reward for doing or forbearing to do or for having does or forborne to do any act in relation to the obtaining or execution of this or any other contract for the owner;

Shall enter into a contract with the owner in connection with which commission has been paid or agreed to be paid by him or to his knowledge, unless the particulars of any such commission and the terms of payment thereof have previously been disclosed in writing to the accepting authority/Owner; or

Shall obtain a contract with the owner as a result of wrong tendering or other non-bonfide methods of competitive tendering; or

Being an individual, or if a firm, any partner thereof, shall at a time to be adjudged insolvent or have a receiving order of order for administration of his estate made against him or shall take any proceedings for liquidation/composition (other than a voluntary liquidation for the purpose of amalgamation or reconstruction) under and Insolvency Act for the time being in force for the acquisition of this estate or if a trust deed be executed by him for the benefit of his creditor; or

Being a company shall pass a resolution or the court shall make an order for the liquidation of its affairs, or a receiver or Manager on behalf of the debenture holders shall be appointed or circumstances shall arise which entitle the Court on debenture holders to appoint receiver or Manager; or

Shall suffer an execution being levied on his goods and allow it to be continued for a period of 21 days ; or

Assigns, transfers, sub lets (engagement of labour on a piece work basis or of labour with materials not to be incorporated in the work, shall not be deemed to be subletting) or attempts to assign, transfer or sublet the entire works or any portion thereof without the prior written approval of the Accepting Authority. Accepting authority may, without prejudice to any other right to remedy which shall have accrued or shall accrue thereafter to the owner by written notice, cancel the contract as a whole or only such items of work in default from the contract.

- a. The Accepting Authority shall on such cancellation have powers to:-
- b. Take possession of the Site and any materials, constructional, plant, implements, stores, etc. thereon; and/or
- c. Carry out the incomplete work by any means AT THE RISK AND COST OF THE CONTRACTOR.
- d. On cancellation of the Contract in full or in part the Owner shall determine what amount, if any is recoverable from the Contractor for completion of the works or part of the works or in case the works or part of the work is not completed, the loss or damage suffered by the owner.
- e. In determining the amount, credit shall be given to the Contractor for the value of the work executed by him up to the time of cancellation, the value of Contractor's material taken over and incorporated in the work, and use of tackle and machinery belonging to the Contractor.
- f. Any excess expenditure incurred or to be incurred by the owner in completing the works or part of the works or the excess aforesaid after allowing such credit shall be recovered from any moneys due to the contractor on any account and if such moneys are not sufficient, the contractor shall be called upon in writing to pay the same within 30 days.

- g. If the Contractor shall fail to pay the required sum within the aforesaid period of 30 days, the Owner shall have the right to sell any or all of the Contractors temporary buildings etc., and apply the proceeds of sale thereof outstanding from the contractor it shall be recovered in accordance with the provisions of the contract.
- h. Any sums in excess of the amounts due to the owner and unsold materials, constructional plant, etc., shall be returned to the contractor, provided always that if cost or anticipated cost of completion by the owner of the works or part of the works is less than the amount which the contractor would have been paid had he completed the works or part of the works, such benefit shall not accrue to the Contractor.

LABOUR

The Contractor shall employ no child labour under 18 years of age on the work. If female labour is engaged the Contractor shall make necessary provision for safeguarding small children and keeping them clear of the site of operations. No laborer shall reside within the compound except authorized guards.

The contractor has to make his own arrangements of water and electricity for the purpose of construction.

Electrical power and water cannot be made available at site. The Contractor will have to make his own arrangements for electrical power and water at site or has to pay extra to owner for the units consumed. He will also have to make arrangements for lighting during night. The Contractor will have to arrange for procurement and maintenance of diesel generating sets, distribution board, switch fuse units, cabling, wiring, light fittings etc. as may be required

LIST OF APPROVED MAKE OF MATERIAL

No.	Material	Approved Manufacturer/supplier.
	CIVIL WORK	
1	Cement(OPC)-53 grade/43 grade	Ambuja, Ultra tech,.ORIENT, Birla A-1,ACC,koromandal, M/s. Zuari cements, Chettinad.
2	Cement(PPC)-53 grade/43 grade	Ambuja, Ultra tech,.ORIENT, Birla A-1,ACC,koromandal, Chettinad.
3	White cement	Birla, J.K.,Ultra tech
4	Mild steel & Tor steel, hot rolled steel angle, sections, plates, TMT	TATA, Sail, Jindal ,Kalika,Polaad, Kamdhenu,Essar.Rajuri.
5	Tile Adhesive cement & joint filling compounds	Bal adhesive, Pidilite industries, Aqua alliance (India)pvt. Ltd. ,ROFF
6	Glazed Tiles	H&R Johnson, Kajaria,euro,Simpolo, Nitco
7	Vitrified Tiles (900x900,800x800,600x600, 1200x600, 1200x2400 size)	Marbonite from H&R , Johnson ,granite from Bellceramics,Kajaria, Euro,Simpolo.,regency,somani,Naveen ,Asian, Marbito
8	Ceramic tiles	H&R, Johnson, Bell ceramic, Nitco,Kajaria.,Euro, RAK Ceramics,regency,Somani,Orient.
9	Brick tile	Unistone
10	Wall putty	JK wall putty, Birla putty.
	HARDWARE/PAINT/PLYWOOD	
1	Cement Paint	Snowcem,Asian, Nerolac.ICI,Berger
2	Synthetic Enamel	Asian paint, Jensen &Nicholson,ICI,Berger.
3	Anti-corrosive paint	Asian paint, Berger & Nicholson
4	GRC Jali	Uni stone, Anjali marble.
5	Hardware	Hafele,Ebco,Hettich, solo,ozone, enox
6	S.S. handrails	KICH,Bajaj Aurangabad

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7	Aluminum building hardware	IPSA, Everlite, EBCO, ECIE, Hardwin Traders
8	Locks	Godrej, Harrison, Yale.
9	PVC and fibre frame and shutter	Rajshri, Fibroplast, duraplast, fenestra, fibretuff.
10	Pre coated iron galvanized profile sheet and accessories, galvalume	Lloydeck, Trackdeck, Multiclad, TATA blue scope, Dynarroof, Uttam Glava, Safintra.
11	Autoclaved Aerated concrete block (AAC Block) all sizes	Buildtech, Ecolite, Ucrete, Ecocrete, ADYALITE
	LIST OF APPROVED MANUFACTURERS FOR GLAZING WORK STRUCTURAL GLAZING & COMPOSITE PANELING, GLASS	
1	Aluminum extrusion	Jindal, century, Hindalco, Indalco, Mahaveer.
2	Stainless steel	Salem steel or approved equivalent.
3	EPDM	Ame Rubber Industries, Eltech
4	Expansion anchors	Arrow/Kundan Industries or approved
5	Door & window furniture	GIESSE or approved equivalent Cotswold or approved equivalent.
6	Aluminum composite panels	Reynobond, Alstrong, Alucobond, Alex, ALpolic, Kinar 500
7	Mirror	Float glass India, Modiguard, AIS, saintgobain
8	Ordinary glass	Float glass India, Modiguard, AIS, saintgobain
9	Float glass	Float glass India, Modiguard, AIS, saintgobain.
10	Silicone sealant	DOW Cornice, G.E.
11	Structural sealant	DOW Corning-2 part silicon 983, G.E.
12	Weather sealant	Dow Corning, G.E.
13	Powder coating	Jotun PEF grade

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14	Curtain wall	Technal
15	UPVC windows& door	Fenistra, Kommerling, ENCRAFT,CORA, LG-Hause.
16	Fibre door and frame	Fibroplast, Everlast, House of doors
17	Water proofing compound	FOSROC, SIKA, CICO
18	Pressed steel door frame	Senharvic, AGEW, steel flast, Rajender steel.
19	PEB manufacturer and supplier	Kirby, Loya, Next, Phonix, Tata.
	LIST OF APPROVED MAKES OR BRANDS.(PLUMBING WORK)	
1	CPVC pipes for water supply	Astral, Ashirvad, Ajay, Ori-plast, Prince, flow guard, finolex, Prince
2	CPVC fittings	Astral, Ashirvad, Ajay, Ori-plast, Prince, flow guard, finolex.
3	FOAM CORE pipes & fittings for drainage	Astral, Ashirvad, Ajay, Ori-plast, Prince, flow guard.
4	CPVC pipes for drainage& rainwater	Supreme/prince/finolex, Astral
5	Stoneware pipes for drainage	Perfect potteries cerind, Rajura ceramics (corporation approved), Pragati, Burn, C&R.
6	R.C.C. pipes for storm drainage	Indian Hume pipe/Pranali/ K.K.
7	Brass & Gun metal gate valve	Kirloskar/IVC/As per IS standard
8	C.I. Sluice valve	Kirloskar/IVC/ As per I.S. standard
9	Ball valves	Leader/Zoloto/RB/DRP, SANT/LEADER
10	Butterfly valves	Audco/C&R/Advance/ZOLOTO
11	Air release valve	Leader/ HAWA/Zoloto
12	Non return valve	Kirloskar/IVC/ISI approved
13	Stainers	Leader/Zoloto/ RB
14	Water supply fancy fitting like pillar taps, showers, sink mixers	Jaquar/Gem/ESS ESS (as per client), CERA., KOHLER
15	Flush valve	Jaquar/Gem/ESS ESS (as per client)

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16	Sanitary ware	Hindware/ Parryware / cera/ROCA/KOHLER
17	Foot valves	TBS/Normex
18	C.I. manhole frame & cover	NECO, BIC,RIF
19	Hydro pneumatic systems	Grundfoss/HBD/Kirloskar
20	Sewage & dirty water pumps	Grundfoss
21	Water meter	Capstan /Kaycee/Actaris
22	Pressure switch	Indofos/Danfos/system sensor
23	Pressure Gauges	Fiebig/H. guru /Venus
24	Enamel Painting of pipes etc.	Asian (ADSOLITE only.) Goodlas.
25	Paint Primer	Asian/ Jenson Nicholson/ other equal Shakti/Anchorman/ Hi-tech.
26	G.I. pipes 'B' class	Tata/Jindal/ Zenith/Surya
27	G.I. fittings	R brand/kirti/unique or equivalent.
28	Bath accessories	Chilly, Viking
29	Sink	Nirali,Nilkanth, Jayna, crysil.
30	Plastic W.C. cover	Hindustan sanitary ware, commander,ROCA
31	G.I. pipes	Jindal, TATA, praksh, surya
32	G.I. fittings	Unik, ZOLOTO-M, DRP-M, Kent.
33	Rain water & PVC pipes & fittings	Prince, Supreme, Finolex, SFMC
34	Gunmetal valves	Leader, Sant
35	UPVC pipes & fittings	Supreme, Finolex, SFMC,Astral.
36	C.P. Brass fittings & accessories	Jaquar, Gem, Ess-Ess, Aquaplus.
37	Floor drain fixtures and channel gratings	Chilly, Neer, ACO, Astral.
38	C.P. gratings and floor trap	Chilly, Cockroach trap, GMGR.
39	Cast iron pipes and fittings as per IS 3989	NECO, Kapilansh.
40	Cast iron pipes and fittings as per IS 1729	NECO, Raj iron foundry, BIC Calcutta, Kajeco, SKFBC, K.K., SRIF, RIF.
41	Cast iron pipes and fittings as per IS 1536	Electro steel Calcutta, KesoramCalcutta,Neco

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42	Drip seal	Vinod cement co. chadigarh (PJS-43)
43	G.I. pipe sealant	Henkel-LOCTITE 55
44	Pipe clamp and supports	Chilly, Euro clamp, Hi tech.
45	Clean out plug	Neer, GMGR.
46	Water type check valves	Audco, zoloto, advance.
47	Air release valve	ZOLOTO,OR,Arco
48	Ball float valve	ZOLOTO,HBD,Esseti.
49	MH/water tank plastic steps	KGM,patel,pranali industries.
50	Insulation for hot water pipes	Thermoflex, K-flex, ,Armacell,Kitek
51	Water tanks	Sintex, Rotoplast.
52	SFRC MH cover& frame & gratings	KK manholes & gratings, SFP/steel fibre product pragati.
53	Anticorrosive tape for pipe protection	PYPKOTE
54	Anti corrosiveBitumastic paint	Shalimar
55	Epoxy paint	Asian, Berger, J&N
56	Pressure gauge	H Guru, Fiebig, Dwyer
57	Fastener	Fisher, Hilti, Canon
58	Fire sealant	Hilti, Promat, Birla 3 M
59	Sealant & Additives	Asian paints, Fosroc, Pidilite
60	Concrete Additives	SIKA, Fosroc, CICO, SunandaRoff
61	Polymer sealant for expansion joint	SIKA, CICO, Pidilite, G.E. Silicon,STP
62	R.C.C. pipe	Ashok Cement pipe, Indian Hume pipe, KK
63	APP membrane	Lloyd Insulation, Builtech products pvt. Ltd., CICO technologies Ltd., FOSROC chemicals, STP Ltd., SIKA, IWL India Ltd., Pure Leathers Ltd.
64	Paver Tiles	Endura, Marbonite,Pavit.
65	AIR CONDITIONING SYSTEM	Hitachi, Trans, Daikin, Carrier,Voltas,Bluestar,Mitsubishi.
66	Modular furniture supplier/Modular Kitchen supplier	Godrej interio, spacewood, Heramb,Metro,Usha, Durian, wipro, Hulsta, Steller.

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67	Plywood	Archidply, Century,Kutty,Kitply,greenply,mayor,G attani
68	Flush door (waterproof)	Green ply, Anchor, Mayur, Archid ply
69	Laminates (0.8 mm ,1 mm, 1.25 mm,1.5 mm)	Green lam, Century, Royal touch,NeoNuxe, For mica.
70	Adhesive	Fevicol, Pidilite
71	Pre-laminated particle board	Anchor, Durian, Novapan, Bison

List of Recommended makes of Electrical work

Sr. No.	Item	Approved make
1	PVC trucking	Pressfit Royal/ Indoplast/ Diamond
2	PVC insulated copper mains	Polycab/ Finolex/ Anchor/RR/Havell's
3	6A/16A switch /socket and wiring Accessories	Legrand/ Vinay /Anchor/Havell's
4	All types of T8, T5 rods CFL lamps	Crompton/ Wipro/ Philips/Bajaj
5	2 x 9 w M.O. fitting	Crompton/ Wipro/ Bajaj
6	Chalk board fitting	Crompton/ Wipro/ Bajaj
7	4 x 24 watt T5 st fitting	Crompton/ Wipro/ Bajaj
8	Exhaust fan (All types)	Almonaurd / GEC / Usha/Crompton
9	Ceiling Fan/Wall mounted fan	Crompton/ Bajaj/Usha/Hawells/orient
10	Switchgears	Legrand/Siemens/Hawells /L&T
11	MCB SP, DP, TP, FP / All types of Isolators / All MCBDB'S, MCCB, RCCB, MCCB+MCB	Legrand/Siemens/Hawells /L&T/Indo Asian
12	Arm Cable	R.R. Kable/ Polycab/Finolex
13	Fire extinguisher	Safex/minimax/TYCO/FIREAGE
14	OPU / Power pack	BOSH REXROTH / YUKEN / PARKER
15	Power Transformer	AREVA / CGL / VOLTAMP / T & R / ABB / EMCO/MSEDCL APPROVED/PWD approved
16	Butterfly Valve	VA TECH/ BOVING FOURESS/VOITH SIEMENS/TB HYDRO/ JYOTI

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17	Protection Relays	ABB/ SIEMENS / GEC / ALSTOM (Areva)
18	HV Outdoor circuit breaker	ABB / CGL / AREVA / SIEMENS / JYOTI/Megawin
19	11 KV Circuit Breaker (indoor)	ABB / CGL / AREVA / SIEMENS / JYOTI/PCES/Megawin
20	415 V Air Circuit Breaker, MCCB, MCB etc	L & T / ABB / SIEMENS / C & S / G E / JYOTI or Equivalent /Legrand
21	Battery Charger	HBL NIFE / CHHABI / CALDYNE / STATCON / UNIVERSAL / AMCO / ELECTRONIC SYSTEM
22	Battery	EXIDE / HBL NIFE / AMCO / AMARON
23	UPS & Inverter	SIEMENS / KLA ELECTRONICS / UNIVERSAL / STATCON / MASS-TECH / APC or Equivalent/Heramb
24	Switchgear, Control & Protection Panels	ABB / CROMPTON / L&T / C&S / VIDYUT/ AREVA / UNILEC / CONTRONICS / SPACEAGE / SYSTEM CONTROL / TRICOLITE or Equivalent
25	HV Outdoor CT	CGL / AREVA / JYOTI/Transdelta
26	HV Outdoor PT	CGL / AREVA / JYOTI/Transdelta
27	HV Outdoor isolator	DANKE / G R POWER / ELECTROLYTE /MSDCL or PWD approved
28	HV Outdoor Lightning Arrestors	ELPRO / OBLUM / LAMCO / AREVA
29	Cables	NICCO / KEI / RALLISON / POLYCAB / CABCAB/LAPP / UNICAB/RR
30	415 V Switchgear Components	L & T / GE CONTROLS / SIEMENS / SCHNEIDER / C & S / ABB / BCH
31	Metering	AE / IMP / RISHAB / L&T / SECURE
32	Illumination System	AS PER THE MAKE MENTIONED IN ESTIMATE/BOQ/equivalent branded
33	Telephone cables	Finolex/Delton/National
34	Cable Trays	Standard local manufacturer.
35	G.I. strip and earthing material	Indiana/ Bharati or equivalent.
36	G.I. pipe and accessories	Jindal/Tata/Swastik/Surya
37	Meters	AE/Rishaba/IMP.

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38	LED lights	Philips, Wipro, Rajdeep,HPL,Bajaj,Finolex, Polycab,Syska, Oreva . (50000 hours warranty),GE,HPL,Osram, Surya, Fiem.,O-Trix
39	Lift and Escalator	OTIS, Kone, Mitsubishi, Hyundai,Hitachi, Schindler
40	D.G. Set	Kirloskar,Mahindra, Volvo, Powerica, Crompton greaves, Cummins, Ashok Leyland, Cater pillar.

Note: - If above make of materials are not available the contractor shall take written prior permission from Architect to use the other make not specified in list of the same quality

DRAWINGS :

CONTRACT DRAWINGS :

The Contract drawings provided for tendering purpose with the tender documents shall be used as a reference only. Contractor should Visualize the nature or type of work contemplated and to ensure that the rates and prices quoted by him in the bill of quantities take due considerations of the complexities of work involved during actual execution/consideration as experienced in the field.

The tendered rates/prices for the work shall be deemed to include the cost of preparation, supply and delivery of all necessary drawings, contractor is required to provide in accordance with the contract.

DOCUMENTATION:

If so ordered by the Engineer-in charge, the contractor will prepared drawings of the work at constructed and will supply original and three copies to the Engineer who will verify and certify these drawings.

Final and constructed drawings shall then be prepared by the contractor and applied in triplicate along with a micro-film of the same to the Engineer for record and reference purpose at the contractors cost.

ITEMWISE
TECHNICAL
SPECIFICATIONS

Item No. 01:

Providing and fixing in position anodized extruded aluminum partitions, partly glazed and partly laminated having frame made out of extruded tubular section of size 40 mm x 60 mm with 12 mm thick three layered flat pressed teak wood particle board bonded with BWP type exterior grade phenol formaldehyde synthetic resin conforming to IS 128231990, laminated on both sides and 5 mm thick selected quality plain/ float glass panels fixed with aluminum glass clips 12 mm x 12 mm and rubber cushioning beading to glass partitions as per approved drawing etc. compete.

General:Providing and fixing in position anodized extruded aluminum partitions, partly glazed and partly laminated

Specification:Aluminum frame of size 40 mm x 60 mm section will be drilled at floor at every 1.2 m, then vertical section were fixed after that with 12 mm thick three layered flat pressed teak wood particle board bonded with BWP type exterior grade phenol formaldehyde synthetic resin conforming to IS 128231990, laminated on both sides, with the help of aluminiumcleat rubber packing and 5 mm thick selected quality plain/ float glass panels fixed with aluminum glass clips 12 mm x 12 mm and rubber cushioning beading to glass partitions etc. complete including doors as per size shown in drawing with door closer, floor springs including all fixtures and fasteners for door

Item to include:The item rate includes material, labour, finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VATcharges etc.

Mode of Measurement:The item shall be measured in sq.m.

Item No. 02:

Providing and fixing Modular low height partition up to 1.2 m with soft pin board , writing board and fixed on G.I. chanel frame including Electrical fitting three socket with switch, one telephone socket, lan socket etc. complete as per the architectural drawings and as directed by architect .

General: The item pertains to providing and fixing low height 1.2 m high Partition with teak wood framing.

Specification: Modular low height partition in 75 x 50MM t.w. sections, with 8 mm plywood finished with 1.0 mm laminate up to 1.2 m height with soft pin board, writing board fixed on G.I. chanel frame including Electrical fitting three socket with switch, one telephone socket, lan socket etc. complete as per the architectural drawings and as directed by architect.

Item to include: The item rate includes material,labour,finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VAT charges etc.

Mode of Measurement: The item shall be measured in sq.m.

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Item No. 03:

Providing and fixing acoustical tiles wall lining upto bottom of the ceiling. The Gyptone wall lining includes 13mm Gyproc® Duraline (conforming to BS 5234,part 2)Screwed to 50mm Gypsteel Ultra™ C-stud (0.5mm thick having one flange of 34mm and another flange of 36mm made of GI Steel) placed at 610mm centre to centre in 50mm Gypsteel Ultra™ floor and ceiling channel (0.5mm thick have equal flanges of 32mm made of GI steel), which is anchored to the floor & true ceiling using suitable anchor fasteners or metal screws with PVC plugs. Finally square and tapered edges of the boards are to be jointed and finished so as to have a flush look which includes filling and finishing with Jointing compound, JointPaper tape and two coats of Dry wall Top Coat (as per recommended practices of (Saint- Gobain India Gypsum). 50mmglass wool shall be placed in the cavity.

General: The item pertains to providing and fixing acoustical tiles wall lining upto bottom of the ceiling.

Specification:The Gyptone wall lining includes 13mm Gyproc® Duraline (conforming to BS 5234,part 2)Screwed to 50mm Gypsteel Ultra™ C-stud (0.5mm thick having one flange of 34mm and another flange of 36mm made of GI Steel) placed at 610mm centre to centre in 50mm Gypsteel Ultra™ floor and ceiling channel (0.5mm thick have equal flanges of 32mm made of GI steel), which is anchored to the floor & true ceiling using suitable anchor fasteners or metal screws with PVC plugs. Finally square and tapered edges of the boards are to be jointed and finished so as to have a flush look which includes filling and finishing with Jointing compound, JointPaper tape and two coats of Dry wall Top Coat (as per recommended practices of (Saint- Gobain India Gypsum). 50mmglass wool shall be placed in the cavity.

Brief application guideline:13mm Gyproc Duraline board (conforming to BS 5234,part 2)Screwed to 50mm Gypsteel Ultra C-stud 0.5mm thick having one flange of 34mm and another flange of 36mm made of GI Steel placed at 610mm centre to centre in 50mm Gypsteel Ultra floor and ceiling channel 0.5mm thick have equal flanges of 32mm made of GI steel, which is anchored to the floor & true ceiling using suitable anchor fasteners or metal screws with PVC plugs. Finally square and tapered edges of the boards are to be jointed and finished so as to have a flush look which includes filling and finishing with Jointing compound, JointPaper tape and two coats of Dry wall Top Coat (as per recommended practices of (Saint- Gobain India Gypsum). 50mmglass wool shall be placed in the cavity.

Item to include: The item rate includes material,labour,finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VATcharges etc.

Mode of Measurement: The item shall be measured in sq.m.

Item No. 04:

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Providing and fixing in position, Double shuttered aluminium extruded powder coated openable door of specified size with aluminium door frame of powder coated section 101.60 x 44.75mm , 3.18 mm thick and shutter comprising of powder coated section having bottom and lock rail of size 150 mm x 44.5 mm x 3.00 mm thick top rails 47.62 x 44.45 mm x 3.00 mm thick , vertical style 47.62 x 44.45 mm, 3.00 mm thick and for shutter plain glass panes 5 mm thick for top panels and 12mm thick both side laminated phenol bonded particle board panels for bottom panels etc. , I.S.I. mark , heavy duty, Hydraulic floor spring of 150 kg capacity , having heavy duty concealed lock, necessary beading, glazing clips, PVC gaskets, 250mm length aluminium tower bolts, 150mm dia. pad handle, etc. as per detailed design and drawing or as directed by engineer in charge including all materials , labours, and equipment etc.complete

General: The item pertains to providing and fixing Double shuttered aluminium extruded powder coated openable door.

Specification:Double shuttered aluminium extruded powder coated openable door of specified size with aluminium door frame of powder coated section 101.60 x 44.75mm , 3.18 mm thick and shutter comprising of powder coated section having bottom and lock rail of size 150 mm x 44.5 mm x 3.00 mm thick top rails 47.62 x 44.45 mm x 3.00 mm thick , vertical style 47.62 x 44.45 mm, 3.00 mm thick and for shutter plain glass panes 5 mm thick for top panels and 12mm thick both side laminated phenol bonded particle board panels for bottom panels etc. , I.S.I. mark , heavy duty, Hydraulic floor spring of 150 kg capacity , having heavy duty concealed lock, necessary beading, glazing clips, PVC gaskets, 250mm length aluminium tower bolts, 150mm dia. pad handle, etc. as per detailed design and drawing or as directed by engineer in charge.

Item to include: The item rate includes material,labour,finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VATcharges etc.

Mode of Measurement: The item shall be measured in sq.m.

Item No. 05:

Providing and fixing Screen Film on glass approved make and colour, including finishing, cleaning, complete as per the architectural drawings and as directed by Architect.

General: The item pertains to providing and fixing Screen Film on glass

Specification:Providing and fixing Screen Film on glass approved make and colour, **Frosted and Etched Window Films**feature clean **Simple Frosted Films**, vivid **Frosted Color Window Films**, **Opaque Window Films**, **Light Diffusing Films**, and **Etched Glass Window Films**. Supplied with a silicone liner, which protects the clear, pressure-sensitive adhesive, these are applied using the same tools and techniques for window films.

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Item to include: The item rate includes material, labour, finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VAT charges etc.

Mode of Measurement: The item shall be measured in sq.m.

Item No. 06:

Providing and supplying Modular table made in Pre laminated particle board of size 2800 mmLx 900 mmDx 750 mm Ht , side storage with back storage of size 1200 mmL x 900 mmD x 750 mm Ht for R.O. , S.O cabin Table with table top made in 25 mm thick Pre laminated particle board vertical support panel of 18 mm thick made in pre laminated particle board, Side storage made in 18 mm thick pre laminated particle board, vertical support panel of 18 mm thick made in pre laminated particle board, keyboard tray made in 18 gauge M.S. powder coated, CPU trolley made in 18 gauge M.S. powder coated, 3 drawer made in 18 mm thick pre laminated particle board with locking arrangement, detached foot rest made in 18mm thick pre laminated particle board,The top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S. handle, locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by Architect.(Pre-laminated Particle Board shall be Grade II Type II conforming to IS:12823:1990)

General:Providing Modular table made in Pre laminated particle board of size 2800 mmL X 900 mmDx 750 mm Ht.

Specification:Table Top 2800Lx900D to be made of 25 mm thick Pre-laminated MDF board with gable end,vertical support panel of 18 mm thick made in pre laminated particle board,keyboard and CPU trolley tray made in 18 gauge M.S. powder coated, three drawer made in 18 mm thick pre laminated particle board with locking arrangement, with three number of key set for each drawer,detached foot rest made in 18mm thick pre laminated particle board,The top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S. handle, locks, Telescopic sliding channels with powder coating, nails, S.S. screws, side storage with back storage of size 1200 mmL x 900 mmD x 750 mm Ht with 18mm thick pre laminated particle board with locking arrangement, with three number of key set for each storage as per details drawing and as directed by Architect.

Item to include: The item rate includes material,labour,finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VATcharges etc.

Contractor

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Mode of Measurement: The item shall be measured in numbers.

Item No. 07:

Providing and supplying Modular table made in Pre laminated particle board of size 1500 mmLX 750 mmDx 750 mm Ht , for Field officer's, Accountant Table with table top made in 25 mm thick Pre laminated particle board vertical support panel of 18 mm thick made in pre laminated particle board, vertical support panel of 18 mm thick made in pre laminated particle board, keyboard tray made in 18 gauge M.S. powder coated, CPU trolley made in 18 gauge M.S. powder coated, 3 drawer made in 18 mm thick pre laminated particle board with locking arrangement, detached foot rest made in 18mm thick pre laminated particle board, The top and Side Panels will be clad with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S. handle, locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by Architect. (Pre-laminated Particle Board shall be Grade II Type II conforming to IS:12823:1990)

General: Providing Modular table made in Pre laminated particle board of size 1500 mmLX 750 mmDx 750 mm Ht.

Specification: Table Top 1500 Lx750D to be made of 25 mm thick Pre-laminated MDF board with gable end, vertical support panel of 18 mm thick made in pre laminated particle board, keyboard and CPU trolley tray made in 18 gauge M.S. powder coated, three drawer made in 18 mm thick pre laminated particle board with locking arrangement, with three number of key set for each drawer, detached foot rest made in 18mm thick pre laminated particle board, The top and Side Panels will be clad with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S. handle, locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by Architect.

Item to include: The item rate includes material, labour, finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VAT charges etc.

Mode of Measurement: The item shall be measured in numbers.

Item No. 08:

Providing and supplying Modular table made in Pre laminated particle board of size 1200 mmLX 600 mmDx 750 mm Ht,for JSA and Junior Clerks Table with table top made in 25 mm thick Pre laminated particle board vertical support panel of 18 mm thick made in pre laminated particle board, vertical support panel of 18 mm thick made in pre laminated particle board, keyboard tray made in 18 gauge M.S. powder coated, CPU trolley made in 18 gauge M.S. powder coated, 3 drawer made in 18 mm thick pre laminated particle board with locking arrangement, detached foot rest made in 18mm thick pre laminated particle board,The top and Side Panels will be clad with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S. handle, locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by Architect.(Pre-laminated Particle Board shall be Grade II Type II conforming to IS:12823:1990)

General:Providing Modular table made in Pre laminated particle board of size 1200 mmL X 600 mmDx 750 mm Ht.

Specification:Table Top 1200mm Lx 600mm Dto be made of 25 mm thick Pre-laminated MDF board with gable end,vertical support panel of 18 mm thick made in pre laminated particle board,keyboard and CPU trolley tray made in 18 gauge M.S. powder coated, three drawer made in 18 mm thick pre laminated particle board with locking arrangement, with three number of key set for each drawer,detached foot rest made in 18mm thick pre laminated particle board,The top and Side Panels will be clad with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S. handle, locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by Architect.

Item to include: The item rate includes material,labour,finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VATcharges etc.

Mode of Measurement: The item shall be measured in numbers.

Item No. 09:

Providing and supplying Modular table made in Pre laminated particle board of size 2030mmLX 600mmDx 750mm Ht for Reception and Receiving Corner Table with table top made in 25 mm thick Pre laminated particle board, 12mm thick throughout Toughened glass fitting with S.S. glass holder on top of table, vertical support panel of 18 mm thick made in pre laminated particle board, vertical support panel of 18 mm thick made in pre laminated particle board, keyboard tray made in 18 gauge M.S. powder coated, CPU trolley made in 18 gauge M.S. powder coated, 3 drawer made in 18 mm

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thick pre laminated particle board with locking arrangement, detached foot rest made in 18mm thick pre laminated particle board,The top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S. handle, locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by Architect.(Pre-laminated Particle Board shall be Grade II Type II conforming to IS:12823:1990)

General:Providing Modular table made in Pre laminated particle board of size 2030 mmL X 600 mmDx 750 mm Ht.

Specification:Table Top 2030mm Lx 600mm Dto be made of 25 mm thick Pre-laminated MDF board with gable end,12mm thick throughout Toughened glass fitting with S.S. glass holder on top of tablevertical support panel of 18 mm thick made in pre laminated particle board,keyboard and CPU trolley tray made in18 gauge M.S. powder coated, three drawer made in 18 mm thick pre laminated particle board with locking arrangement, with three number of key set for each drawer,detached foot rest made in 18mm thick pre laminated particle board,The top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S. handle, locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by Architect.

Item to include: The item rate includes material,labour,finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VATcharges etc.

Mode of Measurement: The item shall be measured in numbers.

Item No. 10:

Providing and supplying 22 Person Seater Modular table made in Pre-laminated particle Board of size 21500 L x 750 D x 750 HT for Conference hall with table top made in 25 mm thick pre-laminated particle board, vertical support panel of 18 mm thick made in pre-laminated particle board, detachable foot rest made in 18mm thick pre-laminated particle board etc.,The top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S.handle, locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by Architect.

General:Providing Modular table made in Pre laminated particle board of size 21500 mmL X 750 mmDx 750 mm Ht.

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Specification:Table Top 21500mm Lx 750mm Dto be made of 25 mm thick Pre-laminated MDF board with gable end, vertical support panel of 18 mm thick made in pre laminated particle board, detached foot rest made in 18mm thick pre laminated particle board,The top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S. handle, locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by Architect.

Item to include: The item rate includes material,labour,finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VATcharges etc.

Mode of Measurement: The item shall be measured in numbers.

Item No. 11:

Providing and supplying P.V.C. dining table in dining hall Table in size 1500 L x 750 D x 750 HT approved make, color and approved by architect etc. complete.

General:Providing and supplying P.V.C. dining table in dining hall Table in size 1500 L x 750 D x 750 HT

Specification: The item pertains to providing and supplying dining Table of specified size and shape as per detailed specification and material mentioned in the wording of the item itself. The drawings enclosed are tentative; the detailed working drawings shall be supplied by Architect during execution keeping the overall size of table.The internal arrangement may change.

Item to include: The item rate includes material,labor,finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VAT charges etc.

Mode of Measurement: The item shall be measured in Number

Item No. 12:

Providing and supplying Tea poy table S.S. vertical support and 12 mm thick Toughened glass at top 600 L x 750 D x 600 HT approved make, color and approved by architect etc. complete.

General:Providing tea poy table with S.S. vertical support

Specification:Table Top 600mm Lx 750mm Dto be made of 12 mm thick toughened glass at topwith gable end, vertical support of S.S. pipe with powder coating, nails, S.S. screws as per details drawing and as directed by Architect.

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Item to include: The item rate includes material,labour,finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VATcharges etc.

Mode of Measurement: The item shall be measured in numbers.

Item No. 13:

Providing and supplying Modular Cupboard made in Pre-laminated particle board of size 900 x 600 x 2100mm made in 25 mm thick Pre-laminated particle board, Glazed Shutter made in 18mm thick Pre-laminated particle board with 5mm thick plane glass, drawer made in 18 mm thick Pre-laminated particle board with locking arrangement etc.,The top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S.handle,S .S. box hinges, S.S. Tower bolt locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by architect.

General:Providing Modular Cupboard made in Pre-laminated particle board of size 900mm L x 600mm D x 2100mm Ht.

Specification:Modular cupboard of size 900mm Lx 600mm D x 2100mm Ht to be made of 25 mm thick Pre-laminated particle board with Glazed Shutter made in 18mm thick Pre-laminated particle board with 5mm thick plane glass,drawer made in 18 mm thick Pre-laminated particle board with locking arrangementThe top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S.handle,S .S. box hinges, S.S. Tower bolt locks, Telescopic sliding channels with powder coating, nails, S.S. screws, all S.S. Material should be 304 Grade as per details drawing and as directed by architect.

Item to include: The item rate includes material,labour,finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VATcharges etc.

Mode of Measurement: The item shall be measured in numbers.

Item No. 14:

Providing and supplying Modular Cupboard made in Pre-laminated particle board of size 1500 x 450 x 1200mm made in 25 mm thick Pre-laminated particle board I, Glazed Sutter made in 18mm thick Pre-laminated particle board with 5mm thick plane glass, drawer made in 18 mm thick Pre-laminated particle board with locking arrangement etc. ,The top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items,

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S.S.handle,S .S. box hinges, S.S. Tower bolt locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by architect.

General:Providing Modular Cupboard made in Pre-laminated particle board of size 1500mm L x 450mm D x 1200mm Ht.

Specification:Modular cupboard of size 1500mm Lx450mm D x 1200mm Ht to be made of 25 mm thick Pre-laminated particle board with Glazed Shutter made in 18mm thick Pre-laminated particle board with 5mm thick plane glass,drawer made in 18 mm thick Pre-laminated particle board with locking arrangementThe top and Side Panels will be clad with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S.handle,S .S. box hinges, S.S. Tower bolt locks, Telescopic sliding channels with powder coating, nails, S.S. screws, all S.S. Material should be 304 Grade as per details drawing and as directed by architect.

Item to include: The item rate includes material,labor,finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VATcharges etc.

Mode of Measurement: The item shall be measured in numbers.

Item No. 15:

Providing and supplying Modular Cupboard made in Pre-laminated particle board of size 1600 x 450 x 1200mm made in 25 mm thick Pre-laminated particle board I, Glazed Sutter made in 18mm thick Pre-laminated particle board with 5mm thick plane glass, drawer made in 18 mm thick Pre-laminated particle board with locking arrangement etc. ,The top and Side Panels will be clad with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S.handle,S .S. box hinges, S.S. Tower bolt locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by architect.

General:Providing Modular Cupboard made in Pre-laminated particle board of size 1600mm L x 450mm D x 1200mm Ht.

Specification:Modular cupboard of size 1600mm Lx 450mm D x 1200mm Ht to be made of 25 mm thick Pre-laminated particle board with Glazed Shutter made in 18mm thick Pre-laminated particle board with 5mm thick plane glass,drawer made in 18 mm thick Pre-laminated particle board with locking arrangementThe top and Side Panels will be clad with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S.handle,S .S. box hinges, S.S. Tower bolt locks, Telescopic sliding channels with powder coating, nails, S.S. screws, all S.S. Material should be 304 Grade as per details drawing and as directed by architect.

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Item to include: The item rate includes material,labor,finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VATcharges etc.

Mode of Measurement: The item shall be measured in numbers.

Item No. 16:

Providing and supplying Modular Cupboard made in Pre-laminated particle board of size 2000 x 450 x 750mm made in 25 mm thick Pre-laminated particle board I, Glazed Shutter made in 18mm thick Pre-laminated particle board with 5mm thick plane glass, drawer made in 18 mm thick Pre-laminated particle board with locking arrangement etc. ,The top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S.handle,S .S. box hinges, S.S. Tower bolt locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by architect.

General:Providing Modular Cupboard made in Pre-laminated particle board of size 1600mm L x 450mm D x 1200mm Ht.

Specification:Modular cupboard of size 2000mm Lx 450mm D x 750mm Ht to be made of 25 mm thick Pre-laminated particle board with Glazed Shutter made in 18mm thick Pre-laminated particle board with 5mm thick plane glass,drawer made in 18 mm thick Pre-laminated particle board with locking arrangementThe top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S.handle,S .S. box hinges, S.S. Tower bolt locks, Telescopic sliding channels with powder coating, nails, S.S. screws, all S.S. Material should be 304 Grade as per details drawing and as directed by architect.

Item to include: The item rate includes material,labor,finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VATcharges etc.

Mode of Measurement: The item shall be measured in numbers.

Item No. 17:

Providing and supplying Modular Cupboard made in Pre-laminated particle board of size 600mm L x 300mm D x 1200mm Ht made in 25 mm thick Pre-laminated particle board I, Glazed Sutter made in 18mm thick Pre-laminated particle board with 5mm thick plane glass, drawer made in 18 mm thick Pre-laminated particle board with locking arrangement etc. ,The top and Side Panels will be cladded with post forming laminate of

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thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S.handle,S .S. box hinges, S.S. Tower bolt locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by architect.

General:Providing Modular Cupboard made in Pre-laminated particle board of size 600mm L x 300mm D x 1200mm Ht.

Specification:Modular cupboard of size 600mm Lx 300mm D x 1200mm Ht to be made of 25 mm thick Pre-laminated particle board with Glazed Shutter made in 18mm thick Pre-laminated particle board with 5mm thick plane glass,drawer made in 18 mm thick Pre-laminated particle board with locking arrangementThe top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S.handle,S .S. box hinges, S.S. Tower bolt locks, Telescopic sliding channels with powder coating, nails, S.S. screws, all S.S. Material should be 304 Grade as per details drawing and as directed by architect.

Item to include: The item rate includes material,labor,finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VATcharges etc.

Mode of Measurement: The item shall be measured in numbers.

Item No. 18:

Providing and supplying Modular Cupboard made in Pre-laminated particle board of size 600 x 450 x 1200mm made in 25 mm thick Pre-laminated particle board I, Glazed Sutter made in 18mm thick Pre-laminated particle board with 5mm thick plane glass, drawer made in 18 mm thick Pre-laminated particle board with locking arrangement etc. ,The top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S.handle,S .S. box hinges, S.S. Tower bolt locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by architect.

General:Providing Modular Cupboard made in Pre-laminated particle board of size 600mm L x 450mm D x 1200mm Ht.

Specification:Modular cupboard of size 600mm Lx450mm D x 1200mm Ht to be made of 25 mm thick Pre-laminated particle board with Glazed Shutter made in 18mm thick Pre-laminated particle board with 5mm thick plane glass,drawer made in 18 mm thick

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Pre-laminated particle board with locking arrangement The top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S.handle,S .S. box hinges, S.S. Tower bolt locks, Telescopic sliding channels with powder coating, nails, S.S. screws, all S.S. Material should be 304 Grade as per details drawing and as directed by architect.

Item to include: The item rate includes material,labor,finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VATcharges etc.

Mode of Measurement: The item shall be measured in numbers.

Item No. 19:

Providing and supplying Modular Cupboard made in Pre-laminated particle board of size 730 x 600 x 1200mm made in 25 mm thick Pre-laminated particle board I, Glazed Sutter made in 18mm thick Pre-laminated particle board with 5mm thick plane glass, drawer made in 18 mm thick Pre-laminated particle board with locking arrangement etc. ,The top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S.handle,S .S. box hinges, S.S. Tower bolt locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by architect.

General:Providing Modular Cupboard made in Pre-laminated particle board of size 730mm L x 600mm D x 1200mm Ht.

Specification:Modular cupboard of size 730mm Lx 600mm D x 1200mm Ht to be made of 25 mm thick Pre-laminated particle board with Glazed Shutter made in 18mm thick Pre-laminated particle board with 5mm thick plane glass,drawer made in 18 mm thick Pre-laminated particle board with locking arrangementThe top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S.handle,S .S. box hinges, S.S. Tower bolt locks, Telescopic sliding channels with powder coating, nails, S.S. screws, all S.S. Material should be 304 Grade as per details drawing and as directed by architect.

Item to include: The item rate includes material,labor,finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VATcharges etc.

Mode of Measurement: The item shall be measured in numbers.

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Item No. 20:

Providing and supplying Modular Cupboard made in Pre-laminated particle board of size 1200 x 450 x 2100mm made in 25 mm thick Pre-laminated particle board I, Glazed Sutter made in 18mm thick Pre-laminated particle board with 5mm thick plane glass, drawer made in 18 mm thick Pre-laminated particle board with locking arrangement etc. ,The top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S.handle,S .S. box hinges, S.S. Tower bolt locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by architect.

General:Providing Modular Cupboard made in Pre-laminated particle board of size 1200mm L x 450mm D x 2100mm Ht.

Specification:Modular cupboard of size 1200mm Lx 450mm D x 2100mm Ht to be made of 25 mm thick Pre-laminated particle board with Glazed Shutter made in 18mm thick Pre-laminated particle board with 5mm thick plane glass,drawer made in 18 mm thick Pre-laminated particle board with locking arrangementThe top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S.handle,S .S. box hinges, S.S. Tower bolt locks, Telescopic sliding channels with powder coating, nails, S.S. screws, all S.S. Material should be 304 Grade as per details drawing and as directed by architect.

Item to include: The item rate includes material,labor,finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VATcharges etc.

Mode of Measurement: The item shall be measured in numbers.

Item No. 21:

Providing and supplying 1- seater (Type-1) Executive Sofa Set in R.O. Cabin in 3 & 4 inches high density foam Pounds/Cubic fit fixed on a base of 18 mm thick gurjan hardwood based ply. As per drawing no. finished with specified leather cloth.Approved by Architect.

General:Providing 1- seater (Type-1) Executive Sofa

Specification:The item pertains to providing and supplying sofa set of specified size andshape as per detailed specification and material mentioned in the wording of the

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item itself. The drawings enclosed are tentative; the detailed working drawings shall be supplied by Architect during execution keeping the overall size of sofa set same. The internal arrangement may change. The catalogue shall be made available or samples shall be shown. Contractor shall procure only mentioned quantity of approved sample only.

Item to include: The item rate includes material, labor, finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VAT charges etc.

Mode of Measurement: The item shall be measured in numbers.

Item No. 22:

Providing and supplying 1- seater (Type-2) Executive Sofa Set in R.O. Cabin in 3 & 4 inches high density foam Pounds/Cubic fit fixed on a base of 18 mm thick gurjan hardwood based ply. As per drawing no. finished with specified leather cloth. Approved by Architect.

General: Providing 1- seater (Type-2) Executive Sofa

Specification: The item pertains to providing and supplying sofa set of specified size and shape as per detailed specification and material mentioned in the wording of the item itself. The drawings enclosed are tentative; the detailed working drawings shall be supplied by Architect during execution keeping the overall size of sofa set same. The internal arrangement may change. The catalogue shall be made available or samples shall be shown. Contractor shall procure only mentioned quantity of approved sample only.

Item to include: The item rate includes material, labor, finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VAT charges etc.

Mode of Measurement: The item shall be measured in numbers.

Item No. 23:

Providing and supplying 3- seater (Type-2) Visitor Sofa Set in waiting Cabin in 3 & 4 inches high density foam Pounds/Cubic fit fixed on a base of 18 mm thick gurjan hardwood based ply. As per drawing no. finished with specified leather cloth. Approved by Architect.

General: Providing 3- seater (Type-2) Executive Sofa

Specification: The item pertains to providing and supplying sofa set of specified size and shape as per detailed specification and material mentioned in the wording of the item itself. The drawings enclosed are tentative, the detailed working drawings shall be supplied by Architect during execution keeping the overall size of sofa set same. The internal arrangement may be changed. The catalogue shall be made available or samples shall be shown. Contractor shall procure only mentioned quantity of approved sample only.

Item to include: The item rate includes material, labor, finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VAT charges etc.

Mode of Measurement: The item shall be measured in numbers.

Item No. 24:

Providing & supplying High Back Executive Chair with hydraulic stand of 5 legs having reclining and revolving system for RO, Conference hall in artificial leather finish approved by Architect. With 3 inch in seat and 2 inch in finished with powder coated M.S. Coated base. Approved by Architect.

General: Providing High Back Executive Chair

Specification: The item pertains to providing and supplying High Back Executive Chairs of specified size and shape as per detailed specification and material mentioned in the wording of the item itself. The catalogue shall be made available or samples shall be shown. Contractor shall procure only mentioned quantity of approved sample only. The High Back Executive Chairs shall be procured for GODREJ or equivalent make.

Item to include: The item rate includes material, labor, finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VAT charges etc.

Mode of Measurement: The item shall be measured in numbers.

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Item No. 25:

Providing & supplying Low Back Executive chairs for Conference hall cabin with hydraulic height adjustment with reclining and revolving system stand of 5 legs having seat and back in foam with fabric cloth finish with 3 inch in seat and 2 inch in back finished with powder coated M.S. Coated base, approved by Architect.

General: Providing Low Back Executive Chair

Specification: The item pertains to providing and supplying Low Back Executive Type Chairs of specified size and shape as per detailed specification and material mentioned in the wording of the item itself .The catalogue shall be made available or samples shall be shown .Contractor shall procure only mentioned quantity of approved sample only .The Low Back Executive Type Chairs shall be procured for GODREJ or equivalent make.

Item to include: The item rate includes material,labor,finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VAT charges etc.

Mode of Measurement:The item shall be measured in numbers.

Item No. 26:

Providing & supplying Computer Chair for Staff in Fabric finish approved by Architect. Standing with 5 legs, revolving tilting and finished with powder coated M.S. Coated base. Approved by Architect.

General: Providing Computer Chair for Staff in Fabric finish

Specification:The item pertains to providing and supplying Computer Chairs of Specified size and shape as per detailed specification and material mentioned in the wording of the item itself .The catalogue shall be made available or samples shall be shown .Contractor shall procure only mentioned quantity of approved sample only .The computer Chairs shall be procured for GODREJ or equivalent make.

Item to include: The item rate includes material,labor,finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VAT charges etc.

Mode of Measurement:The item shall be measured in numbers.

Item No. 27:

Providing and supplying PVC chairs in dining hall approved by Architect.

General: Providing PVC chairs

Specification: The item pertains to providing and supplying PVC Chairs of specified size and shape as per detailed specification and material mentioned in the wording of the item itself .The catalogue shall be made available or samples shall be shown.Contractor shall procure only mentioned quantity of approved sample only .The PVC Chairs shall be procured for NILKAMAL, SUPREME or equivalent make.

Item to include: The item rate includes material, labor, finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VAT charges etc.

Mode of Measurement:The item shall be measured in numbers.

Item No. 28:

Providing and supplying visitor chairs 3 in 1 for waiting area having seat and back in foam with fabric cloth finish with 3 inch in seat and 2 inch in back finished with powder coated M.S. Coated base, approved by Architect.

General: Providing visitor chairs 3 in 1

Specification:The item pertains to providing and supplying visitor chairs 3 in 1 Specified size and shape as per detailed specification and material mentioned in the wording of the item itself.The catalogue shall be made available or samples shall be shown .Contractor shall procure only mentioned quantity of approved sample only.The computer chairs shall be procured for GODREJ or equivalent make.

Item to include: The item rate includes material,labor,finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VATcharges etc.

Mode of Measurement:The item shall be measured in numbers.

Item No. 29:

Providing and fixing 4 legged Lab stool, Legs made of 16 Gauge 45 MM Outer dimension MS Pipe, Duly painted, With a 304 Grade Stainless steel 12 inch wide seat with a 1 inch

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collar, Height adjustment via a screws per design and drawing and instructions of Engineer in charge.

General: Providing 4 legged Lab stool

Specification: Providing and fixing 4 legged Lab stool, Legs made of 16 Gauge 45 MM Outer dimension MS Pipe, Duly painted, With a 304 Grade Stainless steel 12 inch wide seat with a 1 inch collar, Height adjustment via a screws per design and drawing and instructions of Engineer in charge.

Item to include: The item rate includes material, labor, finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VAT charges etc.

Mode of Measurement: The item shall be measured in numbers.

Item No. 30:

Providing & fixing chair of fabric seat and back with chrome plated legs, as per design and drawing and instructions of Engineer in charge.

General: Providing chair of fabric seat

Specification: Providing and fixing chair of fabric seat, back with chrome plated legs as per design and drawing and instructions of Engineer in charge.

Item to include: The item rate includes material, labor, finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VAT charges etc.

Mode of Measurement: The item shall be measured in numbers.

Item No. 31:

Providing and supplying Modular Bed For Guest House size 2000mm L x 1200mm D x 450mm Ht With Corner Table made in 18 mm thick Pre-laminated particle board, drawer made in 18 mm thick Pre-laminated particle board with locking arrangement etc. externally finished with 1.0 mm thick laminate and internally finished with 1.0 and mattress 3 & 4 inches high density foam finished with cotton cloth and

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including all hardware items, S.S.handle, locks, Telescopic sliding channels with powder coating, nails, S.S.screws, as per details drawing and as directed by Architect.

General: Providing Modular Bed for Guest House size 2000mm L x 1200mm D x 450mm Ht.

Specification: Modular Bed For Guest House size 2000mm L x 1200mm D x 450mm Ht With Corner Table made in made in 18 mm thick Pre-laminated particle board, drawer made in 18 mm thick Pre-laminated particle board with locking arrangement etc. externally finished with 1.0 mm thick laminate and internally finished with 1.0 and mattress 3 & 4 inches high density foam finished with cotton cloth and including all hardware items, S.S.handle, locks, Telescopic sliding channels with powder coating, nails, S.S.screws, all S.S. material should be of 304 grade as per details drawing and as directed by Architect.

Item to include: The item rate includes material,labor,finishing, loading andunloading charges, transportation charges to the site of work, assembling, octroi, VATcharges etc.

Mode of Measurement:The item shall be measured in numbers.

Item No. 32:

Providing and Fixing of Mineral Fiber Board Acoustical Suspended Ceiling System with ultima (Beveled Tegular) Edge Tiles of size 15mm Exposed GRID. The tiles should have Humidity Resistance (RH) of 99%, NRC 0.7, Light Reflectance 85%, Thermal Conductivity $k = 0.052 - 0.057$ w/m K, Color White, Fire Performance UK Class 0 / Class 1 (BS 476 pt - 6 &7) in module size of 600 x 600 x 20mm , suitable for Green Building application, with Recycled content of 32%. The tile shall be laid on pre-coated G.I.channel on XL2 Clip having a web height of 32 mm with 15 mm wide T - section flanges color white having rotary stitching on all T sections i.e. the Main Runner, 1200 mm and 600 mm Cross Tees with a web height of 32 mm and a load carrying capacity of 7.7 Kgs/M2 and minimum pull out strength of 100 Kgs.. The T Sections have a Galvanizing of 90 grams per M2 and need to be installed with Suspension system. The Tile and Grid system used together should carry a 10 year warranty products approved as per GRIHA and BS 476 etc. complete.

General: Providing Mineral Fiber Board Acoustical Suspended Ceiling System

Specification:Providing and Fixing of Mineral Fiber Board Acoustical Suspended Ceiling System with ultima (Beveled Tegular) Edge Tiles of size 15mm Exposed GRID. The tiles should have Humidity Resistance (RH) of 99%, NRC 0.7, Light Reflectance 85%, Thermal Conductivity $k = 0.052 - 0.057$ w/m K, Color White, Fire Performance UK Class 0 / Class 1 (BS 476 pt - 6 &7) in module size of 600 x 600 x 20mm , suitable for Green Building application, with Recycled content of 32%. The tile shall be laid on pre-coated

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G.I.channel on XL2 Clip having a web height of 32 mm with 15 mm wide T - section flanges color white having rotary stitching on all T sections i.e. the Main Runner, 1200 mm and 600 mm Cross Tees with a web height of 32 mm and a load carrying capacity of 7.7 Kgs/M2 and minimum pull out strength of 100 Kgs.. The T Sections have a Galvanizing of 90 grams per M2 and need to be installed with Suspension system. The Tile and Grid system used together should carry a 10 year warranty products approved as per GRIHA and BS 476 etc. complete.

Item to include: The item rate includes material,labor,finishing, loading andunloading charges, transportation charges to the site of work, assembling, octroi, VATcharges etc.

Mode of Measurement:The item shall be measured in square meter.

Item No. 33:

Providing and fixing in position Gypsum board false ceiling with 12.5mm thick Gypsum boards, screwed/fixed to the under structure of suspended G.I. Grid constructed and suspended from the main ceiling consisting of ceiling sections of size 25 x 50 mm maximum center to center distance of 600 millimeter perimeter channel and intermediate channels at maximum center to center distance 1200 millimeter galvanized grid should be fixed to reinforced cement concrete slab. The gypsum board should be fixed to galvanized iron grid with necessary screws. The boards should be taped and filled from underside to give smooth, seamless ceiling. The rate should include necessary additional ceiling sections and intermediate channels. Additional intermediate channels should be fixed to strap hangers for additional support to prevent strapping at every 1200 millimeter item to be completed in all respect including necessary sleeves for ducts finishing of joints cut outs, painting including labor, material, lifts etc. all complete. Spec:As directed by Engineer in charge.

General: fixing suspended Tagular type false ceiling of 12.5 mm thick gypsum board of size 600 mm x 600 mm with galvanized iron perimeter channel, intermediate channel, galvanized iron hanger ceiling section , necessary clips dry wall screw required including framing, boarding, jointing, finishing filling joints, drilling holes including two coats of primer

Item to include: The item rate includes material, labour, finishing, scaffolding, installation up to the satisfaction, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VAT charges etc.

Mode of Measurement: The item shall be measured in square meter.

Item No. 34:

Providing and Fixing Soft Fiber Acoustical Suspended Ceiling System with Optra (Beveled Tegular) Edge Tiles of size 15mm Exposed Grid. The tiles should have Humidity Resistance (RH) of 95%, NRC 0.9 - 1.0, Light Reflectance ?85%, Color White, Fire Performance UK Class 0 / Class 1 (BS 476 pt - 6 &7) in module size of 600 x 600 x 15mm , suitable for Green Building application, with Recycled content of 66% GW and 74% RW. The tile shall be laid on pre-coated G.I channel 32 with 15 mm wide T - section flanges color white having rotary stitching on all T sections i.e. the Main Runner, 1200 mm and 600 mm Cross Tees with a web height of 32 mm and a load carrying capacity of 7 Kgs/M2 with a minimum pull out strength of 100 kgs. The T Sections have a Galvanizing of 90 grams per M2 and need to be installed with Suspension system The Tile and Grid system used together should carry a 10 year warranty. products approved as per GRIHA and BS 476 etc. complete.

General: Fixing Soft Fiber Acoustical Suspended Ceiling System with Optra (Beveled Tegular) Edge Tiles

Specification: Soft Fiber Acoustical Suspended Ceiling System with Optra (Beveled Tegular) Edge Tiles of size 15mm Exposed Grid. The tiles should have Humidity Resistance (RH) of 95%, NRC 0.9 - 1.0, Light Reflectance ?85%, Color White, Fire Performance UK Class 0 / Class 1 (BS 476 pt - 6 &7) in module size of 600 x 600 x 15mm , suitable for Green Building application, with Recycled content of 66% GW and 74% RW. The tile shall be laid on pre-coated G.I channel 32 with 15 mm wide T - section flanges color white having rotary stitching on all T sections i.e. the Main Runner, 1200 mm and 600 mm Cross Tees with a web height of 32 mm and a load carrying capacity of 7 Kgs/M2 with a minimum pull out strength of 100 kgs. The T Sections have a Galvanizing of 90 grams per M2 and need to be installed with Suspension system The Tile and Grid system used together should carry a 10 year warranty. products approved as per GRIHA and BS 476 etc. complete.

Item to include: The item rate includes material, labour, finishing, scaffolding, installation up to the satisfaction, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VAT charges etc.

Mode of Measurement: The item shall be measured in square meter.

Item No. 35:

Providing and fixing partition with kadappa stone of all sizes and 25mm thick polished on both side and edges to original including fixing in position in cement mortar 1:4 curing polishing, cleaning etc complete.

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General: The item pertains to providing and fixing polished black Kadappa stone slab of required thickness, size etc.

Material: The Kadappa stone shall be polished hard, strong, durable, resistant to wear, uniform color. The stone shall be without any vein, crack, and fault/ flaw. The stone shall be 25 mm to 30 mm thick and at any location the thickness shall not be less than 25 mm. The Kadappa stone shall be of required width, size.

Plastering to Walls: Providing plaster of about 20 mm thick cement mortar 1:3 and providing of mortar bed cement mortar 1:4 – 25 mm to 40 mm thick. Providing plaster to walls is included in the item.

Fixing of Black Kadappa: Dado or skirting work shall be done only after fixing black Kadappa in Vertical position. The work shall be generally carried out as per the approved drawings. For fixing of black Kadappa polished stones, for kitchen platform, necessary grooves in the walls shall be made to hold the slabs in correct location & for stability. The slabs shall be molded, cut rounded and finished at the locations directed by the Engineer in Charge of the work. After completion of work, the area around the slabs shall be finished properly. The gentle slope to drain out water/avoiding forming water pools shall be provided. Black Kadappa shall be fixed when the cushioning mortar is still plastic and before it gets very stiff. The back of black Kadappa shall be covered with a thin layer of neat cement paste and the tile shall then be pressed in the mortar and gently tapped against the wall with a wooden mallet. The fixing shall be done from the bottom of wall upwards without any hollows in the bed or joints. Each Kadappa stone shall be fixed as close as possible to the one adjoining. The black Kadappa shall be joined with cement slurry. Any difference in the thickness of black Kadappa shall be evened out in cushioning mortar to that all tile faces are in one vertical plane. The joints between the black Kadappa shall not exceed 1.5 mm in width and they shall be uniform. While fixing black Kadappa in dado work, care shall be taken not to break joints vertically if the pattern of fixing black Kadappa has not been specified.

Item to Include: The item includes all material, labour, tools and equipments for providing mortar cement mortar 1:4 cushioning, fixing of black Kadappa, filling of joints, curing, cleaning etc, complete as directed above. The item also includes 20 mm thick cement mortar 1:3 plaster as and where required.

Mode of Measurement and Payment: The item shall be measured in square meter.

Item No. 36:

Providing & laying Vinyl flooring of 2.0mm thick, of approved color including cutting, laying, all labour and materials etc. complete as per direction of Architect.

Specification:

Vinyl flooring Scope of work consists of following steps Surface Preparation Vinyl Primer Vinyl flooring Self leveling Coat Application

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Surface Preparation: It is essential that surface should be sound, clean and dry surfaces in order that maximum bond strength is achieved between the substrate and the flooring system. All dust and debris should be removed prior to application of the product. All cracks, crevices and undulations shall be filled with epoxy based mortar.

Primer application: Primer coat on the naked surface as a bonding coat and proper drying time should be given to carry out the Vinyl flooring

Epoxy Underlay Generally material is supplied in pre-weighed packs (base and hardener & aggregate), which are ready for immediate on-site use. Part mixing of these components is not acceptable and will affect both performance and appearance of the finished floor. Mixing should be carried out using either a forced action mixer, or a heavy duty, slow-speed drill with proprietary mixing paddle attachment. The components should be mixed in a suitably sized mixing vessel. The base component should be added to the mixing vessel first and followed by the hardener and these two components mixed together for approximately 2 minutes until an even color and texture is obtained. Thereafter, the contents of the graded aggregate pack should be slowly added and mixing carried out for a further 3 minutes until a completely homogenous material is obtained.

Application of Vinyl flooring coating is supplied in pre-weighed packs ready to use on site. Solvent or thinners should not be added. A forced action mixer with a paddle fitted into a heavy duty, slow speed electric hand drill is recommended for mixing. Hardener component is mixed with Base resin in a suitable mixing vessel. The full color paste is then added and mixed until an even color is obtained. Finally the filler as supplied is added and mixed further for three minutes until homogenous lump free slurry is obtained. Laying the material is poured onto the primed substrate and spread to the required thickness with a steel trowel. Alternatively, a serrated trowel can be used. The resin floor should not be overworked but spread slowly and evenly. Immediately after spreading, the floor should be firmly rolled with a spiked roller to help release any entrapped air in the material and level any slight trowel marks. The floor should now self-smooth to an even colored dense, impervious floor.

Mode of Measurements and Payments

The rate shall include the cost of all labour and materials involved in all the above operations (including surface preparation) described above and measured in sq.m.

Item No. 37:

Providing, supplying and fixing Vertical Vanishing Blinds with 25mm width imported fabric approved by architect with Taiwan made sliding fitting as directed by architect etc. complete as per direction of Architect.

General: fixing Vertical Vanishing Blinds with 25mm width imported fabric

Specification: Vertical Blinds made of glass fiber fabrics in width 5 inch. Minimum overlapping of $\frac{3}{4}$ " in fabric. Top aluminum anodized rail of 1.4 mm thickness 2 inch wide channel with front lamination of same fabric. Runners having stainless steel hooks with built-in shock spring and self-aligning slip clutch. End control box composed of double

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gear system. Stainless steel spacers. Bottom weight fully plastic covered linked with plastic bead chain. Venetian Blinds made of tungsten alloy aluminum. Thickness 0.20mm. Top and bottom channels of powder coated aluminum in thickness 1.4 mm. Brass pulleys, brass roller cord lock with side stainless steel plate. Tiller having brass and nylon with flexible powder coated steel tilting rod. Ladder cord with 20 mm spacing and antilflutter type. The material and color shall be as per sample selected and approved by Architect & Engineer –in-Charge.

Item to include: The item rate includes material, labor, finishing, installation up to the satisfaction, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VAT charges etc.

Mode of Measurement and Payment: The item shall be measured in square meter.

Item No. 38:

Providing and fixing MDF Board Laminated with 1mm thick laminate for Laboratory platform storage internal finish side, bottom, shutters and Shelf etc. complete as per the architectural drawings and as directed by Architect.

General: Providing MDF Board shutters for laboratory platform.

Specification: MDF board shutters of 25 mm thick with 1mm thick Pre-laminated. The top and Side Panels will be clad with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S. handle, S.S. box hinges, S.S. Tower bolt locks, Telescopic sliding channels with powder coating, nails, S.S. screws, all S.S. Material should be 304 Grade as per details drawing and as directed by architect.

Item to include: The item rate includes material, labor, finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VAT charges etc.

Mode of Measurement: The item shall be measured in square meter.

Item No. 39:

Providing and fixing informatory sign boards in square or rectangular shape of any size made of (2 mm) thick Acrylic sheet bounded with approved retro reflective sheeting of Engineering grade having pressure sensitive / heat activated adhesive white retro reflective cut-out border and messages having Red Radium color transparent color over white reflective sheeting having border including G. I. fixtures etc. Complete as per direction of Architect.

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General:Providing informatory sign boards on acrylic sheet.

Specification:Acrylic sheet of 2mm thick with retro reflective sheeting of engineering grade having pressure sensitive/ heat activated adhesive white reflective cut-out border with red radium color over white reflective sheeting including border with GI fixtures as per the direction of architect.

Item to include: The item rate includes material,labor,finishing, loading and unloading charges, transportation charges to the site of work, assembling, octroi, VATcharges etc.

Mode of Measurement: The item shall be measured in square meter.

Item No. 40:

Removing cement tiles, or marble or polished Shahabad floor or dado without bed concrete including stacking the materials as directed with all leads, lifts etc. complete.

General:The item is related to dismantling, breaking the existing flooring.

Precautions/Specification:

1. All materials obtained from dismantling or demolition shall be the property of the owner unless otherwise specified and shall be kept in safe custody until they are handed over to the Engineering-Charge/ authorized representative.
2. The demolition shall always be well planned before hand and shall generally be done in reverse order of the one in which the structure was constructed. The operations shall be got approved from the Engineer-in-Charge before starting the work. Due care shall be taken to maintain the safety measures prescribed in IS 4130.
3. Necessary propping, shoring and or under pinning shall be provided to ensure the safety of the adjoining work or property before dismantling and demolishing is taken up and the work shall be carried out in such a way that no damage is caused to the adjoining work or property. Wherever specified,temporary enclosures or partitions and necessary scaffolding with suitable double scaffolding and proper cloth covering shall also be provided, as directed by the Engineer-in-Charge.
4. Necessary precautions shall be taken to keep noise and dust nuisance to the minimum. All work needs to be done under the direction of Engineer-in-Charge. Helmets, goggle, safety belts etc.should be used whenever required and as directed by the Engineer-in-Charge.The demolition work shall be proceeded with in such a way that it causes the least damage and nuisance to the adjoining building and the public.
5. Dismantling shall be done in a systematic manner. All materials which are likely to be damaged by dropping from a height or by demolishing roofs, masonry etc. shall be carefully removed first. Chisels and cutters may be used carefully as directed. The dismantled articles shall be removed manually or

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- otherwise, lowered to the ground (and not thrown) and then properly stacked as directed by the Engineer-in-Charge.
6. Where existing fixing is done by nails, screws, bolts, rivets, etc., dismantling shall be done by taking out the fixing with proper tools and not by tearing or ripping off.
 7. Any serviceable material, obtained during dismantling or demolition, shall be separated out and stacked properly as directed by the Engineer-in-Charge within a lead of 50 metres. All unserviceable materials, rubbish etc. shall be disposed off as directed by the Engineer-in-Charge.
 8. The contractor shall maintain/disconnect existing services, whether temporary or permanent, where required by the Engineer-in-Charge.
 9. No demolition work should be carried out at night especially when the building or structure to be demolished is in an inhabited area.
 10. Screens shall be placed where necessary to prevent injuries due to falling pieces.
 11. Water may be used to reduce dust while tearing down plaster from brick work.
 12. Safety belts shall be used by laborers while working at higher level to prevent falling from the structure.
 13. First-aid equipment shall be got available at all demolition works of any magnitude.

Item to Include: The item include all material, labour, tools and equipment required to execute the work as per specifications

Mode of Measurement: The dismantled area shall be measured and item shall be paid on per sqm.

Item No. 41:

Dismantling brick masonry in lime or cement mortar and stacking the materials as directed with all leads, lifts etc.

General: The item is related to dismantling, breaking the existing brick work.

Precautions/Specification:

1. All materials obtained from dismantling or demolition shall be the property of the owner unless otherwise specified and shall be kept in safe custody until they are handed over to the Engineering-Charge/ authorized representative.
2. The demolition shall always be well planned before hand and shall generally be done in reverse order of the one in which the structure was constructed. The operations shall be got approved from the Engineer-in-Charge before starting the work. Due care shall be taken to maintain the safety measures prescribed in IS 4130.
3. Necessary propping, shoring and or under pinning shall be provided to ensure the safety of the adjoining work or property before dismantling and demolishing is taken up and the work shall be carried out in such a way that no damage is caused to the adjoining work or property. Wherever specified, temporary enclosures or partitions and necessary scaffolding with

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suitable double scaffolding and proper cloth covering shall also be provided, as directed by the Engineer-in-Charge.

4. Necessary precautions shall be taken to keep noise and dust nuisance to the minimum. All work needs to be done under the direction of Engineer-in-Charge. Helmets, goggles, safety belts etc. should be used whenever required and as directed by the Engineer-in-Charge.
5. The demolition work shall be proceeded with in such a way that it causes the least damage and nuisance to the adjoining building and the public.
6. Dismantling shall be done in a systematic manner. All materials which are likely to be damaged by dropping from a height or by demolishing roofs, masonry etc. shall be carefully removed first. Chisels and cutters may be used carefully as directed. The dismantled articles shall be removed manually or otherwise, lowered to the ground (and not thrown) and then properly stacked as directed by the Engineer-in-Charge. Where existing fixing is done by nails, screws, bolts, rivets, etc., dismantling shall be done by taking out the fixing with proper tools and not by tearing or ripping off.
7. Any serviceable material, obtained during dismantling or demolition, shall be separated out and stacked properly as directed by the Engineer-in-Charge within a lead of 50 meters. All unserviceable materials, rubbish etc. shall be disposed off as directed by the Engineer-in-Charge.
8. The contractor shall maintain/disconnect existing services, whether temporary or permanent, where required by the Engineer-in-Charge.
9. No demolition work should be carried out at night especially when the building or structure to be demolished is in an inhabited area.
10. Screens shall be placed where necessary to prevent injuries due to falling pieces.
11. Water may be used to reduce dust while tearing down plaster from brick work.
12. Safety belts shall be used by laborers while working at higher level to prevent falling from the structure.
13. First-aid equipment shall be got available at all demolition works of any magnitude.

Mode of Measurement: The dismantled area shall be measured and item shall be paid on per cu.m. basis including all work upto installation complete as per specifications as detailed above.

Item No. 42:

Providing and laying masonry of I.S. Standard C.C. hollow block 100 x 200 x 400 mm with 100mm thick in cement mortar 1:6 proportion for superstructure including curing, scaffolding etc. complete.

Specification:-

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General:The item pertains to providing C.C. hollow block Masonry in specified proportion of Cement Mortar as per drawing / contract, in foundation and up to plinth level. The item covers bailing out water striking out joints on exposed faces, scaffolding, curing etc.

Material:

1. C.C. hollow block:C.C. hollow block shall conform to the specifications.Approval to samples of locally available shall be taken from the Engineer-in-Charge and samples shall be preserved to compare with the supply to work site.
2. The Sand or Fine Aggregate:The sand or fine aggregate for mortar shall be natural sand, crushed stone sand or crushed gravel sand. The specifications shall conform to item. Test results of the grading of sand shall be submitted to the Engineer-in-Charge for approval. The decision in accepting the sand, which has deviation from specification, is left to the Engineer-in-Charge.
3. Cement:Cement to be used shall conform to Specifications.
4. Water:Water shall conform to Specifications as per item.

Construction Procedure:

Cement Mortar:Cement mortar shall meet the requirements of IS: 2250 shall be prepared by mixing cement and sand by volume. Proportion of cement and sand shall be as specified or as directed by the Engineer-in-charge or as shown in drawings. The sand being used for mortar shall be sieved. The mortar shall be used as soon as possible after mixing and before it has begun to set and in any case within initial setting time of cement after water is added to the dry mixture. Mortar unused for more than initial setting time of cement, shall be rejected and removed from the site of work.

Proportioning:The unit of measurement for cement shall be a bag of cement weighing 50 kgs and this shall be taken as 0.035 cubic meter. Sand shall be measured in boxes of suitable size on the basis of its dry volume. In case of damp sand, its quantity shall be increased suitably to allow for bulkage.

Mixing:The mixing of mortar shall be done in mechanical mixer operated manually or by power. The Engineer-in-Charge may however, permit hand mixing, as a special case, taking into account the magnitude, nature and location of work. The Contractor shall take the prior permission of Engineer-in- Charge in writing, for using hand-mix, before the commencement of work.

Mixing in Mechanical Mixer:Cement and sand in specified proportions, by volume, shall be thoroughly mixed dry in a mixer. Water shall then be added gradually and wet mixing continued for at least one minute. Care shall be taken not to add more water than that which shall bring the mortar to the consistency of a stiff paste. Wet mix from the mixer shall be unloaded on watertight masonry platform, made adjacent to the mixer. Platform shall be at least 150mm above the leveled ground, to avoid contact of surrounding earth with the mix. Size of the platform shall be such that it shall extend at least 300mm around the loaded wet mix area. Wet mix, so, prepared shall be utilized within initial setting time

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[thirty (30) minutes for ordinary Portland cement conforming to IS:269] after addition of water. Mixer shall be cleaned with water each time before suspending the work.

Hand Mixing:The measured quantity of sand shall be leveled on a clean watertight masonry platform and cement bags emptied on top. The cement and sand shall be thoroughly mixed dry by being turned over and over, backward and forward, several times till the mixture is of uniform color. The quantity of dry mix that can be consumed within initial setting time of cement shall then be mixed with just sufficient quantity of water to bring the mortar to the consistency of stiff paste.

Block masonry: (one or more block thickness): Block work (one or more block thickness) shall be laid in English Bond unless otherwise specified. Half or cut block shall not be used except when needed to complete the bond. In no case the defective block shall be used. A layer of average thickness of 10 mm of cement mortar shall be spread on full width over a suitable length of lower course or the concrete surface. In order to check and achieve uniformity in masonry, the thickness of bed joints shall be such that four courses and three joints taken consecutively shall measure equal to four times the actual thickness of the brick plus 30 mm. Its inside faces shall be buttered with mortar before the next block is laid and pressed against it. After completion of the course, all vertical joints shall be filled from top with mortar. All block course shall be taken up truly plumb; if battered, the batter is to be truly maintained. All courses shall be laid truly horizontal and vertical joints shall be truly vertical. The level and verticality of work in walls shall be checked up at every 1-metre interval. The masonry walls of structures shall be carried up progressively, leaving no part one meter lower than the other. If this cannot be adhered to, the blockmasonry shall be raked back according to bond (and not left toothed) at an angle not more than 45 degrees but raking back shall not start within 60 centimeters of a corner. In all cases returns, buttresses, counter forts, pillars etc. shall be built up carefully course by course, and properly bonded with the main walls. The blockwork shall not be raised more than fourteen (14) courses per day.

At the junction of any two walls, the blocks shall at each alternate course, be carried into each of the respective walls so as to thoroughly unite the work. The courses at the top of plinth and skirting's, at the top of the wall just below the soffit of the roof slab or roof beam and at the top of the parapet, shall be laid with bricks on edge. Brick on edge course shall be so arranged as to tightly fit under the soffit of the roof beam or roof slab, restricting the mortar layer thickness upto 12mm, however, any gap between the finished fly ash brick masonry and soffit or roof slab/beam shall be suitably sealed with the mortar.

Bad Workmanship : If the workmanship of the block workmasonry laid, or the strengths of mortar after testing found to be not of acceptable standard, the Engineer-in-charge shall ask the contractor to demolish the block work and redo the block work of good quality at the contractors cost.

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Curing:Green work shall be protected from rain or any other running water or accumulated water from any source, by suitable means. Masonry works, as it progresses, shall be kept thoroughly wet by sprinkling water at regular intervals, on all faces. Curing shall be done after 24 hours of completion of day's work and shall be done for at least 7 days after completion. Proper watering cans with spray nozzles, rubber or PVC pipes shall be used for this purpose.

Testing:The testing of Blocks for its crushing strength, water absorption test etc. shall be carried out as specified in Gen/D/0.2. Tests for grading of sand / fine aggregate, bulkgage etc shall be as specified at Gen/C/0 and Gen/C/0.2.2. Tests for cement shall be as specified at Gen/C/0.2.1. All the tests shall have to be carried out as directed and the cost of contractor. The test records shall be maintained and kept at site for inspection.

Staging/Scaffolding:Staging/scaffolding shall be properly planned and designed by the Contractor. Use of only tubes is permitted for staging/scaffolding. Design of staging/scaffolding shall be submitted for approval of the Engineer-in-Charge, before commencement of work. Single scaffolding having one set of vertical support, shall be used and other end of the horizontal scaffolding member shall rest in a hole provided in the header course. The supports shall be sound and strongly clamped with the horizontal pieces over which the scaffolding planks shall be fixed. The holes left in the masonry works for supporting the scaffolding shall be filled and made good with plain cement concrete of grade 1:3:6 during plastering. Suitable access shall be provided to the working platform area. The scaffolding shall be strong enough to withstand all loads likely to come upon it and shall also meet all the requirements specified in IS : 2750. Double scaffolding shall be provided for pillars less than one meter in width or for the first class masonry or for a building having more than two storey's. The following measures shall also be considered during erection of the scaffolding/staging.

- a) Sufficient skirting's or underpinnings, in addition to base plates, shall be provided, particularly, where scaffoldings are erected on soft grounds.
- b) Adjustable bases to compensate for uneven ground shall be used.
- c) Proper anchoring of the scaffolding/staging at reasonable intervals shall be provided in each direction with the main structure wherever available.
- d) Horizontal braces shall be provided to prevent the scaffolding from rocking.
- e) Diagonal braces shall be provided continuously from bottom to top between two adjacent rows of vertical supports.
- f) The scaffolding/staging shall be checked at every stage for plumb line.
- g) Wherever the scaffolding/staging is found to be out of plumb, it shall be dismantled and re-erected afresh. Effort shall not be made to bring it in line with a physical force.
- h) All clamps and couplings shall be properly tightened with nuts and bolts to avoid slippage.
- i) Erection work of a scaffolding/staging under no circumstances shall be left totally to semiskilled or skilled workmen and shall be carried out under the supervision of

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contractor's technically qualified civil engineer. For smaller works or work in remote areas, wooden ballies or bamboos may be permitted for scaffolding/staging by the Engineer-in-Charge at his sole discretion. The contractor must ensure the safety and suitability of such works

Embedment of Fixtures:All fixtures, pipes, conduits, holdfasts of doors and windows etc. required to be built in walls, shall be embedded in plain cement concrete of grade 1:3:6 at the required position as the work proceeds.

Item to Include:Item includes supply of accepted standard C.C. hollow block, all other material viz. cement, sand or fine aggregate, water; all labor; scaffolding; tools and equipment; bailing out the water, mixing of mortar, laying of the brickwork as specified above etc.. The cost of testing, the machinery hire/depreciation charges, charges for scaffolding, curing etc. are deemed to be included in the item rate for the fly ash brick masonry. Item also includes providing openings, fixtures, preparing soffits for beams or other elements, racking of joints on outer surface etc. upto a lift of + 5 m.

Mode of Measurement and Payment:The measurement of brickwork will be on volumetric basis in cubic metre (cum). Deductions for rectangular or circular openings, shall be as per IS : 1200.

Item No. 43:

Providing second class Burnt Brick masonry with conventional/ I.S. type bricks in cement mortar 1:4 in half brick thick wall including mild steel longitudinal reinforcement of 2 bars of 6 mm diameter / 2 hoop iron strips 25 mm X 1.6 mm placed at every third course, properly bent and bonded at ends scaffolding, racking out joints and watering etc. complete.

Specification-brick masonry in half brick walls shall be done in the same manner as described above except that the bricks shall be laid in stretcher bond. When the half fly ash brick masonry is to be reinforced, 2 Nos. M.S.bars of 6 mm dia., shall be embedded in every Eleventh layer as given in the item (the dia. of bars shall not exceed 8 mm). These shall be securely anchored at their end where the partitions end. The free ends of the reinforcement shall be keyed into the mortar of the main fly ash brick masonry to which the half fly ash brick masonry is joined. The mortar used for reinforced fly ash brick masonry shall be rich dense cement mortar of mix 1:4(1 cement: 4 coarse sand). Lime mortar shall not be used. Over laps in reinforcement, if any shall not be less than 30 cm. The mortar interposed between the reinforcement bars and the brick shall not be less than 5 mm. The mortar covering in the direction of joints shall not be less than 15 mm.

Measurements: - The length and height of the wall shall be measured correct to a cm. The area shall be calculated in sq.m. Where half brick wall is joined to the main walls of one brick or greater thickness and measurements for half brick wall shall be taken for its clear length from the face of the thicker wall.

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Rate: The rate includes the cost of the materials and labor involved in all the operations described above except reinforcement which is to be paid for separately.

BRICK TILE WORK

The work shall be done in the same manner as described

HONEY COMB FLY ASH BRICK MASONARY

The honeycomb fly ash brick masonry shall be done with specified class of brick, laid in specified mortar. All joints and edges shall be struck flush to give an even surface. The thickness of the brick honeycomb work shall be half-brick only, unless otherwise specified. Openings shall be equal and alternate with half brick laid with a bearing of 2 cm on either side. The rate includes the cost of materials and labor involved in all the operations described above.

JOINING OLD FLY ASH BRICK MASONARY WITH NEW FLY ASH BRICK MASONARY:

In case the height of the bricks of old as well as new work is same, the old work shall be toothed to the full width of the new wall and to the depth of a quarter of brick in alternate courses. In case the height of the bricks is unequal, then the height of each course of new work shall be made equal to the height of the old work by adjusting thickness of horizontal mortar joints in the new wall. Where necessary, adjustment shall be made equal to thickness of old wall by adjusting the thickness of vertical joints. For joining new cross wall to old main walls, a number of rectangular recesses of width equal to the thickness of cross wall, three courses in height and half a brick in depth shall be cut in the main walls. A space of the three courses shall be left between two consecutive recesses. The new cross wall shall be bonded into the recesses to avoid any settlement. Joining of old fly ash brick masonry with the new fly ash brick masonry shall be done in such a way that there shall not be any hump or projection at the joint.

Mode of Measurement and Payment: The measurement of brickwork will be on basis in Square meter (sqm). Deductions for rectangular or circular openings, shall be as per IS : 1200.

Item No. 44:

Providing and laying Cast in situ/Ready Mix cement concrete in M-25 of trap/ granite/ quartzite/ gneiss metal for R.C.C. beams and lintels as per detailed designs and drawings or as directed including steel centering, formwork, cover blocks, laying/pumping, compaction and roughening the surface if special finish is to be provided and curing etc. complete. (Excluding reinforcement and structural steel). with fully automatic micro processor based PLC with SCADA enabled reversible Drum Type mixer/ concrete Batch mix plant (Pan mixer) etc. complete. With fine aggregate (Natural Sand / Crushed sand VSI Grade finely washed etc)

General: The item refers to cement concrete required for R.C.C. beams (including cantilevered) and lintels in building construction.

Materials:

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Proportion: Proportion of cement concrete shall be 1 : 1 : 2

Coarse aggregates. – Coarse aggregates shall be crushed from sound stones of the type mentioned in the item and obtained from approved quarries. The maximum size of the coarse aggregates shall be 20mm. or 6mm. less than (i) the minimum lateral space between the bars or (ii) the cover whichever is less. The maximum size of the coarse aggregate may be reduced around the congested reinforcement to comply with the above requirement.

Construction.

Dewatering: Dewatering, if any so placing plinth or any other beams shall be covered by the rare of concrete unless a separate item for separate item for dewatering is provided in the tender.

Mixing. The concrete shall be mixed in mechanical mixtures. The Architect shall direct water cement ratio. Slump shall not exceed 8 cm. (about 3") but in thin sections and where reinforcing bars are crowded, slump up to 12 cm. (about 5") may be allowed by the Architect if considered necessary.

Formwork: According to specification No. B. 6.5(b). The bottom boards of the formwork for beams shall be given a camber of 1/240 of the span or as directed by the Architect. Clamps, hooks, etc., required to be embedded shall be fixed in the formwork at the correct location as directed by the Architect. Chamfers, rounding's, moldings, etc., shall be made in the form itself. Constructing of the upper floor shall not be done until the concrete of the lower floor has set adequately to take the load.

Placing: The forms, centering and reinforcement shall be checked and passed the Architect and reinforcement measured before concreting is permitted. Reinforcement will be paid as separate item. Placing shall be done in a balanced manner to avoid eccentric loading on the formwork. The concreting of the beam shall be done in one continuous operation as far as possible. The Architect may, however, permit construction joints at approved sections of the beam. The ribs of beams shall normally be concreted together with the slab of which they form a part. The schedule of programmer shall be got approved by the Architect and adequate labor and machinery shall be provided to keep up the programmed. Clamps, fan hooks and other fixtures, etc., shall be embedded in the concrete while placing, if so, required by the Architect Clamps, etc., they will be paid for separately. Bridges shall be provided to avoid walking over the reinforcement and fresh concrete.

Compaction: Compaction shall be done by vibrators and rods as the concrete is being placed to give a dense concrete free of honeycombing. It should be seen that the vibrator needle does not touch the reinforcement and disturb the concrete already set. Where it is not possible to use the vibrator, rodding shall be resorted to and the concrete with greater slump may be used.

Finishing: Immediately on removing the forms and within a day thereof the formed faces shall be roughened and finished with 1 : 3 cement plaster of sufficient minimum thickness to give a smooth, even and finished surface and the same cured. The average thickness of finishing plaster should not normally 6mm. If, however, it is intended to give a special finish to the formed surface the above plastering shall not be done and the formed faces shall only be roughened to receive the special finish. The special finish shall be paid under a separate item.

Mode of measurement and payment:

The concrete beam and lintel shall be measured for their net length inclusive of bearing on wall correct to a cm. and sectional measurements correct to the nearest half

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centimeter. The sizes of beams and lintels assumed in the estimate of preliminary, drawings are approximate and likely to be changed. The contractor shall not be entitled to extra claims due to any such changes in the sizes. The quantity shall be worked out correct to three places of decimals of cubic meter. The increase in dimension due to plaster finish shall not be taken into account.

No deduction shall be made for reinforcement bars, for pipes not exceeding 25 sq. cms. Each in sectional area, for fixtures embedded, for ends of dissimilar materials like beams, girders etc. having a sectional area up to 500 sq. cm. or for chambers or roundings of edges. The length of a plinth beam shall be measured clear between the faces of pile caps. When a beam is supported on columns, the length of the beam shall be measured between the faces of columns. In beam and slab construction the beam shall be measured as the rib or part below or above the slab.

Fillets between beams and slabs haunches of beams shall be measured as part of beam.

Item No. 45:

Providing and fixing in position TMT - FE - 500 bar reinforcement of various diameters for R.C.C. pile caps, footings, foundations, slabs, beams columns, canopies, staircase, newels, chajjas, lintels pardis, copings, fins, arches etc. as per detailed designs, drawings and schedules. including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required complete.

General: The item pertains to providing and fixing in position reinforcement of all dial for RCC piles, pile caps, footings, foundations, slabs, columns, beams, canopies, staircase, newels, hajjis, lintels padres, copings, fins, arches etc.

Material: The reinforcement shall be of Mild Steel or Tor Steel bars as indicated on the drawings.

Construction: Contractor shall provide the reinforcement bars of tor steel or mild steel of specified dial. at locations in numbers or at spacing, as per detailed designs, drawings and schedules including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required at all locations and height. The work shall be carried out as specified. The reinforcement shall be got checked by the Architect or his representative before concreting. The contractor shall provide and fix in position any additional reinforcement, if directed, in addition to the reinforcement shown on drawing.

Item to Include: The item includes all the material of reinforcement bars, binding wires, welding rods and labor and tools and equipment for cutting, bending welding, testing charges etc. complete as per drawings and as directed by the Architect.

Mode of Measurement and Payment: The measurement of the reinforcement bars shall be taken in metric tons.

Item No. 46:

Providing internal cement plaster 12mm thick in single coat in cement mortar 1:4 without neeru finish to concrete or brick surfaces, in all positions including scaffolding and curing etc. complete.

General: The item pertains to providing Plaster in CM 1:4, without neeru finish to concrete or masonry surface.

Material:

Cement: As per specifications

Sand: As per specifications

Water: As per specification

Cement Mortar: Cement mortar of the specified proportion of 1:4 shall be prepared

Preparation of Surface: The joints in masonry shall be raked out properly. Dust and loose mortar shall be brushed out properly. Brushing and scrapping if any, shall remove efflorescence. The surface shall then be thoroughly washed with water, cleaned and kept wet before plastering is commenced.

Scaffolding: The contractor shall provide scaffolding required for facility of construction. Quoted rates are deemed to include the cost of scaffolding as required. Scaffolding will be double or single as is warranted by the work. Scaffolding shall be erected with steel sections or pipes, bullies or bamboos of adequate strength so as to be safe for all construction operations. The contractor shall take all measures to ensure the safety of the work and working people. Any instruction of the Architect in this respect shall also be complied with. The contractor shall be entirely responsible for any damage to property or injury to persons resulting from ill erected scaffolding, defective ladders and materials or otherwise arising out of his default in his respect. Proper scaffolding shall be provided to allow easy approach to every part of the work. Overhead work shall not be allowed.

Application of Plaster: Before commencing the plastering the surface to be plastered shall be made wet sprinkling water. The patches of mortar, with thickness equivalent to thickness shall be provided on the area to be plastered. It shall be ensured that the surface all such patches is in true level/batter/plumb as the case may be; to achieve this thickness of patches may vary marginally, but average thickness shall not be less than that specified.

1. Ceiling plaster shall be completed before commencement of wall plaster.

2. Plastering shall be started from the top and worked down towards the floor. All putlog holes shall be properly filled in advance of the plastering as the scaffolding is being taken down. To ensure even thickness and a true surface, plaster about 15x15 cm shall be first applied, horizontally and vertically, at not more than 2 m intervals over the entire surface to serve as gauge. The surfaces of these gauged areas shall be truly in the plane of the finished plaster surface. The mortar shall then be laid on the wall, between the gauges with trowel. The mortar shall be applied in a uniform surface slightly more than the specified thickness and then brought to a true surface by working a wooden straight edge reaching across the gauges, with small upward and sideways movements at a time. Finally the surface shall be finished off true with trowel or wooden float according as a smooth or a sandy granular texture is required. Excessive trawling or over working the float shall be avoided. During this process a solution of lime putty shall be applied on the surface to make the later workable.

3. All corners, arises, angles and junctions shall be truly vertical or horizontal as the case may be and shall be carefully finished. Rounding or chamfering corners, arises, provision

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of grooves at junction etc. where required shall be done without any extra payment. Such rounding, chamfering or grooving shall be carried out using proper templates or battens to the sizes required.

4. When suspending work at the end of the day, the plaster shall be left, cut clean to line both horizontally and vertically. When recommencing the plastering, the edge of the old work shall be scrapped cleaned and wetted with lime putty before plaster is applied to the adjacent areas, to enable the two to properly joint together. Plastering work shall be closed at the end of the day on the body of wall and not nearer than 15 cm to any corners or arises. It shall not be closed on the body of the features such as plasters, bands and cornices, nor at the corners of arises. Horizontal joints in plasterwork shall not also occur on parapet tops and coping as these invariably lead to leakage. No portion of the surface should be left out initially to be patched up later on.

5. Finish: The plaster shall be finished to a true level and plumb surface and to the proper degree of smoothness as required. The work shall be tested frequently as the work proceeds with a true straight edge not less than 2.5 m long and with plumb bobs. All horizontal lines and surfaces shall be tested with a level and all jambs and corners with a plumb bob as the work proceeds.

Thickness: The thickness of the plaster specified shall be measured exclusive of the thickness of key i.e. grooves or open joints in brick work. The average thickness of plaster shall not be less than the specified thickness or 12mm. The minimum thickness over any portion of the surface shall not be less than specified thickness by more than 3 mm. The average thickness should be regulated at the time of plastering by keeping suitable thickness of the gauges. Extra thickness required in doubling behind rounding of corners at junction of wall or in plastering of masonry cornices etc. shall not be paid for.

Curing: Curing shall be started 24 hours after finishing the plaster. The plaster shall be kept wet for a period of seven days. During this period, it shall be suitably protected from all damages at the contractor's expenses by such means as the Architect may approve. The dates on which the plastering is done shall be legibly marked on the various sections plastered so that curing for the specified period thereafter can be watched.

Precautions: Any cracks which appear in the surface and all portions which sound hollow when tapped, or are found to be soft or otherwise defective shall be cut out in rectangular shape and re plastered as directed by Architect. When ceiling plaster is done, it shall be finished to chamfered edge at an angle at its junction with a suitable tool when plaster is being done. Similarly when the wall plaster is being done, it shall be kept separate from the ceiling plaster by a thin straight groove not deeper than 6 mm drawn with any suitable method while the plaster is green.

To prevent surface cracks appearing between junction of column/beams and walls 150 mm wide chicken wire mesh should be fixed with U nails 150 mm c/c in one vertical plane should be carried out in one go. For providing and fixing chicken wire mesh with U nails, payment shall be made separately under relevant item.

Item to Include: The item includes providing all materials for plastering, including transportation, royalty for material, all labour, tools and plants, machinery and equipments, staging, scaffolding, bailing out water, testing, curing and construction as per above specifications etc. complete.

Mode of Measurement and Payment: The plaster area shall be measured in sqm as detailed below and shall be paid at the contract rate per sqm.

Measurements:

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1. Length and breadth shall be measured correct to a cm and its area shall be calculated in m² correct to two places of decimal.
2. Thickness of the plaster shall be exclusive of the thickness of the key i.e. grooves, or open joints in brickwork.
3. The measurement of wall plaster shall be taken between the walls or partitions (the dimensions before the plaster shall be taken) for the length and from the top of the floor of skirting to the ceiling for the height. Depth of covers or cornices if any shall be deducted.
4. Plaster over masonry pilasters will be measured and paid for as plaster only.
5. Exterior plastering at a height greater than 10 m from average ground level shall be measured separately in each story height. Patch plastering (in repairs) shall be measured as plastering new work, where the patch exceed 2.5 m² extra payment being made for preparing old wall, such as dismantling old plaster, raking out the joints and cleaning the surface. Where the patch does not exceed 2.5 m² in area it shall be measured under the appropriate item under sub head 'Repairs to Building'.
6. Deductions in measurements for opening, etc. will be regulated as follows.
No deduction will be made for openings or ends of joints, beams, posts, girders, steps etc. up to 2.0 m² in area and no additions shall be made either for the jambs, soffits and sills of such openings. When plastered on one face when plaster is provided on both faces the area of opening shall be deducted from one side. In respect of large openings with area more than 2.0 Sqm. The deduction for opening shall be made and jambs will be paid. The above procedure will apply to both faces of wall.

Item No. 47:

Providing Internal Cement Plaster 6mm Thick In Single Coat In Cement Mortar 1:3 Without Neeru Finish to concrete or brick surfaces, in all position including scaffolding and curing etc. complete. Spec. No. Bd.L. 2 Page No. 368

General: The item pertains to providing Plaster in CM 1:3, with neeru finish to concrete or masonry surface.

Material:

Cement: As per specifications

Sand: As per specifications

Water: As per specification

Cement Mortar: Cement mortar of the specified proportion of 1:3 shall be prepared

Preparation of Surface: The joints in masonry shall be raked out properly. Dust and loose mortar shall be brushed out properly. Brushing and scrapping if any, shall remove efflorescence. The surface shall then be thoroughly washed with water, cleaned and kept wet before plastering is commenced.

Scaffolding: The contractor shall provide scaffolding required for facility of construction. Quoted rates are deemed to include the cost of scaffolding as required. Scaffolding will be double or single as is warranted by the work. Scaffolding shall be erected with steel sections or pipes, bullies or bamboos of adequate strength so as to be safe for all construction operations. The contractor shall take all measures to ensure the safety of the work and working people. Any instruction of the Architect in this respect shall also be complied with. The contractor shall be entirely responsible for any damage to property or

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injury to persons resulting from ill erected scaffolding, defective ladders and materials or otherwise arising out of his default in his respect. Proper scaffolding shall be provided to allow easy approach to every part of the work. Overhead work shall not be allowed.

Application of Plaster: Before commencing the plastering the surface to be plastered shall be made wet sprinkling water. The patches of mortar, with thickness equivalent to thickness shall be provided on the area to be plastered. It shall be ensured that the surface all such patches is in true level/batter/plumb as the case may be; to achieve this thickness of patches may vary marginally, but average thickness shall not be less than that specified.

1. Ceiling plaster shall be completed before commencement of wall plaster.
2. Plastering shall be started from the top and worked down towards the floor. All putlog holes shall be properly filled in advance of the plastering as the scaffolding is being taken down. To ensure even thickness and a true surface, plaster about 15x15 cm shall be first applied, horizontally and vertically, at not more than 2 m intervals over the entire surface to serve as gauge. The surfaces of these gauged areas shall be truly in the plane of the finished plaster surface. The mortar shall then be laid on the wall, between the gauges with trowel. The mortar shall be applied in a uniform surface slightly more than the specified thickness and then brought to a true surface by working a wooden straight edge reaching across the gauges, with small upward and sideways movements at a time. Finally the surface shall be finished off true with trowel or wooden float according as a smooth or a sandy granular texture is required. Excessive trawling or over working the float shall be avoided. During this process a solution of lime putty shall be applied on the surface to make the later workable.
3. All corners, arises, angles and junctions shall be truly vertical or horizontal as the case may be and shall be carefully finished. Rounding or chamfering corners, arises, provision of grooves at junction etc. where required shall be done without any extra payment. Such rounding, chamfering or grooving shall be carried out using proper templates or battens to the sizes required.
4. When suspending work at the end of the day, the plaster shall be left, cut clean to line both horizontally and vertically. When recommencing the plastering, the edge of the old work shall be scrapped cleaned and wetted with lime putty before plaster is applied to the adjacent areas, to enable the two to properly joint together. Plastering work shall be closed at the end of the day on the body of wall and not nearer than 15 cm to any corners or arises. It shall not be closed on the body of the features such as plasters, bands and cornices, nor at the corners of arises. Horizontal joints in plasterwork shall not also occur on parapet tops and coping as these invariably lead to leakage. No portion of the surface should be left out initially to be patched up later on.
5. Finish: The plaster shall be finished to a true level and plumb surface and to the proper degree of smoothness as required. The work shall be tested frequently as the work proceeds with a true straight edge not less than 2.5 m long and with plumb bobs. All horizontal lines and surfaces shall be tested with a level and all jambs and corners with a plumb bob as the work proceeds.

Thickness: The thickness of the plaster specified shall be measured exclusive of the thickness of key i.e. grooves or open joints in brick work. The average thickness of plaster shall not be less than the specified thickness or 12mm. The minimum thickness over any portion of the surface shall not be less than specified thickness by more than 3 mm. The average thickness should be regulated at the time of plastering by keeping

suitable thickness of the gauges. Extra thickness required in doubling behind rounding of corners at junction of wall or in plastering of masonry cornices etc. shall not be paid for.

Curing: Curing shall be started 24 hours after finishing the plaster. The plaster shall be kept wet for a period of seven days. During this period, it shall be suitably protected from all damages at the contractor's expenses by such means as the Architect may approve. The dates on which the plastering is done shall be legibly marked on the various sections plastered so that curing for the specified period thereafter can be watched.

Precautions: Any cracks which appear in the surface and all portions which sound hollow when tapped, or are found to be soft or otherwise defective shall be cut out in rectangular shape and re plastered as directed by Architect. When ceiling plaster is done, it shall be finished to chamfered edge at an angle at its junction with a suitable tool when plaster is being done. Similarly when the wall plaster is being done, it shall be kept separate from the ceiling plaster by a thin straight groove not deeper than 6 mm drawn with any suitable method while the plaster is green.

To prevent surface cracks appearing between junction of column/beams and walls 150 mm wide chicken wire mesh should be fixed with U nails 150 mm c/c in one vertical plane should be carried out in one go. For providing and fixing chicken wire mesh with U nails, payment shall be made separately under relevant item.

Item to Include: The item includes providing all materials for plastering, including transportation, royalty for material, all labour, tools and plants, machinery and equipments, staging, scaffolding, bailing out water, testing, curing and construction as per above specifications etc. complete.

Mode of Measurement and Payment: The plaster area shall be measured in sqm as detailed below and shall be paid at the contract rate per sqm.

Measurements:

1. Length and breadth shall be measured correct to a cm and its area shall be calculated in m² correct to two places of decimal.
2. Thickness of the plaster shall be exclusive of the thickness of the key i.e. grooves, or open joints in brickwork.
3. The measurement of wall plaster shall be taken between the walls or partitions (the dimensions before the plaster shall be taken) for the length and from the top of the floor of skirting to the ceiling for the height. Depth of covers or cornices if any shall be deducted.
4. Plaster over masonry pilasters will be measured and paid for as plaster only.
5. Exterior plastering at a height greater than 10 m from average ground level shall be measured separately in each story height. Patch plastering (in repairs) shall be measured as plastering new work, where the patch exceed 2.5 m² extra payment being made for preparing old wall, such as dismantling old plaster, raking out the joints and cleaning the surface. Where the patch does not exceed 2.5 m² in area it shall be measured under the appropriate item under sub head 'Repairs to Building'.
6. Deductions in measurements for opening, etc. will be regulated as follows.
No deduction will be made for openings or ends of joints, beams, posts, girders, steps etc. up to 2.0 m² in area and no additions shall be made either for the jambs, soffits and sills of such openings. When plastered on one face when plaster is provided on both faces the area of opening shall be deducted from one side. In respect of large openings with area more than 2.0 Sqm. The deduction for opening shall be made and jambs will be paid. The above procedure will apply to both faces of wall.

Item No. 48:

Providing and applying two coats of wall care Putty on plastered surface and Ceiling and Walls to prepare surface even and smooth of approved make, etc complete.

General: The item pertains to providing wall care putty to concrete or masonry surface.

Material:

Wall care putty As per HS Codes of Heading 3214

Preparation of Surface: Remove all loosely adhering material with a help of emery stone, putty blade or wire brush and clean water. The substrata should be clean, free from dust, grease loose materials. Dry and absorbent surface should be moistened with sufficient quantity of clean water. Mixing of putty shall be done with 33-35% clean water slowly mixing to make a paste till a uniform paste is formed.

Scaffolding: The contractor shall provide scaffolding required for facility of construction. Quoted rates are deemed to include the cost of scaffolding as required. Scaffolding will be double or single as is warranted by the work. Scaffolding shall be erected with steel sections or pipes, bullies or bamboos of adequate strength so as to be safe for all construction operations. The contractor shall take all measures to ensure the safety of the work and working people. Any instruction of the Architect in this respect shall also be complied with. The contractor shall be entirely responsible for any damage to property or injury to persons resulting from ill erected scaffolding, defective ladders and materials or otherwise arising out of his default in his respect. Proper scaffolding shall be provided to allow easy approach to every part of the work. Overhead work shall not be allowed.

Application:- The first coat shall be applied on already moistened wall surface from bottom to upward direction uniformly with help of putty blade after drying of first coat of putty the surface will be gently rubbed with wet sponge or with putty blade in order to remove the loose particle. Allow the surface to dry for at least three hours before applying the second coat of putty after drying of second coat marks if any will be removed with the help of moist sponge or with the putty blade. Total thickness of coat shall be limited to 1.5mm

Precautions: Any cracks which appear in the surface and all portions which sound hollow when tapped, or are found to be soft or otherwise defective shall be cut out in rectangular shape and re plastered as directed by Architect.

Item to Include: The item includes providing all materials for plastering, including transportation, royalty for material, all labour, tools and plants, machinery and equipments, staging, scaffolding, bailing out water, testing, curing and construction as per above specifications etc. complete.

Mode of Measurement and Payment: The Wall care putty area shall be measured in sqm as detailed below and shall be paid at the contract rate per sqm.

Measurements:

1. Length and breadth shall be measured correct to a cm and its area shall be calculated in m² correct to two places of decimal.
2. Thickness of the plaster shall be exclusive of the thickness of the key i.e. grooves, or open joints in brickwork.
3. The measurement of wall plaster shall be taken between the walls or partitions (the dimensions before the plaster shall be taken) for the length and from the top of the floor of skirting to the ceiling for the height. Depth of covers or cornices if any shall be deducted.

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4. Plaster over masonry pilasters will be measured and paid for as plaster only.
5. Exterior plastering at a height greater than 10 m from average ground level shall be measured separately in each story height. Patch plastering (in repairs) shall be measured as plastering new work, where the patch exceed 2.5 m² extra payment being made for preparing old wall, such as dismantling old plaster, raking out the joints and cleaning the surface. Where the patch does not exceed 2.5 m² in area it shall be measured under the appropriate item under sub head 'Repairs to Building'.
6. Deductions in measurements for opening, etc. will be regulated as follows.
No deduction will be made for openings or ends of joints, beams, posts, girders, steps etc. up to 2.0 m² in area and no additions shall be made either for the jambs, soffits and sills of such openings. When plastered on one face when plaster is provided on both faces the area of opening shall be deducted from one side. In respect of large openings with area more than 2.0 Sqm. The deduction for opening shall be made and jambs will be paid. The above procedure will apply to both faces of wall.

Item No. 49:

Providing and laying ceramic tiles/antiskid ceramic tiles (Bell, Spartek , Johnson, Pedders, Kajaria, RAK etc). conforming to IS:13712-1993, of approved color including cement float, filling the joints with matching color, with pigments added to white cement slurry cleaning etc. complete.

Specification:

General: The item pertains to providing and laying ceramic tiles of approved make.

Material: Ceramic tiles shall be of approved make and quality and shall conform to IS:777-

1988 or latest relevant IS code in all respect. Samples of tiles shall be got approved by the Engineer-in-Charge, who shall keep them in his office for verification and composition. White cement shall be of approved make. The samples of the tiles shall be got tested from the approved

Laboratory as per provisions in IS:777-1988 or latest relevant IS code by the contractor at his cost. The test results are submitted to the MIDC for record.

Mortar Bedding: The mortar shall be of 1:3 proportions and shall be about 20 mm thick average, laid on prepared sub-base of appropriate level and grade. The amount of water added while preparing mortar shall be the minimum necessary to give sufficient plasticity for laying. Care shall be taken in the preparation of the mortar to ensure that there are no hard lumps that would interfere with even bedding of the tiles. Before spreading the mortar bed, the base shall be cleaned of all dirt, scum or laitance and loose materials and then well wetted without forming any pools by the use of screed battens to proper level of slope. The thickness of the bedding shall not be less than 20 mm any one place. The tiles shall be laid on the bedding mortar when it is still plastic but has become sufficiently stiff to offer a fairly firm cushion for the tiles.

Fixing Tiles: The tiles before laying shall be soaked in water for at least 2 hours. Tiles which are fixed in the floor adjoining the wall shall be so arranged that the surface of the round edge tiles shall correspond to the skirting or dado. Neat cement grout of honey like consistency shall be spread over the bedding mortar just to cover so much area as can be tiled within half an hour. The edges of the tiles shall be smeared with neat white cement slurry or colored cement slurry matching color of the tiles and fixed in this grout one after the other, each tile being well pressed and gently

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tapped with a wooden mallet till it is properly bedded and in level with the adjoining tiles. There shall be no hollows in bed or joints. The joints shall be kept as close as possible and in straight lines. The joints between the tiles shall not exceed 1.5 mm wide. The joints shall be grouted with slurry of white cement. Where ceramic tiles are specified joint shall be grouted with slurry of white cement mixed with appropriate color.

Curing: After fixing the tiles finally in an even plane, the flooring shall be covered with wet

saw dust and allowed to mature undisturbed for 7 days.

Cleaning: After the tiles have been laid in a room or at the day's fixing work is completed, the surplus cement grout that may have come out of the joints shall be cleaned off before it sets.

Once the floor has set, the floor shall be carefully washed clean and dried. When dry, the floor

shall be covered with oil free dry saw dust which shall be removed only after completion of the

construction work and just before the floor is occupied.

Item to Include: The item shall include all labor, materials, cement mortar 1:3 mortar bedding, tools and equipment required for the operations to carry out the work for providing and fixing the ceramic tiles as specified above.

Mode of Measurement and Payment: The area of the flooring shall be measured in sqm correct up to 2 decimals. The contract rate shall be per sqm .

Item No. 50:

Providing sills of polished Kadappa stone 25mm to 30mm thick, on a bed of 1:4 cement mortar including cement float, filling joints with slurry, curing polishing and cleaning etc. complete.

Specification:

General: The item pertains to providing and fixing polished black Kadappa stone slab of required thickness, size etc.

Material: The kadappa stone shall be polished hard, strong, durable, resistant to wear, uniform color. The stone shall be without any vein, crack, fault/ flaw. The stone shall be 25 mm to 30 mm thick and at any location the thickness shall not be less than 25 mm. The kadappa stone shall be of required width, size.

Plastering to Walls: Providing plaster of about 20 mm thick cement mortar 1:3 and providing of mortar bed cement mortar 1:4 – 25 mm to 40 mm thick. Providing plaster to walls is included in the item.

Fixing of Black kadappa: Dado or skirting work shall be done only after fixing black kadappa on the floor in horizontal position. The work shall be generally carried out as per the approved drawings. For fixing of black kadappa polished stones, for kitchen platform, necessary grooves in the walls shall be made to hold the slabs in correct location & for stability. The slabs shall be molded, cut rounded and finished at the locations directed by the Engineer in Charge of the work. After completion of work, the area around the slabs shall be finished properly. The gentle slope to drain out water/avoiding forming water pools shall be provided.

In case of sill, jambs, the kadappa pieces of specified size should be of equal thickness all around to have proper aesthetic view. The projection of the sill/ jamb shall be maximum 5 mm from the finished wall surface. The sill, jambs shall be cut/ rounded/ molded & finished at the locations

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directed by Engineer-in-Charge.

Black kadappa shall be fixed when the cushioning mortar is still plastic and before it gets very st

iff. The back of black kadappa shall be covered with a thin layer of neat cement paste and the tile

shall then be pressed in the mortar and gently tapped against the wall with a wooden mallet. The

fixing shall be done from the bottom of wall upwards without any hollows in the bed or joints. Each kadappa stone shall be fixed as close as possible to the one adjoining. The black kadappa shall be joined with cement slurry. Any difference in the thickness of black kadappa shall be evened out in cushioning mortar to that all tile faces are in one vertical plane. The joints between the black kadappa shall not exceed 1.5 mm in width and they shall be uniform. While fixing black kadappa indado work, care shall be taken not to break joints vertically if the pattern of fixing black kadappa has not been specified. After fixing the dado, skirting etc., they shall be kept continuously wet for 7 days. If doors, windows or other openings are located within the dado area, the sills, jambs, angles etc., shall be provided with black kadappa and appropriate specials according to the foregoing specification and such tiled area shall be measured net along with the dado. Page 290 Tender ID - 16662

Item to Include: The item includes all material, labor, tools and equipments for providing mortar cement mortar 1:4 cushioning, fixing of black kadappa, filling of joints, curing, cleaning etc, complete as directed above. The item also includes 20 mm thick cement mortar 1:3 plaster as and where required.

Mode of Measurement and Payment: The measurement shall be the area of the dado or skirting, kitchen platform provided in sqm up to 2 decimal. The area provided for jambs, sills etc.

shall be measured net along with the area of dado or skirting. The contract rate shall be per sqm.

Item No. 51:

Providing and laying in position flooring of telephone black / Amba White / Cat bary brown / Ruby red / Ocean Brown granite stone of approved shade and size 18 mm to 20 mm thick on bed 1:6 cement mortar including cement floats striking joints, pointing in C.M. 1:3 curing and cleaning etc. complete.

Specification:

General: The item pertains to providing and laying machine cut machine polished granite stone conforming to IS:1237-1990. The design of the tiles shall be got approved from the Engineer-in-charge.

Material: These shall be granite stone of the color and pattern as approved by the Page 300 Tender ID – 16662 Engineer-in-Charge. The sizes of granite stone slab shall be approved by the Engineer-in-Charge. The granite tiles shall be of the colors to suit the design. A few specimens of the granite tiles to be used as approved by the Engineer-in-Charge, shall be deposited by the contractor in the office of the Engineer-in-Charge for reference.

Fixing of Granite Stone Facing:

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Bedding: Cement mortar for the bedding and cement mortar for pointing shall be of the proportion as specified in the item. When sand bed is mentioned in the item, sand used shall be coarse and shall not contain more than 5 percent of clay.

Fixing of Stone Slab: Before laying, the granite stone, flags shall be thoroughly wetted with clean water and soaked in water not less than 2 hrs. Neat cement grout of honey like consistency shall be spread on the mortar bed over as much area as could be covered with the slabs within half an hour. The specified type of granite stone flags shall be laid on the neat cement float and shall be evenly and firmly bedded to the required level and slope in the mortar bed. Each granite

flag shall be gently tapped with a wooden mallet till it is firmly and properly bedded. There shall be no hollows left. If there is a hollow sound on gentle tapping of the slabs, such granite slabs shall be removed and reset properly. The mason shall make the joints of uniform thickness and in straight lines. The joints shall be struck smooth. But there shall be no smearing on mortar over the slabs. When pointing is to be done the joints shall be raked out for not less than the width of the joints when the mortar is green. The granite flags shall be laid so as to give continuous parallel long joints with cross joints at right angles to them. The edges of the adjoining granite slabs shall be in one plane. Where the granite slabs cover open edges, of floor or window sills the edges shall be neatly rounded off. This shall be included in the rate. When diamond pattern paving is provided in the item, the granite slabs shall be square and laid to the diamond pattern with triangular shaped slabs to make up the edges. In plain pattern stones on each course shall break joint with those in the next. The necessary scaffolding staging shall also be provided under this item. No separate payments shall be made for scaffolding. The necessary hidden clamps shall be provided to ensure proper fixing of facing. The cost of clamps is inclusive in the unit rate of the item.

Polishing and Finishing: Polishing, finishing etc. shall conform to IS:1443. Polishing shall be done by machine to a smooth and plain surface. When a border of colored tiles is included in the

Item, the tiles of the specified color shall be laid in one tile width all round near the border. If a pattern of colored tiles is to be provided it shall be mentioned in the special provisions and/or shown in the drawings. The joints of the plain tiles shall be filled with neat cement slurry and of colored tiles with colored cement slurry.

Curing: The granite slab shall be kept well wetted with damp sand or water for fourteen days. It shall be kept undisturbed for at least seven days.

Cleaning: All flooring shall be thoroughly cleaned and handed over clean and free from any mortar stains, etc.

Item to Include: The item shall include all labour, material, tools and equipments, polishing the granite slabs, cleaning the sub-base, laying mortar bed and cement grout, fixing cement tiles as specified above and making up the joints including cost of clamps, scaffolding etc. completed.

Mode of Measurement and Payment: The area of the granite facing shall be measured in sqm up to 2 decimals. The contract rate shall be per sqm.

Item No. 52:

Providing and fixing solid core flush door shutter in single leaf 32 mm thick decorative type of exterior grade as per detailed drawings approved face veneers 3 mm thick on both faces or as directed, all necessary beads, moldings and lipping, wrought iron hold

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fasts, chromium plated fixtures and fastenings, with brass mortise lock, chromium plated handles on both sides, and finishing with French Polish etc. complete.

Specification:

General: The item pertains to providing and fixing solid core flush door in single leaf of specified thickness, hot pressed with veneer finish on both faces per following specifications.

Material: The teak wood beading for fixing around the flush door shall be of 12 mm thick and of the width flush to the flush door.

Shutter: The solid core shutter shall be of the decorative type of the exterior and interior grade with veneer finish as mentioned in the item. It shall conform to the relevant specifications for the type and grade given in IS 2202/1991. Specifications for wooden Flush Door Shutters (solid core type) It shall be obtained from manufacturers from the approved list. The finished thickness of the shutter shall be as mentioned in the item. Face veneers used shall be deposited with the Engineer for reference. Concealed Teak wood lock rail shall be provided in the shutter. Specific instructions are issued to the manufacturer while placing the order.

Finishing: The wood work shall be applied with three coats of French polishing or oil painting as mentioned as specified or as directed. The varnishing or French polishing shall be done. Oil painting shall be done in three coats of approved shade of paint as specified by the Engineer in Charge.

Item to Include: The item includes all labour, materials and equipment to provide and fix the solid core flush doors as specified. It also includes finishing of the woodwork and iron bars when provided and fixing of approved fixtures. The fixtures shall be paid separately.

Mode of Measurement and Payment: The shutters shall be measured of the clear unrebated opening within door frame in sqm. The dimensions shall be measured correct upto 1 cm. The contract rate shall be for one square meter.

Item No. 53:

Providing and fixing fiber glass reinforced polyster door shutter 30 mm thick as per IS 14856 (2000) (Reaffirmed 2006) without ventilator including chromium plated fixtures and fastening with chromium plated handle.

Specification:

General: The item pertains to providing and fixing fiber glass reinforced polyster door.

Material: fiber glass reinforced polyster as Per IS 14856: 2000

Specification: Fire Rated Fiberglass reinforced Plastic (FRP) Doors certified by Intertek Testing Services for Warnock-Hersey in 20, 45, 60 and 90 minute ratings meeting all specifications of UL 10(c) and UL 10(b) fire door test standards. B. Doors shall be made of fiberglass reinforced plastic (FRP) using chemically proven fire retardant resins resistant to contaminants typically found in the environment for which these specifications are written. Doors shall be 1 3/4 inch thick and of flush construction, having no seams or cracks. Doors shall have equal diagonal measurements. C. Door Plates shall be molded in one continuous piece, starting with a 25-mil gelcoat of the color specified, integrally molded with at least two layers of 1.5 ounce per square foot fiberglass mat. D. Stiles and Rails Core shall be banded by a matrix of fire resistant

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mineral and glass fiber material. E. Core material shall be fire resistant mineral core placed within band structure allowing no voids within. F. Finish of door and frame shall be identical in color and finish. At time of manufacture, 25 mil of resin-rich gelcoat must be integrally molded into both the door and frame. To achieve optimum surface characteristics, the gelcoat shall be cured within a temperature range of 120 F to 170F creating an impermeable outer surface, uniform color throughout, and a permanent homogeneous bond with the resin/fiberglass substrate beneath. Only the highest quality gelcoat will be used to ensure enduring color and physical properties. Paint and/or post application of gelcoat result in poor mechanical fusion and will be deemed unacceptable for this application. The finish of the door and frame must be field repairable without compromising the integrity of the original uniform composite structure, function or physical strength. G. Window openings shall be provided for at time of manufacture and shall be completely sealed so that the interior of the door is not exposed to the environment. Window kits shall be fire rated per U.L. for rating of opening and function of same. H. FBC Option. Where specifically indicated on drawings, fire rated fiberglass doors up to 3' x 7' with corresponding fiberglass frames shall meet the requirements of High Velocity Hurricane Zones up to 175 mph winds. Fire rated fiberglass doors up to 4' x 8' and corresponding fiberglass frames shall meet the requirements of High Velocity Hurricane Zones up to 128 mph winds.

Screws: Screw threads of machine screws used in the manufacture of chromium plated fixtures and fastening with chromium plated handle.

Specification: Providing and fixing fiber glass reinforced polyster door shutter 30 mm thick as per IS 14856 (2000) (Reaffirmed 2006) without ventilator including chromium plated fixtures and fastening with chromium plated handle.

Mode of Measurement and Payment: The shutters shall be measured of the clear unrebated opening within door frame in sqm. The dimensions shall be measured correct upto 1 cm. The contract rate shall be for one square meter.

Item No. 54:

Providing and fixing in position (as per 1868 / 1982) Aluminum sliding window of three tracks with rectangular pipe 95 x 38.10 x 0.90 mm at weight 0.637 kg/Rmt. with window frame bottom track section 92 x 31.75 x 1.30 mm at weight 1.070 kg/Rmt.. Top and side track section 92 x 31.75 x 1.30 mm at weight 0.933 kg/Rmt. The shutter should be of bearing bottom 40 x 18 x 1.25 mm at weight 0.417 kg/Rmt. Inter locking section 40 x 18 x 1.10 mm at weight 0.469 kg/Rmt. and handle and top section 40 x 18 x 1.25 mm at weight 0.417 kg/Rmt. As per detailed drawings and as directed by Engineer in charge with all necessary Aluminum sections fixtures and fastenings such as roller bearing in nylon casting and self locking catch fitted in vertical section of shutter including 5 mm thick plain glass and aluminum mosquito net shutter with stainless steel jail with all required screws and nuts etc, complete. With color anodizing with box.

Specification:

General: The item pertains to providing and fixing anodized aluminium sliding type windows.

Material: Aluminium Alloy Extruded Sections : Aluminium alloy used in the manufacture of extruded window sections shall correspond to IS designation HE9-WP of IS:773 latest

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edition. Specification for wrought aluminium and aluminium alloys, bars, rods and sections (for general engineering purpose). Hollow aluminium alloy sections used shall conform to IS designation HE9-WP of IS:1285 latest edition. Specification for wrought aluminium and aluminium alloys, extruded round tube and hollow sections (for general engineering purpose). Dimensions and weight per meter run of the extruded sections shall be as given in the standard or in the description of the item. For sliding Aluminium windows total weight of section shall be between 6 to 8 kg per sqm.

Coupling Sections: Aluminium alloy coupling sections used shall conform to IS designation HV9-WP of IS:1285 latest edition.

Glass Panes: Glass panes shall be 5 mm thick and weigh at least 12.5kg/m² and shall be free from flaws, specks, or bubbles.

Screws: Screw threads of machine screws used in the manufacture of aluminium doors, windows and ventilators shall conform to the requirement of IS:1362 latest edition. Dimensions for screw threads for general purposes (dia range 0.25 to 39 mm). Other threads shall be permissible if agreed to between the purchaser and the vendor.

Fabrication & Fixing:

Frames: In the opening for the window aluminium rectangular tube frame with width equivalent with of 2/3 or 4 track aluminium section and depth 40 mm shall be fixed. The frame shall have true right angle corners with diagonals when checked shall be same. This frame shall be fixed in the opening for the windows firmly using screws rawal plugs, with screws fixed not more than 300 mm apart. Within this frame four track frames shall be fixed. It should be ensured that the corners are right angle. The sliding shutters shall be fabricated cut of the sections of stipulated size. It should ensure that all the four corners are at true right angle. The frame shall be dismantled. A rubber/PVC gasket of 5 mm with glass shall be fixed on all four sides of glazing. Such glass is fixed in the sliding shutter frame using glass. The PVC rollers shall be fixed to the shutter for smooth sliding. Top track members shall be removed four sliding shutters shall be placed one shutter in each track of top track and placed over bottom track. After ascertaining in each track one shutter is placed top track shall be fixed again to top frame with machine screws.

The loading arrangements as stipulated at end shutters and tracks shall be fixed along with sliding locks to the each shutter. The arrangements handling sliding shutters as approved shall be fixed.

Item to Include: The item includes all labour, materials and equipments to provide and fix the fully glazed anodized aluminium sliding type windows. It also includes, cleaning, polishing of the aluminium section and fixing of approved fixtures such as handles & locking arrangement etc. The fixtures are included in the item. The rate shall be inclusive of silicon sealant / neoprene gasket.

Mode of Measurement and Payment :

a. The aluminium sections used shall be measured in kg upto 1 gram. The contract rate for aluminium section shall be per kg. The cleats for joining the member shall not be paid extra.

b. The specified type of glass shall be measured in sqm upto 2 decimals. The contract rate for glass shall be per sqm.

Item No. 55:

Providing and fixing in position powder coated aluminium louvered windows / ventilator of various sizes with powder coating as per detailed drawing and specifications including

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aluminium frames 80 x 38 mm x 1.22 mm box type, 5 mm thick sheet glass louvers, of approved quality etc. complete. Spec as directed by engineer in charge.

Description	Reference for codes / Employer's requirement
Anodic coatings on aluminium and its alloys – Specifications	I.S. 1868
Specifications for Wrought aluminium and aluminium alloy bars, rods & sections	I.S. 733
Specifications for Aluminium doors, windows & ventilators	I.S. 1948
Recommended practice for anodizing aluminium and its alloys	I.S. 7088
Method for measurement of coating thickness by eddy current	I.S. 6012
Wrought aluminium and aluminium alloys – Extruded round tube and hollow sections for general engineering purposes – Specifications	I.S. 1285
Wrought aluminium and aluminium alloy rivet stock for general engineering purposes	I.S. 740
ISO Metric screw threads Part I to IV	I.S. 4218
Specifications for float glass	I.S. 14900

Materials:

Aluminium Extruded sections: All aluminium extruded sections used shall be of suitable gauge oxidized to natural matt finish or electro colour. The Contractor shall prepare detailed shop drawings of proposal using sections based on architectural design and adequate to meet the performance and other specifications laid down for the work and the same shall be got approved from the Employer's Representative. The aluminium extruded sections shall conform to IS designation HE9 WP alloy with chemical composition and mechanical properties as per IS 733. Hollow section shall conform to IS HV 9 WP of IS 1285. The work shall include the provision of mullions, coupling bars as required to join various units of glazing windows and doors.

Fixtures and fittings: All hardware shall be in stainless steel **316** grade. All fittings and fixtures such as stays, locks, handles, special hinges, floor springs and neoprene /

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rubber lining, gaskets, bushes, rollers, sealants, etc. shall be of approved make and quality. All screws shall be in stainless steel and threads of machine screws shall conform to IS 4218. Gaskets for retaining glass shall be approved heavy duty extruded neoprene. Doors, windows or fixed glazing etc. shall be fixed to sub-frame, concrete or brick wall with suitable metal fasteners.

Sealants: All windows, glazing, door etc. shall be made completely waterproof with the use of necessary approved sealants etc.

Workmanship

General; All joints shall be accurately fabricated and shall be hairline in appearance. The finished surface shall be free from visible defects. The aluminium sections shall be brushed and anodised to natural matt finish or electro colour anodised to any shade as per IS 1868 - 1968 and IS 6012 – 1970. For general interior and exterior use, the anodising shall be of minimum 40 microns thickness and the density shall be at least 32 mg / sqm. The anodic coating shall be properly sealed by steam or boiling in deionised water. Wherever specified, polyester grade machine applied powder coating of approved shade of minimum thickness 40 microns shall be provided. The frames shall be mechanically jointed with 3 mm thick aluminium angle cleats. The shutters shall be mechanically jointed with plated self tapping screws and aluminium safety plate or aluminium alloy blind rivets and nickel plated self tapping screws.

Heavy duty sliding windows: Frames shall be 2 or 3 track as required having in-built grooves to accept weather strip for weather sealing. The shutter vertical, interlock sections shall be hollow sections and horizontal sections shall be non-hollow and suitable for glazing with PVC gaskets. Interlock section shall have in-built grooves for weather stripping. In heavy rainfall areas, the sill member shall be hollow section with special gutter section clipped on to the bottom track so as to have hollow chamber of minimum cross-sectional area. The slots of appropriate size shall be provided in the bottom track and gutter sections for vertical drainage of rain water. PVC valves shall be provided in the gutter sections acting as pressure equalisation cum non-return valves. Rubber gaskets shall not be allowed. The sliding shutters shall be provided with rollers, guides etc. as required.

Open able louvered windows: The coupling bar panel shall be of suitable shape and the louver blade clip shall be riveted to jambs after fixing the blade from inside and being attached to coupling bar.

Open able and fixed windows: The frames shall have in-built grooves to accept the weather strip for weather sealing. For the shutters, vertical interlock shall be hollow section Horizontal section shall be non-hollow suitable for glazing with suitable gaskets.

Doors:The outer frame including intermediate vertical and horizontal members shall be rectangular extruded section having in-built grooves to receive glazing. For shutter, horizontal and vertical section provision shall be made for snap on glazing. Vertical section shall have mullion groove for weather stripping.

Protection: A thick layer of clear transparent lacquer, based on methacrylates or cellulose butyrate shall be applied on the anodized glazing before they are brought on site. The lacquer shall be removed on completion of erection. Gummed paper tape shall be provided for door sections as protective coating.

Testing: The testing shall be as per the methods prescribed in the International or equivalent Indian Standard codes.

Mode of Measurement and Payment:The item shall be measured in sq.m.

Item No. 56:

Providing and fixing mild steel grill work for windows, ventilators etc. 20 kg/sqm as per drawing including fixtures, necessary welding and painting with one coats of anticorrosive paint and two coats of oil painting complete.

Materials:

MS Section: Hot rolled steel section for fabrication of steel grill work for windows, ventilators opening shall conform to IS: 7452. Shapes weights and designations of hot rolled sections shall be as per IS: 7452. Appendix 'D' on page 114-117 indicates the purpose or the situation where these sections are normally used. Tolerance in thickness of the sections shall be $\pm 0.2\text{mm}$. The sections shall be squares, flats, rounds, etc. of the specified dimensions shown in the drawings.

Construction:The steel window grills shall be according to the specified sizes and design. The size of doors and windows shall be calculated, so as to allow 1.25cm clearance on all the four sides of opening to allow for easy fitting of grill into opening. The actual sizes of windows and ventilators shall not vary by more than $+1.5\text{mm}$ from those given in the drawing.

Frames: Both the fixed and opening frames shall be made of sections, which have been cut to length and mitred. The corner of fixed and opening frames shall be welded to form a solid fused welded joint conforming to the requirements given below. All frames shall be square and flat. The process of welding adopted shall be flash butt welding.

Requirements of Welded Joints:

Visual Inspection Test: When two opposite corners of the frame are cut, paint removed and inspected, the joint shall conform to the following:-

- a. Welds should have been made all along the place of meeting the members and tack weldings shall not be permitted.
- b. Welds should have been properly grinded and
- c. Complete cross section of the corner shall be checked and see that the joint is completely solid and there are no cavities visible.

II) Micro and Macro Examinations: From the two opposite corners obtained for visual test, the flanges of the sections shall be cut with the help of saw. The cut surface of the remaining portions shall be polished and etched faces of the weld and the base metal

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shall be free from cracks and reasonably free from under cutting, overlaps, gross porosity and entrapped slag.

III) Fillet Weld Test: Hammering shall fracture the fillet weld in the remaining portion of the joint. The fractured surfaces shall be free from slag inclusion porosity, crack penetration defects and fusion defects. The grill shall be fabricated to the designs and pattern shown in the drawings in this item and the joints shall be welded as shown in the plans or directed by the Engineer in Charge. The grill so formed shall be fixed into the frames of the windows, ventilators, etc. before they are erected in position. The outside strip frame of the frame shall be housed to its full thickness into the recess cut into the frame of the window ventilator, etc. The grill shall be fixed to the frame with screws at the rate of one screw per 30 cm of the length of the outer strip subject to a minimum of 2 nos. in each side of the frame or as indicated on the drawings. The screws shall be countersunk and shall be fixed with the tops of their heads flush with the face of the frame strip. In case the grill is to be fixed to MS windows or ventilators, it shall be properly welded from all the four sides. The frame shall be painted with one coat of red oxide primer and 2 coats of synthetic enamel paint of approved shade when the entire work is completed.

Item to Include: The item includes all labour, tools and equipments, materials such as mild steel sections of specified sizes, screws, necessary welding, painting etc. including wastage for fabricating and fixing and completing the item satisfactory.

Mode of Measurement and Payment: The item of frame provided is measured in Square meter.

Item No. 57:

Providing and applying plastic emulsion paint of approved quality, colour and shade to new surface in three coats including scaffolding, preparing the surface. (excluding primer coat) etc. complete.

Specification:

General: The item pertains to providing and applying plastic emulsion paint of approved color to old or new plastered or masonry surfaces for the specified number of coats.

Material: Plastic emulsion paint shall be conforming to IS:5411. Paints, oil varnish etc. of approved brand and manufacturer shall be used. Only ready mixed paint (Exterior grade) as received from the manufacturer without any admixture shall be used. If for any reason, thinning is necessary in case of ready mixed paint, the brand of thinner recommended by the manufacturer or as instructed by the Engineer-in-Charge shall be used. Approved paints, oil or varnishes shall be brought to the site of work by the contractor in their original containers in sealed condition. The material shall be brought in at a time in adequate quantities to suffice for the whole work or at least of fortnight's work. The materials shall be kept in the joint custody of the contractor and the Engineer-in-Charge. The empties shall not be removed from the site of work, till the relevant item of work has been completed and permission obtained from the Engineer-in-Charge. The empties shall be property of the contractor.

Scaffolding:

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1. Wherever scaffolding is necessary, it shall be erected on double supports tied together by horizontal pieces, over which scaffolding planks shall be fixed. No bullies, bamboos or planks shall rest on or touch the surface
2. Where ladders are used, pieces of old gunny bags shall be tied on their tops to avoid damage or scratches to walls.
3. For white washing the ceiling, proper stage scaffolding shall be erected.

Preparation of Surface: The surface shall be thoroughly cleaned and dusted off. All rust, dirt, scales, smoke splashes, mortar dropping and grease shall be thoroughly removed before painting is started. The prepared surface shall have received the approval of the Engineer-in-Charge after inspection, before painting is commenced. Painting shall not be started until the Engineer-in-Charge has inspected the items of work to be painted, satisfied himself about their proper quality and given his approval to commence the painting work. Painting of external surface should not be done in adverse weather condition like hail storm and dust storm. Painting, except the priming coat, shall generally be taken in hand after practically finishing all other building work. The rooms should be thoroughly swept out and the entire building cleaned up, at least one day in advance of the paint work being started.

Application: Before pouring into smaller containers for use, the paint shall be stirred thoroughly in its containers, when applying also; the paint shall be continuously stirred in the smaller containers so that its consistency is kept uniform. The painting shall be laid on evenly and smoothly by means of crossing laying off, the latter in the direction of the grains of wood. The crossing and laying off consists of covering the area over with paint, brushing the surface hard for the first time over and then brushing alternately in opposite direction, two or three times and then finally brushing lightly in a direction at right angles to the same. In this process, no brush marks shall be left after the laying off is finished. The full process of crossing and laying off will constitute one coat. Where so stipulated, the painting shall be done by spraying. Spray machine used may be (a) high pressure (small air aperture) type, or (b) a low-pressure (large air gap) type, depending on the nature and location of work to be carried out. Skilled and experienced workmen shall be employed for this class of work. Paints used shall be brought to the requisite consistency by adding a suitable thinner. Spraying should be done only when dry condition prevails. Each coat shall be allowed to dry out thoroughly and rubbed smooth before the next coat is applied. This should be facilitated by thorough ventilation. Each coat except the last coat, shall be lightly rubbed down with sand paper or fine pumice stone and cleaned off dust before the next coat is laid. No left over paint shall be put back into the stock tins. When not in use, the containers shall be kept properly closed. No hair marks from the brush or clogging of paint puddles in the corners of panels, angles of molding etc. shall be left on the work. In painting doors and windows, the putty round the glass panes must also be painted but care must be taken to see that no paint stains etc. are left on the glass. Tops of shutters and surfaces in similar hidden locations shall not be left out in painting. However, bottom edge of the shutters where the painting is not practically possible, need not be done nor any deduction on this account will be done but two coats of primer of approved make shall be done on the bottom edge before fixing the shutters. On painting steelworks, special care shall be taken while painting over bolts, nuts rivets overlap etc. The additional specifications for primer and other coats of paints shall be as according to the detailed specifications under the respective headings.

Protective Measures: Doors, windows, floors, article of furniture etc. and such other parts of the building not to be white washed, shall be protected from being splashed upon.

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Splashing and droppings, if any shall be removed by the contractor at his own cost and the surfaces cleaned. Damages if any to furniture of fittings and fixtures shall be recoverable from the contractor.

Item to Include: Item includes all labour, material, equipments such as brushes, scrappers, polish papers etc., scaffolding, cleaning of the area etc. complete as per the specifications. The item also includes removing nails, marking good holes, cracks, patches etc.

Mode of Measurement and Payment:

1. Length and breadth shall be measured correct to a cm. and area shall be calculated in sqm correct to two places of decimals.
2. Corrugated surfaces shall be measured flat as fixed and the area so measured shall be increased by the following percentages to allow for the girthed area. Corrugated asbestos cement sheet 20% Semi corrugated asbestos cement sheet 10%
3. Cornices and other such wall or ceiling features, shall be measured along the girth and included in the measurements
4. Work on old treated surfaces shall be measured separately and so described. The contract rate shall be per sqm area painted including all material and labour involved in all the operations described above.

Item No. 58:

Providing and applying pearl/ luster finish paint of approved color and shade to the existing plaster surface including scaffolding, preparing the surface, applying the acrylic wall putti etc. complete.

Specification:

General: The item pertains to providing and applying pearl/ luster finish paint of approved color to old or new plastered or masonry surfaces for the specified number of coats.

Material: pearl/ luster finish paint shall be conforming to IS:5411. Paints, oil varnish etc. of approved brand and manufacturer shall be used. Only ready mixed paint (Exterior grade) as received from the manufacturer without any admixture shall be used. If for any reason, thinning is necessary in case of ready mixed paint, the brand of thinner recommended by the manufacturer or as instructed by the Engineer-in-Charge shall be used. Approved paints, oil or varnishes shall be brought to the site of work by the contractor in their original containers in sealed condition. The material shall be brought in at a time in adequate quantities to suffice for the whole work or at least of fortnight's work. The materials shall be kept in the joint custody of the contractor and the Engineer-in-Charge. The empties shall not be removed from the site of work, till the relevant item of work has been completed and permission obtained from the Engineer-in-Charge. The empties shall be property of the contractor.

Scaffolding:

1. Wherever scaffolding is necessary, it shall be erected on double supports tied together by horizontal pieces, over which scaffolding planks shall be fixed. No bullies, bamboos or planks shall rest on or touch the surface
2. Where ladders are used, pieces of old gunny bags shall be tied on their tops to avoid damage or scratches to walls.
3. For white washing the ceiling, proper stage scaffolding shall be erected.

Preparation of Surface: The surface shall be thoroughly cleaned and dusted off. All rust, dirt, scales, smoke splashes, mortar dropping and grease shall be thoroughly removed before painting is started. The prepared surface shall have received the approval of the Engineer-in-Charge after inspection, before painting is commenced. Painting shall not be started until the Engineer-in-Charge has inspected the items of work to be painted, satisfied himself about their proper quality and given his approval to commence the painting work. Painting of external surface should not be done in adverse weather condition like hail storm and dust storm. Painting, except the priming coat, shall generally be taken in hand after practically finishing all other building work. The rooms should be thoroughly swept out and the entire building cleaned up, at least one day in advance of the paint work being started.

Application: Before pouring into smaller containers for use, the paint shall be stirred thoroughly in its containers, when applying also; the paint shall be continuously stirred in the smaller containers so that its consistency is kept uniform. The painting shall be laid on evenly and smoothly by means of crossing laying off, the latter in the direction of the grains of wood. The crossing and laying off consists of covering the area over with paint, brushing the surface hard for the first time over and then brushing alternately in opposite direction, two or three times and then finally brushing lightly in a direction at right angles to the same. In this process, no brush marks shall be left after the laying off is finished. The full process of crossing and laying off will constitute one coat. Where so stipulated, the painting shall be done by spraying. Spray machine used may be (a) high pressure (small air aperture) type, or (b) a low-pressure (large air gap) type, depending on the nature and location of work to be carried out. Skilled and experienced workmen shall be employed for this class of work. Paints used shall be brought to the requisite consistency by adding a suitable thinner. Spraying should be done only when dry condition prevails. Each coat shall be allowed to dry out thoroughly and rubbed smooth before the next coat is applied. This should be facilitated by thorough ventilation. Each coat except the last coat, shall be lightly rubbed down with sand paper or fine pumice stone and cleaned off dust before the next coat is laid. No left over paint shall be put back into the stock tins. When not in use, the containers shall be kept properly closed. No hair marks from the brush or clogging of paint puddles in the corners of panels, angles of molding etc. shall be left on the work. In painting doors and windows, the putty round the glass panes must also be painted but care must be taken to see that no paint stains etc. are left on the glass. Tops of shutters and surfaces in similar hidden locations shall not be left out in painting. However, bottom edge of the shutters where the painting is not practically possible, need not be done nor any deduction on this account will be done but two coats of primer of approved make shall be done on the bottom edge before fixing the shutters. On painting steelworks, special care shall be taken while painting over bolts, nuts rivets overlap etc. The additional specifications for primer and other coats of paints shall be as according to the detailed specifications under the respective headings.

Protective Measures: Doors, windows, floors, article of furniture etc. and such other parts of the building not to be white washed, shall be protected from being splashed upon. Splashing and droppings, if any shall be removed by the contractor at his own cost and the surfaces cleaned. Damages if any to furniture of fittings and fixtures shall be recoverable from the contractor.

Item to Include: Item includes all labour, material, equipments such as brushes, scrappers, polish papers etc., scaffolding, cleaning of the area etc. complete as per the

specifications. The item also includes removing nails, marking good holes, cracks, patches etc.

Mode of Measurement and Payment:

1. Length and breadth shall be measured correct to a cm. and area shall be calculated in sqm correct to two places of decimals.
2. Corrugated surfaces shall be measured flat as fixed and the area so measured shall be increased by the following percentages to allow for the girthed area. Corrugated asbestos cement sheet 20% Semi corrugated asbestos cement sheet 10%
3. Cornices and other such wall or ceiling features, shall be measured along the girth and included in the measurements
4. Work on old treated surfaces shall be measured separately and so described. The contract rate shall be per sqm area painted including all material and labour involved in all the operations described above.

Item No. 59:

Providing and applying two coats of synthetic enamel paint of approved colour to new /old structural steel work and wood work in buildings, including scaffolding if necessary, cleaning and preparing the surface (excluding primer coat) etc. complete.

General: The item pertains to providing and applying Synthetic Super Enamel paint conforming to IS:2932, with specified number of coats, over a primer coat.

Material: Synthetic Super Enamel paint shall be conforming to IS:2932-1991 of approved brand and **manufacturer** shall be used. Only ready mixed paint (Exterior grade) as received from the manufacturer without any admixture shall be used. Approved paints shall be brought to the site of work by the contractor in their original containers in sealed condition. The material shall be brought in at a time in adequate quantities to suffice for the whole work or at least of fortnight's work. The materials shall be kept in the joint custody of the contractor and the Engineer-in-Charge. The empties shall not be removed from the site of work, till the relevant item of work has been completed and permission obtained from the Engineer-in-Charge. The empties shall be property of the contractor.

Scaffolding:

1. Wherever scaffolding is necessary, it shall be erected on double supports tied together by horizontal pieces, over which scaffolding planks shall be fixed. No bullies, bamboos or planks shall rest on or touch the surface.
2. Where ladders are used, pieces of old gunny bags shall be tied on their tops to avoid damage or scratches.

Preparation of Surface: The surface shall be thoroughly cleaned and dusted off. All rust, dirt, scales, smoke splashes, mortar dropping and grease shall be thoroughly removed before painting is started. The prepared surface shall have received the approval of the Engineer-in-Charge after inspection, before painting is commenced. Painting shall not be started until the Engineer-in-Charge has inspected the items of work to be painted, satisfied himself about their proper quality and given his approval to commence the painting work. Painting of external surface should not be done in adverse weather condition like hail storm and dust storm. Painting, except the priming coat, shall generally be taken in hand after practically finishing all other building work. The

rooms should be thoroughly swept out and the entire building cleaned up, at least one day in advance of the paint work being started.

Application: Before pouring into smaller containers for use, the paint shall be stirred thoroughly in its containers, when applying also; the paint shall be continuously stirred in the smaller containers so that its consistency is kept uniform. The painting shall be laid on evenly and smoothly by means of crossing laying off, the latter in the direction of the grains. The crossing and laying off consists of covering the area over with paint, brushing the surface hard for the first time over and then brushing alternately in opposite direction, two or three times and then finally brushing lightly in a direction at right angles to the same in both directions. In this process, no brush marks shall be left after the laying off is finished. The full process of crossing and laying off will constitute one coat. Each coat except the last coat, shall be lightly rubbed down with sand paper or fine pumice stone and cleaned off dust before the next coat is laid. No left over paint shall be put back into the stock tins. When not in use, the containers shall be kept properly closed. No hair marks from the brush or clogging of paint puddles in the corners of panels, angles of moulding etc. shall be left on the work. In painting doors and windows, the putty round the glass panes must also be painted but care must be taken to see that no paint stains etc. are left on the glass. Tops of shutters and surfaces in similar hidden locations shall not be left out in painting. However, bottom edge of the shutters where the painting is not practically possible, need not be done nor any deduction on this account will be done but two coats of primer of approved make shall be done on the bottom edge before fixing the shutters. On painting steelworks, special care shall be taken while painting over bolts, nuts rivets overlap etc. The additional specifications for primer and other coats of paints shall be as according to the detailed specifications under the respective headings.

Protective Measures: Doors, windows, floors, article of furniture etc. and such other parts of the building not to be painted, shall be protected from being splashed upon. Splashing and droppings, if any shall be removed by the contractor at his own cost and the surfaces cleaned. Damages if any to furniture of fittings and fixtures shall be recoverable from the contractor.

Item to Include : Item includes all labour, material, equipments such as brushes, scrappers, polish papers etc., scaffolding, cleaning of the area etc. complete as per the specifications. The item also includes removing nails, marking good holes, cracks, patches etc.

Mode of Measurement and Payment:

1. Length and breadth shall be measured correct to a cm. and area shall be calculated in sqm correct to two places of decimals.
2. Corrugated surfaces shall be measured flat as fixed and the area so measured shall be increased by the following percentages to allow for the girthed area. Corrugated asbestos cement sheet 20% Semi corrugated asbestos cement sheet 10%
3. Cornices and other such wall or ceiling features shall be measured along the girth and included in the measurements. The contract rate shall be per sqm area painted including all material and labour involved in all the operations described above.

Item No. 60:

Providing and fabricating structural steel work in rolled sections like joists, channels, angles, tees etc. as per detailed design and drawings or as directed including cutting,

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fabricating, hoisting, erecting, fixing in position making riveted / bolted /welded connections without connecting plates, braces etc. and including one coat of anticorrosive paint and over it two coats of oil painting of approved quality and shade etc. complete.

Specification:

General: The item covers the specifications of fabrication and erection of structural steel work including painting. The structural steel work includes cutting, fabrication, welding, or bolting, erecting the structure, painting etc. for various items such as columns, trusses, portals, girders, gantry, bracings etc.

Material: This shall comply with specification No. GENERAL SCOPE & MATERIAL- Gen/C/0 and Gen/C/0.2.5, Gen/C/0.19.2.

Fabrication and Erection: Cutting, welding, assembly, machining, painting, marking and erection shall be carried out in accordance with approved plans and as directed by the Engineer-in-Charge from time to time and shall comply with IS 800 and detailed below.

Damaged Members:

1. Any material found damaged or defective shall be stacked separately and shall be marked in a distinctive color. Such material is to be dealt with expeditiously under the orders of the Engineer-in-Charge.
2. Welding shall be done, as per specifications.
3. All permanent machine-fitted or other bolts must be perfectly tight and should be burred or otherwise checked, to prevent nuts from becoming loose.
4. Care shall be taken to see that cracks are not filled with paint, putty, cinders, dirt, oil or fillings.
5. Particular care must be taken to ensure free expansion and contraction wherever provided for in drawings or as the Engineer-in-Charge directs.

Shop Drawings: The contractor shall prepare shop drawings for the structural steelwork/ERW tubes to be executed as per IS: 800. The contractor shall submit the drawings in triplicate to the Engineer-in-Charge for his approval. Fabrication shall not be taken in hand until the relevant shop drawings have been approved by the Engineer-in-Charge. However, the contractor shall remain wholly responsible for their correct conformation the designs and for accurate fabrication to meet the requirements of design and the Indian Standard. One copy of the drawings duly approved shall be returned to contractor and the work shall be carried out according to the approved design.

Laying Out : As far as possible and whenever necessary, structural parts, ERW Tubes their joints, gusset plates, etc. shall be drawn out to full size on a level platform, a steel tape being used for measurement. All angles shall be carefully set out and checked. Gusset plates shall be marked with as few sides as possible and of such shapes that there is a minimum waste in cutting a large number. Steel metal templates of adequate dimensions shall be made to correspond to each member and temperature effect shall be taken into account where necessary.

Fabrication and Welding: When the lengths of sections required for fabrication are not more than the standard lengths of rolling, no splicing of shorter length shall be allowed to be fabricated.

Unless provided in the designs or specially permitted in writing by the Engineer-in-Charge. All the rolled sections forming part of the structural member shall be cut square or accurately to shapes shown in the detailed drawings and correct to lengths and shapes, a steel tape being used for measurement. The cut ends shall be dressed true with hammer, chisel and file or by grinding. All straightening, leveling and shaping to form shall be done by pressure and not by hammering unless the latter is specially permitted by the Engineer-in-Charge. Bending, cutting, forging, etc. shall be done in such a manner as not to impair the strength of the metal. Where tight fits are required or stress is to be transmitted through end contacts, the ends or surfaces shall be faced and brought to a true contact bearing. The expansion bearing surface where provided, shall be machined true and smooth and in the direction of the movement.

1. Columns and stanchions shall be erected truly vertical with the necessary cross bracing etc. and the base shall be properly fixed with the foundation concrete by means of anchor bolts etc. as per drawings.

2. Anchor bolts to be placed in the concrete foundation should be held in position with a wood template. At the time of concreting anchor bolt locations shall be provided with suitable timber mould or pipe sleeve to allow for adjustment which shall be removed after initial setting of concrete. The spaces left around anchor bolts shall be linked to a stopping channel in the concrete leading to the side of the pedestal and on the underside of the base plate to allow the spaces being grouted up after the base plate is fixed in the position along with the column footing. Grouting shall be of cement mortar 1:3 (1 cement: 3 coarse sand) or as specified.

3. Bedding of Column, Stanchions etc.: Bedding shall not be carried out until the steel work has been finally leveled, plumbed and connected together. The stanchion shall be supported on steel wedges and adjusted to make the column plumb. For multi-storied buildings, the bedding shall not be done until sufficient number of bottom lengths of stanchions have been properly lined, leveled and plumbed and sufficient floor beams are fixed in position. The base plates shall be wedged clear of the bases by MS wedges and adjusted where necessary to plumb the columns. The gaps under the base plate may be made up to 25 mm shall then be pressure grouted with cement grouts. With small columns, if permitted by the Engineer-in-Charge, the column base shall be floated on a thick cement grout on the concrete pedestal. The anchor bolt holes in the base plate may be made about 10 to 15 mm larger than the bolts. In such cases suitable washers shall be provided.

4. Welding: The steelwork in built up section (welded) such as in trusses, framed work etc. is specified in this clause. Welding shall generally be done by electric arc process as per IS:816 and 823. The electric arc method is usually adopted and is economical. Where electricity for public is not available generators shall be arranged by the contractor at his own cost unless otherwise specified. Precautions shall therefore be taken to avoid distortion of the members due to these temperature stresses. The work shall be done as shown in the shop drawings, which should clearly indicate various details of the joint to be welded, type of welds, shop and site welds as well as the type of electrodes to be used. Symbol for welding on plane and shop drawings shall be according to IS 813-1986. By

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providing tack welding the structure be assembled and correctness as per drawing be checked. After confirming the structure assembled is true alignment level and as per approved drawing welding at each joint be taken in hand. Length of welding at each joint for each member be worked out and ensured that at least 1.25 times welding length is provided at each joint for each member. No tack welding be allowed. As far as possible every effort shall be made to limit the welding that must be done after the structure is erected so as to avoid the improper welding that is likely to be done due to heights and difficult positions on scaffolding etc. apart from the aspect of economy. The maximum dia of electrodes for welding any work shall be as per IS 814-1991 and appendix 'B' of IS 823-1964. Joint surfaces, which are to be welded together, shall be free from loose mill scale, rust, paint, grease or other foreign matter, which adversely affect the quality of weld and workmanship.

5. Precautions: All operations connected with welding and cutting equipment shall conform to the safety requirements given in IS: 818 for safety requirements and Health Provision in Electric and gas welding and cutting operations. Operation, Workmanship and Process of Welding is described in Appendix. Inspection and testing of welds shall be as per IS: 822.

6. Assembly: Before welding is commenced, the members to be welded shall first be brought together and firmly clamped or tack welded to be held in position. This temporary connection has to be strong enough to hold the parts accurately in place without any disturbance. Tack welds located in places where final welds will be made later shall conform to the final weld in quality and shall be cleaned off slag before final weld is made.

7. Erection: Steelwork shall be hoisted and erected in position carefully, without any damage to itself, other structures and equipment and injury to workmen. The method of hoisting and erection proposed to be adopted by the contractor shall be got approved from the Engineer-in-Charge in advance. The contractor however shall be fully responsible for the work being carried out in a safe and proper manner without unduly stressing the various members and proper equipment such as derricks, lifting tackles, winches, ropes etc. shall be used. The work may be erected in suitable units as may be directed by the Engineer-in-Charge. Fabricated members shall be lifted at such points as to avoid deformation or excessive stress in members. The structure or part of it placed in position shall be secured against over-turning or collapse by suitable means. During execution, the steelwork shall be securely bolted or otherwise fastened and when necessary temporarily braced to provide for all loads to be carried safely by the structure during erection including those due to erection equipment and its operations. The steel work shall be placed in proper position as per approved drawing, final riveting or permanent bolting shall be done only after proper alignment has been checked and confirmed.

8. Trusses shall be lifted only at nodes. The trusses above 10m in span shall not be lifted by slinging at two mid points of rafters, which shall be temporarily braced by a wooden member of suitable section. After the trusses are placed in position, purlins and wind bracings shall be fixed as soon as possible. The end of the truss, which faces the prevailing winds, shall be fixed with holding down bolts and the other end kept free to move. In case of trusses of spans up to 10m the free end of the truss shall be laid on lead sheet or steel plate as per design, and the holes for holding down bolts shall be made in the form of oblong slots so as to permit the free movements of the truss

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Painting: All surfaces, which are to be painted, oiled or otherwise treated shall be dry and thoroughly cleaned to remove all loose scale and loose rust. Surfaces not in contact but inaccessible after shop assembly, shall receive the full-specified protective treatment before assembly. This does not apply to the interior of sealed hollow sections. Part to be encased in concrete shall not be painted or oiled. A priming coat of approved steel primer i.e. Red Oxide Zinc chrome primer conforming to IS:2074 shall be applied before any member of steel structure are placed in position or taken out of workshop. Two coats of synthetic super enamel paint are included in this item.

Item to Include: The item includes all material, ERW Tubes, nut bolts, labour, tools and equipments, manufacturing, transportation, erection painting etc. as per the drawings and directed. It also includes all taxes, insurance etc.

Mode of Measurement and Payment: The work as fixed in place shall be measured in running meters correct to a millimetre and weights calculated on the basis of standard tables correct to the nearest kilogram. Unless otherwise specified, weight of cleats, brackets, packing pieces, bolts, nuts, washers, distance pieces, separators, diaphragm gussets (taking overall square dimensions) fish plates, etc. shall be added to the weight of respective items. No deductions shall be made for bolt holes (excluding holes for anchor or holding down bolts) the weight of steel sheets, plates and strips shall be taken from relevant Indian Standards based on 7.85 kg/m² for every millimeter sheet thickness. For rolled sections, steel rods and steel strips, weight given in relevant Indian Standard shall be used. The contract rate shall be per Metric tonne weight of the component fabricated and measured as above, correct to a 3 decimals (one gram).

Item No. 61:

Providing and fixing white European type wall-hung pan, of size 350mm x 355mm x 570 mm concealed flush tank with floor mounting frame installing kit and drain pipe connection set for wall hung WC, with approved make square control plates including soil pipe, vent pipe upto the outside face of wall, 100mm dia C.I. plug bend inlet pipe all fittings, cutting & making good walls, floors etc. complete.

Specification:

General: The item pertains to providing and fixing the European type white glazed earthenware commode of white or of approved color as specified with all necessary pipe connections up to the soil and vent pipes fixed on the outside of the wall.

Materials:

Commode: The European type water-closet pan (commode) shall conform to IS:2556 with 'S' trap. The water-closet pan shall be of the best Indian make available in the market unless one of a particular make and quality and shall be white or of specified color as specified in the item. This color and the maker of the commode shall be got approved by the Engineer-in-charge.

Plastic Seat & Covers: The seat and cover shall be of thermosetting or thermoplastic conforming to IS:2548 as specified. Unless and otherwise specified these shall be of closed pattern. Thermosetting plastic used shall conform to grade 2 or 3 of IS:1300 when it is phenolic or IS:3389 when of urea formaldehyde. Thermo plastic materials used may be of Polystyrene conforming to type 2 or 3 or IS:2267 or of polypropylene, appendix A of IS:2548. In public buildings where rough and heavy use of seats and covers are common,

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plastic seats shall be flat with solid moulding. The hinging device shall be bronze or brass with nickel chromium plating conforming to IS:2548 and the seat shall have not less than three rubber or plastic buffers unless otherwise specified. The cover shall be fitted with the same number of buffers as provided for the seat. Seats shall have a smooth finish and shall be non absorptive and free from cracks and crevices. They shall be capable of being easily cleaned and shall not be adversely affected by common solvents or household cleanser.

Strength: The seats shall withstand without permanent distortions of the seat or hinge fittings as prescribed in ARE:2548.

Fixing: The European type's water –closet pan and shall be fixed into the places indicated on the drawings or as directed. The vent and soil pipes shall run through the holes left in the floor and walls and the walls and floor made good. If holes are not left in the floor and wall, they shall be cut and the cavity surrounding the pipes made good properly after fixing the pipes. The pan shall be fixed into position in 1:1 cement mortar with the connecting 'S' trap and pipes duly concealed including the lead PVC pipe from flushing cistern. All other fittings including the flushing cistern pipes etc. and the tests shall be carried out for leakages. The seat and lid shall then be fixed to pan with chromium-plated hinges.

Item to Include: The item includes providing European type water closet (commode) pan 'S' trap, seat and lid cover, cast iron pipes, fitting and stop tap, lead pipe with nuts, fixing the pan and making good after fixing of pipes, testing the installation to give satisfactory results including all necessary labour, materials and use of tools etc. complete.

Mode of Measurement of Payment: The measurement shall be **per** number of European type WC (commodes) provided and fixed with accessories and the contract rate shall be per number of European type water–closet (commode) of specified color.

Item No. 62:

Providing and fixing wall-hung white wash basin of size 470x575x190mm of approved make half pedestal, pillar cock, C.P. Angular stop cock, long thread continental including S.S. bottle trap of having necessary pipe connections up to the outside face of the wall. etc complete.

Specification:

General: The item pertains to providing and fixing wash hand basin of the specified size including all necessary fixtures and pipe connections up to the outside face of the wall and outlet waste pipe up to nearest nahani trap.

Material: The wash hand basin shall conform to IS:771. The brackets shall conform to IS:775.

Brass waste shall be 32mm and of standard pattern with standard pattern plug and brass chains.

The lead PVC and galvanized pipes shall conform to IS:404 and IS:1239. The 15 mm CP brass pillar taps shall conform to IS:1795 & stop cock for inlet.

Fixing: The basin shall be fixed at the location and level as per the drawings or as directed. The basin shall be supported on a pair of steel or cast iron cantilever brackets securely embedded in wall or fixed to wall with wooden cleats and screws. The height of the top of the basin from the floor shall be 75 cm or as directed. The waste pipe shall run

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through the wall. If holes are not left in the wall, they shall be cut and the cavity surrounding the pipes made good after fixing of the pipe. All the pipe connections shall be made as shown on the drawings or as directed. Brass stop tap shall be fixed on the supply pipe. The pipe connections shall conform to IS:1742. The lead waste pipe shall be provided with a trap. All the exposed pipes and brackets shall be painted with one coat of red lead and two coats of good oil paints of approved shade.

Item to Include: The item includes providing of Basin of specified size and type, pillar taps brass stop tap, plug with chain, brackets, pipes, chromium bottle plated trap, painting, fixing of brackets, basin taps, plugs, lead PVC and galvanized pipes up to the outside face of the wall and painting pipes, cutting and waste, making good damages, etc. including all necessary labour, materials and use of tools.

Mode of Measurement and Payment: The measurement shall be per number of wash hand basins of specified size and type provided and fixed with all accessories as per specifications. The contract rate shall be per number of wash hand basin of specified size and type provided and fixed.

Item No. 63:

Providing and fixing Colored Glazed Earthenware Full Stall Type Urinal with prismatic urinal flush valve auto closing system with built in control cock & wall flange etc. Jaquar _PRS-077, with inlet pipes, fitting, flush pipe with fittings and flushing arrangement including lead soil pipe, lead trap soil pipe connection up to the outside face of the wall. Spec. No. Bd.V.23 Page No. 562

Specification:

General: The item pertains to the provision and fixing of white porcelain lined urinal pot, and spreader arrangement as mentioned in the item including all fitting and down take pipe connection.

Materials: Lipped Urinal Pot: Urinal basins shall be of flat back or corner wall type lipped in front. These shall be of white vitreous china conforming to IS:2556 (Part VI) Sec. The urinals shall be of one piece construction. Each urinal shall be provided with not less than two fixing holes of minimum dia 6.5mm 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 urinals. At the bottom of the urinals an outlet horn for connecting to an outlet pipe shall be provided. The exterior of the outlet horn shall not be glazed and the surface shall 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.

The following tolerances may be allowed on the dimensions:

- a) On dimension 50mm and over + 5 percent
- b) On dimension less than 50mm + 2 mm
- c) On all angles + 3 degree

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Fixing: Lipped urinal (Single or range) installation shall consist of an automatic flushing cistern, GI flush and waste pipe. The capacity of flushing cistern and relevant sizes of flush pipe for urinals in a range shall be as per drawing or as directed. Flushing cistern shall be paid separately under relevant items. Waste pipe shall be of 32 mm nominal bore GI pipe and shall be paid separately. Urinals shall be fixed in position by using wooden plugs and screws. It shall be at a height of 65 cm from the standing level to the top of the lip of the urinal, unless otherwise directed by the Engineer-in-Charge. The size of wooden plugs shall be 50 mm x 50 mm at base tapering to 38 mm x 38 mm at top and of length of 5.0 cms. These shall be fixed in the wall in cement mortar 1:3 (1 cement: 3 fine sand). After the plug fixed in the wall, the mortar shall be cured till it is set. Each urinal shall be connected to 32 mm dia waste pipe which shall discharge into the channel or a floor trap. The connection between the urinal and flush or waste pipe shall be made by means of putty or white lead mixed with chopped hemp.

Item to Include: The item includes providing the lipped urinals of specified size with all accessories, fixing and jointing all inlets and outlets, with all labour and use of tools etc. complete.

Mode of Measurement and Payment: Urinals provided and fixed shall be measured per number. The contract rate shall include the cost of all the materials and labour involved in all the operations described above and shall be per number.

Item No. 64:

Providing and fixing floor trap connection 75mm diameter unplasticized polyvinyl chloride (UPVC) ultra violet stabilized multi floor deep seal Nahani trap including PVC grating conforming to IS 4985, rubber plug and piece of PVC pipes of suitable diameter and length upto outside face of wall and making all joints water tight with providing rubber socketed packing and sealing with suitable and durable water tight resins and making holes in masonry / concrete, redoing the same with cement mortar 1:4 and curing etc. complete. As directed by Engineer in charge.

General - The item pertains to the provision and fixing UPVC Floor Trap complete with necessary specials required. Including the grating, bends and PVC pipe piece up to the outside face of the wall. This item shall be subject to the general specification.

Material - The UPVC Floor Trap, bend and pipe with 12.5 cm grating shall be the best available in the market and approved by the Engineer. It shall conform to A. 13 regarding its material.

Fixing - The UPVC Floor Trap with the bend and pipe piece shall be fixed as per the drawings or the instructions of the Engineer. The joints shall be sealed with 1:1 cement mortar. This shall conform to para 5 of I.S. 1942-1972.

Item to include -

- 1) UPVC Floor Trap with grating, bend PVC pipe up to the outside face of the wall and cement mortar.
- 2) Fixing of the trap bend and pipe, cutting and waste.
- 3) All necessary labour, materials and use of tools.

Mode of measurement and payment- The contract rate shall be for one UPVC Floor Trap fixed. The measurement shall be for the number UPVC Floor trap fixed.

Item No. 65:

Providing and fixing Hand shower (health faucet) with 8mm dia. 1m long flexible tube having wall hook with approved make including necessary sockets/ union nut etc. complete as directed by Engineer in charge.

General - The item pertains to the provision and fixing Hand shower (health faucet) with 8mm dia. 1m long flexible tubewall hook with approved make including necessary sockets/ union nut this item shall be subject to the general specification.

Material - Hand shower (health faucet) with 8mm dia. 1m long flexible tube shall be the best available in the market and approved by the Engineer. It shall conform to A. 13 regarding its material.

Fixing - Hand shower (health faucet) with 8mm dia. 1m long flexible tube shall be fixed as per the drawings or the instructions of the Engineer. The joints shall be sealed with 1:1 cement mortar. This shall conform to para 5 of I.S. 1942-1972.

Item to include -

- 1) Hand shower (health faucet) with 8mm dia. 1m long flexible tube
- 2) Fixing of the trap bend and pipe, cutting and waste.
- 3) All necessary labour, materials and use of tools.

Mode of measurement and payment- The contract rate shall be for one Hand shower (health faucet). The measurement shall be for the number Hand shower (health faucet) fixed.

Item No. 66:

Providing and fixing C.P. Two way BIB cock of approved make continental including necessary sockets/union nut etc. complete.

Specification:

General: The item pertains to providing and fixing heavy duty CP BIB cock with auto closingsystem of the specified diameter including necessary accessories.

Materials: The bib or stop cocks shall conform to IS. 781.

Fixing: The bib or stop cock shall be fixed into the pipe line with necessary sockets or union nut in places indicated on the drawing or as directed. Sun and safeda shall be used for complete watertight joint. If leakages observed on test, the joint shall be remade to make it leak proof.

Item to include: The item includes providing the screw down type CP brass bib cock or stop cock of the specified diameter, sun & safeda, all necessary materials, labour and use of tools.

Mode of measurement and payment: The contract rate shall be per number of screw down bib cock or stopcock fixed. Measurement shall be for the number of cocks fixed.

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Providing and fixing C.P. sink cock with raised J" shaped swinging casted spout of approved make including necessary sockets/ union nut etc. complete."

Specification:

General: The item pertains to providing and fixing C. P. Sink Cock with Raised "J" Shaped Swinging Casted Spout Jaquar or Equivalent Make Continental (CAT. NO. CON 359) including necessary accessories.

Materials: C. P. Sink Cock with Raised "J" Shaped Swinging Casted Spout Jaquar or Equivalent Make Continental (CAT. NO. CON 359)

Fixing: The C. P. Sink Cock shall be fixed into the pipe line with necessary sockets or union nut in places indicated on the drawing or as directed. Sun and safeda shall be used for complete watertight joint. If leakages observed on test, the joint shall be remade to make it leak proof.

Item to include: The item includes providing the C. P. Sink Cock of the specified diameter, sun & safeda, all necessary materials, labor and use of tools.

Mode of measurement and payment: The contract rate shall be per number of C. P. Sink Cock fixed. Measurement shall be for the number of cocks fixed.

Item No. 68:

Providing and fixing C. P. Angular Stop Clock With Wall Flange Jaquar Make Or Equivalent Continental (CAT. NO. CON 059) including necessary sockets / union nut etc. complete. Spec.No. As directed by Engineer in charge.

Specification:

General: The item pertains to providing and fixing heavy duty .Angular stop Cock with auto closing system of the specified diameter including necessary accessories.

Materials: The Angular stop Cock shall conform to IS. 781.

Fixing: The Angular stop Cock shall be fixed into the pipe line with necessary sockets or union nut in places indicated on the drawing or as directed. Sun and safeda shall be used for complete watertight joint. If leakages observed on test, the joint shall be remade to make it leak proof.

Item to include: The item includes providing the screw down type Angular stop Cock of the specified diameter, sun & safeda, all necessary materials, labor and use of tools.

Mode of measurement and payment: The contract rate shall be per number of Angular stop Cock fixed. Measurement shall be for the number of cocks fixed.

Item No. 69:

Providing and fixing stainless steel sink of size 600 x 510 x 200 mm including coupling, outlet pipe, elbow and other necessary fitting, finishing etc. complete.

Specification:

General: The item pertains to providing and fixing stainless steel sink of BIS or salam mark of specified size for kitchen platforms, including the waste coupling with mm dia GI B class down take pipe upto Nahani Trap.

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Material: The stainless steel sink of specified size shall be used as specified above and approved by the Engineer-in-charge.

Fixing: The stainless steel sink shall be fixed in position as per the drawing or as directed. The stainless shall be packed with wetted spun yarn in cement slurry sealed with 1:1 cement mortar. This shall conform to IS: 1943. The joint with pipe/special within wall width shall be avoided.

Item to include: The item includes all labour, material (Stainless steel sink, waste coupling, pipe and all required fittings, etc), tools and equipments, cutting of holes / excavation and making good the cut holes etc. to complete the item satisfactorily.

Mode of Measurement and Payment: The contract rate shall be per number of stainless steel sink of specified size provided and fixed including all fitting as specified above. Cutting and waste will not be paid for separately.

Item No. 70:

Providing and fixing 450mm x 550mm size superior type Belgium mirror with 16mm dia. nickel plated towel rod etc. complete.

Specification:

General: The item pertains to providing and fixing superior type Belgium mirror.

Specification: Providing 450mm X 550mm size superior type Belgium type mirror including the edges of glass should be chamfered finished and well polished with all S.S. screw fittings of with grade 304 as per the direction of engineer in charge.

Item to Include: The item includes all labour, material, tools and equipment for providing and fixing the mirror complete to the satisfaction of Architect and Engineer –In Charge.

Mode of Measurement and Payment: The measurement shall be in terms of number.

Item No. 71:

Providing and fixing Chromium Plated Towel Rod 16 mm Dia and 75 Cm. In Length including all accessories complete. Spec. No. As directed by Engineer in charge.

General: The item pertains to providing and fixing of Chromium Plated Towel Rod 16 mm Dia and 75 Cm. In Length.

Specification:- Providing 16mm dia. And 75cm in length chromium plated towel rod S.S. screw fittings of with grade 304 as per the direction of engineer in charge.

Item to Include: The item includes all labour, material, tools and equipment for providing and fixing the mirror complete to the satisfaction of Architect and Engineer –In Charge.

Mode of Measurement and Payment: The measurement shall be in terms of number.

Item No. 72:

Providing and fixing Chromium Plated Toilet Paper Holder Jaquar _Continental (Cat No.AQ 7751) including all accessories complete. Spec. No. As directed by Engineer in charge.

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General: The item pertains to providing and fixing of Chromium Plated toilet paper holder and nailing arrangement for toilet of good quality Chromium Plated toilet paper holder with all accessories and tools, labours required for installation in perfect line and level. The contractor shall prepare or procure sample of toilet paper holder first and then shall procure total quantity as per sample approved by Architect and Engineer – In – Charge.

Item to Include: The item includes all labour, material, tools and equipment for providing and fixing the mirror complete to the satisfaction of Architect and Engineer – In Charge.

Mode of Measurement and Payment: The measurement shall be per the toilet paper holder installed completed in all respect up to the satisfaction of Architect and Engineer – In – Charge. The length and diameter of towel rod installed will be measured and area will be calculated up to two decimal points. The contract rate shall **be per Nos.**

Item No. 73:

Providing & Fixing of Chromium Plated Soap Dish (polyurethane) Jaquar make Continental (Cat.no.AQN 7733) including all accessories complete for basins, lab sinks etc. complete. Spec. No. As directed by Engineer in charge.

General: The item pertains to providing and fixing of Chromium Plated Soap Dish (polyurethane) and nailing arrangement for toilet of good quality Chromium Plated Soap Dish (polyurethane) with all accessories and tools, labours required for installation in perfect line and level. The contractor shall prepare or procure sample of toilet paper holder first and then shall procure total quantity as per sample approved by Architect and Engineer – In – Charge.

Item to Include: The item includes all labour, material, tools and equipment for providing and fixing the mirror complete to the satisfaction of Architect and Engineer – In Charge.

Mode of Measurement and Payment: The measurement shall be per the Chromium Plated Soap Dish (polyurethane) installed completed in all respect up to the satisfaction of Architect and Engineer – In – Charge. The length and diameter of towel rod installed will be measured and area will be calculated up to two decimal points. The contract rate shall **be per Nos.**

Item No. 74:

P.V.C. pipe 40mm dia. 10kg/cm² pressure (class IV)

General: The item pertains to providing and fixing of Light, Medium and Heavy class, PVC pipes and specials, of specified diameter, with screw and spigot joints, for external works with GI fittings and all connections, including excavation, in all strata backfilling & scaffolding, making holes in masonry/ concrete, remaking the same properly etc. complete.

Materials: The PVC pipes and specials shall be of the class and diameter nominal bore specified and shall conform to IS: 1239 1982. The pipes and fitting of which the galvanized has been damaged shall not be used. Unless otherwise specified, For water tight joints sun & safeda shall be applied.

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Excavation: The excavation shall be through all strata's met with all lifts. The excavation shall be done only so much in advance of laying of pipes as to cause least damage to the trench. In case of excavation across, a road, permission of road authorities shall be obtained for the excavation of the road surface which shall be made good and restored to the original condition at the contractor's cost. At all road crossings, the trench shall be dug only for half the width of the road and pipe is laid at a time. The other half shall be excavated only after back filling is done over the laid pipe and making it suitable for the traffic. Care shall be taken to avoid accidents and inconvenience to public shall be minimum. All the pipes, water mains, cables, etc., met in the excavation shall be carefully protected and supported. Any damage done shall be made good by the contractor at his own cost and risk. The pipe shall be laid on a well-compacted bed in the trench. The trench after laying the pipe shall be refilled except at the joints, in layers and manually rammed. Care shall be taken to see that no earth, etc., gets inside the pipes. The filling shall be kept raised by about 5 cm for subsequent settlement. In the case of trench through rock, bedding and cushioning of murum, good earth or sand shall be provided for the pipe. The trench at the joints shall be filled similarly after satisfactory testing of the pipe. Any surplus excavated stuff shall be disposed of satisfactorily without causing nuisance and any extra cost.

Laying and fixing: The plumbing contractor shall lay the pipeline as per the approved layout drawings issued by Architect. The pipes shall be generally so laid or fixed as not to be exposed to the heat of the sun or be subject to any injury or risk to the pipe. As far as possible, the pipes shall be laid plumb and in straight and parallel lines. The pipe shall be laid to falling or raising gradients or dead level so as to avoid air locks. It should be possible to empty the pipes readily and completely. All water-supply pipes shall as far as possible, be kept outside of walls, partitions and floors and be exposed to view and accessible. They shall be used in standard lengths cut lengths being used only where necessary to make up the exact lengths. The pipe shall be laid into the trench and screwed with sockets elbows, tees, bends, etc. as necessary. In making the joints, sun and safeda shall be used to make the joint watertight. No joint shall be located in the thickness of the walls. If the pipe is required to be cut and the end threaded, the burns of the cut end shall be file smooth and any obstruction in the bore shall be entirely eliminated. The rate includes wastage in cutting, etc. When the pipe is to be fixed to walls it shall be fixed with standard brackets, clips or holder bates keeping the pipe about 12 mm clear of the wall. The pipe shall be fixed to the wall horizontally and vertically and parallel to one another when more than one pipe is laid unless unavoidable. The supporting clips, etc., for the pipe shall be spaced at about two meters or so as necessary. When holes are not left during construction they shall be cut into the walls or slabs, etc., to pass the pipe through or to fix clamps, etc. After fixing of the pipes, clamps etc., these shall be neatly made good. The scaffoldings should be provided without any extra cost during laying, fixing & testing operations.

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Testing: On completion of laying the pipe line and fixing taps, etc. the pipeline shall be tested with a hydraulic pump for a pressure of 7 kg/sq. cm. or for any other pressure as directed. No leakages at the joints are allowable. Any leakage found shall be removed by redoing the joint satisfactorily, without extra cost.

Item to include: The item includes supply of PVC pipes of specified diameter and class and specials, excavating and back filling trenches wherever necessary including dewatering, laying, jointing and fixing the pipe with the fittings including cutting pipes, wastage and threading the ends, testing the joints and all necessary labour, materials and tools, including scaffolding, making holes in masonry/ concrete, remaking the same properly.

Mode of measurement and payment: The length shall be measured net on the straight and bends along the centre line of the pipes and fittings correct upto a cm. The contract rate shall be for **one meter** of specified class and diameter of pipe laid complete with fittings, clamps etc., as specified.

Item No. 75:

P.V.C. pipe 50mm dia. 10kg/cm² pressure (class IV)

General: The item pertains to providing and fixing of Light, Medium and Heavy class, PVC pipes and specials, of specified diameter, with screw and spigot joints, for external works with GI fittings and all connections, including excavation, in all strata backfilling & scaffolding, making holes in masonry/ concrete, remaking the same properly etc. complete.

Materials: The PVC pipes and specials shall be of the class and diameter nominal bore specified and shall conform to IS: 1239 1982. The pipes and fitting of which the galvanized has been damaged shall not be used. Unless otherwise specified, for water tight joints sun & safeda shall be applied.

Excavation: The excavation shall be through all strata's met with all lifts. The excavation shall be done only so much in advance of laying of pipes as to cause least damage to the trench. In case of excavation across, a road, permission of road authorities shall be obtained for the excavation of the road surface which shall be made good and restored to the original condition at the contractor's cost. At all road crossings, the trench shall be dug only for half the width of the road and pipe is laid at a time. The other half shall be excavated only after back filling is done over the laid pipe and making it suitable for the traffic. Care shall be taken to avoid accidents and inconvenience to public shall be minimum. All the pipes, water mains, cables, etc., met in the excavation shall be carefully protected and supported. Any damage done shall be made good by the contractor at his own cost and risk. The pipe shall be laid on a well-compacted bed in the trench. The trench after laying the pipe shall be refilled except at the joints, in layers and manually rammed. Care shall be taken to see that no earth, etc., gets inside the pipes. The filling shall be kept raised by about 5 cm for subsequent settlement. In the case of trench

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through rock, bedding and cushioning of murum, good earth or sand shall be provided for the pipe. The trench at the joints shall be filled similarly after satisfactory testing of the pipe. Any surplus excavated stuff shall be disposed of satisfactorily without causing nuisance and any extra cost.

Laying and fixing: The plumbing contractor shall lay the pipeline as per the approved layout drawings issued by Architect. The pipes shall be generally so laid or fixed as not to be exposed to the heat of the sun or be subject to any injury or risk to the pipe. As far as possible, the pipes shall be laid plumb and in straight and parallel lines. The pipe shall be laid to falling or raising gradients or dead level so as to avoid air locks. It should be possible to empty the pipes readily and completely. All water-supply pipes shall as far as possible, be kept outside of walls, partitions and floors and be exposed to view and accessible. They shall be used in standard lengths cut lengths being used only where necessary to make up the exact lengths. The pipe shall be laid into the trench and screwed with sockets elbows, tees, bends, etc. as necessary. In making the joints, sun and safeda shall be used to make the joint watertight. No joint shall be located in the thickness of the walls. If the pipe is required to be cut and the end threaded, the burns of the cut end shall be file smooth and any obstruction in the bore shall be entirely eliminated. The rate includes wastage in cutting, etc. When the pipe is to be fixed to walls it shall be fixed with standard brackets, clips or holder bates keeping the pipe about 12 mm clear of the wall. The pipe shall be fixed to the wall horizontally and vertically and parallel to one another when more than one pipe is laid unless unavoidable. The supporting clips, etc., for the pipe shall be spaced at about two meters or so as necessary. When holes are not left during construction they shall be cut into the walls or slabs, etc., to pass the pipe through or to fix clamps, etc. After fixing of the pipes, clamps etc., these shall be neatly made good. The scaffolding should be provided without any extra cost during laying, fixing & testing operations.

Testing: On completion of laying the pipe line and fixing taps, etc. the pipeline shall be tested with a hydraulic pump for a pressure of 7 kg/sq. cm. or for any other pressure as directed. No leakages at the joints are allowable. Any leakage found shall be removed by redoing the joint satisfactorily, without extra cost.

Item to include: The item includes supply of PVC pipes of specified diameter and class and specials, excavating and back filling trenches wherever necessary including dewatering, laying, jointing and fixing the pipe with the fittings including cutting pipes, wastage and threading the ends, testing the joints and all necessary labour, materials and tools, including scaffolding, making holes in masonry/ concrete, remaking the same properly.

Mode of measurement and payment: The length shall be measured net on the straight and bends along the centre line of the pipes and fittings correct upto a cm. The contract rate shall be for **one meter** of specified class and diameter of pipe laid complete with fittings, clamps etc., as specified.

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Item No. 76:

Providing, laying & jointing in position best quality UPVC soil, waste & vent pipes with all fitting like junction of various angles, jointing with rubber ring joints & sealants etc. complete & fixing below floor / ground with bricks supports etc. complete Make - Astral / Prince / Finolex

- a. 75MM
- b. 110MM

Specification:

General: The item covers specifications for providing and laying UPVC Pipes with all fixtures, bends tees etc. for drainage lines and rain water down take pipes.

Material:

Rigid (Unplasticized) PVC Pipes: are widely accepted for applications such as cold waterservices internal/external water supplies systems, water mains, rain water system, soil wastepiping system, and under ground (sewage pipes) drainage piping system. Rigid PVC is three times as rigid as polyethylene. It is also much stronger and will withstand much higher pressure for a given wall thickness. Joints can easily be made in rigid PVC pipes by solvent welding, and a whole range of injection moulded matching fittings and specials are available for these pipes. Rigid PVC pipes are normally available in the following shades:

White/Cream

Light to Dark Gray

Black.

In general rigid PVC is resistant to most inorganic acids alkalis and salts, as well as many organic chemicals. It is quite resistant to most effluents, salt water and plating solutions, corrosive fumes, soils which lead to its applications over a wide field. The material is also perfectly safe with potable water, whether hard or soft, and in the former case it tends to retard the formation of scale. Those materials, which do attack it, include concentrated oxidizing acids, esters, ketones, aromatic and chlorinated hydrocarbons, organonitro compounds, organoamino compounds, lacquer solvents and acetic anhydride. The pipes shall be reasonably round and shall be supplied in straight lengths with socketed ends. The internal and external surfaces of pipes shall be smooth & clean, free from grooving and other defects. The ends shall be cleanly cut and square with the axis of the pipe. The pipe shall be designated by external diameter and shall conform to IS: 4985 (revised) in all respects.

Fittings: Fittings used shall be of the same make as that of PVC pipes, injection moulded or made in cast iron and shall conform to Indian Standard wherever available.

Laying:

Trenches: The trench bottom shall be carefully examined for the presence of hard objects such as flints, rock protrudes or tree roots etc. Pipes shall be bedded in sand or soft soil free from rock and gravel. Back fill 15cm above the pipe shall also be of fine sand or soft soil. The width of trench shall not be less than outside diameter of pipe plus 15cm on either side of pipe. In case of gravel soils, pipes shall be laid at least 90cms below the ground level (measured from surface of the ground to the top of the pipe).

For Rain Water down take Pipes: The pipe shall be fixed along the surface of wall in true vertical line. The pipe shall be fixed to the wall by the M.S. clamps, which shall be

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provided at a distance not more than 2.0 m. with PVC clips to cover the offsets in the masonry offsets shall be used. At the cover end of pipe shoe shall be provided the PVC clamp shall be fixed at every joint in pipe/fixture/offset, shoe.

Jointing:

Solvent Welded Joints:

Non Heat Application Method: In this method, instead of forming a socket on one pipe and spigot on other, an injection moulded socket fitting or coupler is used, with a provision to take in the pipes at both ends. After properly cleaning ends of both the pipes the solvent cements are applied on the surfaces to be jointed and the joint is made at ambient temperature. Injection moulded fittings only shall be used in preference to fabricated fittings. Only solvent recommended by the manufacturers of the pipes shall be used and full load on the joints applied only after 24 hours. The pipe shall be cut perpendicular to the axis of the pipe length with a metal cutting saw. Pipe ends have to be beveled slightly with a beveling tool (Remer) at an angle of about 30 degree. The total length of insertion socket (injection moulded socket or coupler) shall be marked on the pipe and checked how far the pipe end could be inserted into the fitting socket.

Attempt shall be made to push the pipe to marked distance, if not possible it shall at least be pushed for 2/3 of this distance. Dust, oil, water grease etc. shall be wiped out with a dry cloth from the surface. Further the grease should be thoroughly removed with a suitable solvent, such as methylene chloride or as an alternative the outside surface of the pipe and the inside of the fitting may be roughened with emery paper. Generous coatings of solvent cement shall be evenly applied on the inside of the fittings around the circumference of the full length of insertion and on the outside of the pipe end up to the marked line with a brush of suitable dimension. The pipe shall be pushed into the fitting socket and held for 2 minutes as otherwise the pipe may come out of the fitting due to the slippery quality of cement and the tapering inside bore of the fitting. The surplus cement on the pipe surfaces shall be wiped out. If the solvent cement has dried up too much or the tapering of the socket is too steep, jointing will not be proper and pipe will come out of the fitting. In summer months joints shall be made preferably early in the morning or in the evening when surrounding environment is cooler. This will prevent joint from pulling apart when the pipe cools off at night. Heat application method for jointing shall not be allowed.

Flanged Joints: For jointing PVC pipes particularly of larger size to valves and vessels and larger size metal pipes where the tensile strength is required the joint is made by the compression of a gasket or ring seal in the face of CI flange. Flanges solvent welded to the PVC pipes shall be supplied by the manufacturers.

Rubber Ring Joints: Rubber ring joints can provide a watertight seal but do resist pull. As such these may be used only as repairs collar and for jointing pipes larger than 110mm. Such joints may be provided on pipes, which are buried in the ground and supported throughout on bedding so that they are not subject to movement and longitudinal pull. The material of rubber ring shall conform to IS : 5382-1985, where aggressive soil are met with, synthetic rubbers perform better for jointing. The ring shall be housed in a groove formed in plastic or metallic housing. The ring shape and the method of compressing the ring vary considerably in different type of joints. Most joints often require the application of lubricating paste, which shall be procured from the manufacturer of PVC pipes.

Measurements : The length shall be measured in running meter correct to a cm for the finished work which shall include PVC fittings such as bends, tees, elbows, reducer,

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crosses, plugs, sockets, nipples and nuts, but exclude, taps, valves, etc. All pipes and fittings shall be classified according to their outside diameter. Reducer shall be measured along with the larger diameter pipe. As far as jointing is concerned even though explained in foregoing paras the jointing of pipes shall be carried out as per the code of practice if specified by the manufacture and the deviations of any in the code of practice by the manufacturers be strictly taken care off.

Item No. 77:

Providing and laying cast iron pipes of B class of 150mm diameter with sockets and spiget ends/ flanges and cast centrifugally/ vertically including specials, laying pipes and back filling the trench complete including excavation.

General - The item pertains to the provision and fixing of cast iron soil or vent or waste pipes as mentioned in the item of specified diameter including all fittings, excavation laying refilling fixing to wall and painting the exposed pipes. The item shall be subject to the general specifications.

Materials - Cast iron pipe of specified diameter shall have sockets for underground and sockets with lugs for fixing on walls. They shall be of the make specified or shall be the best available in the market and approved by the Engineer and shall have been treated with Dr. Angus Smith's solution. They shall generally comply with the following requirements.

Normal diameter Of pipe	Thickness	Overall weight of 180cm long pipe inclusive of lugs
50mm	5mm	11kg.
80mm	5mm	18kg.
100mm	5mm	24kg.

All the pipes, fittings etc. should be free from cracks and other flaws. The interior of the pipes and fittings shall be clean and smooth.

All the fittings shall be of the same quality as that of pipe. The fittings shall have cleaning eyes with plugs where necessary. Offsets of the required shape and dimensions to suit each particular location shall only be used. Oil paint shall conform to A.17.Cement concrete 1:2:4 shall conform to B.6.Cement mortar 1:1 shall conform to B.5.a

Laying and fixing - The pipes shall be laid or fixed at locations indicated on the drawings or as ordered by the Engineer. The excavation and laying of the cast iron pipes shall conform to Bd.V.13. The socket end shall be the inlet end for the soil or waste pipes. In vent pipes the socket shall face up. The joints shall be filled with cement mortar 1:1 conforming to B.5. a The jointing shall conform to para 5.1 and 5.8.3. of I.S. 1742-1972 The filling shall conform to Bd.V.1.5.Where the cast iron pipes are fixed on to the wall they shall be supported on a 1:2:4 cement concrete block of 30cm x 30cm and sufficient height in the ground. The concrete shall conform to B.6.The pipes shall be fixed on to the wall with nails driven through the lugs to the holder battens necessary fittings shall be included in the pipes. The

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exposed pipes shall be painted with a base coat of red lead and two coats of good anticorrosive oil paint of approved shade. Oil painting shall conform to B.21.

Testing - The joints of cast iron pipes laid underground shall be tested for a 60 cm head over the crown of the highest pipe between two inspection chambers. The lowest end shall be plugged water tight. Water shall than be filled in the inspection chamber at the upper end of the line with 60cm depth of water over the crown. Any defective joints shall be re-made or embedded in 15cm layer of concrete 1.2.4 to make it leak-proof. For pipes fixed on walls, smoke test shall be carried out as detailed under. Greasy cotton waste shall be burnt in a smoke machine consisting of a bellows and a burner leakage through the joints shall be observed and defective joint rectified.

Item to include -

- 1) Cast iron pipes, fittings, cement mortar, cement concrete, oil paint and necessary fixtures.
- 2) Excavating, laying and fitting pipes, refilling, fixing pipes to wall, sealing joints with cement mortar 1:1 including the joints with the pipes coming out of walls form different appliances and fittings and supporting on concrete block, cutting and waste.
- 3) Testing pipe joints and rectifying defective joints.
- 4) All necessary labour, materials and use of tools.

Mode of measurement and payment - The contract rate shall be for one meter of pipe laid the measurement shall be over all the fittings along the centre line form end to end.

Item No. 78:

Providing and laying cast iron pipes of B class of 100mm diameter with sockets and spigot ends/ flanges and cast centrifugally/vertically including specials, laying pipes and back filling the trench complete including excavation.

General - The item pertains to the provision and fixing of cast iron soil or vent or waste pipes as mentioned in the item of specified diameter including all fittings, excavation laying refilling fixing to wall and painting the exposed pipes. The item shall be subject to the general specifications.

Materials - Cast iron pipe of specified diameter shall have sockets for under ground and sockets with lugs for fixing on walls. They shall be of the make specified or shall be the best available in the market and approved by the Engineer and shall have been treated with Dr. Angus Smith's solution. They shall generally comply with the following requirements.

Normal diameter Of pipe	Thickness	Overall weight of 180cm long pipe inclusive of lugs
50mm	5mm	11kg.
80mm	5mm	18kg.
100mm	5mm	24kg.

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All the pipes, fittings etc., should be free from cracks and other flaws. The interior of the pipes and fittings shall be clean and smooth.

All the fittings shall be of the same quality as that of pipe. The fittings shall have cleaning eyes with plugs where necessary. Offsets of the required shape and dimensions to suit each particular location shall only be used. Oil paint shall conform to A.17. Cement concrete 1:2:4 shall conform to B.6. Cement mortar 1:1 shall conform to B.5.a

Laying and fixing - The pipes shall be laid or fixed at locations indicated on the drawings or as ordered by the Engineer. The excavation and laying of the cast iron pipes shall conform to Bd.V.13. The socket end shall be the inlet end for the soil or waste pipes. In vent pipes the socket shall face up. The joints shall be filled with cement mortar 1:1 conforming to B.5. a The jointing shall conform to para 5.1 and 5.8.3. of I.S. 1742-1972 The filling shall conform to Bd.V.1.5. Where the cast iron pipes are fixed on to the wall they shall be supported on a 1:2:4 cement concrete block of 30cm x 30cm and sufficient height in the ground. The concrete shall conform to B.6. The pipes shall be fixed on to the wall with nails driven through the lugs to the holder battens necessary fittings shall be included in the pipes. The exposed pipes shall be painted with a base coat of red lead and two coats of good anticorrosive oil paint of approved shade. Oil painting shall conform to B.21.

Testing - The joints of cast iron pipes laid underground shall be tested for a 60 cm head over the crown of the highest pipe between two inspection chambers. The lowest end shall be plugged water tight. Water shall then be filled in the inspection chamber at the upper end of the line with 60cm depth of water over the crown. Any defective joints shall be re-made or embedded in 15cm layer of concrete 1.2.4 to make it leak-proof. For pipes fixed on walls, smoke test shall be carried out as detailed under. Greasy cotton waste shall be burnt in a smoke machine consisting of a bellows and a burner leakage through the joints shall be observed and defective joint rectified.

Item to include -

- 1) Cast iron pipes, fittings, cement mortar, cement concrete, oil paint and necessary fixtures.
- 2) Excavating, laying and fitting pipes, refilling, fixing pipes to wall, sealing joints with cement mortar 1:1 including the joints with the pipes coming out of walls form different appliances and fittings and supporting on concrete block, cutting and waste.
- 3) Testing pipe joints and rectifying defective joints.
- 4) All necessary labour, materials and use of tools.

Mode of measurement and payment - The contract rate shall be for one meter of pipe laid the measurement shall be over all the fittings along the centre line from end to end.

Item No. 79:

Providing and fixing 15 cm rigid PVC Nahani trap including PVC grating, bend, connecting piece of UPVC pipe up to the outside face of wall, making the good damaged

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surface and testing etc. complete (Prior approval of sample and brand by Ex. Engr. is necessary before use)

Specification:

General: The item pertains to providing and fixing UPVC nahani trap of specified size for sinks andbaths, urinals etc. including the cast iron grating, bends and cast iron pipe.

Material: The UPVC nahani trap, bend and pipe grating of specified size shall be used of the bestavailable in the market and approved by the Engineer-in-charge. The diameter of the cast ironnahani trap shall be as specified in the item, which shall be the inside diameter of the bore of thepipes.

Fixing: The UPVC nahani trap with the bend and pipe piece shall be fixed in position as per thedrawings or as directed. The joints shall be packed with wetted spun yarn in cement slurry sealedwith 1:1 cement mortar. This shall conform to IS:1942. The joint with pipe/specified within wallwidth shall be avoided.

Item to Include: The item includes all labour, material (UPVC Nahani trap, pipes and fittings),tools and equipments, cutting of holes / excavation and making good the cut holes etc. to completethe item satisfactorily.

Mode of Measurement and Payment: The contract rate shall be for **one number of Nahani trap**fixed including all fitting. Cutting and waste will not be paid for separately.

Item No. 80:

Providing and fixing on walls/ ceiling/ floor 15 mm dia. CPVC pipe with necessary fittings, remaking good the demolished portion etc. complete. Including removing existing pipe line if necessary and conveying and stacking the same in PWD chowky or as directed etc. complete.

General: The item pertains to providing and fixing chlorinated Poly Vinyl Chloride (CPVC) Pipes, having thermal stability for hot and cold water supply including all CPVC plain & brass threaded fittings i/c fixing the pipe with clamps at 1.00 mtr spacing. etc. complete. .

Item to Include : This includes jointing of pipes & fittings with one step CPVC solvent cement& testing of joints complete as per direction of Engineer in Charge (Internal work exposed on wall)for specified size. The item shall be executed as per instructions of Engineer in charge and as per best Engineering practice.

Mode of Measurement and Payment: .The contract rate shall be per Rmt of CPVC pipes.

Item No. 81:

Providing and fixing on walls/ceiling/floor 20 mm dia. CPVC pipe with necessary fittings, remaking good the demolished portion etc. complete. Including removing existing pipe

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line if necessary and conveying and stacking the same in PWD chowky or as directed etc. complete.

General: The item pertains to providing and fixing chlorinated Poly Vinyl Chloride (CPVC)Pipes, having thermal stability for hot and cold water supply including all CPVC plain & brass threaded fittings i/c fixing the pipe with clamps at 1.00 mtr spacing. etc. complete. .

Item to Include : This includes jointing of pipes & fittings with one step CPVC solvent cement& testing of joints complete as per direction of Engineer in Charge (Internal work exposed on wall)for specified size. The item shall be executed as per instructions of Engineer in charge and as per best Engineering practice.

Mode of Measurement and Payment: .The contract rate shall be per Rmt of CPVC pipes.

Item No. 82:

Providing and fixing on walls/ ceiling/ floor 25 mm dia. CPVC pipe with necessary fittings, remaking good the demolished portion etc. complete. Including removing existing pipe line if necessary and conveying and stacking the same in PWD chowky or as directed etc. complete.

General: The item pertains to providing and fixing chlorinated Poly Vinyl Chloride (CPVC)Pipes, having thermal stability for hot and cold water supply including all CPVC plain & brassthraded fittings i/c fixing the pipe with clamps at 1.00 mtr spacing. etc. complete. .

Item to Include : This includes jointing of pipes & fittings with one step CPVC solvent cement& testing of joints complete as per direction of Engineer in Charge (Internal work exposed on wall)for specified size.The item shall be executed as per instructions of Engineer in charge and as per best Engineeringpractice.

Mode of Measurement and Payment: .The contract rate shall be per Rmt of CPVC pipes.

Item No. 83:

Providing and fixing on walls/ ceiling/ floor 32 mm dia. CPVC pipe with necessary fittings, remaking good the demolished portion etc. complete. Including removing existing pipe line if necessary and conveying and stacking the same in PWD chowky or as directed etc. complete.

General: The item pertains to providing and fixing chlorinated Poly Vinyl Chloride (CPVC)Pipes, having thermal stability for hot and cold water supply including all CPVC plain & brassthraded fittings i/c fixing the pipe with clamps at 1.00 mtr spacing. etc. complete. .

Item to Include : This includes jointing of pipes & fittings with one step CPVC solvent cement& testing of joints complete as per direction of Engineer in Charge (Internal work exposed on wall)for specified size.The item shall be executed as per instructions of Engineer in charge and as per best Engineeringpractice.

Mode of Measurement and Payment: .The contract rate shall be per Rmt of CPVC pipes.

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Item No. 84:

Providing and fixing on walls/ ceiling/ floor 50 mm dia. CPVC pipe with necessary fittings, remaking good the demolished portion etc. complete.

General: The item pertains to providing and fixing chlorinated Poly Vinyl Chloride (CPVC) Pipes, having thermal stability for hot and cold water supply including all CPVC plain & brass threaded fittings i/c fixing the pipe with clamps at 1.00 mtr spacing. etc. complete. .

Item to Include : This includes jointing of pipes & fittings with one step CPVC solvent cement & testing of joints complete as per direction of Engineer in Charge (Internal work exposed on wall) for specified size. The item shall be executed as per instructions of Engineer in charge and as per best Engineering practice.

Mode of Measurement and Payment: .The contract rate shall be per Rmt of CPVC pipes.

Item No. 85:

Supplying, erecting, testing and commissioning self contained water cooler 230/250V 50 cycles nominal cooling capacity of 40 litres/hr and storage capacity 80 litres with partially stainless steel body complete. specification no. APWCR/ WC

Supplying ,erecting testing and commissioning self contained water cooler with specified storage capacity & cooling capacity, and marking S No and date of erection.

Material:

1. Water Cooler:

The water cooler shall be suitable for operation on 230 V +/- 10% , 50 Hz, single phase AC supply with hermetically sealed type suction cooled compressor with overload protection conforming to IS :-10617(part I) : 1983 with amendment no 1&2.

2. Tank:

Tank shall be fabricated from SS sheet of 0.8 mm min. thickness as per AISI 304 and shall be made by electrically seam welded lap joints or alternatively from 0.63 mm thickness stainless steel sheet with PUF insulation. However tank fabricated by double seam jointing is also acceptable if the same is reinforced and sealed by lead free solder material. Use of lead soldering material for sealing the joints of water tank is not permitted. Water tank cover and lid bottom shall be made of 1.25 mm aluminium sheet duly anodized / epoxy painted / high impact polystyrene (HIP) of 1.5 mm thickness. Positive locking of the lid is to be provided (lock with two keys). A drain valve at the bottom of the storage tank to be provided to draw out water while cleaning

3. Cabinet (Body):

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The cabinet of the water cooler shall be made of GS sheet of 1.0 mm. The front panel, below the water outlets in the storage type water coolers shall be made of stainless steel of 0.8 mm. The drain pan for storage type water coolers shall be made of stainless steel sheet of 0.63 mm upto size 40 liters/hour and beyond 40 liters/hour of 0.8 mm thickness. The bottom pedestal shall be made of 2.65 mm minimum thick stainless steel sheet. Pedestal shall have a minimum ground clearance of 100 mm for ease of cleaning. Pedestal shall be strong enough to withstand weight with storage tank full and shall be reinforced to prevent skewing. The body shall be held securely with the pedestal with stainless steel nuts and bolts. The drain size should be 25 mm or above. In case water outlets are provided on three sides then all the three lower panels should be made of aluminium sheet or stainless steel sheet.

The mild steel components used in the manufacture of the cabinet shall be individually degreased, pickled, scrubbed and rinsed to remove grease, rust, scale or any other foreign elements. Immediately after pickling the MS parts shall be given phosphate treatment. The components along with the front panels shall then be given a primer coat with a finish coat of stove with a finish coat of stove enamel paint. The finish shall be smooth and uniform with hard tough film of the enamel adhering to the surface. The finish shall be free from all the visible defects and shall not chip when tapped lightly with a dull pointed instrument. Alternatively method of corrosion protection like plastic powder coating, electrostatic painting shall be permitted

Refrigeration coils to be fully soldered to the outside of the tank for good thermal contact and not merely tack welded

There shall not be any gap between water tank cover (mask) and water tank to prevent rodent/ insect/ dust entry.

Water tank overflow should be adequately covered with strainer such as wire mesh etc to avoid rodent/ insect/ dust entry.

4. Condenser fan motor: The condenser fan motor shall be capacitor start and capacitor run (CSR) or permanently split capacitor (PSC) or alternatively permanently lubricated motor may be provided.
5. Thermostat: The thermostat shall conform to IS: 11338-1985. The position of the thermostat shall be adjustable through a rotary switch mounted on the front or side panels. Min and max of the thermostat setting shall be from 10 degree Celsius and 25 degree Celsius which shall be marked.

Method of Construction:

The water cooler shall be fixed at designated place or as directed by the site engineer, duly connected with inlet and drain, and tested.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e each)

Item No. 86:

Supplying and erecting ultra violet water purifier with softener for safe drinking water consisting of UV germicidal tube of 8W capacity, choke made of copper wire, two indicator lamps, dual function cartridge with output of purified water 2 litre/min. with activated carbon filter and softener operating on 230 V single phase AC supply.

General: Providing ultra violet water purifier with softener

Specification: Supplying and erecting ultra violet water purifier with softener for safe drinking water consisting of UV germicidal tube of 8W capacity, choke made of copper wire, two indicator lamps, dual function cartridge with output of purified water 2 litre/min. with activated carbon filter and softener operating on 230 V single phase AC supply.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e each)

Item No. 87:

Supplying and erecting PVC trunking (PVC casing-n-capping) of size 25 mm with accessories on wall/ceiling as per specification No: WG-MA/CON.

Material:

PVC Conduit

PVC pipe minimum 25mm dia and above depending No. of wires to be drawn (refer Table No1/2, ISI mark, HMS grade (2mm thick), accessories for PVC pipes of the same make that of pipe; such as Spacers & Saddles, Couplers, Bends, inspection or non inspection type Elbows, Tees, Junction boxes of required ways and resin / adhesive to make all joints rigid. Black pipe shall not be used for surface type wiring.

Hardware:

Sheet Metal (SM) screws of sizes specified in method of construction, washers, plugs / wooden gitties, etc.

Method of construction:

Erection of Surface type Conduits:

General

Erection shall be done as per the layout finalized, in perfect level and plumb. Conduits shall be firmly fixed on spacers and saddles. Fixing of spacers shall be equidistant and at ends near boards. Screws of minimum 35x8 mm and suitable plugs shall be used for fixing. In case of stonewalls wooden gitties shall be grouted in wall for fixing of spacers and saddles. Distance between 2 spacers shall not be more than 600mm. Size of conduit shall be correct depending on number of wires to be drawn (as per Table No.1/2 for PVC conduits). Separate pipe shall be used for each phase in 1-ph distribution and for power and light distribution. Also for wiring for other utilities like data, telephone, TV cabling distance between pipes shall not be less than 200 mm. Adequate use of conduit accessories shall be made at required locations. Entries in wall shall be at level of surface conduit with colour coding (For Visual identification) as per Table No. 4. Flexible conduits shall be used at expansion joints.

Erection of Conduits:

PVC Conduits for surface type wiring

In addition to general instructions above, all joints shall be made rigid with resin / adhesive. Wherever offsets are necessary, same shall be done with bending spring.

Mode of Measurement: Executed quantity shall be measured in RMT

Item No. 88:

Supplying and erecting PVC trunking (PVC casing-n capping) of size 32 mm with accessories on wall/ceiling as per specification No: WG-MA/CON.

Material:

PVC Conduit

PVC pipe minimum 32mm dia and above depending No. of wires to be drawn (refer Table No1/2, ISI mark, HMS grade (2mm thick), accessories for PVC pipes of the same make that of pipe; such as Spacers & Saddles, Couplers, Bends, inspection or non inspection type Elbows, Tees, Junction boxes of required ways and resin / adhesive to make all joints rigid. Black pipe shall not be used for surface type wiring.

Hardware:

Sheet Metal (SM) screws of sizes specified in method of construction, washers, plugs / wooden gitties, etc.

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Method of construction:

Erection of Surface type Conduits:

General

Erection shall be done as per the layout finalized, in perfect level and plumb. Conduits shall be firmly fixed on spacers and saddles. Fixing of spacers shall be equidistant and at ends near boards. Screws of minimum 35x8 mm and suitable plugs shall be used for fixing. In case of stonewalls wooden gitties shall be grouted in wall for fixing of spacers and saddles. Distance between 2 spacers shall not be more than 600mm. Size of conduit shall be correct depending on number of wires to be drawn (as per Table No.1/2 for PVC conduits). Separate pipe shall be used for each phase in 1-ph distribution and for power and light distribution. Also for wiring for other utilities like data, telephone, TV cabling distance between pipes shall not be less than 200 mm. Adequate use of conduit accessories shall be made at required locations. Entries in wall shall be at level of surface conduit with colour coding (For Visual identification) as per Table No. 4. Flexible conduits shall be used at expansion joints.

Erection of Conduits:

PVC Conduits for surface type wiring

In addition to general instructions above, all joints shall be made rigid with resin / adhesive. Wherever offsets are necessary, same shall be done with bending spring.

Mode of Measurement: Executed quantity shall be measured in RMT

Item No. 89:

Supplying and erecting PVC trunking (PVC casing-ncapping) of size 40 mm with accessories on wall/ceiling as per specification No: WG-MA/CON.

Material:

PVC Conduit

PVC pipe minimum 40mm dia and above depending No. of wires to be drawn (refer Table No1/2, ISI mark, HMS grade (2mm thick), accessories for PVC pipes of the same make that of pipe; such as Spacers & Saddles, Couplers, Bends, inspection or non inspection type Elbows, Tees, Junction boxes of required ways and resin / adhesive to make all joints rigid. Black pipe shall not be used for surface type wiring.

Hardware:

Sheet Metal (SM) screws of sizes specified in method of construction, washers, plugs / wooden gitties, etc.

Method of construction:

Erection of Surface type Conduits:

General

Erection shall be done as per the layout finalized, in perfect level and plumb. Conduits shall be firmly fixed on spacers and saddles. Fixing of spacers shall be equidistant and at ends near boards. Screws of minimum 35x8 mm and suitable plugs shall be used for fixing. In case of stonewalls wooden gitties shall be grouted in wall for fixing of spacers and saddles. Distance between 2 spacers shall not be more than 600mm. Size of conduit shall be correct depending on number of wires to be drawn (as per Table No.1/2 for PVC conduits). Separate pipe shall be used for each phase in 1-ph distribution and for power and light distribution. Also for wiring for other utilities like data, telephone, TV cabling distance between pipes shall not be less than 200 mm. Adequate use of conduit accessories shall be made at required locations. Entries in wall shall be at level of surface conduit with colour coding (For Visual identification) as per Table No. 4. Flexible conduits shall be used at expansion joints.

Erection of Conduits:

PVC Conduits for surface type wiring

In addition to general instructions above, all joints shall be made rigid with resin / adhesive. Wherever offsets are necessary, same shall be done with bending spring.

Mode of Measurement: Executed quantity shall be measured in RMT

Item No. 90:

Supplying & erecting mains with 2x1.5 sq.mm FRLSH copper PVC insulated wire laid in provided conduit/trunking/inside pole/Bus bars or any other places as per specification No: WGMA/ BW

Scope:

Bunch of wires

Providing specified wires and drawing them through provided conduits and / or as directed; ferruling by coding tags, harnessing the bunch of wires with necessary material when used in panel boards, and duly connecting with lugs.

Material:

Wires

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Mains / Sub-mains / Circuit mains (comprising phase and neutral wires):

PVC insulated wire of specified size, minimum FR grade insulation, copper conductor of electrolytic grade, having insulation 1.1 kV grade, ISI marked, of required colour coding as per Table No 1/5.

Earth Wire:

PVC insulated wire minimum FR grade insulation copper conductor of electrolytic grade, having insulation 1.1 kV grade, of green colour, ISI marked, of specified size but not less than 1.5 sq.mm as per Table No 1/5.

Lugs: copper lugs of required size & type

Other material: Rubber grommet, bush, harnessing material, flexible conduit etc.

Method of construction:

Bunch of wires

Drawing of wires: General

Wires shall be drawn with adequate care. Correct colour coding as per Table No. 1/5, shall be used for phase, neutral and earth. Wires shall not have intermediate joint in between terminals of the accessories. Earth-wire and Return wire (neutral) may be looped only within circuit. For lighting load or single-phase distribution wires of two different phases shall not be drawn in single pipe. Wires shall be terminated in the terminals of accessories only, with correct type of and correct size of lugs.

Drawing of wires: through PVC conduits

Insulated Earth wire of green or green-yellow colour of minimum 1.5 sq mm or as per specified shall be drawn through pipe. Number of wires shall not exceed with respect to size of pipe as per Table No. 1/2.

Drawing of wires: through Rigid Steel conduits

Bush shall be used at pipe opening to protect wire insulation from getting damaged due to burrs / sharp edges. Number of wires shall not exceed with respect to size of pipe as per Table No. 1/1

Open Wire bunch: Open wires shall be erected with due care so as to avoid chances of any mechanical injury. Harnessing shall be done with required material in an approved manner in panel boards or where ever necessary. For covering lead wires flexible conduit shall be used with gland as per necessity.

Testing:

Insulation resistance test:

All wiring shall be tested with 500V Megger between phases, phase – neutral and to Earth. IR value shall not be less than 1M-ohm.

Earth continuity:

Earth continuity shall be ensured at termination point of Earth wire.

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Polarity Test:

Test shall be carried out for ensuring the correct polarity in plug

Mode of measurement:

Measurement shall be carried out on the basis per running meter length of single wire or bunch as specified.

Item No. 91:

Supplying & erecting mains with 2x2.5 sq.mm FRLSH copper PVC insulated wire laid in provided conduit/trunking/inside pole/Bus bars or any other places. as per specification No: WGMA/BW

Scope:

Bunch of wires

Providing specified wires and drawing them through provided conduits and / or as directed; ferruling by coding tags, harnessing the bunch of wires with necessary material when used in panel boards, and duly connecting with lugs.

Material:

Wires

Mains / Sub-mains / Circuit mains (comprising phase and neutral wires):

PVC insulated wire of specified size, minimum FR grade insulation, copper conductor of electrolytic grade, having insulation 1.1 kV grade, ISI marked, of required colour coding as per Table No 1/5.

Earth Wire:

PVC insulated wire minimum FR grade insulation copper conductor of electrolytic grade, having insulation 1.1 kV grade, of green colour, ISI marked, of specified size but not less than 1.5 sq.mm as per Table No 1/5.

Lugs: copper lugs of required size & type

Other material: Rubber grommet, bush, harnessing material, flexible conduit etc.

Method of construction:

Bunch of wires

Drawing of wires: General

Wires shall be drawn with adequate care. Correct colour coding as per Table No. 1/5, shall be used for phase, neutral and earth. Wires shall not have intermediate joint in between terminals of the accessories. Earth-wire and Return wire (neutral) may be looped only within circuit. For lighting load or single-phase distribution wires of two

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different phases shall not be drawn in single pipe. Wires shall be terminated in the terminals of accessories only, with correct type of and correct size of lugs.

Drawing of wires: through PVC conduits

Insulated Earth wire of green or green-yellow colour of minimum 1.5 sq mm or as per specified shall be drawn through pipe. Number of wires shall not exceed with respect to size of pipe as per Table No. 1/2.

Drawing of wires: through Rigid Steel conduits

Bush shall be used at pipe opening to protect wire insulation from getting damaged due to burrs / sharp edges. Number of wires shall not exceed with respect to size of pipe as per Table No. 1/1

Open Wire bunch: Open wires shall be erected with due care so as to avoid chances of any mechanical injury. Harnessing shall be done with required material in an approved manner in panel boards or where ever necessary. For covering lead wires flexible conduit shall be used with gland as per necessity.

Testing:

Insulation resistance test:

All wiring shall be tested with 500V Megger between phases, phase – neutral and to Earth. IR value shall not be less than 1M-ohm.

Earth continuity:

Earth continuity shall be ensured at termination point of Earth wire.

Polarity Test:

Test shall be carried out for ensuring the correct polarity in plug

Mode of measurement:

Measurement shall be carried out on the basis per running meter length of single wire or bunch as specified.

Item No. 92:

Supplying and erecting ISI mark modular type electronic step regulator for fan two module, duly erected on provided plate and box with wiring connections complete.

General: Providing Electronic step regulator for Fan.

Specification: Supplying and erecting ISI mark modular type electronic step regulator for fan two module, duly erected on provided plate and box with wiring connections complete.

Mode of measurement:

Measurement shall be carried out on the basis per numbers.

Item No. 93:

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Point wiring for light/fan/bell concealed type in min 20 mm ISI marked HMS PVC conduit with 1.5 sq.mm. (2+1E) FR grade copper wires, modular type switch, earthing and required accessories as per specification No: WG-PW/CW

Scope:

Point wiring (Concealed type)

Providing all required approved specified material including hardware and erecting rigid steel / PVC conduits, junction boxes, provided fan boxes, along with required accessories in RCC slabs before casting and in walls, flooring by making chases, and refilling the same after erection of conduits, fixing concealed type boxes for switch boards in walls, drawing wires through conduits, from switch board to outlet for light / fan / bell / independent plug point fixing modular type switch for controlling power supply and an accessory for outlet of light / fan / bell / plug at other end, with mounting plate, and terminating wires within at both ends, as per approved method of construction, closing all junction boxes with plates; removing all debris and testing the installation for safety and beneficial use.

Material:

Point wiring (Concealed)

PVC conduit:

PVC pipe minimum 20mm dia and above depending No. of wires to be drawn (refer Table No 1/2); ISI mark, HMS grade (2mm thick), accessories for PVC pipes of the same make that of pipe; such as Spacers & Saddles, Couplers, Bends, inspection or non inspection type Elbows, Tees, Junction boxes of required ways and resin / adhesive to make all joints rigid. Black pipe shall not be used for surface type wiring.

Rigid Steel conduit:

Rigid steel conduit minimum 20mm dia. and 16 gauge, ISI mark, ERW grade duly processed for anti-rust treatment and painted with black enamel paint, accessories for rigid steel conduits such as 3mm thick 20mm width spacers and MS/G.I. saddles, sockets, open bends, junction boxes of required ways all of the same make; 22g 10mm width, copper earth clips for fixing earth wire along the conduits

Sheet metal Junction boxes / Draw-in boxes:

Junction box shall be fabricated from 16 SWG CRCA sheet steel duly treated with antirust treatment and painted with two coats of red oxide paint. There shall be knockout holes in required numbers and dia. for entry of conduit pipes and arrangement to fix cover plate on it. Cover plate shall be made up of fire resistant PVC material/3mm thick laminate/Bakelite/hylam sheet with duly tapered edges.

Wires: comprising phase and neutral wires:

PVC insulated minimum FR grade copper wires of electrolytic grade, having insulation 1.1 kV grade, ISI marked, of required colour coding as per Table No 1/5 and as per specified size

Earth Wire:

PVC insulated minimum FR grade copper wires of electrolytic grade, having insulation 1.1 kV grade, of green colour, ISI marked, 1.5 sq.mm / bare copper wire of 14g / GI wire of 12g.

Lugs: Pin type Copper lugs.

Accessories:

Switch: 1 or 2 way Modular type switch 6/10A.

Outlet: Modular type 6A angle / batten lamp holder or 3 plate ceiling-rose or Bakelite / porcelain 3 way connector or if plug point, 6A, 3-pin plug shuttered socket.

Boards: Switchboards shall comprise of; concealed type box of required modules made of sheet metal or Polypropylene material, mounting plate and cover plate. The required modules shall be worked out on the basis of points, plug socket/sockets, step type fan regulator, etc are to fixed. For the blank module, 1 way blank plate shall be fixed. All the above accessories shall be of same make, as that of switch.

Hardware:

Sheet Metal (SM) screws of sizes specified in method of construction, washers, plugs / wooden gitties, 'U' nails, plumbing nails, steel binding wire 20g etc. Other material for Surface finishing; Sand, Cement, water etc.

Method of construction:

Point wiring (Concealed)

Concealing of conduits:

General

Work shall be done in co-ordination with civil work. Size of conduit shall be correct depending on number of wires to be drawn. (Table No. 1/1 for Steel conduits & Table No 1/2 for PVC conduits) Separate pipe shall be used for each phase in 1-ph distribution and for power and light distribution and also for wiring for other utilities like data, telephone, TV cabling, etc. The distance between pipes shall not be less than 200 mm. Adequate use of conduit accessories shall be made at required locations. Entries in wall shall be at level of corresponding conduit with colour coding as per Table No. 4. (For Visual identification) Flexible conduits shall be used at expansion joints. Erection shall be done as per the layout finalized, with minimum sharp bends, with junction boxes at

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angular junctions and for straight runs at every 4.25m, in such manner so as to facilitate drawing of wires. All the bends shall be done with Bending Spring.

Concealing of conduits:

In slabs

Work shall be commenced after fixing of steel on centering material. Conduits shall be firmly fixed with steel in slab by binding wire. Fixing of conduits shall be such that it will remain rigid during casting of slab and also while use of vibrator in column/beam. Deep junction boxes and other draw-in boxes shall be such that their open end will be flush with centering material even after fixing covers to steel of RCC and be filled with dry sand. Open ends of conduits; to be concealed in walls, shall be provided with couplers / sockets at ends and be flush with bottom of beam, and at the center of the beam. As far as possible bunching / grouping of conduits shall be avoided so that it will not affect strength of RCC work especially in beams. Suitable Steel fish wire shall be laid in the conduits for drawing of wires later on.

Concealing of Conduits:

In walls

Chases shall be made in walls of adequate width, with cutter and chiseling through it. Necessary finishing of the surface shall be done. Conduits of adequate size shall be erected with use of appropriate accessories and 'U' nails.

Drawing of wires:

Use of Steel fish wire shall be made for drawing of wires. Wires shall be drawn with adequate care. Correct colour coding shall be used for phase, neutral and earth. Wires shall not have intermediate joint in between terminals of the accessories. Earth-wire and Return wire (neutral) may be looped within circuit only. For lighting load distribution, wires of two different phases shall not be drawn in single pipe. Wires shall be terminated in the terminals of accessories only. Adequate extra length shall be left at termination points.

Fixing Switchboards and accessories:

Control switchboards shall generally be erected at 1.35m height or as specified and fixed with minimum 2 Nos. of screws of length not less than 50mm, Boards shall be in line and plum and shall be in level with wall surface so as to fix mounting plate flush with wall, Termination of wires shall be done in switch and other accessories only by carefully inserting all strands in terminals and proper tightening. Switches shall be provided on phase wire only. Bare wire shall not be used for looping incoming supply to switches. Phase wire shall be routed through switch only. For plug socket phase wire shall be

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connected in right side terminal when seen from front. Proper termination of earth wire in Earth terminal shall be ensured.

Testing:

Insulation resistance test:

All wiring shall be tested with 500V Megger between phases, phase – neutral and to Earth. IR value shall not be less than 1M-ohm.

Earth continuity:

Earth continuity shall be ensured at all earth terminals of plug outlets and at earth terminals of metal enclosures.

Polarity test:

Polarity test shall be carried out for ensuring the correct polarity in the plug.

Mode of measurement:

Measurement shall be carried out on the basis per number of points, for the point length up to 6m between switch and outlet. For the length exceeding 6m 10% of overall rate shall be added for every 1m.

Item No. 94:

Supplying and erecting ISI mark modular switch with LED indicator available to connect in a switch board to glow LED when connected load is off, on provided double mounting plate complete duly erected.

General:- Providing ISI mark modular switch with LED indicator

Specification: Supplying and erecting ISI mark modular switch with LED indicator available to connect in a switch board to glow LED when connected load is off, on provided double mounting plate complete duly erected.

Mode of measurement: Measurement shall be carried out on the basis per number

Item No. 95:

Supplying and erecting regular/ standard model ceiling fan of 1400mm. sweep complete erected in position as per specification no. FG-FN/CF

Scope:

Supplying and erecting Ceiling fan of specified sweep with all accessories and necessary materials, erected in provided hook/clamp.

Material:

Ceiling Fan:

Electric Ceiling fan capacitor type with double ball bearing complete with capacitor, 300 mm down rod, canopies, shackles, reel insulator, half threaded bolts of 3/8" dia 2-1/2" to 3-1/2" long and 5/16" dia 1-3/4" to 2-1/4" long with nuts, with lock pin, spring & plate washers, etc.; three number blade made of aluminum alloy, suitable for single phase, AC 210 volts, 50 Hz supply and conforming to class I of IS : 374/1979

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with amendment no 1 to 6 except for performance parameters to the extent modified as details in general requirements. The down rod shall be capable to withstand a tensile load of 1000 kg without breakdown and a torsion load of 500 kgcm without breakage as per Clause 10.14.1 of IS: 374/1979 with amendment no.1 to 6. Electrical motor should be single phase permanent capacitor type with no. of poles 12/14/16/18 (As per sweep), Class-I with basic insulation. Class of insulation shall be B class. The winding wire used for fan should be synthetic enameled of 30 to 38 SWG. Connection wire: PVC insulated Twin twisted flexible copper wire 24/0.2 mm. Paint: Superior quality enamel paint of specified colour.

Table 2/1

Performance Parameters for Fans suitable for Low Voltage operation

S.No	Sweep	Input Power in watts	Air delivery in m ³ /minute		Minimum Service Value	
			at 210 V	at 180 V	at 210 V	at 180 V
1	1200 mm	62	203	175	3.27	3.36
2	1400 mm	75	248	215	3.3	3.31

Method of Construction:

The Ceiling fan complete with all above accessories and duly wired shall be erected on provided hook/clamp and connected to the supply and tested.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e each)

Item No. 96:

Supplying and erecting fresh air cum exhaust fan of light duty 250V A.C. 50 cycles 300mm. 1400 RPM rust proof body & blades, wire mesh, duly erected in an approved manner.

Scope:

Supplying and erecting Exhaust fan of specified sweep and speed, with all accessories and necessary materials, suitable to work on 230 V / 415 V, AC Supply 50 Hz, erected in position.

Material:

Exhaust Fan: ISI marked Exhaust fan suitable for Single/Three phase AC 230/415 Volts 50 Hz, capacitor run with mounting ring, four numbers of fixing hole without regulator and louvers. The sweep and speed shall be as per table below. Fan motor with moisture proof treatment and E class insulation, ISI marked, confirming to IS: 2312/67 with amendments 1 to 8. The fan mounting rings shall be proper pretreatment followed with at least two coats of primer, final finish shall be with two coats of grey colour paint duly baked. The connecting leads shall be brought out for making connections. Paint: Superior quality enamel paint of specified colour.

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Table 2/2

Corresponding Speed with Sweep

S.No	Sweep	Speed in RPM	Voltage level
1	375 mm	900	230 V
2	375 mm	1400	230 V
3	450 mm	1400	230 V
4	450 mm	900	230 V
5	375 mm	900	415 V

Method of Construction:

The Exhaust fan complete with all above accessories and duly wired shall be erected at specified position, connected to the supply and tested.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e each)

Item No. 97:

Supplying & erecting on line UPS pure sine wave of 10 kVA capacity complete with standard features, along with necessary SMF batteries for 30 mins battery backup, as per specification no. AP-UPS

General

This part of the specifications covers the technical aspects of the Online UPS system for 1 to 10 kVA capacity.

2. Scope:

Supplying, erecting, testing & commissioning of Online UPS with necessary safeties, etc.

Specification No**3. Material:**

Equipment manufactured as per standard manufacturer's specification and as tabulated in Table No. 3.7/2. The unit housed in powder coated CRCA sheet enclosure with following fault protection on mains / UPS mode:

- Under voltage on mains mode

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- Overvoltage on mains mode
- Charger protection on mains mode
- Overload on UPS mode
- Short circuit on UPS mode
- Low battery on UPS mode
- Battery reverse on UPS mode
- Under voltage on UPS mode
- Overvoltage on UPS mode
- LED & LCD display for above fault protection
- Alarm for above fault protection
- Batteries shall be of Sealed Maintenance Free type (Tubular). The selection of number of batteries required shall be as per Table No 3.7/1

Table No. 3.7/1**Details of Batteries required for the UPS in respect to the Backup Period.**

kVA rating	DC Voltage	Output pf	No of SMF Batteries	Back Up Period				
				15 mins.	30 mins.	1Hr	2Hrs	3Hrs
1kVA	36V	0.7	3	17AH	2 X 17AH	42AH	65AH	100AH
2kVA	96V	0.7	8	17AH	26AH	42AH	65AH	100AH
3kVA	192V	0.8	16	17AH	17AH	26AH	42AH	65AH
5/6 kVA	192V	0.8	16	17AH	26AH	42AH	65AH	100AH
8kVA	240V	0.8	20	17AH	26AH	42AH	100AH	2X 65AH
10kVA	240V	0.8	20	26AH	42AH	65AH	2X 65AH	2X 100AH
A)	The Batteries considered are Sealed Maintenance Free							

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	Batteries (SMF)	
B)	The Batteries need to be placed in Ambient Temperature of 20Deg C - 25Deg C	
C)	The UPS is considered to be working @ 90% Load of its capacity	

Table No. 3.7/1**Specifications & Standard Parameters of On Line UPS**

The UPS shall comply with specifications as indicated in the following table:

Conditions / Features	Parameters
Topology	Double Conversion design (Microprocessor based)
Input Voltage range	270 V for 1 Phase Input 477 V for 3 Phase Input
Power factor	Power factor 1 Phase input
Surge compatibility	times the UPS rating)
Input frequency	6 %
Rectifier type	Rectifier with inbuilt APFC (Advance Power Factor Compensated) for 1 Phase. Larger Advance Rectifier with inbuilt APFC (Advance Power Factor Compensated) for 3 Phase.
Output Voltage	+/- 1 % for 1 Phase Output. (380/415 selectable) for 3 Phase & Neutral.
THD (Total Harmonic distortion)	Output Linear load Non-linear load Output Linear load Non-linear load
Capacity	10 Seconds & 130 % for 2 Seconds for 1 & 2 kVA UPS. 10 Minutes & 150 % for 60 Seconds for 3 to 10 kVA UPS.
	Microprocessor based PWM with Digital control (Microprocessor based)
Power Rating	& 2 kVA UPS. to 10 kVA UPS.
Transfer	Transfer bypass switch facility
	User friendly with LED & LCD display with showing important parameters.

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Power factor	Unity within kVA & kW rating.
Terms of PC per kVA. (PC with 15" CRT Monitor)	kVA (for 1 & 2 kVA UPS) kVA (for 3 to 10 kVA UPS)
Type	rack plate / Tubular
Voltage	12 V, 2 kVA – 96 V, 3 & 5 kVA – 192 V, 10 kVA – 240 V
Charge current limit	2 kVA – 6 A, 3 & 5 kVA – 4 & 6 A, 10 kVA – 8 & 15 A.
Temperature	
Height	3 metres
Standards	IS: 266 Part III
Galvanic	transformer from 3 to 10 kVA

4. **Mode of Measurement:** Executed quantity will be measured on number basis. (i.e Each)

Item No. 98:

Supplying and erecting 12 V/80Ah to 88 Ah tubular battery with battery terminal wire, duly charged complete with 36 months warranty complete

MECHANICAL SPECIFICATIONS:

General: Providing 12 V/80Ah to 88 Ah tubular batteries with battery.

I) Technical Specifications: 1.1) Technical Specifications for Battery: Battery Type Tubular lead acid traction battery Capacity 289 AH, C5 rated No. of cells in the battery 12 Nominal voltage per cell 2 V Nominal voltage of battery 2X12 = 24V Material of inter cell connector Lead plated copper Method of connection Bolted Applicable Standard IS:5154 II) List of applicable standards: Standard No. Title IS: 266 Sulphuric Acid IS: 1069 Water for Storage type batteries IS: 1146 Rubber and plastic containers IS: 3116 Sealing Compound for lead acid batteries IS: 6071 Synthetic separators for lead acid batteries Equipment meeting with the requirement of other authoritative standards, which ensure equal or better performance than the standards mentioned above, shall also be considered. III) General Technical Requirements: 1) Container: Each cell container shall preferably be made of hard rubber or talc filled polypropylene or FRP and shall have adequate mechanical strength to prevent bulging, cracking etc., and housed in a M.S box. The M.S box shall be painted with acid resistant paint and shall conform to relevant IS. The cell container shall conform to latest edition of IS-1146. Gap between each cell and between cell and M.S. outer container shall be filled with suitable leak proof filling material to prevent entry of electrolyte to container bottom. 2) Positive plates: The plates shall be of first class material and GOOD workmanship and shall be free from blow holes, cracks and other imperfections. The tubular positive plates shall consist of a suitable bar with spines cast of suitably alloyed lead to give adequate mechanical strength and minimum electrical resistance. The tubular spines shall be cast of an alloy of Pb and antimony. 3) Negative plate: The negative plate shall be of flat pasted type lead calcium alloy grid. 4) Electrolyte: The sulphuric and water used for the preparation of

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electrolyte shall conform to IS 266 and IS 1069 respectively. 5) Sealing Compound: Sealing compound, if bitumen based, shall conform to IS 3116: 1965 or latest edition. 6) Separators: It shall be micro porous polyethylene envelope type to avoid direct as well as side shorts. It should be acid resistant, chemically inert and should have excellent oxidation resistance and high degree of porosity to ensure minimum internal resistance. Micro porous synthetic separators shall conform to latest IS: 6071. 7) Fasteners: Nuts and bolts for connecting the cells shall be made of copper, brass or stainless steel. Copper or brass nuts and bolts shall be effectively lead coated to prevent corrosion. Stainless steel bolts and nuts shall be passivated to prevent corrosion with acid. 8) Connectors: When it is not possible to bolt the cell terminals directly to assemble the battery, a separate lead coated copper connectors or flexible copper cable connectors of suitable cross-section shall be provided to join the cells. The lead plating on copper connectors shall not be less than 25 micron. 9) Terminal Posts: Positive and negative terminal posts shall be clearly and unmistakably identifiable. 10) Cell lids: It should be either moulded from opaque talc-filled polypropylene or made of hard rubber and sealed to the container. It should be easily removable if the need arises. 11) Micro porous ceramic vent plugs: The vent plug shall be micro porous ceramic filter which effectively returns all acid spray to the cell, but allow free exit of oxygen and hydrogen which is generated at the end of boost charging. On removal, the plug shall permit drawing of the electrolyte sample for servicing and of checking of the electrolyte level. 12) Marking: The following information shall be indelibly and durably marked on the Battery: i) Manufacturer's name ii) Type iii) Voltage Rating of the battery iv) Operating Specific gravity @ 30o C v) Weight vi) Date of Manufacturing Each cell may also be marked with Manufacturer's name, Nominal cell voltage, Standard to which it confirms and battery may also be marked with the Standard to which it confirms.
Specification: Supplying and erecting 12 V/80Ah to 88 Ah tubular battery with battery terminal wire, duly charged complete with 36 months warranty complete

Mode of Measurement:Executed quantity will be measured on number basis. (i.e Each)

Item No. 99:

Supplying erecting and marking double pole isolator only switch version of miniature circuit breaker of 40A with required wiring connections and lugs etc. in provided distribution board complete.

General: double pole isolator only switch version of miniature circuit breaker of 40A

Specification: Supplying erecting and marking double pole isolator only switch version of miniature circuit breaker of 40A with required wiring connections and lugs etc. in provided distribution board complete.

Electrical Voltage rating: 250V a.c. Current: 32A Switch 45A Cooker Control Unit 45A Cooker Connection Unit 50A Switch (Resistive Load) Switch: 3mm contact gap Double pole operation – except socket switch on Cooker Control Unit Terminal capacity, 50A switches, Cooker Control Unit and Cooker Connection Unit: 4 x 4mm² 3 x 6mm² 1 x 16mm² Terminal capacity, 32A Switch: 3 x 2.5mm² 2 x 4mm² 1 x 6mm² Physical Ambient operating temperature: –5°C to +40°C (not to exceed an average of more than 25°C in any 24 hour period) IP rating: IP2XD (K5061, K5060, K5041, K5040, K5001,

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K5011, K5012) IP4X (K5105, K5205, K5215CK, K5215SH, K5230) Max. installation altitude: 2000 metres

Mode of Measurement: Executed quantity will be measured on number basis. (i.e Each)

Item No. 100:

Supplying erecting and marking four pole isolators only switch version of miniature circuit breakers of 63A in provided distribution board complete.

General: Four pole isolators only switch version of miniature circuit breakers of 63A

Specification: Supplying erecting and marking four pole isolators only switch version of miniature circuit breakers of 63A in provided distribution board complete.

Mode of Measurement: Executed quantity will be measured on number basis. (i.e Each)

Item No. 101:

Supplying and erecting triple pole and neutral distribution board (TPNDB) surface/ flush mounted suitable for SPMCB of 24 ways on iron / GI frame (horizontal busbar type) as per specification no. SW-SWR/MCBDB

Scope:

Supplying of MCBDB suitable for 230 V / 415 V, horizontal/vertical, with/without door of specified ways (poles), surface / flush mounting to house incoming and outgoing MCB's, and erected on iron frame.

General Specifications for MCBDB's

- DB's shall be prewired and shall be fabricated as per IS: 8623.
- Suitable for flush mounting & surface mounting, with 100 A copper bus bar (For Horizontal type DB), neutral bar, earth bar & cable ties for cable management.
- In case of Vertical DB the bus bar shall be of 200 A rating.
- DB's shall be of IP – 43 degree of protection.
- All the MCB distribution boards shall be fabricated out of 18 SWG thick sheet steel duly rust inhibited through a process of degreasing, pickling, phosphating & powder coating to an approved colour over primer & shall be of the totally enclosed dust proof type suitable for wall mounting.
- All components shall be mounted on DIN rails & covered totally with a sheet steel cover rendering it finger-safe. Access to the internal connections shall be only through removing the cover sheet.
- All DB's shall be internally prewired using copper insulated high temperature PVC wires.
- Bus bars & neutral bar shall be fully insulated with standard colour code.
- Bus bar withstanding capacity shall be 10kA.

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- DB's must have facility of reversing door without modification, pan assembly for ease of installation & convertible locking.

Material:

1. Horizontal/Vertical type MCBDB: ISI marked as per IS 8623, of specified ways (poles), surface/flush mounting, with/without door, suitable for 230 V / 415 V.
2. Lugs – Copper lugs of suitable size.
3. Iron work: Suitable size of angle/flat.
4. Hardware: SM screws, rawl plug, gitties, etc.

Method of Construction:

MCBDB shall be erected at designated location and directed by site engineer and terminating the provided wires by copper lugs (crimping type) and connecting the same.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

Item No. 102:

Providing & erecting 4 Pole MCCB of 315/400A, 415V capacity with S.C. rating 36 kA ($I_{cs}=100\%$ of I_{cu}), adjustable thermal and magnetic setting with provided leads, provision for installation of shunt/ UV/ trip alarm contact and MCCB should have phase barriers both sides, in provided enclosure on iron /GI frame as per specification no. SW-SWR/MCCB

Scope:

Providing & erecting 3 Pole/4 Pole MCCB of specified rating and with specified short circuit rupturing capacity in KA, complete erecting in provided enclosure & connected with provided leads on incoming and outgoing side, complete.

General Specifications for MCCB's

- MCCB's should comply with IS 13947 part -2, IEC (6094) and IEC 60947-3 & IEC 60947 part – 2.
- The MCCB shall be suitable for universal mounting i.e. the load/line shall be interchangeable.
- The MCCB shall be suitable for minimum operating voltage of 415V.
- The thermal setting shall be adjustable from 64 % to 100% of its normal current.
- The magnetic setting shall be adjustable from 3.5 to 10 I_n (normal current).
- Trip reset should be available Manual / Automatic.
- Isolator switches for electronic circuits to open the MCCB automatically.
- The MCCB's must house transparent label holder to ensure circuit identification.

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- The MCCB's must have fully insulated safety shutters.
- Overload Zone adjustable from 0.4 to 1 in with line (For 630 amp & above MCCB)
- **Short circuit Zone adjustable from 1.5 to 10 Ir with time.**

Material: 3/4 Pole MCCB moulded case circuit breaker. Fixed version– front Terminals with current rating & breaking capacity as below:

- | | | | |
|------|----------------|---|-------|
| i. | 63 A to 125 A | - | 16 KA |
| ii. | 160 A to 250 A | - | 36 KA |
| iii. | 300/400 A | - | 36 KA |
| iv. | 630 A | - | 70 KA |

Method of Construction:

3 pole /4 pole MCCB shall be erected in provided enclosure & connected with provided leads/strip on incoming & out going site complete

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

Item No. 103:

Providing & erecting floor / wall mounting, MCCB panel board with door suitable for four pole incoming 250A, 4 ways four pole outgoing upto 100 A MCCB's on iron frame, as per specification no SW-SWR/MCCBPB. (Excluding MCCB'S)

Scope:

Providing & erecting 3 Pole/4 Pole MCCB of specified rating and with specified short circuit rupturing capacity in KA, complete erecting in provided enclosure & connected with provided leads on incoming and out going side, complete.

General Specifications for MCCB's

- MCCB's should comply with IS 13947 part -2, IEC (6094) and IEC 60947-3 & IEC 60947 part – 2.
- The MCCB shall be suitable for universal mounting i.e. the load/line shall be interchangeable.
- The MCCB shall be suitable for minimum operating voltage of 415V.
- The thermal setting shall be adjustable from 64 % to 100% of its normal current.
- The magnetic setting shall be adjustable from 3.5 to 10 In (normal current).
- Trip reset should be available Manual / Automatic.
- Isolator switches for electronic circuits to open the MCCB automatically.
- The MCCB's must house transparent label holder o ensure circuit identification.
- The MCCB's must have fully insulated safety shutters.

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- Overload Zone adjustable from 0.4 to 1 in with line (For 630 amp & above MCCB)
- **Short circuit Zone adjustable from 1.5 to 10 Ir with time.**

Material:

3/4 Pole MCCB moulded case circuit breaker. Fixed version– front Terminals with current rating & breaking capacity as below:

v.	63 A to 125 A	-	16 KA
vi.	160 A to 250 A	-	36 KA
vii.	300/400 A	-	36 KA
viii.	630 A	-	70 KA

Method of Construction:

3 pole /4 pole MCCB shall be erected in provided enclosure & connected with provided leads/strip on incoming & out going site complete

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

Item No. 104:

Supplying and erecting GI sheet of 1.25mm (18 SWG) size 200 x 150 mm duly painted with red oxide & enamel paint for displaying the department, date of erection of the electrical installation with approved shade complete.

General: Providing: GI sheet of 1.25mm (18 SWG) size 200 x 150 mm duly painted with red oxide & enamel paint.

Specification: Supplying and erecting GI sheet of 1.25mm (18 SWG) size 200 x 150 mm duly painted with red oxide & enamel paint for displaying the department, date of erection of the electrical installation with approved shade complete.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

Item No. 105:

Supplying and erecting metal work in CRCA sheet with fabrication of boxes panel boards etc. including cutting, bending, drilling, welding, riveting etc. treated with anti-rust treatment and duly power coated or painted with one coat of red lead paint and 2 coats of enamel paint as complete

Material:Acoustic enclosure (canopy) shall be fabricated out of the CRCA sheet of thickness not less than 1.6 mm on the outside cover with inside cover having not less than 0.6 mm thick perforated power coated CRCA sheet.

Method of Construction:The construction of Acoustic enclosure (canopy) should be such that, it shall prevent entry of rain water splashing into the enclosure, and shall allow free & quick flow of rain water to the ground in the event of heavy rain.

The detailed construction shall confirm to the details as under:-

1. The hinged doors shall be made from not less than 16 SWG (1.6 mm) thick CRCA sheet and will be made air tight with neoprene rubber gasket and heavy duty locks.
2. All sheet metal parts should be processed through 7-tank process.
3. The enclosure should be powder coated.
4. The enclosure should accommodate the daily service fuel tank of the D.G. set to make the system compact.
5. There should be provision of fuel gauge, which should show the level of the fuel even when the DG set is not running. The gauge should be calibrated. The fuel tank should be filled from the out side as in automobiles and should be with a lockable cap.
6. The batteries should be accommodated in the enclosure in battery rack.
7. The canopy should be provided with high enclosure temperature safety device.
8. The acoustics lining should be made up of high quality insulation material/ glass / mineral or rock wool of minimum 50 mm thickness and shall be of 75 kg/m³ to 100 kg/m³ density for sound absorption as per standard design of manufacturers to reduce the sound level as per CPCB norms. The insulation material shall be covered with fine glass fiber cloth and would be supported by perforated MS sheet duly powder coated.
9. The enclosure shall be provided with suitable size and No. of hinged type doors along the length of the enclosure on each side for easy access inside the acoustic enclosure for inspection, operation, and maintenance purpose. Sufficient space will be provided inside the enclosure on all sides of the D.G. set for inspection, easy maintenance, and repairs.
10. The canopy should be as compact as possible with good aesthetic look
11. The complete enclosure shall be of modular construction.
12. The forced ventilation shall be as per manufacturer design using either engine radiator fan or additional blower fans. If the acoustic enclosure is to be provided with forced ventilation then suitable size of axial flow fan with motor (Auto-start arrangement) and suitable size of axial flow exhaust fan to take the hot air from the enclosure complete with necessary motors and auto start arrangement should be provided. The forced ventilation arrangement should be provided with auto stop arrangement to stop after 5 minutes of the stopping of D.G. sets.
13. The acoustic enclosure should be suitable for cable connection through bus-trucking. Such arrangements on acoustic enclosure should be water proof and dust-proof conforming to IP-65 protection.

Mode of measurement: Executed quantity will be counted on KG basis. (i.e. each)

Item No. 106:

Supplying and erecting panel mounting type digital ammeter having three and half digit LED display, external CT operated, calibrated for suitable to operate on 500V, 0 to 1000A AC supply with necessary PVC wire leads and lugs and mounting hardware on provided panel complete with calibration certificate from manufacturer.

General:- Providing digital ammeter having three and half digit LED display, external CT operated, calibrated for suitable to operate on 500V, 0 to 1000A AC supply.

Specification: Supplying and erecting panel mounting type digital ammeter having three and half digit LED display, external CT operated, calibrated for suitable to operate on 500V, 0 to 1000A AC supply with necessary PVC wire leads and lugs and mounting hardware on provided panel complete with calibration certificate from manufacturer.

Mode of measurement: Executed quantity will be counted on number basis. (i.e. each)

Item No. 107:

Supplying and erecting panel mounting type digital voltmeter having three and half digit LED display, calibrated for 0 to 750V AC suitable to operate on 500V AC supply with necessary PVC wire leads and lugs and mounting hardware on provided panel complete with calibration certificate from manufacturer.

General:- Providing digital voltmeter having three and half digit LED display, calibrated for 0 to 750V AC suitable to operate on 500V AC

Specification: Supplying and erecting panel mounting type digital voltmeter having three and half digit LED display, calibrated for 0 to 750V AC suitable to operate on 500V AC supply with necessary PVC wire leads and lugs and mounting hardware on provided panel complete with calibration certificate from manufacturer.

Mode of measurement: Executed quantity will be counted on number basis. (i.e. each)

Item No. 108:

Supplying and erecting digital frequency meter of 3 digit LED display having 0 to 100 Hz range suitable to operate on 500V AC supply with necessary PVC wire leads and lugs and mounting hardware on provided panel complete with calibration certificate from manufacturer.

General: - Providing digital frequency meter of 3 digit LED display having 0 to 100 Hz range suitable to operate on 500V AC supply

Specification: Supplying and erecting digital frequency meter of 3 digit LED display having 0 to 100 Hz range suitable to operate on 500V AC supply with necessary PVC

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wire leads and lugs and mounting hardware on provided panel complete with calibration certificate from manufacturer.

Mode of measurement: Executed quantity will be counted on number basis. (i.e. each)

Item No. 109:

Supplying and erecting 525 V 3 phase, 50 Hz., MPP type capacitor having minimum over current capacity of 1.8 In, peak inrush current capacity 300 In and minimum life 150000 hours kVAR bank of all polypropylene condensers (APP) with the standard capacities of 2, 3, 5, 7, 10, 12.5 and 15 kVAR units of P.F. correction for operation on 3 phase 50 Hz. with externally discharging resistances, earthing terminals and built on angle iron or channel iron frame work and provided with terminal cover box complete erected on provided iron bracket or on floor duly tested by licensee.

General: - Providing 525 V 3 phase, 50 Hz., MPP type capacitor having minimum over current capacity of 1.8 In, peak inrush current capacity 300 In and minimum life 150000 hours kVAR bank

Specification: Supplying and erecting 525 V 3 phase, 50 Hz., MPP type capacitor having minimum over current capacity of 1.8 In, peak inrush current capacity 300 In and minimum life 150000 hours kVAR bank of all polypropylene condensers (APP) with the standard capacities of 2, 3, 5, 7, 10, 12.5 and 15 kVAR units of P.F. correction for operation on 3 phase 50 Hz. with externally discharging resistances, earthing terminals and built on angle iron or channel iron frame work and provided with terminal cover box complete erected on provided iron bracket or on floor duly tested by licensee.

Mode of measurement: Executed quantity will be counted on number basis. (i.e. each)

Item No. 110:

Supplying, erecting & terminating XLPE armoured cable 1100 V. 3½ core 185 sq. mm. aluminium conductor with continuous 12.97 sq. mm. (8 SWG) G.I. earth wire complete erected with glands & lugs, on wall/ trusses/pole or laid in provided trench/ pipe as per specification no. CB-LT/AL

Providing armoured cable of specified voltage level, size & of required material (Aluminum / Copper) for erection including hardware and erecting armoured cable on wall, ceiling, RCC slab or drawing the same through pole, pipe, etc.

MATERIAL:

Cables: All cables shall be manufactured as per relevant IS. The core shall either be of circular shape (for solid conductor) or sector shaped (for stranded conductor) duly covered with flat galvanized steel armouring strips, Virgin PVC insulation with manufacturer's name, IS No & License No of IS duly embossed/screen printed

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while extruding the insulation at every metre and having the total count of progressive length in meter at each mark.

Earth wire: Galvanized Iron (G I) wire of appropriate guage as per **Table No 7/1**.

MS Spacers: Spacers made from 6 mm thick mild steel and having 25 mm width, duly machined for smooth edges, and 2 holes of 8/10 mm dia. for fixing of counter sunk head SM screws. Spacer shall be painted with black colour enamel paint of superior quality.

Saddles: Saddles fabricated from GI/MS sheet of required gauge (16/18 gauge) either galvanized or painted with superior quality enamel black paint, with necessary shearing for mechanical strength, semi circular shaped with extended piece having suitable holes for fixing on spacer.

G I Strip: 22 g x 25 mm width G I Strip.

MS Clamps: Clamps fabricated of required length and shape, of 3 mm thick mild steel having 25 mm width.

Hardware: Sheet Metal (SM) screws of required sizes, plugs/wooden gitties, etc.

METHOD OF CONSTRUCTION:

Erection of Cable on Surface:

Erection shall be done as per the layout finalized, in perfect level and plumb. Before fixing the cable shall be straightened as far as possible for good aesthetics look, along with continuous bare GI earth wire of required guage as per **Table No 7/1**. Cable with G I wire shall be fixed on MS Spacers with saddles firmly clipped on cable. Spacers shall be fixed to wall with minimum 50 x 8 mm SM screws with plugs/wooden gitties (Distance between two spacers shall be maximum 600 mm). Wooden gitties shall be used wherever required (Especially for stone wall). MS Saddles shall be fixed to spacers with two 25 x 8 mm machine SM screws. Wherever the cable has to be bent, the turning radius shall be as mentioned in **Table No 7/2** the diameter of cable. The entries made in wall, floor slab, etc for laying the cable shall be made good by filling and finishing with plastering the same.

Erection of Cable on Trusses:

Cable along with bare GI earth wire, while erecting on trusses, shall be firmly clamped by wrapping GI strip of 22 g, 25 mm width of required length fixed to truss with SM nuts and bolts.

Erection of Cable on Pole:

Cable along with bare GI earth wire, while erecting on pole, shall be firmly clipped by 25 x 3 mm MS Clamp of required length and fixed to pole with SM nuts and bolts.

Laying of Cable in provided Trench/Pole:

While laying Cable along with bare GI earth wire, utmost care shall be taken to prevent damage to the insulation of the cable and at the open end, the bare GI earth wire shall be run along with cable. Cable shall be brought out from trench vertically straight (minimum 1.0 metre from G L).

Mode of Measurement:

Executed quantity shall be measured on the basis of running metre per run of cable.

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Item No. 111:

Supplying, erecting & terminating XLPE armoured cable 4 core 120 sq. mm. aluminium conductor with continuous 12.97 sq. mm. (8 SWG) G.I. earth wire complete erected with glands & lugs, on wall/ trusses/pole or laid in provided trench/ pipe as per specification no. CB-LT/AL

Providing armoured cable of specified voltage level, size & of required material (Aluminum / Copper) for erection including hardware and erecting armoured cable on wall, ceiling, RCC slab or drawing the same through pole, pipe, etc.

MATERIAL:

Cables:All cables shall be manufactured as per relevant IS. The core shall either be of circular shape (for solid conductor) or sector shaped (for stranded conductor) duly covered with flat galvanized steel armouring strips, Virgin PVC insulation with manufacturer's name, IS No & License No of IS duly embossed/screen printed while extruding the insulation at every metre and having the total count of progressive length in meter at each mark.

Earth wire: Galvanized Iron (G I) wire of appropriate guage as per **Table No 7/1.**

MS Spacers: Spacers made from 6 mm thick mild steel and having 25 mm width, duly machined for smooth edges, and 2 holes of 8/10 mm dia. for fixing of counter sunk head SM screws. Spacer shall be painted with black colour enamel paint of superior quality.

Saddles: Saddles fabricated from GI/MS sheet of required gauge (16/18 gauge) either galvanized or painted with superior quality enamel black paint, with necessary shearing for mechanical strength, semi circular shaped with extended piece having suitable holes for fixing on spacer.

G I Strip: 22 g x 25 mm width G I Strip.

MS Clamps: Clamps fabricated of required length and shape, of 3 mm thick mild steel having 25 mm width.

Hardware: Sheet Metal (SM) screws of required sizes, plugs/wooden gitties, etc.

METHOD OF CONSTRUCTION:

Erection of Cable on Surface:

Erection shall be done as per the layout finalized, in perfect level and plumb. Before fixing the cable shall be straightened as far as possible for good aesthetics look, along with continuous bare GI earth wire of required guage as per **Table No 7/1.** Cable with G I wire shall be fixed on MS Spacers with saddles firmly clipped on cable. Spacers shall be fixed to wall with minimum 50 x 8 mm SM screws with plugs/wooden gitties (Distance between two spacers shall be maximum 600 mm). Wooden gitties shall be used wherever required (Especially for stone wall). MS Saddles

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shall be fixed to spacers with two 25 x 8 mm machine SM screws. Wherever the cable has to be bent, the turning radius shall be as mentioned in **Table No 7/2** the diameter of cable. The entries made in wall, floor slab, etc for laying the cable shall be made good by filling and finishing with plastering the same.

Erection of Cable on Trusses:

Cable along with bare GI earth wire, while erecting on trusses, shall be firmly clamped by wrapping GI strip of 22 g, 25 mm width of required length fixed to truss with SM nuts and bolts.

Erection of Cable on Pole:

Cable along with bare GI earth wire, while erecting on pole, shall be firmly clipped by 25 x 3 mm MS Clamp of required length and fixed to pole with SM nuts and bolts.

Laying of Cable in provided Trench/Pole:

While laying Cable along with bare GI earth wire, utmost care shall be taken to prevent damage to the insulation of the cable and at the open end, the bare GI earth wire shall be run along with cable. Cable shall be brought out from trench vertically straight (minimum 1.0 metre from G L).

Mode of Measurement:

Executed quantity shall be measured on the basis of running metre per run of cable.

Item No. 112:

Providing earthing with galvanized iron earth plate size 60 x 60 x 0.6 cm complete with all materials, testing & recording the results as per specification no. EA-EP

Scope:

Supplying and erecting galvanized cast iron / copper earth plate type / G.I. pipe type earthing with / without C.I. cover as per instructions from the site engineer.

Material:

Galvanised cast iron / Copper earth plate or G.I. pipe as per specifications given in Table No 9/1.

C.I. Cover as per specifications given in Table No 9/1. Copper/G.I strip/Annealed bare copper wire/G.I. earth wire of size as per specifications given in Table No 9/1. G.I. pipe for watering and as enclosure for Earth wire, as per specifications given in Table No 9/1. Screw / nut bolts with required washer of dimensions and material as per specifications given in Table No 9/1. Coal /Charcoal/ salt as per specifications given in Table No 9/1. Rawl plug / clip/ 'U' Nails as per specifications given in Table No 9/1.

Copper/ Aluminium lugs as per specifications given in Table No 9/1.

Method of construction:

Digging the pit of required dimension and depth for the earthing at site, and laying Galvanised cast iron / Copper earth plate or G.I. pipe as per in Table No 9/1. given below and connecting it to equipment/ switch gear and earthing electrode as shown in the diagram and IS 3043 amended upto-date or with drilling, welding, reverting, brazing and machining nut bolting plate or pipe when ever required in an approved manner with required material such as nut bolts and washer etc. (as per IS 3043 amended upto-date). As far as possible continuous strip shall be used but when ever jointing of strip is unavoidable, the overlap portion must not be less than 21/2 times the width of the strip either welded/ brazed/soldered by all sides or with two

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nut bolts/ riveting of adequate size with required washer and covered by anti corrosive paint as per approved jointing practice in the industry and as per directives from site engineer in charge. The wires shall not have any. Pit shall be filled with screened soil with alternate layer of coal and salt with necessary brick masonry work as per the specification mentioned in item no. 9-1-3 with laying Wires in PVC/ G.I. pipe and watering arrangement as per diagram no. and covered with C.I. Cover (When ever applicable). The value of each earth electrode shall be measured by earth tester and record be submitted. (Refer drawing no.)

Mode of Measurement: Executed quantity will be measured on number basis i.e. each

Table No 9/1
Detailed Specifications of various types of Earthing

Type of earthing ----->		Galvanised cast iron earth plate type without C.I cover	Copper earth plate type with C.I cover	Galvanised cast iron earth plate type with C.I cover	Pipe type earthing with out C.I cover
S.No	Particulars				
1	Depth of pit	2.1 mtr	2.1 mtr	2.1 mtr	2.5 mtr
2	Size & type of material for pipe / Plate type earthing.	Cast iron earth plate size 60x60x0.6 cms	Copper earth plate size 60x60x0.6 cms	cast iron earth plate size 60x60x0.6 cms	'B' grade G.I. pipe 40mm. dia. 2.5 mtr. Long or 20 mm dia. G.I. Rod
3	Salt/charcoal	30 Kg. charcoal and salt each	30 Kg. charcoal and salt each	40 Kg. charcoal and salt each	N A
5	Type of Wire	Double G.I. wire 8 SWG	Double G.I. 8 SWG	Double G.I. 6 SWG	double G.I. 8 SWG
6	Wire enclosure	12mm. dia. G. I. pipe 2 mtr. Long	12mm. dia. G. I. pipe 2 mtr. Long	12mm. dia. G. I. pipe 2.5 mtr. Long	N A
7	Nut bolts	12 mm dia. Cadmium / GI	12 mm dia. Cadmium / GI	12 mm dia. Cadmium / GI	N A
8	Washers	GI	GI	GI	N A
9	Watering pipe	19mm. dia. G.I. pipe	19mm. dia. G.I.	19mm. dia. G.I. pipe	N A

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			pipe		
10	Lugs	Yes	Yes	Yes	Yes
11	funnel	No	yes	yes	N A
12	Brick Masonry	No	yes	yes	N A

Item No. 113:

Providing earthing with copper earth plate size 30 x 30 x 0.315 cm complete with all materials, testing & recording the results as per specification no. EA-EP

Scope:

Supplying and erecting galvanized cast iron / copper earth plate type / G.I. pipe type earthing with / without C.I. cover as per instructions from the site engineer.

Material:

Galvanised cast iron / Copper earth plate or G.I. pipe as per specifications given in Table No 9/1.

C.I. Cover as per specifications given in Table No 9/1. Copper/G.I strip/Annealed bare copper wire/G.I. earth wire of size as per specifications given in Table No 9/1. G.I. pipe for watering and as enclosure for Earth wire, as per specifications given in Table No 9/1. Screw / nut bolts with required washer of dimensions and material as per specifications given in Table No 9/1. Coal /Charcoal/ salt as per specifications given in Table No 9/1. Rawl plug / clip/ 'U' Nails as per specifications given in Table No 9/1.

Copper/ Aluminium lugs as per specifications given in Table No 9/1.

Method of construction:

Digging the pit of required dimension and depth for the earthing at site, and laying Galvanised cast iron / Copper earth plate or G.I. pipe as per in Table No 9/1. given below and connecting it to equipment/ switch gear and earthing electrode as shown in the diagram and IS 3043 amended upto-date or with drilling, welding, reverting, brazing and machining nut bolting plate or pipe when ever required in an approved manner with required material such as nut bolts and washer etc. (as per IS 3043 amended upto-date). As far as possible continuous strip shall be used but when ever jointing of strip is unavoidable, the overlap portion must not be less than 21/2 times the width of the strip either welded/ brazed/soldered by all sides or with two nut bolts/ riveting of adequate size with required washer and covered by anti corrosive paint as per approved jointing practice in the industry and as per directives from site engineer in charge. The wires shall not have any. Pit shall be filled with screened soil with alternate layer of coal and salt with necessary brick masonry work as per the specification mentioned in item no. 9-1-3 with laying Wires in PVC/ G.I. pipe and watering arrangement as per diagram no. and covered with C.I. Cover (When ever applicable). The value of each earth electrode shall be measured by earth tester and record be submitted. (Refer drawing no.)

Mode of Measurement: Executed quantity will be measured on number basis i.e. each

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Table No 9/1
Detailed Specifications of various types of Earthing

Type of earthing ----->		Galvanised cast iron earth plate type without C.I cover	Copper earth plate type with C.I cover	Galvanised cast iron earth plate type with C.I cover	Pipe type earthing with out C.I cover
S.No	Particulars				
1	Depth of pit	2.1 mtr	2.1 mtr	2.1 mtr	2.5 mtr
2	Size & type of material for pipe / Plate type earthing.	Cast iron earth plate size 60x60x0.6 cms	Copper earth plate size 60x60x0.6 cms	cast iron earth plate size 60x60x0.6 cms	'B' grade G.I. pipe 40mm. dia. 2.5 mtr. Long or 20 mm dia. G.I. Rod
3	Salt/charcoal	30 Kg. charcoal and salt each	30 Kg. charcoal and salt each	40 Kg. charcoal and salt each	N A
5	Type of Wire	Double G.I. wire 8 SWG	Double G.I. 8 SWG	Double G.I. 6 SWG	double G.I. 8 SWG
6	Wire enclosure	12mm. dia. G. I. pipe 2 mtr. Long	12mm. dia. G. I. pipe 2 mtr. Long	12mm. dia. G. I. pipe 2.5 mtr. Long	N A
7	Nut bolts	12 mm dia. Cadmium / GI	12 mm dia. Cadmium / GI	12 mm dia. Cadmium / GI	N A
8	Washers	GI	GI	GI	N A
9	Watering pipe	19mm. dia. G.I. pipe	19mm. dia. G.I. pipe	19mm. dia. G.I. pipe	N A
10	Lugs	Yes	Yes	Yes	Yes
11	funnel	No	yes	yes	N A
12	Brick Masonry	No	yes	yes	N A

Item No. 114:

Supplying and erecting copper strip of required size used for earthing on wall and/or any other purpose with necessary copper clamps fixed on wall painted with bituminous paint in an approved manner with joints required. As per specification no.EA-EP.

Contractor**Consultant****Member Secretary**

Scope:

Supplying and erecting galvanized cast iron / copper earth plate type / G.I. pipe type earthing with / without C.I. cover as per instructions from the site engineer.

Material:

Galvanised cast iron / Copper earth plate or G.I. pipe as per specifications given in Table No 9/1.

C.I. Cover as per specifications given in Table No 9/1. Copper/G.I strip/Annealed bare copper wire/G.I. earth wire of size as per specifications given in Table No 9/1. G.I. pipe for watering and as enclosure for Earth wire, as per specifications given in Table No 9/1. Screw / nut bolts with required washer of dimensions and material as per specifications given in Table No 9/1. Coal /Charcoal/ salt as per specifications given in Table No 9/1. Rawl plug / clip/ 'U' Nails as per specifications given in Table No 9/1.

Copper/ Aluminium lugs as per specifications given in Table No 9/1.

Method of construction:

Digging the pit of required dimension and depth for the earthing at site, and laying Galvanised cast iron / Copper earth plate or G.I. pipe as per in Table No 9/1. given below and connecting it to equipment/ switch gear and earthing electrode as shown in the diagram and IS 3043 amended upto-date or with drilling, welding, reventing, brazing and machining nut bolting plate or pipe when ever required in an approved manner with required material such as nut bolts and washer etc. (as per IS 3043 amended upto-date). As far as possible continuous strip shall be used but when ever jointing of strip is unavoidable, the overlap portion must not be less than 21/2 times the width of the strip either welded/ brazed/soldered by all sides or with two nut bolts/ riveting of adequate size with required washer and covered by anti corrosive paint as per approved jointing practice in the industry and as per directives from site engineer in charge. The wires shall not have any. Pit shall be filled with screened soil with alternate layer of coal and salt with necessary brick masonry work as per the specification mentioned in item no. 9-1-3 with laying Wires in PVC/ G.I. pipe and watering arrangement as per diagram no. and covered with C.I. Cover (When ever applicable). The value of each earth electrode shall be measured by earth tester and record be submitted. (Refer drawing no.)

Mode of Measurement: Executed quantity will be measured on KG basis

Table No 9/1
Detailed Specifications of various types of Earthing

Type of earthing ----->		Galvanised cast iron earth plate type without C.I cover	Copper earth plate type with C.I cover	Galvanised cast iron earth plate type with C.I cover	Pipe type earthing with out C.I cover
S.No	Particulars				
1	Depth of pit	2.1 mtr	2.1 mtr	2.1 mtr	2.5 mtr
2	Size & type of material for pipe / Plate type earthing.	Cast iron earth plate size 60x60x0.6 cms	Copper earth plate size 60x60x0.6 cms	cast iron earth plate size 60x60x0.6 cms	'B' grade G.I. pipe 40mm. dia. 2.5 mtr. Long or 20 mm dia. G.I. Rod
3	Salt/charcoal	30 Kg. charcoal and salt each	30 Kg. charcoal and salt each	40 Kg. charcoal and salt each	N A
5	Type of Wire	Double G.I. wire 8 SWG	Double G.I. 8 SWG	Double G.I. 6 SWG	double G.I. 8 SWG
6	Wire enclosure	12mm. dia. G. I. pipe 2 mtr. Long	12mm. dia. G. I. pipe 2 mtr. Long	12mm. dia. G. I. pipe 2.5 mtr. Long	N A
7	Nut bolts	12 mm dia. Cadmium / GI	12 mm dia. Cadmium / GI	12 mm dia. Cadmium / GI	N A
8	Washers	GI	GI	GI	N A
9	Watering pipe	19mm. dia. G.I. pipe	19mm. dia. G.I. pipe	19mm. dia. G.I. pipe	N A
10	Lugs	Yes	Yes	Yes	Yes
11	funnel	No	yes	yes	N A
12	Brick Masonry	No	yes	yes	N A

Item No. 115:

Contractor

Consultant

Member Secretary

Supplying and erecting GI strip of required size used for earthing on wall and/or any other purpose with necessary GI clamps fixed on wall painted with bituminous paint in an approved manner with joints required. As per specification no EA-EP.

Scope:

Supplying and erecting galvanized cast iron / copper earth plate type / G.I. pipe type earthing with / without C.I. cover as per instructions from the site engineer.

Material:

Galvanised cast iron / Copper earth plate or G.I. pipe as per specifications given in Table No 9/1.

C.I. Cover as per specifications given in Table No 9/1. Copper/G.I strip/Annealed bare copper wire/G.I. earth wire of size as per specifications given in Table No 9/1. G.I. pipe for watering and as enclosure for Earth wire, as per specifications given in Table No 9/1. Screw / nut bolts with required washer of dimensions and material as per specifications given in Table No 9/1. Coal /Charcoal/ salt as per specifications given in Table No 9/1. Rawl plug / clip/ 'U' Nails as per specifications given in Table No 9/1. Copper/ Aluminium lugs as per specifications given in Table No 9/1.

Method of construction:

Digging the pit of required dimension and depth for the earthing at site, and laying Galvanised cast iron / Copper earth plate or G.I. pipe as per in Table No 9/1. given below and connecting it to equipment/ switch gear and earthing electrode as shown in the diagram and IS 3043 amended upto-date or with drilling, welding, reventing, brazing and machining nut bolting plate or pipe when ever required in an approved manner with required material such as nut bolts and washer etc. (as per IS 3043 amended upto-date). As far as possible continuous strip shall be used but when ever jointing of strip is unavoidable, the overlap portion must not be less than 2 1/2 times the width of the strip either welded/ brazed/soldered by all sides or with two nut bolts/ riveting of adequate size with required washer and covered by anti corrosive paint as per approved jointing practice in the industry and as per directives from site engineer in charge. The wires shall not have any. Pit shall be filled with screened soil with alternate layer of coal and salt with necessary brick masonry work as per the specification mentioned in item no. 9-1-3 with laying Wires in PVC/ G.I. pipe and watering arrangement as per diagram no. and covered with C.I. Cover (When ever applicable). The value of each earth electrode shall be measured by earth tester and record be submitted. (Refer drawing no.)

Mode of Measurement: Executed quantity will be measured on KG basis

Table No 9/1
Detailed Specifications of various types of Earthing

Type of earthing ----->		Galvanised cast iron earth plate type without C.I cover	Copper earth plate type with C.I cover	Galvanised cast iron earth plate type with C.I cover	Pipe type earthing with out C.I cover
S.No	Particulars				
1	Depth of pit	2.1 mtr	2.1 mtr	2.1 mtr	2.5 mtr
2	Size & type of material for pipe / Plate type earthing.	Cast iron earth plate size 60x60x0.6 cms	Copper earth plate size 60x60x0.6 cms	cast iron earth plate size 60x60x0.6 cms	'B' grade G.I. pipe 40mm. dia. 2.5 mtr. Long or 20 mm dia. G.I. Rod
3	Salt/charcoal	30 Kg. charcoal and salt each	30 Kg. charcoal and salt each	40 Kg. charcoal and salt each	N A
5	Type of Wire	Double G.I. wire 8 SWG	Double G.I. 8 SWG	Double G.I. 6 SWG	double G.I. 8 SWG
6	Wire enclosure	12mm. dia. G. I. pipe 2 mtr. Long	12mm. dia. G. I. pipe 2 mtr. Long	12mm. dia. G. I. pipe 2.5 mtr. Long	N A
7	Nut bolts	12 mm dia. Cadmium / GI	12 mm dia. Cadmium / GI	12 mm dia. Cadmium / GI	N A
8	Washers	GI	GI	GI	N A
9	Watering pipe	19mm. dia. G.I. pipe	19mm. dia. G.I. pipe	19mm. dia. G.I. pipe	N A
10	Lugs	Yes	Yes	Yes	Yes
11	funnel	No	yes	yes	N A
12	Brick Masonry	No	yes	yes	N A

Item No. 116:

Contractor

Consultant

Member Secretary

Providing printed instruction chart for treating persons suffering from electric shock printed in English & Marathi and duly laminated complete.

Scope:

Supplying printed instruction chart for treating persons suffering from electric shock printed in English & Marathi and duly laminated complete.

Mode of Measurement: Executed quantity will be measured on number basis i.e. each

Item No. 117:

Supplying standard first aid box with necessary antiseptic cream, medicine for use on wounds due burn, crepe bandage, gauge bandage, medicated ready to use bandage (Band-Aid) adhesive tape for medicinal use, scissors, anti-septic solution, etc. (All above contents shall be of standard makes)

Scope:

Supplying standard first aid box with necessary antiseptic cream, medicine for use on wounds due burn, crepe bandage, gauge bandage, medicated ready to use bandage (Band-Aid) adhesive tape for medicinal use, scissors, anti-septic solution, etc. (All above contents shall be of standard makes)

Mode of Measurement: Executed quantity will be measured on number basis i.e. each

Item No. 118:

Supplying and fixing PVC synthetic elastomer electrically insulating mat with class B insulation conforming to IS: 15652 – 2006 & CPRI tested having 2.5 mm thickness upto 11 kV

Scope:

Supplying and fixing PVC synthetic elastomer electrically insulating mat with class B insulation conforming to IS: 15652 – 2006 & CPRI tested having 2.5 mm thickness upto 11 kV

Mode of Measurement: Executed quantity will be measured on Square-meter basis i.e. each

Item No. 119:

Supplying, erecting and commissioning of diesel generating set with alternator of 62.5 kVA output continuous rating, 3 phase, 415 V, 50c/s 0.8 p. f. A.C a totally enclosed air cooled / liquid cooled multi-cylinder diesel engine developing suitable BHP at 1500 rpm with 10% overload for 1 hour in 12 hours, along with standard accessories, self-excited,

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self-regulated, screen protected alternator with static excitation system running at 1500 RPM as per IS 4722- 2001 with voltage regulation +/- 5 %. Both the engine and alternator direct coupled on a common fabricated steel base frame and mounted on anti-vibrating pads with standard control panel comprising meters, switchgears, indicators connected with suitable wires/cables, the complete set enclosed in composite acoustic enclosure as fully assembled integral unit made of 16 SWG CRCA Sheet, sound absorbing material to restrict sound level upto 75 dB at 1.0 m, provided with first filling of oil, diesel etc. as per specification no. GEN-DG

Scope:

The Work includes delivery of D.G. Set at site all preparatory works, assembling, installation and adjustments, commissioning, final testing, putting in to operation and handing over of the complete system of D.G. set including inspection from inspectorate office. The work include necessary minor Civil works including opening on wall/Slab/floor and making good as it was etc. **&comprehensive maintenance of the DG set up to 3 years from date of commissioning.**

Material:

Diesel Generator set with continuous rating, 3 Phase, 415 V., 50 Cycles A.C. supply of specified capacity, comprising of totally enclosed air/water cooled diesel engine with standard control panel & tool kit.

Method of Construction:

Diesel Engine:The engine shall be of standard design of original manufacturers. It should be a totally enclosed air/water cooled Diesel engine with 4 stroke multi cylinders developing suitable BHP (As per table 11/3) for giving power rating of (As per table 11/3) at the load terminals of alternator at 1500 R.P.M. at armature temperature of 40⁰ C for height at 1000 Meter above M.S.L. at 50% R.H. The engine shall be capable of delivering specified power at variable loads for P.F. of 0.8 (lag) with 10% over load available in excess of specified output for one hour in every 12 hours. The average load factor of the engine over period of 24 hours shall be 0.85 for power output. The engine shall confirm to IS: 10000 and Amended upto date.

The engine shall be fitted with following accessories:-

- 1) Dynamically balanced fly wheel.
- 2) Necessary flexible coupling and guard for alternator and engine applicable
- 3) Lubricating oil cooler
- 4) Air cleaner Dry/Bath type
- 5) Lubricating oil pressure gauge

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6) Lubricating oil filter with replicable element

7) Dry exhaust manifold with suitable exhausts heavy duty residential type exhaust silencer and vertical hot air duct both lagged with asbestos rope exhaust piping of required length to reduce noise level.

8) 12/24 V. Electric starting equipment complete with standard batteries, dynamo, cut-out, ammeter, necessary wiring, self starter etc. The system shall be capable of starting D.G. set within 20 to 30 second even in winter condition with an ambient temperature down to 0° C.

9) Mechanical Governor of Class A2 for up to and including 200 KVA capacity and electronic governor of Class A1 for capacity above 200 KVA shall be provided as per standard design of manufacturer. Governor shall be a self contained unit capable of monitoring speed.

10) Radiator

11) Daily fuel Tank

Daily fuel service tank of minimum capacity as per Table 11/1, below, fabricated from M.S. sheet with inlet, outlet connections air vent tap, drain plug and level indicator (gauge) M.S. fuel piping from tank to engine with valves, unions, reducers, flexible hose connection and floor mounting pedestals, twin fuel filter. The location of the tank shall depend on standard manufactures design.

Table 11/1

Minimum capacity of Daily fuel tank for Generators

Sr. No	Capacity of D.G. set	Minimum Fuel Tank Capacity
1.	Upto 25 KVA	100 Liters
2.	Above 25 KVA to 62.5 kVA	120 Liters
3.	Above 62.5 KVA to 125 KVA	225 Liters
4.	Above 125 KVA to 200 KVA	285 Liters
5.	Above 200 KVA to 380 KVA	520 Liters

Engine Control Panel:

Engine control panel should be fitted with following accessories/indicators and shall have display:-

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- Start/stop key switch
- Lube oil pressure indication
- Water temperature indication
- RPM indication
- Engine Hours indications
- Battery charging indication
- Low lube oil trip indication
- High water temperature indication
- Over speed indication

Battery Charger:

The battery charger shall be of Trickle & Boost type, and suitable to charge required numbers of batteries at 12V/ 24 Volts complete with, transformer, rectifier, charge rate selector switch, indicating ammeter, voltmeter, battery over charging protection with audible alarm. Connections between the battery charger & batteries shall be provided with suitable copper leads with lugs.

Battery:

Battery capacity and copper cable sizes for various engine capacities shall be as per the details given in Table No 11/2. Cable sizes shown are for maximum length of 2m length, if higher size of cable is required, it shall be selected in such a way that voltage drop does not exceed 2 V.

Table 11/2

Battery Capacity and Copper Cable Sizes for Various Engine Capacities

S.No	D G Set Capacity	Battery Capacity (AH)	Copper Cable size in mm²	Electrical System (Voltage)
1.	Upto 25 kVA	88	35	12
2.	Above 25 kVA upto 62.5 kVA	120	50	12
3.	Above 62.5 kVA upto 82.5 kVA	150	50	12
4.	Above 82.5 kVA upto 125 kVA	180	50	24
5.	Above 125 kVA upto 500 kVA	180	70	24

For AMF applications, a static battery charger working on mains supply recommended to keep the batteries charged at all times.

Alternator:

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Alternator of specified rating, 415 Volts, 1500 RPM, 3 Ph, 50 HZ, A/c Supply with P.F 0.9 lagging at 40° C armature temperature for height 1000 mtr. Above MSL at 50 % R.H. alternator shall be brush less type self regulated having static excitation system having capacity of desired output conforming to IS: 4722-1968 with automatic voltage Regulation + 5% operated voltage from no load to full load, two numbers of earth terminal on opposite sides. Terminal box shall be suitable for underground cables and same shall be with stand mechanical and thermal stresses developed due to any short circuit at the terminals. The alternator shall be in accordance with following standards:-

- IS: 4722 The performance of rotating electrical machines
- IS: 4889 Rules for method of declaring efficiency of electrical machines
- IS: 13364 Part I 1992 Alternator-voltage Regulation up to 20 KVA
- IS: 13364 Part II 1992 Alternator Voltage regulation above 20 KVA to 80 KVA

Performance: Voltage dip shall not exceed 20 % of the rated voltage for any step load or transient load as per IS: 8528 (Part I). The winding shall not develop hot spots exceeding safe limits due to unbalance of 20% between any two phases from no load to full load.

The performance characteristics of the alternator shall be as below:-

(a) Efficiency at full load 0.8 P.F.

- (i) Upto 25 KVA- not less than 82 %
(ii) Above 25 KVA and up to 62.5 KVA- not less than 86 %
(iii) Above 62.5 KVA/upto 250 KVA- not less than 90 %
(iv) Above 250 KVA- not less than 93 %

(b) Total Distortion factor Less than 3 %

- I (i) 10 % Overload One Hour in every 12 hrs of continuous operation
(ii) 50% overload 15 seconds.

Common Base Plate: Engine and alternator shall be coupled by means of flex plate/flexible coupling as per manufacturer standard design and both units shall be mounted on a common base plate together with all auxiliaries to ensure perfect alignment of engine and alternator with minimum vibrations. The base plate shall be suitable for installation on suitable anti-vibration mounting system. comprising of 6 anti-vibration pads duly provided

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Control Panel: Floor/wall mounted control panel Box comprising of voltmeter, ammeter, selector switches MCCB/MCB of adequate capacity, indicator lamp duly wired with HRC fuses. Alternator & control panel shall be connected with provided suitable capacity armored cable with necessary cable glands & lugs etc.

Exhaust system:

It shall comprise of following parameters:-

1. Exhaust system should create minimum back Pressure.
2. Smooth bends shall be used for minimizing the back pressure.
3. Minimum number of bends shall be used for minimizing the back pressure.
4. Pipe sleeve of larger diameter should be used while passing the pipe through concrete wall & gap shall be filled with felt lining.
5. Exhaust piping inside the Acoustic enclosure / Generating set room should be lagged with asbestos rope and covered with aluminum sheet cladding to avoid heating of the area.
6. Class B MS pipes and long bend/elbows should be used.
7. The exhaust outlet should be in the direction of prevailing winds and should not allow exhaust gases to enter air inlet / windows, etc.

Testing:

1. Full load trail for 1 hour. Fuel, lubricating oil, etc shall be arranged by the agency.
2. 10% overload trail.

Certificates:

1. Manufacturer's test certificates for Engine, Alternator and of the set.
2. Necessary certificate for the engine model so selected along with compliance of noise and emission norms as per latest CPCB guidelines for D.G. set should be furnished from the manufacturer along with manufacturer's technical details.

Mode of measurement: Executed quantity will be counted on number basis. (i.e. each)

Item No. 120:

Supplying, erecting, testing and commissioning of Microprocessor based AMF panel suitable for diesel generating set of above 62.5 kVA upto 82.5 kVA capacity Single/Three

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phase, 230/415 Volts, 50Hz A.C. with all standard features, safeties etc as per specification no. GEN-AMF.

Scope:

The work includes supplying, installing, Testing & commissioning of automatic mains failure control panel including auto by-pass, suitable for specified rating of DG Set complete with accessories and **comprehensive maintenance of the panel up to 3 years from date of commissioning.**

AMF Panel shall comply following IS specification:

IS: 2147 1962 Degree of protection.

IS: 4722 H.V. testing for panel

Material:

Panel shall consist of following:

1. Power module a pair of electromechanically interlocked contactors for all the phase / phases & neutral. (For mains & generator)
2. Overload relay for generator contactor, neutral contactor for mains and generator.
3. Control and Metering module: Line voltage monitor. Generator voltage monitor, Ammeter, 3 times attempt to start facility.
4. MCB/MCCB of suitable rating for auto/manual operation. Auto/manual switch.
5. Emergency stop push buttons.
6. Manual start push button.
7. Frequency meter.
8. Engine hour and RPM meter. (Tachour meter)
9. Two earthing studs.
10. Protection module: The engine shutdown in the unlikely event of low lube oil pressure, high cylinder head temperature, high water temperature (For water cooled engine)
11. Indicators with alarm for Full/Maximum Load on generator.
12. Indicators for Load on mains, Load on D.G. set, Engine fails to start, Emergency stop.
13. Battery charger complete with transformer/ rectifier, D.C Voltmeter and Ammeter, selector switch for trickle, off, and boost charging and current adjustment.
14. Main supply failure monitor.
15. Timers.
16. Fault reset push button.

Method of Construction:

AMF Panel complete with relays, timers, set of CT's for metering & protection and energy analyzer to indicate currents, phase and line voltages, frequency, power factor, KWH, KVARH & provision for overload, short circuit, fault, under frequency, control cabling from AMF panel to diesel engine and elsewhere if required, complete with metering as per material list.

System OperationThe above-mentioned facilities provided shall be functional for following operational requirements.

1. Auto Mode

- A line voltage monitor shall monitor supply voltage on each phase when the mains supply voltage fails completely or falls below set value (variable between 80 to 95 % of the normal value) on any phase, the monitor module shall initiate start-up of diesel engine. To avoid initiation due to momentary disturbance, a time delay adjustment between 0 to 5 second shall be incorporated in start-up intimation.
- A three attempt starting facility shall be provided 6 seconds ON, 5 seconds OFF, 6 seconds ON, 5 Seconds OFF, 6 seconds ON. If at the end of the third attempt, the engine does not start it shall be locked out of start and a master timer shall be provided for this function, suitable adjustment timers are to be incorporated which will make it feasible to vary independently ON-OFF setting periods from 1-10 seconds, if alternator does not build up voltage after the first or second start as may be the case, further starting attempt will not be made until the starting facility is reset.
- Once the alternator has built up voltage, the alternator circuit breaker shall close connecting the load to the alternator. The load is now supplied by the alternator.

When the main supply is restored and is healthy as sensed by the line voltage monitor setting, both for under voltage or unbalance, the system shall be monitored by a suitable timer which can be set between 1 minute to 10 minutes for the load to be transferred automatically to main supply.

- The panel shall start the set in the event of fault condition of under voltage, over voltage, phase reversal, high frequency, neutral snapping, short circuit, etc., on the mains side. If the above fault condition arises if the load is being fed from the DG Set, then the panel start cut off the load from the set with an audible alarm, and the set shall run on no load.

2. Manual Mode:

Contractor

Consultant

Member Secretary

- In a manual mode, it shall be feasible to start-up the generator set by the operator on pressing the start push button.
- Three attempts starting facility shall be operative for the start-up function.
- Alternator circuit breakers closing and trip operations shall also be through operator only by pressing the appropriate button on the panel and closed shall be feasible only after alternator has built up full voltage.

3. Test Mode

- When under test mode, pressing of test button should complete the start up sequence simulation, and engine shall be started.
- Engine shall build up voltage but the set shall not take load by closing alternator circuit breaker when the load is on the mains, monitoring performance for voltage/ frequency etc. shall be feasible without supply to load
- If during test mode, the power supply has failed, the load shall automatically get transferred on DG Set.
- Bringing the mode selector to auto position shall shut down the set provided main supply is ON if the mains supply is not available at that time, the alternator shall take load.

Mode of measurement: Executed quantity will be counted on number basis. (i.e. each)

Item No. 121:

Supplying and erecting rectangular shaped CRCA /die-cast aluminium powder coated housing LED panel (slim edge-lit) 300x1200mm of suitable for 36 to 40 W with provision for plane front frame with translucent cover fixed to the housing complete.

Material:

1. Fitting:

Scientifically designed highly polished & anodized aluminium reflector ensures precise light control with optimum light utilization, leading to substantial savings in energy cost and excellent ambient conditions. Reflector is fitted into the frame with decorative screw arrangement. Frame is fabricated from CRCA MS sheet and epoxy powder coated white. Precoated frame ensure corrosion free life. Fitting shall have a prismatic acrylic diffuser resting on upper part of reflector to reduce glare. Retaining clips facilitate mounting in false ceilings.

2. Ballast: As per **(FG-FG/AS1)** specified in chapter 2.4.

3. Bi-pin lamp holder: Conforming to IS: 3323/80 with amendment No.1 to the extent possible /applicable.

4. Capacitor / Condenser: As per **(FG-FG/AS7)** specified in chapter 2.4.

5. Connection wire: PVC insulated Twin twisted flexible copper wire 24/0.2 mm.

6. Terminal connector: As per **(FG-FG/AS10)** specified in chapter 2.4.

Method of Construction:

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The fitting shall be fixed firmly in the designated place (False ceiling / Unspecified ceiling) with the help of swinging bracket, and making the connection.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e each)

Item No. 122:

Supplying and erecting square shaped CRCA / die-cast aluminium powder coated housing LED Panel light (slim edge-lit) 600 x 600 mm suitable for 36 W to 40 W with provision for plane front frame with translucent cover fixed to the housing complete. (Make - Philips/Wipro)

Material:

1. Fitting:

Scientifically designed highly polished & anodized aluminium reflector ensures precise light control with optimum light utilization, leading to substantial savings in energy cost and excellent ambient conditions. Reflector is fitted into the frame with decorative screw arrangement. Frame is fabricated from CRCA MS sheet and epoxy powder coated white. Precoated frame ensure corrosion free life. Fitting shall have a prismatic acrylic diffuser resting on upper part of reflector to reduce glare. Retaining clips facilitate mounting in false ceilings.

2. Ballast: As per **(FG-FG/AS1)** specified in chapter 2.4.

3. Bi-pin lamp holder: Conforming to IS: 3323/80 with amendment No.1 to the extent possible /applicable.

4. Capacitor / Condenser: As per **(FG-FG/AS7)** specified in chapter 2.4.

5. Connection wire: PVC insulated Twin twisted flexible copper wire 24/0.2 mm.

6. Terminal connector: As per **(FG-FG/AS10)** specified in chapter 2.4.

Method of Construction:

The fitting shall be fixed firmly in the designated place (False ceiling / Unspecified ceiling) with the help of swinging bracket, and making the connection.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e each)

Item No. 123:

Supplying and erecting LED square / circular 16 to 20W downlighter having pressure die-cast aluminium housing, opal translucent cover, mounting arrangement with board for surface type or spring loaded mounting clips for flush type complete. (Make - Philips/Wipro)

Material:

1. Fitting:

2. Housing fabricated from CRCA/MS sheet, epoxy powder coated, white enamelled, with mirror assembly comprising of significantly designed high purity aluminium reflector for high optical performance back wing light and with improved vertical illumination.

3. Ballast: As per **(FG-FG/AS1)** specified in chapter 2.4.

4. **Bi-pin lamp holder:** Conforming to IS: 3323/80 with amendment No.1 to the extent possible /applicable.
5. **Connection wire:** PVC insulated Twin twisted flexible copper wire 24/0.2 mm.
6. **Hardware:** Sheet Metal (SM) screws, washers, plugs / wooden gitties, etc.
7. **Chain:** Heavy duty lacquered MS chain with hooks.
8. **Block:** As per 1.6 specified in chapter for Point wiring. **(WG-PW/PW)**
9. **Terminal connector:** As per **(FG-FG/AS10)** specified in chapter 2.4.

Method of Construction:

Mirror optic fitting suitable for specified wattage of CFL complete erected on wooden block/PVC block /on ceiling directly in case of surface mounting fitting, as directed by site engineer, with necessary screws of suitable size, with rawl plugs, gitties, etc. In case of recesses mounting, the fitting shall be secured and erected by fixing the hook at ceiling, and the chain shall be fixed to the fitting, in such a manner that the fitting shall be in level with the false / unspecified ceiling.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e each)

Item No. 124:

Supplying, Erecting, testing and Commissioning of Indoor decorative luminaries suitable for T5 lamps as of Wipro make cat no. WRF 80128 SG 1x28w FTL (T5). Including choke, lamp & all accessories

Scope:

Supplying & erecting white stove enameled / powder coated Chalk board type fluorescent fitting with enameled reflector of 0.8 mm thick, white on the reflector side and gray on other surface suitable for T 5 tube/ tubes, with specified ballast, and necessary accessories, duly wired up for use on 250 V AC, supply and erected if required on varnished wooden / PVC block with flexible wire, twin core 24/0.20 mm. and with necessary materials complete and marking Sr. No. and date of erection.

Material:

1. Fitting:

White stove enameled / powder coated Chalk board type fluorescent fitting suitable for T 5 tube, made of CRCA sheet not less than 0.5 mm thick, with enameled reflector of 0.8 mm thick, painted white on the reflector side and gray on other surface. Wire ways shall be smooth & free from sharp edges, burrs, flashes & like which might cause abrasion of the insulation of the wiring. Parts such as metal set screws shall not be protrude into wire ways.

2. **Ballast:** As per **(FG-FG/AS2) / (FG-FG/AS3) / (FG-FG/AS4)** specified in chapter 2.4.
3. **Tube holders:** As per **(FG-FG/AS8)** specified in chapter 2.4
4. **Starter:** As per **(FG-FG/AS11)** specified in chapter 2.4
5. **Condenser:** As per **(FG-FG/AS7)** specified in chapter 2.4
6. **Starter holder:** As per **(FG-FG/AS9)** specified in chapter 2.4

Contractor

Consultant

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7. **Connection wire:** PVC insulated Twin twisted flexible copper wire 24/0.2 mm.
8. **Paint:** Superior quality enamel paint of specified colour.
9. **Hardware:** Sheet Metal (SM) screws, washers, plugs / wooden gitties, etc.
10. **Block:** As per 1.6 specified in chapter for Point wiring. **(WG-PW/PW)**
11. **Terminal connector:** As per **(FG-FG/AS10)** specified in chapter 2.4.

Method of Construction:

The complete fitting with all the above accessories shall be fixed on wooden / PVC block with SM screws (minimum size shall be 25x8 mm). The wooden/PVC block shall be fixed on wall/ceiling with SM screws (minimum size shall be 75x8mm) with necessary plugs, gitties, etc. S. No and date of erection shall be marked/painted by enamel paint. The fitting shall be connected PVC copper wire leads, to the point and testing shall be carried out.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e each)

Item No. 125:

Supplying, Erecting, testing and Commissioning of Functional glare free lumi for surface mounting suitable for TLD/TL fluorescent lamp with opal acrylic cover as of Philips Cat No.TCS 019 1xTLD 36W EBS. Including choke, lamp & all accessories

Scope:

Supplying & erecting white stove enameled / powder coated Chalk board type fluorescent fitting with enameled reflector of 0.8 mm thick, white on the reflector side and gray on other surface suitable for surface mounting suitable for TLD/TL fluorescent lamp with specified ballast, and necessary accessories, duly wired up for use on 250 V AC, supply and erected if required on varnished wooden / PVC block with flexible wire, twin core 24/0.20 mm. and with necessary materials complete and marking Sr. No. and date of erection.

Material:

Fitting: White stove enameled / powder coated Chalk board type fluorescent fitting suitable for surface mounting suitable for TLD/TL fluorescent lamp, made of CRCA sheet not less than 0.5 mm thick, with enameled reflector of 0.8 mm thick, painted white on the reflector side and gray on other surface. Wire ways shall be smooth & free from sharp edges, burrs, flashes & like which might cause abrasion of the insulation of the wiring. Parts such as metal set screws shall not be protrude into wire ways.

1. **Ballast:** As per **(FG-FG/AS2) / (FG-FG/AS3) / (FG-FG/AS4)** specified in chapter 2.4.
2. **Tube holders:** As per **(FG-FG/AS8)** specified in chapter 2.4
3. **Starter:** As per **(FG-FG/AS11)** specified in chapter 2.4
4. **Condenser:** As per **(FG-FG/AS7)** specified in chapter 2.4

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5. **Starter holder:** As per **(FG-FG/AS9)** specified in chapter 2.4
6. **Connection wire:** PVC insulated Twin twisted flexible copper wire 24/0.2 mm.
7. **Paint:** Superior quality enamel paint of specified colour.
8. **Hardware:** Sheet Metal (SM) screws, washers, plugs / wooden gitties, etc.
10. **Block:** As per 1.6 specified in chapter for Point wiring. **(WG-PW/PW)**
11. **Terminal connector:** As per **(FG-FG/AS10)** specified in chapter 2.4.

Method of Construction: The complete fitting with all the above accessories shall be fixed on wooden / PVC block with SM screws (minimum size shall be 25x8 mm). The wooden/PVC block shall be fixed on wall/ceiling with SM screws (minimum size shall be 75x8mm) with necessary plugs, gitties, etc. S. No and date of erection shall be marked/painted by enamel paint. The fitting shall be connected PVC copper wire leads, to the point and testing shall be carried out.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e each)

Item No. 126:

Supplying, installing, testing and commissioning cassette type variable speed inverter technology split room air conditioning unit 3 TR capacity having ISEER maximum 4.50, suitable to operate on 230V /415 V, 50 cycles, AC supply having 1 no. air handling unit false ceiling mounting type complete with refrigerant R32/R410A & copper condenser coil at position with provided copper piping and drainage pipe.

Scope: Supplying, erecting, and testing Split type room air- conditioner of specified tonnage, conforming to I.S.1391, having One of air handling units Hiwall mounting type having cooling unit and the condensing unit connected with 12/9 mm copper piping upto 6 meter duly insulated and 3 core copper flexible cord of required length etc. with stand for condensing unit, complete with testing etc. (Confirming to IS:1391 Part-I & Part-II with all amendments & as per BEE) suitable for operation on single phase, AC supply, 230/250 Volts 50 Hz, using best quality compressor, and fitting in position as per site situation and as directed by site engineer, duly connected to supply, and marking of S No. and date of erection.

The AC unit shall be capable of performing following functions:

- Cooling
- Dehumidifying
- Air Circulating
- Air Filtering
- Ventilation

The Split type AC should be **minimum 3 Star rating as directed by B.E.E.**

Contractor

Consultant

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Material:

1. Compressor:

The air conditioners shall be fitted with hermetically sealed type suction cooled reciprocation or discharge cooled rotary compressor (as applicable), compressor unit operating on Refrigerant R-22 with suitable rated capacitor start electric motor. It shall be equipped with overload protection. These shall be mounted on resilient mountings for quiet operation. The compressor shall conform to IS: 10617 part (1) -1983 (amendment 1 & 2)

The air conditioners shall be complete with automatic temperature control and cut-in and cut-out etc. for temperature range 16 degrees to 30 deg. C. The differential of the thermostat for cut-in and cut-out shall not be greater than +/- 1.75 degree Centigrade.

2. Outdoor Cabinet:

The cabinet of the evaporator unit and condensing unit shall be made from galvanized steel sheet of 1.0mm thick with stiffness for robust construction and shall have rounded corners, steel parts/front panel etc. shall have stove-enameled finish preceded by undercoat of anti corrosive primer paint phosphate and through cleaning of the surface. Alternate methods of corrosion protection like plastic powder coating, electrostatic paintings are also acceptable in lieu of stove enameled finish. Galvanised sheet shall conform to IS: 277/ 2003.

3. Indoor Unit:

The indoor units made of ABS/HIPS shall be of flame retardant and impact resistant life. ABS/HIPS indoor unit cabinet shall pass inflammability test requirement for Grade V-O as per UL -94. For impact resistance the unit duly packed, when dropped from a height of 1 Mtr shall show no damage.

4. Air Filter: The air filters provided shall be of cleanable type and made of synthetic material.

5. Thermostat:

The air conditioners may either be provided with adjustable step less type mechanical thermostat or electronic thermostat as per IS 11338: 1985.

6. Condenser: As per (FG-FG/AS7) specified in chapter 2.4

7. Piping:

- Suction line - Copper pipe of 0.70mm thickness and diameter as per manufacturers design.
- Liquid line - Copper pipe of 0.70mm thickness and diameter as per manufacturers design.
- Drain pipe - 15mm dia flexible PVC pipe.

8. Connection Cable: Suitable capacity 3 Core PVC insulated copper wire to electrically connect both the units with each other.

9. Paint: Superior quality enamel paint of specified colour.

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Method of Construction:

The installation shall comprise the following work:

- Mounting/Fitting indoor & outdoor units at the respective locations.
- Laying refrigerant piping of 6m length and connecting both the units after drilling hole/holes in the wall, if required. The thickness of the copper tubing shall not be less than 0.70mm.
- Insulating the suction pipe with expanded polyethylene foam 5mm tubing.
- Laying 15mm drain pipe to throw out the condensate water formed in the Indoor unit.

- Leak testing the entire system.
- Charging Refrigerant gas in the unit.
- Suitable electric wiring between indoor and outdoor units upto 6 mtrs length upto switch within 3 metre of location of indoor unit.
- Testing and giving satisfactory trials.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e each)

Item No. 127:

Providing & erecting Hot dipped galvanized ladder type cable tray manufactured from 16 swg (1.6 mm thick) GI sheet of 150 mm width & 100 mm height comprising all required standard accessories.

Scope:

Scope:

Providing & erecting Hot dipped galvanized ladder type cable tray manufactured from 16 swg (1.6 mm thick) GI sheet of 150 mm width & 100 mm height comprising all required standard accessories.

Mode of Measurement: Executed quantity shall be counted on RMT basis. (i.e each)

Item No. 128:

Supplying & fixing anchor type fastener fan hook, with 2 nos. of 10 mm dia x 75 mm long with necessary materials for ceiling fan.

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Scope:

Scope:

Supply and erection of ISI mark G.I. Pipe Pole 'B' Grade 75/80 mm dia. 6 mtr. long pole including painting in provided foundation as per method of construction.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e each)

Item No. 129:

Supplying and erecting 'B' grade G.I. pipe / M.S. pipe down rod duly painted for fan complete erected with PVC three core flexible cable 1 sq. mm copper PVC wire.

Scope:

Supply and erection of ISI mark G.I. Pipe Pole 'B' Grade 75/80 mm dia. 6 mtr. long pole including painting in provided foundation as per method of construction.

Material:-

- a. ISI mark G.I. Pipe Pole 'B' Grade 75/80mm dia. of total length 6 meter
- b. C.I / M.S Base plate of 30x30x0.6 cms.
- c. Earth stud 5/8"mm Dia. size bolt welded to pole with required size nut and double G.I./M.S. washers
- d. Bituminous paint
- e. Aluminium paint
- f. Red oxide paint
- g. Pole cap 75mm deep

Method of construction:

Before erection of pole base plate of size 30x30x0.6 cm shall be full length welded or fixed with 4 set screws at the bottom of pole, a suitable hole of required diameter and at specified height shall be drilled and welded with knock out nipple for laying wires of street light. The pole shall be then painted by 2 coats of red oxide paint and one coat of bituminous paint before erection for 1/6 length to be buried in ground & after erection remaining portion by two coats of aluminium paint. The pole shall be erected in provided cement concrete foundation and muffing in perfect plumb. (As per drawing)

Mode of Measurement: Executed quantity will be measured on number basis. (i.e. each)

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Item No. 130:

Dismantling the existing light, fan, bell, clock, independent plug point, wiring including circuit mains of all types along with accessories etc. complete as per specification No: WG-DM/PW

Scope:

Point wiring (Concealed type)

Providing all required approved specified material including hardware and erecting rigid steel / PVC conduits, junction boxes, provided fan boxes, along with required accessories in RCC slabs before casting and in walls, flooring by making chases, and refilling the same after erection of conduits, fixing concealed type boxes for switch boards in walls, drawing wires through conduits, from switch board to outlet for light / fan / bell / independent plug point fixing modular type switch for controlling power supply and an accessory for outlet of light / fan / bell / plug at other end, with mounting plate, and terminating wires within at both ends, as per approved method of construction, closing all junction boxes with plates; removing all debris and testing the installation for safety and beneficial use.

Material:

Point wiring (Concealed)

PVC conduit:

PVC pipe minimum 20mm dia and above depending No. of wires to be drawn (refer Table No 1/2); ISI mark, HMS grade (2mm thick), accessories for PVC pipes of the same make that of pipe; such as Spacers & Saddles, Couplers, Bends, inspection or non inspection type Elbows, Tees, Junction boxes of required ways and resin / adhesive to make all joints rigid. Black pipe shall not be used for surface type wiring.

Rigid Steel conduit:

Rigid steel conduit minimum 20mm dia. and 16 gauge, ISI mark, ERW grade duly processed for anti-rust treatment and painted with black enamel paint, accessories for rigid steel conduits such as 3mm thick 20mm width spacers and MS/G.I. saddles, sockets, open bends, junction boxes of required ways all of the same make; 22g 10mm width, copper earth clips for fixing earth wire along the conduits

Sheet metal Junction boxes / Draw-in boxes:

Junction box shall be fabricated from 16 SWG CRCA sheet steel duly treated with antirust treatment and painted with two coats of red oxide paint. There shall be knockout holes in required numbers and dia. for entry of conduit pipes and arrangement to fix

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cover plate on it. Cover plate shall be made up of fire resistant PVC material/3mm thick laminate/Bakelite/hylam sheet with duly tapered edges.

Wires:comprising phase and neutral wires:

PVC insulated minimum FR grade copper wires of electrolytic grade, having insulation 1.1 kV grade, ISI marked, of required colour coding as per Table No 1/5 and as per specified size

Earth Wire:

PVC insulated minimum FR grade copper wires of electrolytic grade, having insulation 1.1 kV grade, of green colour, ISI marked, 1.5 sq.mm / bare copper wire of 14g / GI wire of 12g.

Lugs: Pin type Copper lugs.

Accessories:

Switch:1 or 2 way Modular type switch 6/10A.

Outlet: Modular type 6A angle / batten lamp holder or 3 plate ceiling-rose or Bakelite / porcelain 3 way connector or if plug point, 6A, 3-pin plug shuttered socket.

Boards: Switchboards shall comprise of; concealed type box of required modules made of sheet metal or Polypropylene material, mounting plate and cover plate. The required modules shall be worked out on the basis of points, plug socket/sockets, step type fan regulator, etc are to fixed. For the blank module, 1 way blank plate shall be fixed. All the above accessories shall be of same make, as that of switch.

Hardware:

Sheet Metal (SM) screws of sizes specified in method of construction, washers, plugs / wooden gitties, 'U' nails, plumbing nails, steel binding wire 20g etc.

Other material for Surface finishing; Sand, Cement, water etc.

Method of construction:

Point wiring (Concealed)

Concealing of conduits:

General

Work shall be done in co-ordination with civil work. Size of conduit shall be correct depending on number of wires to be drawn. (Table No. 1/1 for Steel conduits & Table No 1/2 for PVC conduits) Separate pipe shall be used for each phase in 1-ph distribution and for power and light distribution and also for wiring for other utilities like data, telephone, TV cabling, etc. The distance between pipes shall not be less than 200 mm. Adequate

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use of conduit accessories shall be made at required locations. Entries in wall shall be at level of corresponding conduit with colour coding as per Table No. 4. (For Visual identification) Flexible conduits shall be used at expansion joints. Erection shall be done as per the layout finalized, with minimum sharp bends, with junction boxes at angular junctions and for straight runs at every 4.25m, in such manner so as to facilitate drawing of wires. All the bends shall be done with Bending Spring.

Concealing of conduits:

In slabs

Work shall be commenced after fixing of steel on centering material. Conduits shall be firmly fixed with steel in slab by binding wire. Fixing of conduits shall be such that it will remain rigid during casting of slab and also while use of vibrator in column/beam. Deep junction boxes and other draw-in boxes shall be such that their open end will be flush with centering material even after fixing covers to steel of RCC and be filled with dry sand. Open ends of conduits; to be concealed in walls, shall be provided with couplers / sockets at ends and be flush with bottom of beam, and at the center of the beam. As far as possible bunching / grouping of conduits shall be avoided so that it will not affect strength of RCC work especially in beams. Suitable Steel fish wire shall be laid in the conduits for drawing of wires later on.

Concealing of Conduits:

In walls

Chases shall be made in walls of adequate width, with cutter and chiseling through it. Necessary finishing of the surface shall be done. Conduits of adequate size shall be erected with use of appropriate accessories and 'U' nails.

Drawing of wires:

Use of Steel fish wire shall be made for drawing of wires. Wires shall be drawn with adequate care. Correct colour coding shall be used for phase, neutral and earth. Wires shall not have intermediate joint in between terminals of the accessories. Earth-wire and Return wire (neutral) may be looped within circuit only. For lighting load distribution, wires of two different phases shall not be drawn in single pipe. Wires shall be terminated in the terminals of accessories only. Adequate extra length shall be left at termination points.

Fixing Switchboards and accessories:

Control switchboards shall generally be erected at 1.35m height or as specified and fixed with minimum 2 Nos. of screws of length not less than 50mm, Boards shall be in line and plum and shall be in level with wall surface so as to fix mounting plate flush with wall, Termination of wires shall be done in switch and other accessories only by carefully inserting all strands in terminals and proper tightening. Switches shall be provided on

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phase wire only. Bare wire shall not be used for looping incoming supply to switches. Phase wire shall be routed through switch only. For plug socket phase wire shall be connected in right side terminal when seen from front. Proper termination of earth wire in Earth terminal shall be ensured.

Testing:

Insulation resistance test:

All wiring shall be tested with 500V Megger between phases, phase – neutral and to Earth. IR value shall not be less than 1M-ohm.

Earth continuity:

Earth continuity shall be ensured at all earth terminals of plug outlets and at earth terminals of metal enclosures.

Polarity test:

Polarity test shall be carried out for ensuring the correct polarity in the plug.

Mode of measurement:

Measurement shall be carried out on the basis per number of points, **for the point length up to 6m between switch and outlet.** For the length exceeding 6m 10% of overall rate shall be added for every 1m.

Item No. 131:

Supplying, erecting and Testing RG 59 Coaxial Video Cable 4+1 including all labour charges etc. complete.

To lay the cables for Computers on surface of wall or ceiling concealed in slab, wall, under flooring etc, through existing metallic conduits, rigid PVC conduits, PVC trunking, with all necessary hardware, material, etc. as specified. The cable shall be used only for connections between Information Outlet & Patch/ Multimax Panel. (Exception: For making MDIX patch cord)

Material:

UTP cable:4 pairs,100 ohms, unshielded twisted pair (UTP), each pair separated by a PE former (Star shaped) solid 23AWG tinned copper conductor rated for temperature of 75⁰ C, PVC insulated gray colour with following types as in the table 1.12/1

Table 1.12/1

Sr. No.	Type	Class	Tested frequency
1	Cat 6	E	350MHz
2	Cat 6+	E	500MHz

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Method of Construction: The cable shall be laid in provided separate casing n capping/ PVC conduit/ trunking 400mm away from electrical cables wherever required without sharp bends. The cable shall be spliced at both the ends for punching/ crimping at keystone jacks/ UTP connectors.

Mode of measurement: Executed quantity shall be measured on running metre basis.

Item No. 132:

Supplying, erecting and Testing IR dome Cameras Day and Night vij. IR Rang of 4 Mtrs. With 18 LED's 600 TVL Normal Resolution camera 3.6 mm fixed Lens including all labour charges etc. complete.

1.0 General:

The work under this system shall consist of supply, installation, testing, training & handing over of all materials, equipment's and appliances and labor necessary to commission the said system. The IP CCTV Surveillance System shall comprise of fixed dome cameras, fixed Box type outdoor cameras, Housings, PTZ dome cameras, Digital/Network Video Recorder, application Server, power supply units, monitors, Software and other associated accessories. It shall also include laying of cabling, necessary for installation of the system as indicated in the specification and Bill of Quantities. Any openings/chasing in the wall/ceiling required for the installation shall be made good in appropriate manner.

2.0 System Design and Architecture:

IP CCTV surveillance system should be implemented such as to cover the strategic locations and sensitive areas of High-end cameras with Day/Night features to be installed for both indoor & outdoor application. All outdoor cameras shall be rugged and shall be weather proof as per specifications. Day/Night Cameras with manual varifocal lenses shall be provided for selected outdoor locations. Also, the systems should utilize only industry standard protocol.

The Digital/Network Video Recorders should allow for recording of events both continuous and motion triggered as per requirement and recordings should be able to create evidences and support post event analysis.

3.0 Detailed Specification of CCTV Equipments:

3.1 Indoor/Outdoor Fixed Dome camera

Camera

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- Image Sensor 1/3" Progressive Scan CMOS
- Min. Illumination 0.01Lux @ (F1.2, AGC ON) ,0 Lux with IR 0.028Lux @ (F2.0, AGC ON) ,0 Lux with IR
- Shutter Speed 1/3 s to 1/100,000 s
- Lens 4mm @ F2.0, Angle of view: 85° (6mm optional)
- Lens Mount M12
- Day & Night IR cut filter with auto switch
- Digital Noise Reduction 3D DNR
- Wide Dynamic Range Digital WDR Compression Standard
- Video Compression H.264/ MJPEG
- Video Bit Rate 32 Kbps – 8 Mbps
- Dual Stream Yes

Image

- Max. Resolution 1920 × 1080
- Max Frame Rate 50Hz: 25fps(1920 × 1080), 25fps (1280 × 960), 25fps (1280 × 720)
60Hz: 30fps(1920 × 1080), 30fps (1280 × 960), 30fps (1280 × 720)
- Sub Stream 50 Hz: 25 fps (320 × 240), 25 fps (352 × 288), 25 fps (640 × 480),
25fps(704 × 576) 60 Hz: 30 fps (320 × 240), 30 fps (352 × 288), 30 fps (640 × 480),
30fps(704 × 576)
- Image Settings Rotate mode, Saturation, Brightness, Contrast adjustable by client software or web browser
- Backlight compensation Yes, zone optional
- ROI Support Network
- Network Storage NAS (Support NFS, SMB/CIFS)
- Detection Intrusion detection, Line crossing detection, Motion detection, Dynamic analysis
- Alarm Trigger Tampering alarm, Network disconnect, IP address conflict, Storage exception
- Protocols TCP/IP, ICMP, HTTP, HTTPS, FTP, DHCP, DNS, DDNS, RTP, RTSP, RTCP, PPPoE, NTP, UPnP, SMTP, SNMP, IGMP, 802.1X, QoS, IPv6, Bonjour
- General One-key reset, Anti-Flicker, heartbeat, mirror, password protection, privacy mask, watermark, IP address filtering, Anonymous access
- Standard ONVIF, PSIA, CGI, ISAPI Interface
- Communication Interface 1 RJ45 10M/100M Ethernet interface
- On-board storage Built-in Micro SD/SDHC/SDXC card slot, up to 128 GB

Contractor

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- Reset Button Yes Wi-Fi Specification (Only for the products with Wi-Fi module built-in)
- Wireless Standards IEEE 802.11b, 802.11g, 802.11n
- Frequency Range 2.4 GHz ~ 2.4835 GHz
- Channel Bandwidth 20/40MHz Support
- Protocols 802.11b: CCK, QPSK, BPSK 802.11g/n: OFDM
- Security 64/128-bit WEP, WPA/WPA2, WPA-PSK/WPA2-PSK, WPS
- Transfer Rates 11b: 11Mbps 11g: 54Mbps 11n: up to 150Mbps
- Wireless Range 50m (depend on environment)

General

- Operating Conditions -30 °C – 60 °C (-22 °F – 140 °F) Humidity 95% or less (non-condensing)
- Power Supply 12 V DC ± 10%, PoE (802.3af)
- Power Consumption MAX. 5.8W
- Material Front Cover: Plastic; Back Cover & Bracket: Metal
- Ingress Protection level IP67
- IR Range 30 meters
- Dimensions 70×157×62 mm (2.8" × 6.1" × 2.4")
- Weight 500g (1.1 lbs)

3.4 Outdoor Housing with suitable accessories:

The Environmental Camera Housing shall include, as a minimum, the following features/ functions/ specifications:

- The Environmental Camera Housing shall incorporate a side-hinged lid to provide easy access to the camera and lens for trouble-free installation and servicing.
- The Environmental Camera Housing shall be purpose aluminum camera housing complete with anti-reflective ABS polymer sunshield, flexi-glass face-plate with polycarbonate front and rear.
- The Environmental Camera Housing shall be totally protected from dust and strong jets of water, and must have an International Standards IP Protection Classification of sixty- six (IP66).
- The Environmental Camera Housing shall utilize three (3) weatherproof cable entry glands on the rear of the housing to allow for easy installation of power, video and control cables.
- The Environmental Camera Housing manufacturer shall offer the housing with factory installed sunshield and heater.

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- The Environmental Camera Housing shall have a removable camera sled that can be secured along any position in the housing.
- Bracket for the environmental housing shall be Epoxy powder-coated and aluminium (RAL 9006) finish

Mode of measurement: Executed quantity shall be measured in number basis.

Item No. 133:

Supplying, erecting and Testing IR Bullet Cameras IR Rang of 10 Mtrs. With 26 LED's 650 TVL Normal Resolution camera including all labour charges etc. complete.

2.0 General:

The work under this system shall consist of supply, installation, testing, training & handing over of all materials, equipment's and appliances and labor necessary to commission the said system. The IP CCTV Surveillance System shall comprise of fixed dome cameras, fixed Box type outdoor cameras, Housings, PTZ dome cameras, Digital/Network Video Recorder, application Server, power supply units, monitors, Software and other associated accessories. It shall also include laying of cabling, necessary for installation of the system as indicated in the specification and Bill of Quantities. Any openings/chasing in the wall/ceiling required for the installation shall be made good in appropriate manner.

2.0 System Design and Architecture:

IP CCTV surveillance system should be implemented such as to cover the strategic locations and sensitive areas of High-end cameras with Day/Night features to be installed for both indoor & outdoor application. All outdoor cameras shall be rugged and shall be weather proof as per specifications. Day/Night Cameras with manual varifocal lenses shall be provided for selected outdoor locations. Also, the systems should utilize only industry standard protocol.

The Digital/Network Video Recorders should allow for recording of events both continuous and motion triggered as per requirement and recordings should be able to create evidences and support post event analysis.

3.0 Detailed Specification of CCTV Equipments:

3.2 Indoor/Outdoor Fixed Dome camera

Camera

- Image Sensor 1/3" Progressive Scan CMOS
- Min. Illumination 0.01Lux @ (F1.2, AGC ON) ,0 Lux with IR 0.028Lux @ (F2.0, AGC ON) ,0 Lux with IR
- Shutter Speed 1/3 s to 1/100,000 s

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- Lens4mm@ F2.0, Angle of view: 85° (6mm optional)
- Lens MountM12
- Day & Night IR cut filter with auto switch
- Digital Noise Reduction3D DNR
- Wide Dynamic Range Digital WDR Compression Standard
- Video CompressionH.264/ MJPEG
- Video Bit Rate32 Kbps – 8 Mbps
- Dual Stream Yes

Image

- Max. Resolution1920 × 1080
- Max Frame Rate50Hz: 25fps(1920 × 1080), 25fps (1280 × 960), 25fps (1280 × 720)
60Hz: 30fps(1920 × 1080), 30fps (1280 × 960), 30fps (1280 × 720)
- Sub Stream50 Hz: 25 fps (320 × 240), 25 fps (352 × 288), 25 fps (640 × 480),
25fps(704 × 576) 60 Hz: 30 fps (320 × 240), 30 fps (352 × 288), 30 fps (640 × 480),
30fps(704 × 576)
- Image Settings Rotate mode, Saturation, Brightness, Contrast adjustable by client software or web browser
- Backlight compensation Yes, zone optional
- ROI Support Network
- Network Storage NAS (Support NFS, SMB/CIFS)
- Detection Intrusion detection, Line crossing detection, Motion detection, Dynamic analysis
- Alarm Trigger Tampering alarm, Network disconnect, IP address conflict, Storage exception
- Protocols TCP/IP, ICMP, HTTP, HTTPS, FTP, DHCP, DNS, DDNS, RTP, RTSP, RTCP, PPPoE, NTP, UPnP, SMTP, SNMP, IGMP,802.1X, QoS, IPv6, Bonjour
- General One-key reset, Anti-Flicker, heartbeat, mirror, password protection, privacy mask, watermark, IP address filtering, Anonymous access
- Standard ONVIF, PSIA, CGI, ISAPI Interface
- Communication Interface1 RJ45 10M/100M Ethernet interface
- On-board storage Built-in Micro SD/SDHC/SDXC card slot, up to 128 GB
- Reset Button Yes Wi-Fi Specification (Only for the products with Wi-Fi module built-in)
- Wireless StandardsIEEE802.11b, 802.11g, 802.11n
- Frequency Range2.4 GHz ~ 2.4835 GHz
- Channel Bandwidth20/40MHz Support

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- Protocols 802.11b: CCK, QPSK, BPSK 802.11g/n: OFDM
- Security 64/128-bit WEP, WPA/WPA2, WPA-PSK/WPA2-PSK, WPS
- Transfer Rates 11b: 11Mbps 11g: 54Mbps 11n: up to 150Mbps
- Wireless Range 50m (depend on environment)

General

- Operating Conditions -30 °C – 60 °C (-22 °F – 140 °F) Humidity 95% or less (non-condensing)
- Power Supply 12 V DC ± 10%, PoE (802.3af)
- Power Consumption MAX. 5.8W
- Material Front Cover: Plastic; Back Cover & Bracket: Metal
- Ingress Protection level IP67
- IR Range 30 meters
- Dimensions 70×157×62 mm (2.8" × 6.1" × 2.4")
- Weight 500g (1.1 lbs)

3.5 Outdoor Housing with suitable accessories:

The Environmental Camera Housing shall include, as a minimum, the following features/ functions/ specifications:

- The Environmental Camera Housing shall incorporate a side-hinged lid to provide easy access to the camera and lens for trouble-free installation and servicing.
- The Environmental Camera Housing shall be purpose aluminum camera housing complete with anti-reflective ABS polymer sunshield, flexi-glass face-plate with polycarbonate front and rear.
- The Environmental Camera Housing shall be totally protected from dust and strong jets of water, and must have an International Standards IP Protection Classification of sixty-six (IP66).
- The Environmental Camera Housing shall utilize three (3) weatherproof cable entry glands on the rear of the housing to allow for easy installation of power, video and control cables.
- The Environmental Camera Housing manufacturer shall offer the housing with factory installed sunshield and heater.
- The Environmental Camera Housing shall have a removable camera sled that can be secured along any position in the housing.
- Bracket for the environmental housing shall be Epoxy powder-coated and aluminium (RAL 9006) finish

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Mode of measurement: Executed quantity shall be measured in number basis.

Item No. 134:

Supplying, erecting and Testing of digital video recorder with all accessories including all labour charges etc. complete.

3.3 DiGiTAL Video recorder

The Digital Video Recorder (DVR) shall have on board Ethernet and shall be able to integrate with the Integrated Security Management Software (ISMS).

The DVR shall include, but not limited to the following:

- The DVR shall use H.264 compression technology and shall have on board Ethernet port.
- The DVR shall have embedded Linux operating system and shall function as a standalone unit. For either programming or normal operation, it shall not require the use of a computer, special monitors or any other special peripheral devices.
- Each DVR shall have internal hard disk drives with SATA interfaces. Internal HDD shall be able to support up to a maximum of 4 TB storage.
- The DVR shall have Triplex capability that allows to record, playback and view live images simultaneously.
- The DVR shall have a built-in web server and it shall be possible to do the configuration through a web browser over the IP network.
- The DVR shall have the capability to record and playback real time video at 2 CIF resolutions.
- The DVR shall support loop through streaming of all the 16 channels video.
- The DVR shall use a battery internally to back up memory that stores the time, date and all internal programming functions.
- The DVR shall have an easy to ready on screen text and menus. It shall also allow the user to change the position of On screen display.
- The DVR shall have buttons, jog / shuttle integrated into the front panel to allow menu navigation, set up and control of unit, without the need of any external device.
- The front panel buttons shall be capable of controlling / navigating Pan / Tilt / Zoom functions of PTZ cameras connected to the unit.
- The DVR shall have the following option:
 - a. The unit shall allow the user to select different resolution for each channel.
 - b. The unit shall have the option to select either different frame rate for each channel.

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c. The unit shall allow the option to select either Fixed or Variable bit rate for each channel. The bit rate shall range from 32 Kbps up to 2 Mbps.

- The DVR shall have the following record mode

- a. Continuous

- b. Manual

- c. Motion Detection

- d. External alarm

- e. Motion & Alarm

- f. Motion or Alarm

- The DVR shall allow setting up of privacy mask for each camera using an on screen menu. Each camera shall have the possibility to set at least 4 privacy mask area.

- The DVR shall have a minimum of one audio input channel for every video channel and additional audio input to provide bi-directional audio. The compressed audio bit rate shall not exceed 16Kbps.

- The video and audio signals shall be synchronized and the DVR shall have the option of having a mixed stream (Video & Audio) or a Video only stream.

- The DVR shall the following video output:

- a. Multi-screen / Sequential – BNC Type

- b. VGA

- c. HDMI

- The DVR shall have one digital alarm input for each video channel and a minimum of 4 relay outputs.

- The DVR shall provide automated alarm handling. Upon receipt of an alarm, shall have the capability to change the resolution and frame as defined in the alarm recording settings.

- In addition to changing of record settings upon receipt of an alarm, the DVR shall also be capable to provide relay output operation.

- The DVR shall also have the capability to integrated with access control system controllers, intruder alarm panels and other security control equipments to receive alarm signals from those devices and perform alarm handling over IP network.

- The DVR shall support pre-alarm recording maintained in a buffer and shall append this buffer to the beginning of all recorded alarms. The DVR shall continue to record with the alarm record settings until the alarm is reset or acknowledged.

- The DVR shall provide the option of single channel as well as multi-channel playback.

- The DVR shall provide extensive search capabilities for archiving, restoring and playback operation.

- The DVR shall have the capability of archiving the recorded images from internal hard disk to an external medium.

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- The DVR shall support USB HDD, USB CD R/W, USB DVD R/w.
- The DVR shall allow the option to set 'STOP RECORDING' or OVERWRITE' when the hard disk is full.
- The DVR shall support recording of all images with a digital watermark.
- The DVR shall support Infra-red Remote control to operate, configure and navigate the menus. The remote control shall also support PTZ controls.
- For remote monitoring over IP networks, the DVR shall be set to fixed or variable transmission bit rate on both video streams for each channel. Each channel shall be set with independent record mode, resolution and frame rate.
- IR based remote control shall be supplied along with Digital Video Recorder
- Remote DVR firmware upgrade shall be possible.
- Multi-zone area masking shall be possible.
- **Display function** shall have the following features: Unit Name, Device ID, Require Password, (Y/N), Screen saver, Video standard (PAL / NTSC), Enable Scaler, Brightness, Menu transparency, VGA resolution, DST Setup, Date and Time.
- **Image function** shall have the following features: Select Camera, Camera name and position, Adjustments - Brightness, Contrast, Hue, Saturation, OSD Display mode, position and OSD style setup, Privacy Mask area setup, View tampering area and response policy setup, Video signal loss and policy set up, Motion detection sensitivity, area and response setup.
- **Recording function** shall have the following features: Overwrite/Stop recording if HDD full, SATA1 disk usage, Select Camera, Recording parameters (Normal / Event) - Stream Type, Resolution, Frame Rate, Max Bit Rate, Image Quality, Bit Rate Type; Record schedule, Prerecord time, Post Record time.
- **Networking function** shall have the following features: NIC Type, DVR IP address, mask, gateway, DNS IP, Advanced settings, Multicast IP address, Remote host IP and port PPPoE setup, E-mail
- **Alarm function** shall have the following features: Alarm input type (NO/NC), Alarm response and PTZ linkage, Alarm output and schedule
- If there is no activity for a specified idle time (defined in screen saver), the screen display shall return to live view (preview) mode. It shall allow defining the screen saver time.
- Time zones for Daylight Saving Time (DST) shall be possible.
- Following are the various handle methods that shall be defined for view tampering alarm and one or more of these options shall be enabled
 - On Screen Warning
 - Audible Warning
 - Trigger Alarm Out
 - Email Notification - Optional

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- DVR shall have three DDNS protocols (Ipserver, Dyndns & Peanut Hull) and one of the three shall be selected.
- Following are the exception types shall be available
- Network Failure
- IP Address Conflict
- Illegal Access
- NTSC / PAL Difference
- Video Exception
- Hard disk Full
- Hard disk error
- The DVR shall support configuration / operation through any of the following:
- DVR Front panel buttons
- Remote client viewer software over the network
- Integrated Video Management software (IVMS)
- The Digital Video recorder shall carry the following EMC approvals:
 1. EN55022
 2. EN55024
 3. EN 61000-3-2
 4. EN 61000-3-3
 5. EN 60950-1
 6. FCC Part 15 – Sub part B
 7. Underwriters Laboratories Inc. (UL)

Mode of measurement: Executed quantity shall be measured in number basis.

Item No. 135:

Supplying and erecting ISI marked modular type telephone socket one gang with safety shutter, duly erected on provided plate and box with wiring connections complete.

Scope: To provide wiring for telephone on surface of wall or ceiling concealed in slab, wall, under flooring, etc, through existing metallic conduits, rigid PVC conduits, PVC trunking, with all necessary hardware, material, etc. as specified. To provide, install, test & commission the instruments / equipments and accessories used in telephone system, such as; Main Distribution Frames (MDF), Krone Modules, Over Voltage Magazine, PBX / EPABX, CO-axial cable, Rosette box, Jumper wire, etc.

Material:

- **PVC Telephone cable:** PVC insulated Tinned copper solid conductor with minimum 0.5 mm dia. (Single & Multi pair) properly paired and colour coded, shall be terminated on KRONE module with suitable tool.
- **Jelly filled Armoured Telephone cable:** PVC insulated, PVC sheathed with steel armouring, Tinned copper solid conductor with minimum 0.5 mm dia multi pair, with Jelly, properly paired and colour coded.
- **Saddles:** Saddles fabricated from G I sheet of required gauge (16/18 gauge) either galvanized finish or painted with superior quality enamel black paint, with necessary shearing for mechanical strength, semi circular shaped with extended piece having suitable holes for fixing on spacer.
- **Hardware:** Sheet Metal (SM) screws of required sizes, plugs, wooden gitties, etc.
- **MDF:** Manufactured by reputed manufacturer of specified capacity, facility for wall mounting, with door & lock, aluminium frame for fixing of KRONE, duly enclosed in cabinet made from 18 SWG CRCA sheet with powder coating of required colour.
- **Junction box:** Manufactured by reputed manufacturer of specified capacity, facility for + wall mounting, with door & lock, aluminium frame for fixing of Krone, duly enclosed in cabinet made from 18 SWG CRCA sheet with powder coating of required colour. The depth of the box should consider the height of KRONE module plus protection magazine.
- **Over Voltage protection Magazine:** Manufactured by reputed manufacturer of 10 pair capacity, with 3 pole gas discharge tube should be properly fitted on KRONE module in MDF / Junction box.
- **Rosette box:** PVC / Bakelite box with LED indicator, RJ 11 jack, facility for fixing on wall.
- **Jumper wire:** Twin twisted PVC insulated with Tinned copper solid conductor minimum 0.5 mm dia.
- **KRONE Module:** Disconnection type KRONE module having capacity to connect 10 pairs with silver plated terminal contacts.
- **RG-11 Co-axial low voltage grade cable:** PVC insulated with Tinned copper solid conductor minimum 0.5 mm dia, with connector at both ends suitable for termination in RJ type socket.
- **PBX (Analogue type):** Manufactured by reputed manufacturer and approved by Telephone Engineering Certificate (TEC) of specified extensions, having following

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features:

- Direct Inward dialling (DID) with voice guidance facility.
- Caller line Identification (CLI) on Analog as well as digital extension.
- Call Billing software (CB)
- Dynamic STD locking
- Conferencing facility for specified extensions.

- **EPABX (Digital type):** Manufactured by reputed manufacturer and approved by Telephone Engineering Certificate (TEC) of specified extensions, having following

features:

- Direct Inward dialling (DID) with voice guidance facility.
- Caller line Identification (CLI) on Analog as well as digital extension.
- Call Billing software (CB)
- Dynamic STD locking
- Conferencing facility for specified extensions.
- Provision of battery back-up and power failure line transfer.

Method of construction:

4.1 Drawing of telephone wire through Steel conduit / PVC conduit / PVC Trunking:

As specified in Chapter for Point Wiring.

4.2 Erection of Jelly filled armoured Telephone cable:

Erection shall be done as per the layout finalized, in perfect level and plum. Before fixing the cable shall be straightened as far as possible for good aesthetics look. Cable shall be fixed with saddles firmly clipped on cable. Saddles shall be fixed to wall with minimum 50x8 mm SM screws with plugs/wooden gitties (Distance between two saddles shall be minimum 600 mm). Wooden gitties shall be used wherever required (Especially for stone wall). The entries made in wall, floor slab, etc for laying the cable shall be made good by filling and finishing with plastering the same.

4.3 Erection of MDF Junction box / Rosette box / PBX / EPABX, etc:

Specified equipment shall be fixed to wall with minimum 50x8 mm SM screws, with necessary plugs, wooden gitties, etc. or may be fixed on Table Top if required.

5. Mode of Measurement:
Work done for telephone in Steel / PVC conduit / PVC Trunking will be measured on running meter basis, (i.e. per running meter) for each single run. For the other accessories / equipments shall be done as per unit specified. (I.e. Job / each)

Item No. 136:

Supplying and erecting ISI mark modular type computer jack RJ 45 with safety shutter, duly erected on provided plate and box with wiring connections complete.

Scope:

Structured cabling, to provide connections to switch/ server from desktop computers/ Wireless devices in the patch panel.

Material:

Keystone jack:

High impact plastic body FR grade with high performance unshielded RJ-45 keystone jack (conforming to EIA/TIA 568-B.2-1 Cat 6) , 20milli ohms contact resistance, gold over nickel spring contact ,1.5A current carrying capacity, with T568A/T568B wiring option, insulation displacement connector for cable crimping to accept 22-26AWG solid wire for connections up to Gigabit Ethernet

Method of construction:

The keystone jack shall be fixed with the help of its self-locking arrangement in provided patch panel before making due connection as per EIA/TIA 568 B.2-1 by splicing UTP cable, untwisted up to 12mm & punching the 4 pairs in the keystone jack with the help of punching tool. Not a single wire shall be left without connections.

Mode of Measurement: Executed quantity shall be counted on number basis.

Item No. 137:

Supplying & erecting jelly filled armoured telephone copper cable 50 pair with 0.5 mm dia. laid in provided trench as per specification No. WG-TW

Scope:

To provide wiring for telephone on surface of wall or ceiling concealed in slab, wall, under flooring, etc, through existing metallic conduits, rigid PVC conduits, PVC trunking, with all necessary hardware, material, etc. as specified. To provide, install, test & commission the instruments / equipments and accessories used in telephone system, such as; Main Distribution Frames (MDF), Krone Modules, Over Voltage Magazine, PBX / EPABX, CO-axial cable, Rosette box, Jumper wire, etc.

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Material:

- **PVC Telephone cable:** PVC insulated Tinned copper solid conductor with minimum 0.5 mm dia. (Single & Multi pair) properly paired and colour coded, shall be terminated on KRONE module with suitable tool.
- **Jelly filled Armoured Telephone cable:** PVC insulated, PVC sheathed with steel armouring, Tinned copper solid conductor with minimum 0.5 mm dia multi pair, with Jelly, properly paired and colour coded.
- **Saddles:** Saddles fabricated from G I sheet of required gauge (16/18 gauge) either galvanized finish or painted with superior quality enamel black paint, with necessary shearing for mechanical strength, semi circular shaped with extended piece having suitable holes for fixing on spacer.
- **Hardware:** Sheet Metal (SM) screws of required sizes, plugs, wooden gitties, etc.
- **MDF:** Manufactured by reputed manufacturer of specified capacity, facility for wall mounting, with door & lock, aluminium frame for fixing of KRONE, duly enclosed in cabinet made from 18 SWG CRCA sheet with powder coating of required colour.
- **Junction box:** Manufactured by reputed manufacturer of specified capacity, facility for + wall mounting, with door & lock, aluminium frame for fixing of Krone, duly enclosed in cabinet made from 18 SWG CRCA sheet with powder coating of required colour. The depth of the box should consider the height of KRONE module plus protection magazine.
- **Over Voltage protection Magazine:** Manufactured by reputed manufacturer of 10 pair capacity, with 3 pole gas discharge tube should be properly fitted on KRONE module in MDF / Junction box.
- **Rosette box:** PVC / Bakelite box with LED indicator, RJ 11 jack, facility for fixing on wall.
- **Jumper wire:** Twin twisted PVC insulated with Tinned copper solid conductor minimum 0.5 mm dia.
- **KRONE Module:** Disconnection type KRONE module having capacity to connect 10 pairs with silver plated terminal contacts.
- **RG-11 Co-axial low voltage grade cable:** PVC insulated with Tinned copper solid conductor minimum 0.5 mm dia, with connector at both ends suitable for termination in RJ type socket.
- **PBX (Analogue type):** Manufactured by reputed manufacturer and approved by Telephone Engineering Certificate (TEC) of specified extensions, having following

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features:

- Direct Inward dialling (DID) with voice guidance facility.
- Caller line Identification (CLI) on Analog as well as digital extension.
- Call Billing software (CB)
- Dynamic STD locking
- Conferencing facility for specified extensions.

- **EPABX (Digital type):** Manufactured by reputed manufacturer and approved by Telephone Engineering Certificate (TEC) of specified extensions, having following

features:

- Direct Inward dialling (DID) with voice guidance facility.
- Caller line Identification (CLI) on Analog as well as digital extension.
- Call Billing software (CB)
- Dynamic STD locking
- Conferencing facility for specified extensions.
- Provision of battery back-up and power failure line transfer.

Method of construction:

Drawing of telephone wire through Steel conduit / PVC conduit / PVC Trunking:

As specified in Chapter for Point Wiring.

4.2 Erection of Jelly filled armoured Telephone cable:

Erection shall be done as per the layout finalized, in perfect level and plum. Before fixing the cable shall be straightened as far as possible for good aesthetics look. Cable shall be fixed with saddles firmly clipped on cable. Saddles shall be fixed to wall with minimum 50x8 mm SM screws with plugs/wooden gitties (Distance between two saddles shall be minimum 600 mm). Wooden gitties shall be used wherever required (Especially for stone wall). The entries made in wall, floor slab, etc for laying the cable shall be made good by filling and finishing with plastering the same.

4.3 Erection of MDF Junction box / Rosette box / PBX / EPABX, etc:

Specified equipment shall be fixed to wall with minimum 50x8 mm SM screws, with necessary plugs, wooden gitties, etc. or may be fixed on Table Top if required.

5. Mode of Measurement:

Work done for telephone in Steel / PVC conduit / PVC Trunking will be measured on running meter basis, (i.e. per running meter) for each single run. For the other

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accessories / equipments shall be done as per unit specified. (I.e. Job / each)

Item No. 138:

Supplying, erecting & commissioning MDF Box 60 x 60 pairs as per specification No. WG-TW

Scope:

To provide wiring for telephone on surface of wall or ceiling concealed in slab, wall, under flooring, etc, through existing metallic conduits, rigid PVC conduits, PVC trunking, with all necessary hardware, material, etc. as specified. To provide, install, test & commission the instruments / equipments and accessories used in telephone system, such as; Main Distribution Frames (MDF), Krone Modules, Over Voltage Magazine, PBX / EPABX, CO-axial cable, Rosette box, Jumper wire, etc.

Material:

- **PVC Telephone cable:** PVC insulated Tinned copper solid conductor with minimum 0.5 mm dia. (Single & Multi pair) properly paired and colour coded, shall be terminated on KRONE module with suitable tool.
- **Jelly filled Armoured Telephone cable:** PVC insulated, PVC sheathed with steel armouring, Tinned copper solid conductor with minimum 0.5 mm dia multi pair, with Jelly, properly paired and colour coded.
- **Saddles:** Saddles fabricated from G I sheet of required gauge (16/18 gauge) either galvanized finish or painted with superior quality enamel black paint, with necessary shearing for mechanical strength, semi circular shaped with extended piece having suitable holes for fixing on spacer.
- **Hardware:** Sheet Metal (SM) screws of required sizes, plugs, wooden gitties, etc.
- **MDF:** Manufactured by reputed manufacturer of specified capacity, facility for wall mounting, with door & lock, aluminium frame for fixing of KRONE, duly enclosed in cabinet made from 18 SWG CRCA sheet with powder coating of required colour.
- **Junction box:** Manufactured by reputed manufacturer of specified capacity, facility for + wall mounting, with door & lock, aluminium frame for fixing of Krone, duly enclosed in cabinet made from 18 SWG CRCA sheet with powder

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coating of required colour. The depth of the box should consider the height of KRONE module plus protection magazine.

- **Over Voltage protection Magazine:** Manufactured by reputed manufacturer of 10 pair capacity, with 3 pole gas discharge tube should be properly fitted on KRONE module in MDF / Junction box.
- **Rosette box:** PVC / Bakelite box with LED indicator, RJ 11 jack, facility for fixing on wall.
- **Jumper wire:** Twin twisted PVC insulated with Tinned copper solid conductor minimum 0.5 mm dia.
- **KRONE Module:** Disconnection type KRONE module having capacity to connect 10 pairs with silver plated terminal contacts.
- **RG-11 Co-axial low voltage grade cable:** PVC insulated with Tinned copper solid conductor minimum 0.5 mm dia, with connector at both ends suitable for termination in RJ type socket.
- **PBX (Analogue type):** Manufactured by reputed manufacturer and approved by Telephone Engineering Certificate (TEC) of specified extensions, having following features:
 - Direct Inward dialling (DID) with voice guidance facility.
 - Caller line Identification (CLI) on Analog as well as digital extension.
 - Call Billing software (CB)
 - Dynamic STD locking
 - Conferencing facility for specified extensions.
- **EPABX (Digital type):** Manufactured by reputed manufacturer and approved by Telephone Engineering Certificate (TEC) of specified extensions, having following features:
 - Direct Inward dialling (DID) with voice guidance facility.
 - Caller line Identification (CLI) on Analog as well as digital extension.
 - Call Billing software (CB)
 - Dynamic STD locking
 - Conferencing facility for specified extensions.
 - Provision of battery back-up and power failure line transfer.

Method of construction:

Drawing of telephone wire through Steel conduit / PVC conduit / PVC Trunking:

As specified in Chapter for Point Wiring.

4.2 Erection of Jelly filled armoured Telephone cable:

Erection shall be done as per the layout finalized, in perfect level and plum. Before fixing the cable shall be straightened as far as possible for good aesthetics look. Cable shall be fixed with saddles firmly clipped on cable. Saddles shall be fixed to

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wall with minimum 50x8 mm SM screws with plugs/wooden gitties (Distance between two saddles shall be minimum 600 mm). Wooden gitties shall be used wherever required (Especially for stone wall). The entries made in wall, floor slab, etc for laying the cable shall be made good by filling and finishing with plastering the same.

4.3 Erection of MDF Junction box / Rosette box / PBX / EPABX, etc:
Specified equipment shall be fixed to wall with minimum 50x8 mm SM screws, with necessary plugs, wooden gitties, etc. or may be fixed on Table Top if required.

5. Mode of Measurement:
Measurement of item should be as per number basis.

Item No. 139:

Supplying & installing UTP networking cat-6 cable suitable for LAN / WAN Computer networking as per specification No. WG-COC/NC

Scope:

To lay the cables for Computers on surface of wall or ceiling, concealed in slab, wall, under flooring etc, through existing metallic conduits, rigid PVC conduits, PVC trunking, with all necessary hardware, material, etc. as specified. The cable shall be used only for connections between Information Outlet & Patch/ Multimax Panel. (Exception: For making MDIX patch cord)

Material:

UTP cable:4 pairs,100 ohms, unshielded twisted pair (UTP), each pair separated by a PE former (Star shaped) solid 23AWG tinned copper conductor rated for temperature of 75⁰ C, PVC insulated gray colour with following types as in the table 1.12/1

Table 1.12/1

Sr. No.	Type	Class	Tested frequency
1	Cat 6	E	350MHz
2	Cat 6+	E	500MHz

Method of Construction: The cable shall be laid in provided separate casing n capping/ PVC conduit/ trunking 400mm away from electrical cables wherever required without sharp bends. The cable shall be spliced at both the ends for punching/ crimping at keystone jacks/ UTP connectors.

Mode of measurement: Executed quantity shall be measured on running meter basis.

Item No. 140:

Supplying, installing & testing UTP connector (RJ-45) as per specification No. WG-NAS/UTPC.

General: All material shall conform to relevant standard as per TIA/EIA 568-B2-1.

Scope: To make MDIX (Cross) patch cord required for cascade connections of switches & routers.

Material:

UTP connector: Assembly of Gold over nickel contacts with 1.5A current carrying capacity, 30V with 15milli ohms contact resistance, 8P8C connection easy to crimp with crimping tool in polycarbonate UL94V housing.

Method of construction: The UTP cable shall be spliced, untwisted not more than 12mm, inserted into the connector with sequence as shown in the **diagram ____** as per EIA/TIA 568 B.2-1 & crimped firmly with crimping tool.

Mode of Measurement: Executed quantity shall be counted on number basis.

Item No. 141:

Supplying and fixing 24 port patch panel with tool-less keystone jacks in provided U Rack complete as per specification no. WG-NAS/PP

Scope:

Structured cabling for the installation of keystone jacks

Material:

Patch Panel: Three piece structure including front panel, cable management plate with pre-fitted B-clip to help in routing cables & metal case of 1.6mm thick Mild Steel powder coated panel of size 442.6mm X 44.5mm with the provision for 1 to 24 high density keystone jacks

Hardware: Chromium plated brass nuts & bolts with special type of U shaped square washers of required sizes.

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Method of construction The Patch Panel shall be firmly secured in U Rack (Networking Cabinet) with 4 nos. of chromium plated brass nuts & bolts.

Mode of Measurement: Executed quantity shall be counted on number basis.

Item No. 142:

Supplying & erecting jelly filled armoured telephone copper cable 10 pair with 0.5 mm dia. laid in provided trench as per specification No. WG-TW

Scope: To provide wiring for telephone on surface of wall or ceiling concealed in slab, wall, under flooring, etc, through existing metallic conduits, rigid PVC conduits, PVC trunking, with all necessary hardware, material, etc. as specified. To provide, install, test & commission the instruments / equipments and accessories used in telephone system, such as; Main Distribution Frames (MDF), Krone Modules, Over Voltage Magazine, PBX / EPABX, CO-axial cable, Rosette box, Jumper wire, etc.

Material:

- **PVC Telephone cable:** PVC insulated Tinned copper solid conductor with minimum 0.5 mm dia. (Single & Multi pair) properly paired and colour coded, shall be terminated on KRONE module with suitable tool.
- **Jelly filled Armoured Telephone cable:** PVC insulated, PVC sheathed with steel armouring, Tinned copper solid conductor with minimum 0.5 mm dia multi pair, with Jelly, properly paired and colour coded.
- **Saddles:** Saddles fabricated from G I sheet of required gauge (16/18 gauge) either galvanized finish or painted with superior quality enamel black paint, with necessary shearing for mechanical strength, semi circular shaped with extended piece having suitable holes for fixing on spacer.
- **Hardware:** Sheet Metal (SM) screws of required sizes, plugs, wooden gitties, etc.
- **MDF:** Manufactured by reputed manufacturer of specified capacity, facility for wall mounting, with door & lock, aluminium frame for fixing of KRONE, duly enclosed in cabinet made from 18 SWG CRCA sheet with powder coating of required colour.
- **Junction box:** Manufactured by reputed manufacturer of specified capacity, facility for + wall mounting, with door & lock, aluminium frame for fixing of

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Krone, duly enclosed in cabinet made from 18 SWG CRCA sheet with powder coating of required colour. The depth of the box should consider the height of KRONE module plus protection magazine.

- **Over Voltage protection Magazine:** Manufactured by reputed manufacturer of 10 pair capacity, with 3 pole gas discharge tube should be properly fitted on KRONE module in MDF / Junction box.
- **Rosette box:** PVC / Bakelite box with LED indicator, RJ 11 jack, facility for fixing on wall.
- **Jumper wire:** Twin twisted PVC insulated with Tinned copper solid conductor minimum 0.5 mm dia.
- **KRONE Module:** Disconnection type KRONE module having capacity to connect 10 pairs with silver plated terminal contacts.
- **RG-11 Co-axial low voltage grade cable:** PVC insulated with Tinned copper solid conductor minimum 0.5 mm dia, with connector at both ends suitable for termination in RJ type socket.
- **PBX (Analogue type):** Manufactured by reputed manufacturer and approved by Telephone Engineering Certificate (TEC) of specified extensions, having following features:
 - Direct Inward dialling (DID) with voice guidance facility.
 - Caller line Identification (CLI) on Analog as well as digital extension.
 - Call Billing software (CB)
 - Dynamic STD locking
 - Conferencing facility for specified extensions.
- **EPABX (Digital type):** Manufactured by reputed manufacturer and approved by Telephone Engineering Certificate (TEC) of specified extensions, having following features:
 - Direct Inward dialling (DID) with voice guidance facility.
 - Caller line Identification (CLI) on Analog as well as digital extension.
 - Call Billing software (CB)
 - Dynamic STD locking
 - Conferencing facility for specified extensions.
 - Provision of battery back-up and power failure line transfer.

Method of construction:

Drawing of telephone wire through Steel conduit / PVC conduit / PVC Trunking:

As specified in Chapter for Point Wiring.

Erection of Jelly filled armoured Telephone cable:

Erection shall be done as per the layout finalized, in perfect level and plum. Before fixing the cable shall be straightened as far as possible for good aesthetics look. Cable shall be fixed with saddles firmly clipped on cable. Saddles shall be fixed to wall with minimum 50x8 mm SM screws with plugs/wooden gitties (Distance between two saddles shall be minimum 600 mm). Wooden gitties shall be used wherever required (Especially for stone

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wall). The entries made in wall, floor slab, etc for laying the cable shall be made good by filling and finishing with plastering the same.

4.3 Erection of MDF Junction box / Rosette box / PBX / EPABX, etc:
Specified equipment shall be fixed to wall with minimum 50x8 mm SM screws, with necessary plugs, wooden gitties, etc. or may be fixed on Table Top if required.

5. Mode of Measurement:
Work done for telephone in Steel / PVC conduit / PVC Trunking will be measured on running meter basis, (i.e. per running meter) for each single run. For the other accessories / equipments shall be done as per unit specified. (i.e. Job / each)

Item No. 143:

Supplying & erecting jelly filled unarmoured telephone copper cable 20 pair with 0.5 mm dia. laid in provided PVC casing capping / conduit as per specification No. WG-TW

Scope: To provide wiring for telephone on surface of wall or ceiling concealed in slab, wall, under flooring, etc, through existing metallic conduits, rigid PVC conduits, PVC trunking, with all necessary hardware, material, etc. as specified. To provide, install, test & commission the instruments / equipments and accessories used in telephone system, such as; Main Distribution Frames (MDF), Krone Modules, Over Voltage Magazine, PBX / EPABX, CO-axial cable, Rosette box, Jumper wire, etc.

Material:

- **PVC Telephone cable:** PVC insulated Tinned copper solid conductor with minimum 0.5 mm dia. (Single & Multi pair) properly paired and colour coded, shall be terminated on KRONE module with suitable tool.
- **Jelly filled Armoured Telephone cable:** PVC insulated, PVC sheathed with steel armouring, Tinned copper solid conductor with minimum 0.5 mm dia multi pair, with Jelly, properly paired and colour coded.
- **Saddles:** Saddles fabricated from G I sheet of required gauge (16/18 gauge) either galvanized finish or painted with superior quality enamel black paint, with necessary shearing for mechanical strength, semi circular shaped with extended piece having suitable holes for fixing on spacer.
- **Hardware:** Sheet Metal (SM) screws of required sizes, plugs, wooden gitties, etc.

- **MDF:** Manufactured by reputed manufacturer of specified capacity, facility for wall mounting, with door & lock, aluminium frame for fixing of KRONE, duly enclosed in cabinet made from 18 SWG CRCA sheet with powder coating of required colour.
- **Junction box:** Manufactured by reputed manufacturer of specified capacity, facility for + wall mounting, with door & lock, aluminium frame for fixing of Krone, duly enclosed in cabinet made from 18 SWG CRCA sheet with powder coating of required colour. The depth of the box should consider the height of KRONE module plus protection magazine.
- **Over Voltage protection Magazine:** Manufactured by reputed manufacturer of 10 pair capacity, with 3 pole gas discharge tube should be properly fitted on KRONE module in MDF / Junction box.
- **Rosette box:** PVC / Bakelite box with LED indicator, RJ 11 jack, facility for fixing on wall.
- **Jumper wire:** Twin twisted PVC insulated with Tinned copper solid conductor minimum 0.5 mm dia.
- **KRONE Module:** Disconnection type KRONE module having capacity to connect 10 pairs with silver plated terminal contacts.
- **RG-11 Co-axial low voltage grade cable:** PVC insulated with Tinned copper solid conductor minimum 0.5 mm dia, with connector at both ends suitable for termination in RJ type socket.
- **PBX (Analogue type):** Manufactured by reputed manufacturer and approved by Telephone Engineering Certificate (TEC) of specified extensions, having following features:
 - Direct Inward dialling (DID) with voice guidance facility.
 - Caller line Identification (CLI) on Analog as well as digital extension.
 - Call Billing software (CB)
 - Dynamic STD locking
 - Conferencing facility for specified extensions.
- **EPABX (Digital type):** Manufactured by reputed manufacturer and approved by Telephone Engineering Certificate (TEC) of specified extensions, having following features:
 - Direct Inward dialling (DID) with voice guidance facility.
 - Caller line Identification (CLI) on Analog as well as digital extension.
 - Call Billing software (CB)
 - Dynamic STD locking
 - Conferencing facility for specified extensions.
 - Provision of battery back-up and power failure line transfer.

Method of construction:

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Drawing of telephone wire through Steel conduit / PVC conduit / PVC Trunking:

As specified in Chapter for Point Wiring.

Erection of Jelly filled armoured Telephone cable:

Erection shall be done as per the layout finalized, in perfect level and plum. Before fixing the cable shall be straightened as far as possible for good aesthetics look. Cable shall be fixed with saddles firmly clipped on cable. Saddles shall be fixed to wall with minimum 50x8 mm SM screws with plugs/wooden gitties (Distance between two saddles shall be minimum 600 mm). Wooden gitties shall be used wherever required (Especially for stone wall). The entries made in wall, floor slab, etc for laying the cable shall be made good by filling and finishing with plastering the same.

4.3 Erection of MDF Junction box / Rosette box / PBX / EPABX, etc:

Specified equipment shall be fixed to wall with minimum 50x8 mm SM screws, with necessary plugs, wooden gitties, etc. or may be fixed on Table Top if required.

5. Mode of Measurement:

Work done for telephone in Steel / PVC conduit / PVC Trunking will be measured on running meter basis, (i.e. per running meter) for each single run. For the other accessories / equipments shall be done as per unit specified. (I.e. Job / each)

Item No. 144:

Supplying and installing, testing & commissioning of digital (hybrid) type EPABX of 6 x 24 extensions suitable upto 96 extensions complete.

3.0 General:

The work under this system shall consist of Supply, Installation, testing & commissioning of a new 200 line (extendible up to 256 lines) Analog/ISDN/IP/ PBX system as per technical specifications and terms and conditions of the tender document.

The proposed systems shall be a fully hybrid system that support Time Multiplexing (TDM), employ Stored Program Control (SPC) using Pulse Code Modulation (PCM), IP switching and conforming to latest ITU-T (earlier CCITT) standards. The IP PBX should be able to integrate with public telecom network infrastructure (PSTN/ISDN). The system shall be fully modular and fully non-blocking type with distributed architecture and should have provisions for redundancy for main system controls. The other specific features as listed below shall be satisfied.

2.0 System Design and Architecture:

a) It should have facility to connect Computer Terminal, Telephones and FAX through suitable Interface common to all such devices. Tenderers shall indicate full details of the system offered including CPU speed.

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- b) The system shall be capable of working in a suitably ventilated non-air-conditioned environment. System design shall be immune to noise from various sources like power supplies, lighting system etc.
- c) The System shall ensure a very high degree of availability and maintainability through use of highly reliable components and appropriate structural & functional units.
- d) All components should be rated for continuous operation of the system. It should be designed in such a way that any damage in any circuit/Subassembly /assembly should be self- containing and should not be propagate to other parts of the system.
- e) The EPABX shall be capable of pulse to tone conversion and vice versa to enable correct operation (originating & receiving calls) with the DTMF and dial pulse signaling having a speed range of 8-12 PPS and break ratio of 50 to 80%. Dialing out shall meet following limits. Dial Speed: 10+/-0.5 PPS Make/break ratio: 1:2, normal with break period between 65 to 68%. IDP :>550 ms.
- f) Call buffer memory shall be at least 1350 calls. The tenderer shall indicate call buffer memory capacity offered.
- g) The equipment shall be capable of working in the howling line & junction limits as under:
 - i. Extension loop resistance of at least 600 ohms.
 - ii. Junction Loop up to 1800 ohms.
 - iii. Insulation lower limit 20 k ohms.
- h) Flexibility of opening & closing of limits & modification in class of service will be provided.
- i) There must be protection of EPABX System from high voltage/current transient occurring on junction lines to the Exchange.
- j) All cards of the same type & design shall be interchangeable without necessitating special adjustments.
- k) Cabinet design shall provide for adequate ventilation to dissipate heat due to energy loss.
- l) The points for connecting supplies, the power supply to the different plug-in cards shall be standardized & mechanically non-interchangeable to prevent damage due to accidental interchange of connectors.
- m) Sub-assemblies & printed cards in the equipment shall be suitably marked. Identification of a type of card in its connector shall be possible without necessitating its removal. Any plugin component shall be marked with sufficient information for its complete identification.
- n) All instructions labels or any other marking on the equipment shall be perfectly legible.

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- o) Connecting cables between jacks shall be marked in their extremities with identical designation as on the fixed connecting flanges.
- p) Fuses used shall have a suitable marking for the different rating to enable easy identification and replacement.
- q) The items quoted shall have TEC approval for interconnection. TEC approval will not be necessary for IP Gateways and DECT. Tenderers shall furnish a copy of TEC approval certificate along with tender for each item quoted and it should be valid on the date of tender opening.
- r) No. of 200 extensions specified is exclusive of I.P. Gateways and DECT extensions.

POWER SUPPLY:

- (a) The EPABX shall be suitable for operation on 230V +/- 10%, 50 +/-2 Hz AC or on 48 V DC power supply.
- (b) Power back up for 230V systems can also be provided by external UPS, which will be ordered separately.
- (c) The derived power supply shall be suitably protected on the input side against over current and accidental reversal of polarity and on the output side against over current and over voltage. Automatic recovery shall be possible.

SYSTEM FEATURES:

- (a) The EPABX System should have Digital PCM/TDM (non-blocking) technology. They shall indicate the switching IC/CHIP used. They shall furnish calculation showing the non blocking technology /switching.
- (b) Tone and Ringing: The System shall provide the standard tones and ringing current as in the Public Telephone Network as follows:
 - (i) Ringing 75 V AC, 25 Hz.
 - (ii) Ring back tone 400 Hz. 0.4 sec ON, 0.4 sec OFF.
 - (iii) Dial tone 400 Hz modulated by 25 Hz.
 - (iv) Busy tone 400 Hz, 0.75 sec ON, 0.75 sec OFF.
 - (v) Operating Voltage 48 V +/- 4 V DC.
- (c) The equipment and circuits for tones and ringing shall form part of main PABX equipment.

- (d) The equipment should have Automatic Route Selection facility to determine least cost route automatically based on class of service.
- (e) Extension-to-Extension Dialing: It shall be possible to establish internal calls automatically by dialing any number without assistance of the attendant.
- (f) Direct Outward Dialing: It shall be possible to establish external calls automatically by dialing any number without the assistance of the attendant (subject to class of service).
- (g) Provision of DID & DISA: It shall have facility for direct inward dialing and direct inward station access.
- (h) Direct Outwards Station Access (DOSA): Any Extension can access the trunk lines of the System through personal pass code to make outward calls from outside. All DOSA calls remain in account of that particular Extension.
- (i) Access To Exchange Network: It shall be possible for an extension to get access to public network with or without the attendant in such cases, facility shall exist for the attendant to either dial the required No. or to merely extend the junction to the extension and permit the subscriber to dial the number.
- (j) Privacy Of Call: Full privacy of conversation shall be available on all calls whether established directly or by the attendant. A warning tone of a specified frequency shall be applied when the attendant exercises trunk-offering facility on an extension user.
- (k) Class Of Service: It shall be possible to exercise control on an extension over the telephone usage by providing suitable class of service.
- (l) The coding technique to be used is ALAW/CODEC per channel.
- (m) System should have provision for Automatic Last Number Redial up to 20 times on Junction Line.
- (n) During night, when the board is shut, external lines should be linked to any pre-defined extensions.
- (o) Provision for connecting recorded voice / answering to make available extensions to an incoming call without the help of operator.
- (p) Flexible Numbering Scheme: System should have provision for flexible numbering plan up to four digits for extensions.
- (q) Universal Port Configuration: All ports of the System should be identical to facilitate flexible configuration of the System as per user needs.
- (r) Discriminate Ringing: The System should support discriminate ringing to indicate internal & external calls.
- (s) Mixed Station Dialing: To support all the features irrespective of type of telephone instruments i.e., DTMF or DECADEC.

(t) Versatile ASMDR The System should support ASMDR, which is a call accounting application that can record & print up to at least 3500 calls without dedicated printer.

(u) Power Failure Transfer: In the case of power failure all PSTN lines become available on the pre-set Extensions. Provision for availability of atleast 8 such Junction Lines shall be there.

(v) Programmable Class Of Service: The System should support programmable class of service for PSTN (STD/ISD/LOCAL) dialing as per need.

EXTENSION FEATURES:

(a) Automatic Call Back: Facility shall exist for an extension user on encountering a busy signal on a called extension, to invoke the automatic call back feature by dialing a code before hanging up. When both the calling and called parties are free, the call should be automatically put through. On no-answer the call may be disconnected after a specified period.

(b) Call Forwarding: An extension with this class of service shall be able to transfer all incoming calls, temporarily to another pre-selected extension. Such requests shall be registered by dialing a code followed by the extension No. Facility shall also exist for cancellation of a request registered earlier.

(c) Consultation Hold: An extension engaged on an external call (incoming or outgoing) shall be able to hold the call while making internal call for private consultation. The external subscriber shall not overhear such consultation. There must be facility of music during hold condition.

(d) Brokers Call: An extension engaged on an external call (incoming or outgoing) shall be able to hold the call while making another call and then alternate between the two. The other party shall not over hear such consultation. There must be facility of music during hold condition.

(e) Automatic Call Transfer: It shall be possible for an extension user to transfer incoming calls to another extension with or without help of the attendant.

(f) Executive/Secretary: A combination of call-forwarding, consultation & hold provisions to be there for executive to selectively answer calls.

(g) Executive Over-Ride: There must be facility offering priority to minimum five extensions to over-ride ongoing conversations.

(h) Conference Call: It shall be possible for an extension user (up to a maximum number of 6) to talk to each other at the same time on a conference circuit. One of the extension user or the attendant may set up the conference call.

(i) Call Pick-Up: It shall be possible for an extension user to pick-up incoming calls ringing on another extension without the help of the attendant.

- (j) Call Re-Routing: It shall be possible for a call to be re-routed, without help of the attendant, to other pre-defined extensions when certain conditions apply.
- (k) Auto Call Disconnection: The system should facilitate to fix the time of call beyond which it will be automatically disconnected.
- (l) Dynamic STD Lock: The System should support that individual extension can lock outward dialing (STD/ISD/LOCAL) by a personal secret pass code to prevent misuse by others.
- (m) Background Music: The Key Phone user can enjoy the light background music channeled from System When Voice DISA Card is incorporated.
- (n) Auto-Answer / Auto-Off: Key Phone can be programmed for auto-answer after pre-set number of incoming rings. The Key Phone is automatically disconnected when caller disconnects.

ATTENDANT'S CONSOLE FEATURES:

Stand-alone Attendant Console with the following features:

- (a) The operator console should have soft/feather touch keys with easy to view display and busy lamp field for extensions. It will have easy handling facility for all internal & external calls.
- (b) Answering an Incoming Call: Facility should exist for answering an incoming call, whether from an internal extensions or external junction. It should be possible to identify the type of call that is internal, external line etc., from the call indicator.
- (c) Call Queuing: All incoming calls should be presented to the console in order of the arrival. Facility should exist for giving preference to junction calls and from tie lines over calls from internal extensions.
- (d) Serial Call: Facility should exist to extend an incoming call as serial call which should come back to attendant on completion of call permitting the attendant to route the call to another extension and so on.
- (e) Call Waiting Display: An indication should be given when there is an unanswered call waiting in the queue. The lamp shall flash if number of calls waiting in the queue are two or more or if a call has been waiting for more than a predetermine time.
- (f) Call Selection: Facility should exist to the attendant to select which incoming call to be answered first.
- (g) Call Hold Facility: It shall be possible for the attendant to place an incoming junction call on hold pending further processing.
- (h) Setting Up External Calls: Facility shall exist for enabling the attendant to set up the external calls for the extensions, which are allowed to access the public network. The

attendant may either dial the number himself or merely extend the junction to the authorized extension user.

(i) Trunk Offering: The attendant shall be able to offer an incoming call to busy extension. A tone shall however, alert the talking parties when the attendant barges-in on a connection.

(j) Provision for Remote Supervisor Control to be there.

(k) Position Busy: When more than one console is in use, it shall be possible for a console to prevent further incoming calls from being assigned to it by busying itself. When a console is so busied all the waiting calls queued for the particular console shall be transferred to other console/extensions. Incoming calls in cases where two consoles exist shall be equally distributed. Facility shall exist during absence of the attendants for incoming external calls to be forwarded to one common or several individual extensions.

(l) Night Service: It should be possible for all incoming calls to be transferred to certain prefixed extensions, in case this option has been exercised during the night.

(m) Head Phone Connectivity: The operators can plug-in headphone to handle the call traffic efficiently while keeping her/his hands free for other jobs.

SERVICE OBJECTIVES:

Following service objectives shall be met:

(a) Under overload conditions, the lost call figures applicable shall be one in 200 for extensions to extensions call and one call in 100 for junction calls, overload being defined as 10% increase in occupancy of speech network and simultaneous 25% increase in the number of calls.

(b) The selection time under full load is defined as the time interval between the instant at which the required information for selection of the outlet has been received at the inlet and the instant at which outlet is ceased shall not exceed in 99% of the cases under traffic overload 1.5 seconds.

(c) The assumption to be made whilst dimensioning the links, junctions and attendants console shall be following:

i. Total originating & terminating traffic per extension (including junction traffic) 0.2 erlang during peak busy hour.

ii. Total junction traffic per extension 0.1 erlang during peak hour.

iii. Average holding time of calls 0.90 seconds.

iv. The switching network shall provide access to the links/junction on non-blocking basis.

v. The equipment design shall be such that any special care and precaution on the part of maintenance personnel are kept minimum and no preventive maintenance is required.

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- vi. The System shall have inherent capability to monitor its own performance and to detect, analyze and locate faults.
- vii. Fault repair at site should consist of only replacing the faulty card or plug-in modules.
- viii. The System should have remote maintenance facility.

PRODUCT DESCRIPTION:

EPABX

Matrix make Eternity MENX16SDC configured for 08 CO Lines, 8 Digital Extensions, 200 Analogue Extensions and Expandable up to 960 port expansion cabinet with following accessories and with all connection in an approved manner.

Console-1

Product Description

Vivid LCD Graphical Display, Context Sensitive Keys, Direct Station Selection (DSS) Keys, 32 Keys Expansion Module, Headset Connectivity, High-Quality Full Duplex Speaker Phone and High Definition Audio Quality. Multiple Line Appearance, Context Sensitive Soft Keys, Busy Lamp Field Keys, Voice Mail, Speed Dial and Corporate Directory.

Features:

240 x 64 Pixels Graphical LCD with Backlit

4 Intelligent Context Sensitive Keys

Polyphonic Ringtone

Fixed Function Keys (with LED) – Voice Mail, Mute, Do Not Disturb, Headset, Speaker

Fixed Function Keys (without LED) – Hold, Conference, Redial, Transfer

Built-in 16 DSS Keys for Feature, Line, Extension

Message Wait and Ringer Lamp

Headset Interface – 3.5 mm, RJ9

Adjustable Desk Stand

High-Quality Full Duplex Speaker Phone

Volume Adjust Key

Phone Features:

Call Hold

Mute

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Do Not Disturb

Speed Dial

Hotline

Redial

Call Back

Auto Answer

Call Forward

Call Waiting

Call Transfer

Room Monitoring

Conference

Directory

Call Logs

Paging

Dial-by-Name

Call Management:

Message Wait Lamp

Ringer Lamp

Voice Mail

Call Pickup – Group and Selective Paging

Display:

6 Line and 2 Line LCD with Backlit

LED for Incoming/Ongoing Call

Mute Hold

Intuitive User Interface with Icons

Multiple Languages

Caller ID with Name, Number

Other Details:

Physical Features: 48 keys 1 x RJ9 Handset Port 1 x RJ9 Headset Port Dimension (L x B x H): 240 X 200 X 41 mm

Mechanical Weight: 1 Kg Installation: Wall Mount, Table-to

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Environmental: Operating Temperature Range = 0 to 45°C Storage Temperature = 0 to 55°C Operating and Storage Humidity = 5 to 95%, RH, Non-Condensing

Console-2

A dashboard of the Operator with 32 Programmable Keys each showing the Line's Status with multi-coloured illuminations (Idle, Ringing, Busy or Null). Engineered to work with the Proprietary User Terminals SPARSH VP510E and EON510.

With 32 DSS keys on each console indicating the Presence Status of employees, attendant/operator can transfer the call after judging the availability of the employees. The facility of attaching four operator consoles from a single phone and no consumption of IP license makes the product an easy to attach operator console.

The hardware material is used in compliance with environmental standards. It complies with all global CE, FCC and other leading region specific certifications.

We use ROHS material for our entire product which is environment friendly.

Key Specifications:

- Flexible Usage (Compatible with IP and Digital Key Phone)
- Max. Four such DSS532 per Operator
- No Need of IP Licenses/DKP Port
- 32 Programmable Keys
- DSS keys for Speed Dialing and Call Transfer
- Multi-Colored Illuminations for BLF Status
- Adjustable Desk Stand

Mode of Measurement:
Items should be measured In terms of Numbers or Jobs.

Item No. 145:

Supplying & erecting jelly filled armoured telephone copper cable 20 pair with 0.5 mm dia. laid in provided trench as per specification No. WG-TW

Scope: To provide wiring for telephone on surface of wall or ceiling concealed in slab, wall, under flooring, etc, through existing metallic conduits, rigid PVC conduits, PVC trunking, with all necessary hardware, material, etc. as specified. To provide, install, test & commission the instruments / equipments and accessories used in telephone system, such as; Main Distribution Frames (MDF), Krone Modules, Over Voltage Magazine, PBX / EPABX, CO-axial cable, Rosette box, Jumper wire, etc.

Material:

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- **PVC Telephone cable:** PVC insulated Tinned copper solid conductor with minimum 0.5 mm dia. (Single & Multi pair) properly paired and colour coded, shall be terminated on KRONE module with suitable tool.
- **Jelly filled Armoured Telephone cable:** PVC insulated, PVC sheathed with steel armouring, Tinned copper solid conductor with minimum 0.5 mm dia multi pair, with Jelly, properly paired and colour coded.
- **Saddles:** Saddles fabricated from G I sheet of required gauge (16/18 gauge) either galvanized finish or painted with superior quality enamel black paint, with necessary shearing for mechanical strength, semi circular shaped with extended piece having suitable holes for fixing on spacer.
- **Hardware:** Sheet Metal (SM) screws of required sizes, plugs, wooden gitties, etc.
- **MDF:** Manufactured by reputed manufacturer of specified capacity, facility for wall mounting, with door & lock, aluminium frame for fixing of KRONE, duly enclosed in cabinet made from 18 SWG CRCA sheet with powder coating of required colour.
- **Junction box:** Manufactured by reputed manufacturer of specified capacity, facility for + wall mounting, with door & lock, aluminium frame for fixing of Krone, duly enclosed in cabinet made from 18 SWG CRCA sheet with powder coating of required colour. The depth of the box should consider the height of KRONE module plus protection magazine.
- **Over Voltage protection Magazine:** Manufactured by reputed manufacturer of 10 pair capacity, with 3 pole gas discharge tube should be properly fitted on KRONE module in MDF / Junction box.
- **Rosette box:** PVC / Bakelite box with LED indicator, RJ 11 jack, facility for fixing on wall.
- **Jumper wire:** Twin twisted PVC insulated with Tinned copper solid conductor minimum 0.5 mm dia.
- **KRONE Module:** Disconnection type KRONE module having capacity to connect 10 pairs with silver plated terminal contacts.
- **RG-11 Co-axial low voltage grade cable:** PVC insulated with Tinned copper solid conductor minimum 0.5 mm dia, with connector at both ends suitable for termination in RJ type socket.
- **PBX (Analogue type):** Manufactured by reputed manufacturer and approved by Telephone Engineering Certificate (TEC) of specified extensions, having following features:
 - Direct Inward dialling (DID) with voice guidance facility.

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- Caller line Identification (CLI) on Analog as well as digital extension.
 - Call Billing software (CB)
 - Dynamic STD locking
 - Conferencing facility for specified extensions.
-
- **EPABX (Digital type):** Manufactured by reputed manufacturer and approved by Telephone Engineering Certificate (TEC) of specified extensions, having following features:
 - Direct Inward dialling (DID) with voice guidance facility.
 - Caller line Identification (CLI) on Analog as well as digital extension.
 - Call Billing software (CB)
 - Dynamic STD locking
 - Conferencing facility for specified extensions.
 - Provision of battery back-up and power failure line transfer.

Method of construction:

Drawing of telephone wire through Steel conduit / PVC conduit / PVC Trunking:

As specified in Chapter for Point Wiring.

Erection of Jelly filled armoured Telephone cable:

Erection shall be done as per the layout finalized, in perfect level and plum. Before fixing the cable shall be straightened as far as possible for good aesthetics look. Cable shall be fixed with saddles firmly clipped on cable. Saddles shall be fixed to wall with minimum 50x8 mm SM screws with plugs/wooden gitties (Distance between two saddles shall be minimum 600 mm). Wooden gitties shall be used wherever required (Especially for stone wall). The entries made in wall, floor slab, etc for laying the cable shall be made good by filling and finishing with plastering the same.

4.3 Erection of MDF Junction box / Rosette box / PBX / EPABX, etc:

Specified equipment shall be fixed to wall with minimum 50x8 mm SM screws, with necessary plugs, wooden gitties, etc. or may be fixed on Table Top if required.

5. Mode of Measurement:

Work done for telephone in Steel / PVC conduit / PVC Trunking will be measured on running meter basis, (i.e. per running meter) for each single run. For the other accessories / equipments shall be done as per unit specified. (i.e. Job / each)

Item No. 146:

Supplying, erecting & commissioning 10 pair module for connection & disconnection of telephone cable as per specification No. WG-TW

Scope: To provide wiring for telephone on surface of wall or ceiling concealed in wall, slab,

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under flooring, etc, through existing metallic conduits, rigid PVC conduits, PVC trunking, with all necessary hardware, material, etc. as specified. To provide, install, test & commission the instruments / equipments and accessories used in telephone system, such as; Main Distribution Frames (MDF), Krone Modules, Over Voltage Magazine, PBX / EPABX, CO-axial cable, Rosette box, Jumper wire, etc.

Material:

- **PVC Telephone cable:** PVC insulated Tinned copper solid conductor with minimum 0.5 mm dia. (Single & Multi pair) properly paired and colour coded, shall be terminated on KRONE module with suitable tool.
- **Jelly filled Armoured Telephone cable:** PVC insulated, PVC sheathed with steel armouring, Tinned copper solid conductor with minimum 0.5 mm dia multi pair, with Jelly, properly paired and colour coded.
- **Saddles:** Saddles fabricated from G I sheet of required gauge (16/18 gauge) either galvanized finish or painted with superior quality enamel black paint, with necessary shearing for mechanical strength, semi circular shaped with extended piece having suitable holes for fixing on spacer.
- **Hardware:** Sheet Metal (SM) screws of required sizes, plugs, wooden gitties, etc.
- **MDF:** Manufactured by reputed manufacturer of specified capacity, facility for wall mounting, with door & lock, aluminium frame for fixing of KRONE, duly enclosed in cabinet made from 18 SWG CRCA sheet with powder coating of required colour.
- **Junction box:** Manufactured by reputed manufacturer of specified capacity, facility for + wall mounting, with door & lock, aluminium frame for fixing of Krone, duly enclosed in cabinet made from 18 SWG CRCA sheet with powder coating of required colour. The depth of the box should consider the height of KRONE module plus protection magazine.
- **Over Voltage protection Magazine:** Manufactured by reputed manufacturer of 10 pair capacity, with 3 pole gas discharge tube should be properly fitted on KRONE module in MDF / Junction box.
- **Rosette box:** PVC / Bakelite box with LED indicator, RJ 11 jack, facility for fixing on wall.
- **Jumper wire:** Twin twisted PVC insulated with Tinned copper solid conductor minimum 0.5 mm dia.
- **KRONE Module:** Disconnection type KRONE module having capacity to connect 10 pairs with silver plated terminal contacts.

- **RG-11 Co-axial low voltage grade cable:** PVC insulated with Tinned copper solid conductor minimum 0.5 mm dia, with connector at both ends suitable for termination in RJ type socket.
- **PBX (Analogue type):** Manufactured by reputed manufacturer and approved by Telephone Engineering Certificate (TEC) of specified extensions, having following features:
 - Direct Inward dialling (DID) with voice guidance facility.
 - Caller line Identification (CLI) on Analog as well as digital extension.
 - Call Billing software (CB)
 - Dynamic STD locking
 - Conferencing facility for specified extensions.
- **EPABX (Digital type):** Manufactured by reputed manufacturer and approved by Telephone Engineering Certificate (TEC) of specified extensions, having following features:
 - Direct Inward dialling (DID) with voice guidance facility.
 - Caller line Identification (CLI) on Analog as well as digital extension.
 - Call Billing software (CB)
 - Dynamic STD locking
 - Conferencing facility for specified extensions.
 - Provision of battery back-up and power failure line transfer.

Method of construction:

Drawing of telephone wire through Steel conduit / PVC conduit / PVC Trunking:

As specified in Chapter for Point Wiring.

Erection of Jelly filled armoured Telephone cable:

Erection shall be done as per the layout finalized, in perfect level and plum. Before fixing the cable shall be straightened as far as possible for good aesthetics look. Cable shall be fixed with saddles firmly clipped on cable. Saddles shall be fixed to wall with minimum 50x8 mm SM screws with plugs/wooden gitties (Distance between two saddles shall be minimum 600 mm). Wooden gitties shall be used wherever required (Especially for stone wall). The entries made in wall, floor slab, etc for laying the cable shall be made good by filling and finishing with plastering the same.

4.3 Erection of MDF Junction box / Rosette box / PBX / EPABX, etc:

Specified equipment shall be fixed to wall with minimum 50x8 mm SM screws, with necessary plugs, wooden gitties, etc. or may be fixed on Table Top if required.

- 5. Mode of Measurement:**
Item should be measured in terms of numbers.

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Item No. 147:

Supplying, installing, testing & commissioning push button telephone instrument desk top/wall mount with caller ID unit as per specification complete.

Product description

Corded Landline for Home and Office Use

Incorporating a stylish design, the Binatone Spirit 200 corded landline phone is an ideal device for your home as well as office use. Thanks to the well-spaced alphanumeric keypad, dialling numbers from this phone is a hassle-free affair. Its unique voice enhancer allows you enjoy conversation without any interruption in the audio quality. Additionally, this corded landline telephone comes with a strong frame that enables you to wall mount it and save more space. Moreover, the sleek design of this phone makes it an attractive addition to the existing décor of the premises

Features Built-in Memory

This Binatone corded landline phone facilitates both incoming and outgoing calls. It also features a switch that lets you select tone or pulse dialling. To offer a comfortable grip while handling, the handset of this corded phone is ergonomically designed. Moreover, as this phone comes with a simple-corded operation, you do not have to worry about misplacing the handset. Furthermore, this wall mountable landline phone has built-in memory for storing up to 28 call logs and one redial number. For added convenience, it comes with eight inbuilt ringtones.

Brand: Binatone

Includes: Corded landline telephone

Colour: Black

Wall mountable

Easy to install and use

Ringtones: Eight

Tone-switching and pulse-setting functions available

Alphanumeric keypad

Records 28 previous call details

Mode of Measurement: Item measured in terms of Number.

Item No. 148:

Contractor

Consultant

Member Secretary

Supplying, installing, testing & commissioning push button telephone instrument desk top/wall mount unit as per specification complete

Analogue

Product description

Corded Landline for Home and Office Use

Incorporating a stylish design, the Binatone Spirit 200 corded landline phone is an ideal device for your home as well as office use. Thanks to the well-spaced alphanumeric keypad, dialling numbers from this phone is a hassle-free affair. Its unique voice enhancer allows you enjoy conversation without any interruption in the audio quality. Additionally, this corded landline telephone comes with a strong frame that enables you to wall mount it and save more space. Moreover, the sleek design of this phone makes it an attractive addition to the existing décor of the premises

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Brand: Binatone

Includes: Corded landline telephone

Colour: Black

Wall mountable

Easy to install and use

Ringtones: Eight

Tone-switching and pulse-setting functions available

Alphanumeric keypad

Records 28 previous call details

Mode of Measurement: Item measured in terms of Number.

Item No. 149:

Supplying, installing, testing and commissioning optical type smoke detector complete on box as per specification no. FFFAS/ SD

Contractor

Consultant

Member Secretary

Scope: Supplying, erecting and testing optical type smoke detector complete with base erected on 16 gauge CRCA/MS sheet box of 100 x 100 x 75 mm duly painted.

Material:

- Smoke detector** - UL listed / LPCB marked
- Box** - CRCA/MS sheet of 16 guage
- Red oxide paint** - Superior quality
- Enamel paint** - Superior quality of specified colour
- Hardware** - Sheet metal screws
- Plugs** - Plastic

Method of construction: The Smoke Detector shall be fixed on the CRCA/MS sheet box duly painted with one coat of red oxide & 2 coats of enamel paint of specified shade with necessary SM screws, plugs, etc on ceiling, duly terminating the provided cable with provided glands and making the connection.

Mode of measurement: Executed quantity shall be measured on number basis.

Item No. 150:

Supplying, installing, testing and commissioning manual call point (Pill box) with break glass push button in metal enclosure complete as per specification no. FF-FAAS/MCP

Scope: Supplying, erecting, testing, and commissioning pill box with break glass, push button. MCP is manually operated device used to initiate an alarm signal

Material:

- Push Button** - Plastic
- Enclosure** - CRCA/MS with 100/150 mm round/square with Glass cover
- Hammer with chain** - Brass
- Enamel paint** - Superior quality Post Office red colour
- Hardware** - S.M. Screw
- Plugs** - Plastic

Method of Construction: The pill box with break glass cover, push button in circular/ square enclosure with push button kept inside per set with a glass outside marked "IN CASE OF FIRE BREAK GLASS" provided with a small hammer and chain fixed to

Contractor

Consultant

Member Secretary

the pill box shall be mounted on wall or any other place as directed and provided with cable entry with suitable terminal inside and painted with two coats of red oxide and two coats of post office red enamel paint.

Mode of measurement: Executed quantity shall be measured on number basis

Item No. 151:

Supplying, installing, testing and commissioning hooters with CRCA enclosure complete as per specification no. FF FAAS/HTR

Scope: Supply and erecting hooters with CRCA enclosure duly connected to main amplifier to radiate two tone sounds for public.

Material:

Hooter - Electronic type with 6W output, Line matching transformer

Enclosure - CRCA sheet of 14 SWG with perforation

Enamel paint - Superior quality Post Office red colour

Hardware - S.M. Screw

Plugs - Plastic

Gitties - Wooden

Method of Construction: The electronics hooter with Line matching transformer shall be enclosed in suitable size perforated CRCA enclosure and installed as per instructions and shall be connected and fixed at suitable site to ensure that the alarm is heard anywhere in the protected area. The minimum sound level shall be 80 dB

Mode of measurement: Executed quantity shall be measured on number basis

Item No. 152:

Supplying, installing, testing and commissioning remote response indicators complete as per specification no. FF-FAAS/RRI

Scope: Supplying, erecting, and testing of remote response indicators.

Application: *Remote Response Indicators shall be fixed for closed rooms, cabins, or for inaccessible rooms, etc.*

Material:

Contractor

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Indicator	-	5 mm LED (2 Nos) / 10 mm LED (1 No) in Red colour
Enclosure	-	CRCA sheet of 14 SWG with perforation
Enamel paint	-	Superior quality of specified colour
Hardware	-	S.M. Screw
Plugs	-	Plastic
Gitties	-	Wooden

Method of Construction:

Remote response indicator housed in enclosure shall be fitted outside the rooms, cabins at accessible height and shall be clearly visible.

Mode of measurement: Executed quantity shall be measured on number basis

Item No. 153:

Supplying, installing, testing and commissioning FR, XLPE armoured cable 2 core 1.5 sq.mm. Copper conductor complete erected on wall/ ceiling complete as per specification no. CBLT/CU

MATERIAL:

Cables: All cables shall be manufactured as per relevant IS. The core shall either be of circular shape (for solid conductor) or sector shaped (for stranded conductor) duly covered with flat galvanized steel armouring strips, Virgin PVC insulation with manufacturer's name, IS No & License No of IS duly embossed/screen printed while extruding the insulation at every metre and having the total count of progressive length in meter at each mark.

Earth wire: Galvanized Iron (G I) wire of appropriate guage as per **Table No 7/1.**

MS Spacers: Spacers made from 6 mm thick mild steel and having 25 mm width, duly machined for smooth edges, and 2 holes of 8/10 mm dia. for fixing of counter sunk head SM screws. Spacer shall be painted with black colour enamel paint of superior quality.

Saddles: Saddles fabricated from GI/MS sheet of required gauge (16/18 gauge) either galvanized or painted with superior quality enamel black paint, with necessary shearing for mechanical strength, semi circular shaped with extended piece having suitable holes for fixing on spacer.

Contractor

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GI Strip: 22 g x 25 mm width GI Strip.

MS Clamps: Clamps fabricated of required length and shape, of 3 mm thick mild steel having 25 mm width.

Hardware: Sheet Metal (SM) screws of required sizes, plugs/wooden gitties, etc.

5.METHOD OF CONSTRUCTION:

5.1 Erection of Cable on Surface:

Erection shall be done as per the layout finalized, in perfect level and plumb. Before fixing the cable shall be straightened as far as possible for good aesthetics look, along with continuous bare GI earth wire of required gauge as per **Table No 7/1**. Cable with GI wire shall be fixed on MS Spacers with saddles firmly clipped on cable. Spacers shall be fixed to wall with minimum 50 x 8 mm SM screws with plugs/wooden gitties (Distance between two spacers shall be maximum 600 mm). Wooden gitties shall be used wherever required (Especially for stone wall). MS Saddles shall be fixed to spacers with two 25 x 8 mm machine SM screws. Wherever the cable has to be bent, the turning radius shall be as mentioned in **Table No 7/2** the diameter of cable. The entries made in wall, floor slab, etc for laying the cable shall be made good by filling and finishing with plastering the same.

5.2 Erection of Cable on Trusses:

Cable along with bare GI earth wire, while erecting on trusses, shall be firmly clamped by wrapping GI strip of 22 g, 25 mm width of required length fixed to truss with SM nuts and bolts.

5.3 Erection of Cable on Pole:

Cable along with bare GI earth wire, while erecting on pole, shall be firmly clipped by 25 x 3 mm MS Clamp of required length and fixed to pole with SM nuts and bolts.

5.4 Laying of Cable in provided Trench/Pole:

While laying Cable along with bare GI earth wire, utmost care shall be taken to prevent damage to the insulation of the cable and at the open end, the bare GI earth wire shall be run along with cable. Cable shall be brought out from trench vertically straight (minimum 1.0 metre from G L).

5.5 Mode of Measurement:

Executed quantity shall be measured on the basis of running metre per run of cable.

6. DISMANTLING

Cable laid underground, or fixed on any surface shall be dismantled carefully without damaging complete with all its accessories. The surface of the dismantled cable shall be made proper by finishing with cement mortar, and refilling back and making the surface proper, if dismantled from trench. The dismantled cable & batten shall be retained by the agency.

7. MODE OF MEASUREMENT:

Executed quantity shall be measured on the basis of running metre per run of cable.

Item No. 154:

Contractor

Consultant

Member Secretary

Supplying, installing, testing and commissioning of 8 Zones Microprocessor based conventional fire alarm control panel (FACP) with standard accessories complete as per specification no. FF-FAAS/FACP

Scope: Supplying, erecting, testing, & commissioning of Fire Alarm Control Panel with all accessories.

6.2 Material: Panel- Microprocessor based Conventional Main Fire Alarm Control Panel (FACP) with necessary Test Certificate from ERTL as per IS 2189-1999 provided with SMPS (Switch Mode Power Supply) of suitable battery (2x12V) 24V, 24 AH capacity maintenance free battery as standby supply to switch over automatically for a period of 8 hours in case of A.C. supply failure to panel with 7 AH capacity battery charger, panel shall have following features.

- a) Visual zone indication in which fire has emerged.
- b) Audio alarm devices.
- c) Acknowledge reset and test devices.
- d) Visual indication (2x20 character LCD display) incorporating following indications:
 - (i) Fire condition
 - (ii) Fault condition
 - (iii) A.C. Pilot indication
 - (iv) Low battery indication
 - (v) Blown fuse indication A.C. as well as D.C.
 - (vi) Built in electronic hooters of 2 tone round for fire condition and single tone for fault condition.
 - (vii) Open and short circuit fault.
 - (viii) Push button switch for checking each zone.
 - (ix) Push button to disable audio alarm.
 - (x) Reset push button.
- e) Fire protection and alarm circuit shall have modular design using electronic plug in type printed circuit boards (PCB) with spare cards.

6.3 Method of installation:

Contractor

Consultant

Member Secretary

The microprocessor based main fire Alarm control panel designed as per IS 2189-1999 with ERT L Test certificate shall be fixed at accessible place so that security or fire personal shall attend the fault immediately. The control shall have following features

- 1) Alarm cancel Test
- 2) Reset 1 lamp
- 3) Fire Test
- 4) Open Test (for detector & hooter)
- 5) Short circuit Test (for detector & hooter)
- 6) Walk Test(one man test)
- 7) Sounder Test

6.4 Mode of measurement: Executed quantity shall be measured on number basis

Item No. 155:

Supplying and erecting D.C.P. type fire extinguisher 6 kg capacity cartridge type with gun metal cap 150 gram CO2 gas cartridge, powder and brackets conforming to IS 2171-1985/ IS 15683 and complete erected with necessary clamps made from 50x6 mm M.S. flat with nuts & bolts grouted in wall complete.

General: Providing D.C.P. type fire extinguisher 6 kg capacity cartridge type with gun metal cap 150 gram CO2 gas cartridge, powder and brackets.

Specification: Supplying and erecting D.C.P. type fire extinguisher 6 kg capacity cartridge type with gun metal cap 150 gram CO2 gas cartridge, powder and brackets conforming to IS 2171-1985/ IS 15683 and complete erected with necessary clamps made from 50x6 mm M.S. flat with nuts & bolts grouted in wall complete.

Mode of measurement: Executed quantity shall be measured on number basis

Item No. 156:

Supplying & erecting Carbon Dioxide (CO2) fire extinguisher of 4.5 kg. capacity cartridge type conform to IS 2878 /15683 complete erected with necessary clamp made from 50 x 6 mm. M. S. flat with nut & bolts grouted in wall complete.

General: Providing Carbon Dioxide (CO2) fire extinguisher of 4.5 kg. capacity cartridge type

Specification: Supplying & erecting Carbon Dioxide (CO2) fire extinguisher of 4.5 kg. capacity cartridge type conform to IS 2878 /15683 complete erected with necessary clamp made from 50 x 6 mm. M. S. flat with nut & bolts grouted in wall complete.

Mode of measurement: Executed quantity shall be measured on number basis

Contractor

Consultant

Member Secretary

Item No. 157:

Supplying and erecting G.I. pipe above ground of 'C' class ERW of size 25 mm dia with necessary fittings as per specification no.FF-PP

Pipes

Scope: Supplying erecting C class (Heavy Duty) galvanized iron pipe, ISI mark of specified diameter with screwed sockets, Joints & necessary G.I. fittings such as sockets, back nuts, elbows, bends, tees, reducers, enlarger, plugs, etc. including electric resistance welding (ERW), fixing with clamps & all connected works such as excavation, drilling holes in wall, slabs, backfilling & making good the damages.

Material: The galvanized iron pipes shall be of type and diameter specified in the wording of the item and shall comply with I.S. 1239--1973 and 1969 for the specified type. The specified diameter of the pipes shall refer to the inside diameter of the bore pipes. The fittings of which the galvanizing has been damaged shall not be used. For the firefighting works, the C Class pipes and accessories shall be used.

Method of construction: Galvanized iron pipes of specified diameter and type and galvanized iron fittings with ERW shall be erected on M.S. angle support with one coat of red oxide primer and two coats of Post Office fire red enamel paint duly tested to 1.5 times of working pressure. Excavating and back filling trenches including dewatering cutting through walls, floor etc., and making good. Laying, jointing, and fixing the pipe with the fittings including cutting pipes, wastage and threading the ends. At all the road crossings the pipes shall be laid lower than the crust of the road. During excavation if, any other service pipes (Water, electric, telephone, etc) come across, these shall be carefully protected and supported. Any damage done shall be made good. The pipe shall be laid on a well compacted bed in the trench. The trench after laying the pipe shall be refilled except at the joints in layers and manually rammed. Care shall be taken to see that no earth, etc., gets inside the pipes. The filling shall be kept raised by about 5 cm. for subsequent settlement. Bedding and cushioning of murum, good earth, or sand shall be provided for the pipe in case of trench through rock. The trench at the joints shall be filled similarly after satisfactory testing of the pipe. Any surplus excavated stuff shall be disposed of satisfactory without causing nuisance.

Anti-Corrosive Protection On Under Ground Pipe: Corrosion protection tape shall be wrapped on M.S. Pipes to be buried in ground. This corrosion protection tape shall comprise of coat tar/asphalt component supported on fabric of organic or inorganic fiber and minimum 4 mm. thick and conform to requirement of IS: 10221-Code of practice for coating and wrapping of underground mild steel pipe line. Before application of corrosion protection tape all foreign matter on pipe shall be removed with the help of wire brush and suitable primer shall be applied over the pipe thereafter. The primer shall be allowed to dry until the solvent evaporates and the surface becomes tacky. Both primer

Contractor

Consultant

Member Secretary

and tape shall be furnished by the same manufacturer. Corrosion protection tape shall then be wound around the pipe in spiral fashion and bounded completely to the pipe. There shall be no air pocket or bubble beneath the tape. The overlaps shall be 15 mm. and 250 mm. shall be left uncoated on either end of pipe to permit installation and welding. This area shall be coated insinuate after the pipe line is installed. The tapes shall be wrapped in accordance with the manufacturer's recommendations. If application is done in cold weather, the surface of the pipe shall be pre-heated until it is warm to touch and traces of moisture are removed and then primer shall be applied and allowed to dry. The pipe then shall be laid on a well compacted bed in the trench. The trench after laying the pipe shall be refilled except at the joints, in layers and manually rammed. Care shall be taken to see that no earth, etc., gets inside the pipes. The filling shall be kept raised by about 5 cm. for subsequent settlement. Bedding and cushioning of murum, good earth, or sand shall be provided for the pipe in case of trench through rock. The trench at the joints shall be filled similarly after satisfactory testing of the pipe. Any surplus excavated stuff shall be disposed of satisfactorily without causing nuisance. No joint shall be located in the thickness of the walls. If the pipe is required to be cut and the end threaded, the burrs of the cut end shall be filled smooth and any obstruction in the bore shall be entirely eliminated. The rate includes wastage in cutting etc. When the pipe is to be fixed to walls it shall be fixed with standard bracket, clips or holder bates keeping the pipe about 12mm clear of the wall. The pipe shall be fixed to the wall horizontally and vertically and parallel to one another when more than one pipe is laid unless unavoidable. The supporting clips, etc., for the pipe shall be spaced at about two meters or so as necessary. When holes are not left during construction they shall be cut into the walls or slabs, etc., to pass the pipe through or to fix clamps. etc., after fixing of the pipes, clamps etc., these shall be neatly made good.

11.3.2 Pressure Testing:

All piping shall be tested to hydrostatic test pressure of at least one and a half times the maximum operating pressure, but not less than 10 kg./sq.cm. for a period not less than 24 hours. All leaks and defects in joints revealed during the testing shall be rectified to the satisfaction of the Engineer-in-Charge. Piping repaired subsequent to the above pressure test shall be re-tested in the same manner. System may be tested in sections and such sections shall be securely capped. Pressure gauges may be capped off during pressure testing of the installation.

Mode of Measurement: Measurement shall be for one metre of each type and diameter of pipe laid complete with fittings, clamps etc., as specified. The lengths shall be measured net on the straight and bends along the center line of the pipes and fittings correct up to a cm.

Item No. 158:

Contractor

Consultant

Member Secretary

Supplying and erecting G.I. pipe above ground of 'C' class ERW of size 50 mm dia with necessary fittings as per specification no.FF-PP

Pipes

Scope: Supplying erecting C class (Heavy Duty) galvanized iron pipe, ISI mark of specified diameter with screwed sockets, Joints & necessary G.I. fittings such as sockets, back nuts, elbows, bends, tees, reducers, enlarger, plugs, etc. including electric resistance welding (ERW), fixing with clamps & all connected works such as excavation, drilling holes in wall, slabs, backfilling & making good the damages.

Material: The galvanized iron pipes shall be of type and diameter specified in the wording of the item and shall comply with I.S. 1239--1973 and 1969 for the specified type. The specified diameter of the pipes shall refer to the inside diameter of the bore pipes. The fittings of which the galvanizing has been damaged shall not be used. For the firefighting works, the C Class pipes and accessories shall be used.

Method of construction: Galvanized iron pipes of specified diameter and type and galvanized iron fittings with ERW shall be erected on M.S. angle support with one coat of red oxide primer and two coats of Post Office fire red enamel paint duly tested to 1.5 times of working pressure. Excavating and back filling trenches including dewatering cutting through walls, floor etc., and making good. Laying, jointing, and fixing the pipe with the fittings including cutting pipes, wastage and threading the ends. At all the road crossings the pipes shall be laid lower than the crust of the road. During excavation if, any other service pipes (Water, electric, telephone, etc) come across, these shall be carefully protected and supported. Any damage done shall be made good. The pipe shall be laid on a well compacted bed in the trench. The trench after laying the pipe shall be refilled except at the joints in layers and manually rammed. Care shall be taken to see that no earth, etc., gets inside the pipes. The filling shall be kept raised by about 5 cm. for subsequent settlement. Bedding and cushioning of murum, good earth, or sand shall be provided for the pipe in case of trench through rock. The trench at the joints shall be filled similarly after satisfactory testing of the pipe. Any surplus excavated stuff shall be disposed of satisfactory without causing nuisance.

Anti-Corrosive Protection On Under Ground Pipe: Corrosion protection tape shall be wrapped on M.S. Pipes to be buried in ground. This corrosion protection tape shall comprise of coat tar/asphalt component supported on fabric of organic or inorganic fiber and minimum 4 mm. thick and conform to requirement of IS: 10221-Code of practice for coating and wrapping of underground mild steel pipe line. Before application of corrosion protection tape all foreign matter on pipe shall be removed with the help of wire brush and suitable primer shall be applied over the pipe thereafter. The primer shall be allowed to dry until the solvent evaporates and the surface becomes tacky. Both primer and tape shall be furnished b the same manufacturer. Corrosion protection tape shall then be wound around the pipe in spiral fashion and bounded completely to the

Contractor

Consultant

Member Secretary

pipe. There shall be no air pocket or bubble beneath the tape. The overlaps shall be 15 mm. and 250 mm. shall be left uncoated on either end of pipe to permit installation and welding. This area shall be coated insinuate after the pipe line is installed. The tapes shall be wrapped in accordance with the manufacturer's recommendations. If application is done in cold weather, the surface of the pipe shall be pre-heated until it is worm to touch and traces of moisture are removed and then primer shall be applied and allowed to dry. The pipe then shall be laid on a well compacted bed in the trench. The trench after laying the pipe shall be refilled except at the joints, In layers and manually rammed. Care shall be taken to see that no earth, etc., gets inside the pipes. The filling shall be kept raised by about 5 cm. for subsequent settlement. Bedding and cushioning of murum, good earth, or sand shall be provided for the pipe in case of trench through rock. The trench at the joints shall be filled similarly after satisfactory testing of the pipe. Any surplus excavated stuff shall be disposed of satisfactory without causing nuisance. No joint shall be located in the thickness of the walls If the pipe is required to be cut and the end threaded, the burns of the cut end shall be filled smooth and any obstruction in the bore shall be entirely eliminated. The rate includes wastage in cutting etc. When the pipe is to be fixed to walls it shall be fixed with standard bracket, clips or holder bates keeping the pipe about 12mm clear of the wall. The pipe shall be fixed to the wall horizontally and vertically and parallel to one another when more than one pipe is laid unless unavoidable. The supporting clips, etc., for the pipe shall be spaced at about two meters or so as necessary. When holes are not left during construction they shall be cut into the walls or slabs, etc., to pass the pipe through or to fix clamps. etc., after fixing of the pipes, clamps etc., these shall be neatly made good.

11.3.2 Pressure Testing:

All piping shall be tested to hydrostatic test pressure of at least one and a half times the maximum operating pressure, but not less than 10 kg./sq.cm. for a period not less than 24 hours. All leaks and defects in joints revealed during the testing shall be rectified to the satisfaction of the Engineer-in-Charge Piping repaired subsequent to the above pressure test shall be re-tested in the same manner. System may be tested in sections and such sections shall be securely capped. Pressure gauges may be capped off during pressure testing of the installation.

Mode of Measurement: Measurement shall be for one metre of each type and diameter of pipe laid complete with fittings, clamps etc., as specified. The lengths shall be measured net on the straight and bends along the center line of the pipes and fittings correct up to a cm.

Item No. 159:

Contractor

Consultant

Member Secretary

Supplying and erecting G.I. pipe above ground of 'C' class ERW of size 75 / 80 mm dia with necessary fittings as per specification no.FF-PP

Pipes

Scope: Supplying erecting C class (Heavy Duty) galvanized iron pipe, ISI mark of specified diameter with screwed sockets, Joints & necessary G.I. fittings such as sockets, back nuts, elbows, bends, tees, reducers, enlarger, plugs, etc. including electric resistance welding (ERW), fixing with clamps & all connected works such as excavation, drilling holes in wall, slabs, backfilling & making good the damages.

Material: The galvanized iron pipes shall be of type and diameter specified in the wording of the item and shall comply with I.S. 1239--1973 and 1969 for the specified type. The specified diameter of the pipes shall refer to the inside diameter of the bore pipes. The fittings of which the galvanizing has been damaged shall not be used. For the firefighting works, the C Class pipes and accessories shall be used.

Method of construction: Galvanized iron pipes of specified diameter and type and galvanized iron fittings with ERW shall be erected on M.S. angle support with one coat of red oxide primer and two coats of Post Office fire red enamel paint duly tested to 1.5 times of working pressure. Excavating and back filling trenches including dewatering cutting through walls, floor etc., and making good. Laying, jointing, and fixing the pipe with the fittings including cutting pipes, wastage and threading the ends. At all the road crossings the pipes shall be laid lower than the crust of the road. During excavation if, any other service pipes (Water, electric, telephone, etc) come across, these shall be carefully protected and supported. Any damage done shall be made good. The pipe shall be laid on a well compacted bed in the trench. The trench after laying the pipe shall be refilled except at the joints in layers and manually rammed. Care shall be taken to see that no earth, etc., gets inside the pipes. The filling shall be kept raised by about 5 cm. for subsequent settlement. Bedding and cushioning of murum, good earth, or sand shall be provided for the pipe in case of trench through rock. The trench at the joints shall be filled similarly after satisfactory testing of the pipe. Any surplus excavated stuff shall be disposed of satisfactory without causing nuisance.

Anti-Corrosive Protection On Under Ground Pipe: Corrosion protection tape shall be wrapped on M.S. Pipes to be buried in ground. This corrosion protection tape shall comprise of coat tar/asphalt component supported on fabric of organic or inorganic fiber and minimum 4 mm. thick and conform to requirement of IS: 10221-Code of practice for coating and wrapping of underground mild steel pipe line. Before application of corrosion protection tape all foreign matter on pipe shall be removed with the help of wire brush and suitable primer shall be applied over the pipe thereafter. The primer shall be allowed to dry until the solvent evaporates and the surface becomes tacky. Both primer and tape shall be furnished by the same manufacturer. Corrosion protection tape shall then be wound around the pipe in spiral fashion and bounded completely to the

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pipe. There shall be no air pocket or bubble beneath the tape. The overlaps shall be 15 mm. and 250 mm. shall be left uncoated on either end of pipe to permit installation and welding. This area shall be coated insinuate after the pipe line is installed. The tapes shall be wrapped in accordance with the manufacturer's recommendations. If application is done in cold weather, the surface of the pipe shall be pre-heated until it is worm to touch and traces of moisture are removed and then primer shall be applied and allowed to dry. The pipe then shall be laid on a well compacted bed in the trench. The trench after laying the pipe shall be refilled except at the joints, In layers and manually rammed. Care shall be taken to see that no earth, etc., gets inside the pipes. The filling shall be kept raised by about 5 cm. for subsequent settlement. Bedding and cushioning of murum, good earth, or sand shall be provided for the pipe in case of trench through rock. The trench at the joints shall be filled similarly after satisfactory testing of the pipe. Any surplus excavated stuff shall be disposed of satisfactory without causing nuisance. No joint shall be located in the thickness of the walls If the pipe is required to be cut and the end threaded, the burns of the cut end shall be filled smooth and any obstruction in the bore shall be entirely eliminated. The rate includes wastage in cutting etc. When the pipe is to be fixed to walls it shall be fixed with standard bracket, clips or holder bates keeping the pipe about 12mm clear of the wall. The pipe shall be fixed to the wall horizontally and vertically and parallel to one another when more than one pipe is laid unless unavoidable. The supporting clips, etc., for the pipe shall be spaced at about two meters or so as necessary. When holes are not left during construction they shall be cut into the walls or slabs, etc., to pass the pipe through or to fix clamps. etc., after fixing of the pipes, clamps etc., these shall be neatly made good.

11.3.2 Pressure Testing:

All piping shall be tested to hydrostatic test pressure of at least one and a half times the maximum operating pressure, but not less than 10 kg./sq.cm. for a period not less than 24 hours. All leaks and defects in joints revealed during the testing shall be rectified to the satisfaction of the Engineer-in-Charge Piping repaired subsequent to the above pressure test shall be re-tested in the same manner. System may be tested in sections and such sections shall be securely capped. Pressure gauges may be capped off during pressure testing of the installation.

Mode of Measurement: Measurement shall be for one metre of each type and diameter of pipe laid complete with fittings, clamps etc., as specified. The lengths shall be measured net on the straight and bends along the center line of the pipes and fittings correct up to a cm.

Item No. 160:

Contractor

Consultant

Member Secretary

Supplying and erecting, testing and commissioning of 15 mm (1/2") dia. NBCM Body chrome finished quartzite bulb sprinkler having 68° C fixed temperature rating with deflector disc of conventional construction as per specification No. FF-SPR

Scope: Supplying and erecting 15 mm (1/2") dia. NBCM Body chrome finished, pendent type Quartzoid bulb sprinkler.

Material: Chrome plated sprinkler bulb having 68° C fixed temperature rating UL listed.

Method of Construction: The sprinklers bulb shall be fitted to sprinklers pipe line and tested for required pressure

Mode of measurement: Executed quantity shall be measured on number basis.

Item No. 161:

Supplying & erecting, testing and commissioning vane type water flow detector suitable for detecting flow of water in wet sprinkler pipe of main line or branch lines of 100 mm dia having following features 1) Visual Switch Activation 2) Rugged Switch Assembly 3) Heavy Duty Aluminium pipe Saddles 4) Durable Metal Encloser 5) Steel U Bolts For Secure Mounting 6) Two SPDT (Single Pole Double Track) Synchronised Switches 7) Serviceable Without Draining Pipes

1. Waterflow Switches shall be an integral, mechanical, non-coded, non-accumulative retard type.
2. Waterflow Switches shall have an alarm transmission delay time which is conveniently adjustable from 0 to 60 seconds. Initial settings shall be 30-45 seconds.
3. All waterflow switches shall come from a single manufacturer and series.
4. Waterflow switches shall be provided and connected under this section but installed by the mechanical contractor.
5. Where possible, locate waterflow switches a minimum of one (1) foot from a fitting which changes the direction of the flow and a minimum of three (3) feet from a valve.

Mode of measurement: Executed quantity shall be measured on number basis.

Item No. 162:

Supply of Evaporative air cooling unit with U.V. stabilized polymer body ,electrical motor , cell deck pad , water circulation pump , water distribution system and coarded remote to operate single speed unit. Capacity: 6500 CFM at 8mm static pressure. MAKE: Eco air

General: Cooling only .Cooling function to the entire connected Indoor units as per the demand / mode of operation set in the thermostat on all indoor units.

Contractor

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The casing shall be fully weather proofed for outdoor installation pre-coated galvanised steel sheets with weather proof paints such as 5Y8/1 or similar as per JIS (Japanese Industrial standard). It shall be provided with openings for power and refrigerant connection with removable panels for easy access to all internal components. A access door shall be provided on the control panel.

The condensing units shall be of the air-cooled type, designed for use with refrigerant **R-410 A** for cooling only of capacity as shown in the drawings and schedule. System shall be suitable for a two pipe system with either branch pipe or header pipe arrangement. The refrigeration process of the outdoor unit to be maintained by pressure and temperature sensors controlling solenoid valves, check valves and bypass valves. The Control should be via a 30 vdc signal generated by the outdoor unit. This signal to be sent to the indoor units via a 2 core non polar screened cable.

The condensing unit shall comprise of propeller fan, fan motor, heat exchanger (condenser coil) accumulator, sub cooling coil , oil separator, control box and heat inter change circuit to allow for better refrigerant distribution and control with Electronic expansion valves.

The refrigeration accessories and safety control should be assembled in a common casing, wired and tested in the factory. The unit should be supplied from the factory with an operating charge of refrigerant and dehydrated compressor oil.

Unit must be capable of operating up to 52 Deg C (125 deg F) ambient temperature with out tripping

The compressors must be of **Low Pressure Shell** type allowing the refrigerant to enter from side of the compressor to cool the stator to reach the scroll part and then get compressed .Each module must be with full inverter scroll type only capable of controlling 1 HZ increments plus, mounted on external spring isolators, provided with crankcase heater, oil separator and accumulator. Compressor shall be located in a separate section isolated from the condenser coil and fans.

The condenser fans shall be of the Variable speed BLDC propeller type, arranged for top air discharge. The fan shall be weather proofed, statically and dynamically balanced, and direct driven by a totally enclosed and permanently lubricated resiliently mounted electric motor. Fans shall have safety guards. The fan shall be factory set for zero Pascal ESP with additional dip switch to facility for field adjustment capable of normal operation for additional requirement up to 60 Pascal

The condenser coils shall be constructed of heavy gauge seamless copper tubes mechanically bonded to aluminum plate fins, weather proof treated against corrosion and saline condition such as herasite, blue guard or factory applied protective coatings. The coils will be capable of being divided into smaller sections

to enable the outdoor unit capacity to match the capacity required by the indoor unit. The coils shall be circuited for subcooling and shall have guard protection for the condenser fins. Coils to be leak tested at the factory.

Mode of measurement: Executed quantity shall be measured on number basis.

Item No. 163:

Installation of evaporative air cooling units, Air Flow: 6000 CFM

Supply and install where shown on the drawings ventilation and exhaust fans having capacities as shown on the same drawing. Construct all apparatus of materials suitable for the conditions encountered during operation.

Where corrosion can occur, appropriate corrosion resistant materials and assembly methods must be used including isolation of dissimilar metals against erosion

Where in contact with the air stream, protect insulation against erosion of flaking by a factory applied plastic or mat facing.

Locate and arrange motors, filters, and other components and accessories so that they are accessible for repair, maintenance and replacement.

Mount grease fittings directly on bearings unless the later are not readily accessible. Where equipment bearings are not visible or are inaccessible provide easily accessible extensions to bearings lubrication fittings. Through clean the entire system before installing filters or operating the fans.

On systems containing filters, install filters and permanently seal the filter frames airtight before operating the fans. The Contactor at his own expenses shall replace all dirty filters before turning over the system to the client.

Mode of measurement: Executed quantity shall be measured on number basis.

Item No. 164:

Supply, Installation, Testing & Commissioning of following: Rectangular ducting complete with proper painted M.S. supports, air tight joints with proper thickness neoprene rubber gasket, applied with sealant etc. Nut bolts should be plated. Ducting as per drawings.

Make for GI Sheet :- Jindal / uttam /Tata

24 Gauge GI

22 Gauge GI

Contractor

Consultant

Member Secretary

- Duct fabrication and installation shall generally conform to IS:655 and in accordance with statutory requirements.
- Contractor shall provide and shown on drawings or as may be required to carry out the intent of these specifications and drawings and this work shall meet with the approval of the Engineer -in-charge in all its parts and details.
- All necessary allowance and provisions shall be made by him for beams, pipes or other obstructions in the building whether or not the same area shown on the drawings. Where necessary to avoid beams or other structural work or plumbing or other pipes or conducts, the ducts shall be transformed, divided or curved, to one side, the required area being maintained, all as approved, or direct by the Engineer-in-charge/ Consultant.
- All metal work in connected spaces shall be erected in time to occasion no delay to other contractor on the building.
- Ducts over false ceiling shall be supported from the slab or from beams. In no case shall the duct be supported from the ceiling hangers or be permitted to rest on a hung ceiling. Duct supports shall be fixed by means of concrete anchor fasteners. In no case will contractors be allowed to chip walls/slab for supporting ducts.
- If a duct cannot be run as shown on the drawing, the contractor shall install the duct between the required points by any path available, subject to the approval of the Site-in-charge/Consultants.
- All ducts shall be rigid and shall be adequately supported and braced where required with standing seams, tees or angles of ample size to keep the ducts true to shape to prevent backing, vibration or breathing.
- Rubber gaskets atleast 3 mm thick shall be provided at all flanged connections, duct termination etc. as required.
- Fans shall be connected to duct work by inseting at air inlet and air outlet a double canvas/Rexene sleeves. Each sleeve shall be 100 mm long minimum securely bonded and bolted to duct units.
- Ducting supports shall be provided at not more than 2100 mm intervals.

Mode of measurement: Executed quantity shall be measured on Square-feet basis.

Contractor

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Item No. 165:

Supply and installation of alluminium powder coated grill with volume control damper for supply air

Scope of Work: Providing aluminum power coated grill

Specification: Fixing of aluminum powder coated grill with volume control damper at the inlet of air supply unit as per the drawing all fittings as per the direction.

Mode of measurement: Executed quantity shall be measured on Square-feet basis.

Item No. 166:

Supply and installation of alluminium powder coated grill without volume control damper for Exhaust air

Supply and installation of alluminium powder coated grill with volume control damper for supply air

Scope of Work: Providing aluminum power coated grill

Specification: Fixing of aluminum powder coated grill with volume control damper at the outlet of air supply unit as per the drawing all fittings as per the direction.

Mode of measurement: Executed quantity shall be measured on Square-feet basis.

Item No. 167:

External ducting Insulation with 50 mm thick TF quality thermocole, with bituminous compound, Wiremesh 24G .Sand cement plaster is in client scope.

- Duct fabrication and installation shall generally conform to IS:655 and in accordance with statutory requirements.
- Contractor shall provide and shown on drawings or as may be required to carry out the intent of these specifications and drawings and this work shall meet with the approval of the Engineer -in-charge in all its parts and details.
- All necessary allowance and provisions shall be made by him for beams, pipes or other obstructions in the building whether or not the same area shown on the drawings. Where necessary to avoid beams or other structural work or plumbing or other pipes or conducts, the ducts shall be transformed, divided or curved, to one side, the required area being maintained, all as approved, or direct by the Engineer-in-charge/ Consultant.
- All metal work in connected spaces shall be erected in time to occasion no delay to other contractor on the building.

- Ducts over false ceiling shall be supported from the slab or from beams. In no case shall the duct be supported from the ceiling hangers or be permitted to rest on a hung ceiling. Duct supports shall be fixed by means of concrete anchor fasteners. In no case will contractors be allowed to chip walls/slab for supporting ducts.
- If a duct cannot be run as shown on the drawing, the contractor shall install the duct between the required points by any path available, subject to the approval of the Site-in-charge/Consultants.
- All ducts shall be rigid and shall be adequately supported and braced where required with standing seams, tees or angles of ample size to keep the ducts true to shape to prevent backing, vibration or breathing.
- Rubber gaskets atleast 3 mm thick shall be provided at all flanged connections, duct termination etc. as required.
- Fans shall be connected to duct work by inseting at air inlet and air outlet a double canvas/Rexene sleeves. Each sleeves shall be 100 mm long minimum securely bonded and bolted to duct units.
- Ducting supports shall be provided at not more than 2100 mm intervals.
- **Mode of measurement:** Executed quantity shall be measured on square feet basis.

Item No. 168:

Thermal Insulation with 9 mm thick nitrile rubber insulation. Make : Armaflex , K- flex , Supreme .

Application of Duct Thermal Insulation

External thermal insulation shall be provided as follows:

The thickness of nitrile rubber shall be as shown on drawing or identified in the schedule of quantity. Following procedure shall be adhered to:

Duct surfaces shall be cleaned to remove all grease, oil, dirt, etc. prior to carrying out insulation work. Measurement of surface dimensions shall be taken properly to cut closed cell elastomeric rubber sheets to size with sufficient allowance in dimension. Cutting of nitrile rubber sheets shall be done with adjustable blade to

make 900 cut in thickness of nitrile rubber sheet. Hackshaw or blades are not acceptable tools for cutting the insulation.

Material shall be fitted under compression and no stretching of material shall be permitted. A thin film of adhesive shall be applied on the back of the insulating material sheet and then on to the metal surface. When adhesive is tack dry, insulating material sheet shall be placed in position and pressed firmly to achieve a good bond. All longitudinal and transverse joints shall be sealed by providing 6 mm thick 50 mm wide nitrile rubber tape. The adhesive shall be strictly as recommended by the manufacturer.

Mode of measurement: Executed quantity shall be measured on square feet basis.

Item No. 169:

Acoustic insulation with 25 mm thick open cell insulation

5.9 Acoustic Insulation

Internal Insulation material for Duct insulation shall be open cell Elastomeric Nitrile Rubber. Density of the nitrile rubber shall be Min 120 Kg/m³, NRC 0.6. The product shall have temperature range of –20 °C to 85°C. The insulation material shall be fire rated for Class 0 as per BS 476 Part 6: 1989 for fire propagation test and for Class 1 as per BS 476 Part 7:1987 for surface spread of flame test. The material shall have approval from the Chief Fire Officer if required. Material shall also be FM global approved.

5.10 Under deck Insulation

The insulation material shall satisfy the following requirements: -

Material	Thickness	Density
	(mm)	(Kg/cu.m)
For Under deck Insulation on exposed Roof		
TF Quality EPS	50	16

Insulation material for under deck insulation of exposed concrete slab shall be 50mm thick TF quality Expanded Polystyrene of 16 Kg/m³ fixed to slab with 8 5/20 grade hot bitumen and mechanically fastened at suitable intervals using GI screw washer & GI diagonal wires. The insulation shall be covered with 36 G Aluminium

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Foil. Insulation work to be coordinated with other agencies and repair to be included by contractor as per site requirement.

Thickness of the insulation shall be as specified for the individual application. Each lot of insulation material delivered at site shall be accompanied with manufacturer's test certificate for thermal conductivity values, density, water vapour permeability and fire properties. Samples of insulation material from each lot delivered at site may be selected by Owner's site representative and gotten tested for thermal conductivity and density at Contractor's cost. Adhesive used for sealing the insulation shall be non-flammable, vapour proof adhesive strictly as per manufacturer's recommendations.

Application of Duct Acoustic Insulation:

Internal Acoustic insulation shall be provided as follows:

The thickness of nitrile rubber shall be as shown on drawing or identified in the schedule of quantity. Following procedure shall be adhered to:

Duct surfaces shall be cleaned to remove all grease, oil, dirt, etc. prior to carrying out insulation work. Measurement of surface dimensions shall be taken properly to cut open cell elastomeric rubber sheets to size with sufficient allowance in dimension. Cutting of nitrile rubber sheets shall be done with adjustable blade to make 90° cut in thickness of nitrile rubber sheet. Hacksaw or blades are not acceptable tools for cutting the insulation.

Material shall be fitted under compression and no stretching of material shall be permitted. A thin film of adhesive shall be applied on the back of the insulating material sheet and then on to the metal surface. When adhesive is tack dry, insulating material sheet shall be placed in position and pressed firmly to achieve a good bond. The adhesive shall be strictly as recommended by the manufacturer.

Provide external thermal insulation to entire length of duct in addition to acoustic lining in accordance with the specifications. The duct sizes shall be adjusted to compensate the thickness of internal insulation.

Application of under deck Insulation on exposed Roof

Under deck insulation shall be 50mm thick TF Quality expanded polystyrene (32 Kg/m³). Under deck surface of ceiling shall be cleaned and made dirt free. Insulation panels shall be pasted on this surface with black CPRX compound. 28g wire net shall be tightened around insulation so as to avoid any kind of sagging. Ends of net shall be overlapping by at least 25mm. Overlaps shall be screwed with galvanized screws to avoid rusting.

Mode of measurement: Executed quantity shall be measured on square feet basis.

Item No. 170:

M.S. fabrication work for air washer stand with proper painting

Specification:

General: The item covers the specifications of fabrication and erection of structural steel work including painting. The structural steel work includes cutting, fabrication, welding, or bolting, erecting the structure, painting etc. for various items such as columns, trusses, portals, girders, gantry, bracings etc.

Material: This shall comply with specification No. GENERAL SCOPE & MATERIAL- Gen/C/0 and Gen/C/0.2.5, Gen/C/0.19.2.

Fabrication and Erection: Cutting, welding, assembly, machining, painting, marking and erection shall be carried out in accordance with approved plans and as directed by the Engineer in-Charge from time to time and shall comply with IS 800 and detailed below.

Damaged Members:

1. Any material found damaged or defective shall be stacked separately and shall be marked in a distinctive color. Such material is to be dealt with expeditiously under the orders of the Engineer-in-Charge.
2. Welding shall be done, as per specifications.
3. All permanent machine-fitted or other bolts must be perfectly tight and should be burred or otherwise checked, to prevent nuts from becoming loose.
4. Care shall be taken to see that cracks are not filled with paint, putty, cinders, dirt, oil or fillings.
5. Particular care must be taken to ensure free expansion and contraction wherever provided for in drawings or as the Engineer-in-Charge directs.

Shop Drawings: The contractor shall prepare shop drawings for the structural steelwork/ERW tubes to be executed as per IS: 800. The contractor shall submit the drawings in triplicate to the Engineer-in-Charge for his approval. Fabrication shall not be taken in hand until the relevant shop drawings have been approved by the Engineer-in-Charge. However, the contractor shall remain wholly responsible for their correct

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conformation the designs and for accurate fabrication to meet the requirements of design and the Indian Standard. One copy of the drawings duly approved shall be returned to contractor and the work shall be carried out according to the approved design.

Laying Out : As far as possible and whenever necessary, structural parts, ERW Tubes their joints, gusset plates, etc. shall be drawn out to full size on a level platform, a steel tape being used for measurement. All angles shall be carefully set out and checked. Gusset plates shall be marked with as few sides as possible and of such shapes that there is a minimum waste in cutting a large number. Steel metal templates of adequate dimensions shall be made to correspond to each member and temperature effect shall be taken into account where necessary.

Fabrication and Welding: When the lengths of sections required for fabrication are not more than the standard lengths of rolling, no splicing of shorter length shall be allowed to be fabricated.

Unless provided in the designs or specially permitted in writing by the Engineer-in-Charge. All the rolled sections forming part of the structural member shall be cut square or accurately to shapes shown in the detailed drawings dead correct to lengths and shapes, a steel tape being used for measurement. The cut ends shall be dressed true with hammer, chisel and file or by grinding. All straightening, leveling and shaping to form shall be done by pressure and not by hammering unless the latter is specially permitted by the Engineer-in-Charge. Bending, cutting, forging, etc. shall be done in such a manner as not to impair the strength of the metal. Where tight fits are required or stress is to be transmitted through end contacts, the ends or surfaces shall be faced and brought to a true contact bearing. The expansion bearing surface where provided, shall be machined true and smooth and in the direction of the movement.

1. Columns and stanchions shall be erected truly vertical with the necessary cross bracing etc. and the base shall be properly fixed with the foundation concrete by means of anchor bolts etc. as per drawings.

2. Anchor bolts to be placed in the concrete foundation should be held in position with a wood template. At the time of concreting anchor bolt locations shall be provided with suitable timber mould or pipe sleeve to allow for adjustment which shall be removed after initial setting of concrete. The spaces left around anchor bolts shall be linked to a stopping channel in the concrete leading to the side of the pedestal and on the underside of the base plate to allow the spaces being grouted up after the base plate is fixed in the position along with the column footing. Grouting shall be of cement mortar 1:3 (1 cement: 3 coarse sand) or as specified.

3. Bedding of Column, Stanchions etc.: Bedding shall not be carried out until the steel work has been finally leveled, plumbed and connected together. The stanchion shall be supported on steel wedges and adjusted to make the column plumb. For multi-stored buildings, the bedding shall not be done until sufficient number of bottom lengths of stanchions have been properly lined, leveled and plumbed and sufficient floor beams are fixed in position. The base plates shall be wedged clear of the bases by MS wedges and adjusted where necessary to plumb the columns. The gaps under the base plate may be made up to 25 mm shall then be pressure grouted with cement grouts. With small columns, if permitted by the Engineer-in-Charge, the column base shall be floated on a thick cement grout on the concrete pedestal. The anchor bolt holes in the base plate may

be made about 10 to 15mm larger than the bolts. In such cases suitable washers shall be provided.

4. Welding: The steelwork in built up section (welded) such as in trusses, framed work etc. is specified in this clause. Welding shall generally be done by electric arc process as per IS:816 and 823. The electric arc method is usually adopted and is economical. Where electricity for public is not available generators shall be arranged by the contractor at his own cost unless otherwise specified. Precautions shall therefore be taken to avoid distortion of the members due to these temperature stresses. The work shall be done as shown in the shop drawings, which should clearly indicate various details of the joint to be welded, type of welds, shop and site welds as well as the type of electrodes to be used. Symbol for welding on plane and shop drawings shall be according to IS 813-1986. By providing tack welding the structure be assembled and correctness as per drawing be checked. After confirming the structure assembled is true alignment level and as per approved drawing welding at each joint be taken in hand. Length of welding at each joint for each member be worked out and ensured that at least 1.25 times welding length is provided at each joint for each member. No tack welding be allowed. As far as possible every effort shall be made to limit the welding that must be done after the structure is erected so as to avoid the improper welding that is likely to be done due to heights and difficult positions on scaffolding etc. apart from the aspect of economy. The maximum dia of electrodes for welding any work shall be as per IS 814-1991 and appendix 'B' of IS 823-1964. Joint surfaces, which are to be welded together, shall be free from loose mill scale, rust, paint, grease or other foreign matter, which adversely affect the quality of weld and workmanship.

5. Precautions: All operations connected with welding and cutting equipment shall conform to the safety requirements given in IS: 818 for safety requirements and Health Provision in Electric and gas welding and cutting operations. Operation, Workmanship and Process of Welding is described in Appendix. Inspection and testing of welds shall be as per IS: 822.

6. Assembly: Before welding is commenced, the members to be welded shall first be brought together and firmly clamped or tack welded to be held in position. This temporary connection has to be strong enough to hold the parts accurately in place without any disturbance. Tack welds located in places where final welds will be made later shall conform to the final weld in quality and shall be cleaned off slag before final weld is made.

7. Erection: Steelwork shall be hoisted and erected in position carefully, without any damage to itself, other structures and equipment and injury to workmen. The method of hoisting and erection proposed to be adopted by the contractor shall be got approved from the Engineer-in-Charge in advance. The contractor however shall be fully responsible for the work being carried out in a safe and proper manner without unduly stressing the various members and proper equipment such as derricks, lifting tackles, winches, ropes etc. shall be used. The work may be erected in suitable units as may be directed by the Engineer-in-Charge. Fabricated members shall be lifted at such points as to avoid deformation or excessive stress in members. The structure or part of it placed in position shall be secured against over-turning or collapse by suitable means. During execution, the steelwork shall be securely bolted or otherwise fastened and when necessary temporarily braced to provide for all loads to be carried safely by the structure during erection including those due to erection equipment and its operations. The steel

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work shall be placed in proper position as per approved drawing, final riveting or permanent bolting shall be done only after proper alignment has been checked and confirmed.

8. Trusses shall be lifted only at nodes. The trusses above 10m in span shall not be lifted by slinging at two mid points of rafters, which shall be temporarily braced by a wooden member of suitable section. After the trusses are placed in position, purlins and wind bracings shall be fixed as soon as possible. The end of the truss, which faces the prevailing winds, shall be fixed with holding down bolts and the other end kept free to move. In case of trusses of spans up to 10m the free end of the truss shall be laid on lead sheet or steel plate as per design, and the holes for holding down bolts shall be made in the form of oblong slots so as to permit the free movements of the truss

Painting: All surfaces, which are to be painted, oiled or otherwise treated shall be dry and thoroughly cleaned to remove all loose scale and loose rust. Surfaces not in contact but inaccessible after shop assembly, shall receive the full-specified protective treatment before assembly. This does not apply to the interior of sealed hollow sections. Part to be encased in concrete shall not be painted or oiled. A priming coat of approved steel primer i.e. Red Oxide Zinc chrome primer conforming to IS:2074 shall be applied before any member of steel structure are placed in position or taken out of workshop. Two coats of synthetic super enamel paint are included in this item.

Item to Include: The item includes all material, ERW Tubes, nut bolts, labour, tools and equipments, manufacturing, transportation, erection painting etc. as per the drawings and directed. It also includes all taxes, insurance etc.

Mode of Measurement and Payment: The work as fixed in place shall be measured in running meters correct to a millimetre and weights calculated on the basis of standard tables correct to the nearest kilogram. Unless otherwise specified, weight of cleats, brackets, packing pieces, bolts, nuts, washers, distance pieces, separators, diaphragm gussets (taking overall square dimensions) fish plates, etc. shall be added to the weight of respective items. No deductions shall be made for bolt holes (excluding holes for anchor or holding down bolts) the weight of steel sheets, plates and strips shall be taken from relevant Indian Standards based on 7.85 kg/m² for every millimeter sheet thickness. For rolled sections, steel rods and steel strips, weight given in relevant Indian Standard shall be used. The contract rate shall be per Metric tonne weight of the component fabricated and measured as above, correct to a 3 decimals (one gram).

Item No. 171:

FRP lining at duct entry and wall finishing joint to restrict the water leakage

Scope of Work: Providing FRP lining for duct entry and wall finishing.

Specification:- Apply FRP solution at duct entry and wall finishes to avoid leakages, make all joints should be air tight and water tight. As per the direction.

Mode of measurement: Executed quantity shall be measured on Square feet basis.

Contractor

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Item No. 172:

Electrical cabling work 4 pair lan cable for remote extension if require Cable Make - Polycab , indoplast , KEI etc

Scope:

To lay the cables for Computers on surface of wall or ceiling, concealed in slab, wall, under flooring etc, through existing metallic conduits, rigid PVC conduits, PVC trunking, with all necessary hardware, material, etc. as specified. The cable shall be used only for connections between Information Outlet & Patch/ Multimax Panel. (Exception: For making MDIX patch cord)

Material:**UTP cable:**

4 pairs, 100 ohms, unshielded twisted pair (UTP), each pair separated by a PE former (Star shaped) solid 23AWG tinned copper conductor rated for temperature of 75° C, PVC insulated gray colour with following types as in the table 1.12/1

Table 1.12/1

Sr. No.	Type	Class	Tested frequency
1	Cat 6	E	350MHz
2	Cat 6+	E	500MHz

Method of Construction:

The cable shall be laid in provided separate casing n capping/ PVC conduit/ trunking 400mm away from electrical cables wherever required without sharp bends. The cable shall be spliced at both the ends for punching/ crimping at keystone jacks/ UTP connectors.

Mode of measurement: Executed quantity shall be measured on running metre basis.

Contractor**Consultant****Member Secretary**

INTERIOR, CIVIL, WATER SUPPLY, SANITARY, ELECTRICAL, FIRE FIGHTING, HVAC WORK & ALLIED WORK IN MAHARASHTRA POLLUTION CONTROL'S OFFICE AT CHANDRAPUR DIST. CHANDRAPUR					
BILL OF QUANTITIES					
Sr.No.	Description	Quantity	Unit	Rate	Amount
	PART 'A'				
	INTERIOR WORK				
1	P-3:- Providing and fixing in position anodised extruded aluminum partitions, partly glazed and partly laminated having frame made out of extruded tubular section of size 40 mm x 60 mm with 12 mm thick three layered flat pressed teak wood particle board bonded with BWP type exterior grade phenol formaldehyde synthetic resin conforming to IS 128231990, laminated on both sides, Novatekor equivalent and 5 mm thick selected quality plain/ float glass panels fixed with aluminum glass clips 12 mm x 12 mm and rubber cushioning beading to glass partitions as per approved drawing etc. compete.	278	Sqm		
2	P-4:- Providing and fixing Mouduler low height partition up to 1.2 m with soft pin board , writing board and fixed on G.I. chanel frame including Electrical fitting three socket with swicht, one telephone socket, lan socket etc. complete as per the architectural drawings and as directed by architect .	43	Sqm		
3	P-7:- Providing and fixing accoustical tiles wall lining upto bottom of the ceiling The Gyptone wall lining includes 13mm Gyproc® Duraline (conforming to BS 5234,part 2)Screwed to 50mm Gypsteel Ultra™ C-stud (0.5mm thick having one flange of 34mm and another flange of 36mm made of GI Steel) placed at 610mm centre to centre in 50mm Gypsteel Ultra™ floor and ceiling channel (0.5mm thick have equal flanges of 32mm made of GI steel), which is anchored to the floor & true ceiling using suitable anchor fasteners or metal screws with Pvc plugs. Finally square and tapered edges of the boards are to be jointed and finished so as to have a flush look which includes filling and finishing with Jointing compound, JointPaper tape and two coats of Dry wall Top Coat (as per recommended practices of (Saint- Gobain India Gypsum). 50mmglass wool shall be placed in the cavity.	167	Sqm		

Sr.No.	Description	Quantity	Unit	Rate	Amount
4	Providing and fixing in position, Double shuttered aluminium extruded powder coated openable door of specified size with aluminium door frame of powder coated section 101.60 x 44.75mm , 3.18 mm thick and shutter comprising of powder coated section having bottom and lock rail of size 150 mm x 44.5 mm x 3.00 mm thick top rails 47.62 x 44.45 mm x 3.00 mm thick , vertical style 47.62 x 44.45 mm, 3.00 mm thick and for shutter plain glass panes 5 mm thick for top panels and 12mm thick both side laminated phenol bonded particle board panels for bottom panels etc. , I.S.I. mark , heavy duty, Hydraulic floor spring of 150 kg capacity , having heavy duty concealed lock, necessary beading, glazing clips, PVC gaskets, 250mm length aluminium tower bolts, 150mm dia. pad handle, etc. as per detailed design and drawing or as directed by engineer in charge including all materials , labours, and equipment etc.complete	218	Sqm		
5	Providing and fixing Screen Film on glass approved make and colour, including finishing, cleaning, complete as per the architectural drawings and as directed by Architect.	107	Sqm		
6	(TBL-1-A) Providing and supplying Modular table made in Pre laminated particle board of size 2800 mmLX 900 mmDx 750 mm Ht , side storage with back storage of size 1200 mmL x 900 mmD x 750 mm Ht for R.O. , S.O cabin Table with table top made in 25 mm thick Pre laminated particle board vertical support panel of 18 mm thick made in pre laminated particle board, Side storage made in 18 mm thick pre laminated particle board, vertical support panel of 18 mm thick made in pre laminated particle board, keyboard tray made in 18 gauge M.S. powder coated, CPU trolley made in 18 gauge M.S. powder coated, 3 drawer made in 18 mm thick pre laminated particle board with locking arrangement, detached foot rest made in 18mm thick pre laminated particle board, The top and Side Panels will be clad with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S. handle, locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by Architect.(Pre-laminated Particle Board shall be Grade II Type II conforming to IS:12823:1990)	1	Nos		
7	(TBL-3) Providing and supplying Modular table made in Pre laminated particle board of size 1500 mmLX 750 mmDx 750 mm Ht , for Field officer's, Accountant Table with table top made in 25 mm thick Pre laminated particle board vertical support panel of 18 mm thick made in pre laminated particle board, vertical support panel of 18 mm thick made in pre laminated particle board, keyboard tray made in 18 gauge M.S. powder coated, CPU trolley made in 18 gauge M.S. powder coated, 3 drawer made in 18 mm thick pre laminated particle board with locking arrangement, detached foot rest made in 18mm thick pre laminated particle board, The top and Side Panels will be clad with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S. handle, locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by Architect.(Pre-laminated Particle Board shall be Grade II Type II conforming to IS:12823:1990)	11	Nos		

Sr.No.	Description	Quantity	Unit	Rate	Amount
8	(TBL-4) Providing and supplying Modular table made in Pre laminated particle board of size 1200 mmLX 600 mmDx 750 mm Ht ,for JSA and Junior Clerks Table with table top made in 25 mm thick Pre laminated particle board vertical suport panel of 18 mm thick made in pre laminated particle board, vertical suport panel of 18 mm thick made in pre laminated particle board, keyboard tray made in18 gauge M.S. powder caoted, CPU trolley made in18 gauge M.S. powder caoted, 3 drawer made in 18 mm thick pre laminated particle board with locking arrangment, detached foot rest made in 18mm thick pre laminated particle board.The top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S. handle, locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by Architect.(Pre-laminated Particle Board shall be Grade II Type II conforming to IS:12823:1990)	7	Nos		
9	(TBL-5) Providing and supplying Modular table made in Pre laminated particle board of size 2030 mmLX 600 mmDx 750 mm Ht for Reception and Receiving Corner Table with table top made in 25 mm thick Pre laminated particle board, 12mm thick through out Toughened glass fitting with S.S. glass holder on top of table, vertical suport panel of 18 mm thick made in pre laminated particle board, vertical suport panel of 18 mm thick made in pre laminated particle board, keyboard tray made in18 gauge M.S. powder caoted, CPU trolley made in18 gauge M.S. powder caoted, 3 drawer made in 18 mm thick pre laminated particle board with locking arrangment, detached foot rest made in 18mm thick pre laminated particle board.The top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S. handle, locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by Architect.(Pre-laminated Particle Board shall be Grade II Type II conforming to IS:12823:1990)	2	Nos		
10	(TBL- 7) Providing and supplying 22 Person Seater Modular table made in Prelaminated particle Board of size 21500 L x 750 D x 750 HT for Conference hall with table top made in 25 mm thick prelaminated particle board, vertical suport panel of 18 mm thick made in prelaminated particle board, detachable foot rest made in 18mm thick prelaminated particle board etc.,The top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S.handle, locks, Teliscopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by Architect.	1	Nos		
11	(TBL- 8) Providing and supplying P.V.C. dining table in dining hall Table in size 1500 L x 750 D x 750 HT approved make, colour and approved by architect etc. complete.	5	Nos		
12	(TBL- 9) Providing and supplying Tea poy table S.S. vertical support and 12 mm thick Toughened glass at top 600 L x 750 D x 600 HT approved make, colour and approved by architect etc. complete.	4	Nos		

Sr.No.	Description	Quantity	Unit	Rate	Amount
13	(CB-1) Providing and supplying Modular Cuboard made in Prelaminated particle board of size 900 x 600 x 2100mm made in 25 mm thick Prelaminated particle board 1, Glazed Sutter made in 18mm thick Prelaminated particle board with 5mm thick plane glass, drawer made in 18 mm thick Prelaminated particle board with locking arrangement etc. .The top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S.handle,S .S. box hinges, S.S. Tower bolt locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by architect.	12	Nos		
14	(CB-2) Providing and supplying Modular Cuboard made in Prelaminated particle board of size 1500 x 450 x 1200mm made in 25 mm thick Prelaminated particle board 1, Glazed Sutter made in 18mm thick Prelaminated particle board with 5mm thick plane glass, drawer made in 18 mm thick Prelaminated particle board with locking arrangement etc. .The top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S.handle,S .S. box hinges, S.S. Tower bolt locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by architect.	17	Nos		
15	(CB-3) Providing and supplying Modular Cuboard made in Prelaminated particle board of size 1600 x 450 x 1200mm made in 25 mm thick Prelaminated particle board 1, Glazed Sutter made in 18mm thick Prelaminated particle board with 5mm thick plane glass, drawer made in 18 mm thick Prelaminated particle board with locking arrangement etc. .The top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S.handle,S .S. box hinges, S.S. Tower bolt locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by architect.	4	Nos		
16	(CB-4) Providing and supplying Modular Cuboard made in Prelaminated particle board of size 2000 x 450 x 750mm made in 25 mm thick Prelaminated particle board 1, Glazed Sutter made in 18mm thick Prelaminated particle board with 5mm thick plane glass, drawer made in 18 mm thick Prelaminated particle board with locking arrangement etc. .The top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S.handle,S .S. box hinges, S.S. Tower bolt locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by architect.	1	Nos		
17	(CB-5) Providing and supplying Modular Cuboard made in Prelaminated particle board of size 600 x 300 x 1200mm made in 25 mm thick Prelaminated particle board 1, Glazed Sutter made in 18mm thick Prelaminated particle board with 5mm thick plane glass, drawer made in 18 mm thick Prelaminated particle board with locking arrangement etc. .The top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S.handle,S .S. box hinges, S.S. Tower bolt locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by architect.	6	Nos		

Sr.No.	Description	Quantity	Unit	Rate	Amount
18	(CB-6) Providing and supplying Modular Cuboard made in Prelaminated particle board of size 600 x 450 x 1200mm made in 25 mm thick Prelaminated particle board 1, Glazed Sutter made in 18mm thick Prelaminated particle board with 5mm thick plane glass, drawer made in 18 mm thick Prelaminated particle board with locking arrangement etc. .The top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S.handle,S .S. box hinges, S.S. Tower bolt locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by architect.	1	Nos		
19	(CB-8) Providing and supplying Modular Cuboard made in Prelaminated particle board of size 730 x 600 x 1200mm made in 25 mm thick Prelaminated particle board 1, Glazed Sutter made in 18mm thick Prelaminated particle board with 5mm thick plane glass, drawer made in 18 mm thick Prelaminated particle board with locking arrangement etc. .The top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S.handle,S .S. box hinges, S.S. Tower bolt locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by architect.	1	Nos		
20	(CB-10) Providing and supplying Modular Cuboard made in Prelaminated particle board of size 1200 x 450 x 2100mm made in 25 mm thick Prelaminated particle board 1, Glazed Sutter made in 18mm thick Prelaminated particle board with 5mm thick plane glass, drawer made in 18 mm thick Prelaminated particle board with locking arrangement etc. .The top and Side Panels will be cladded with post forming laminate of thickness 0.6mm and other exposed edges is concealed with 2mm PVC Lipping including all hardware items, S.S.handle,S .S. box hinges, S.S. Tower bolt locks, Telescopic sliding channels with powder coating, nails, S.S. screws, as per details drawing and as directed by architect.	4	Nos		
21	(SF-2) Providing and supplying 1- seater (Type-1) Executive Sofa Set in R.O. Cabin in 3 & 4 inches high density foam Pounds/Cubic fit fixed on a base of 18 mm thick gurjan hardwood based ply. As per drawing no. finished with specified leather cloth. Approved by Architect.	1	Nos		
22	(SF-3) Providing and supplying 1- seater (Type - 2) Visitor Sofa Set in waiting Cabin in 3 & 4 inches high density foam Pounds/Cubic fit fixed on a base of 18 mm thick gurjan hardwood based ply. As per drawing no. finished with specified leather cloth. Approved by Architect.	5	Nos		

Sr.No.	Description	Quantity	Unit	Rate	Amount
23	(SF-4) Providing and supplying 3- seater (Type-2) Visitor Sofa Set in waiting Cabin in 3 & 4 inches high density foam Pounds/Cubic fit fixed on a base of 18 mm thick gurjan hardwood based ply. As per drawing no. finished with specified leather cloth. Approved by Architect.	3	Nos		
24	(CH-1) Providing & supplying High Back Executive Chair with hydraulic stand of 5 legs having reclining and revolving system for RO, Confrance hall in artificial leather finish approved by Architect. with 3" in seat and 2" in finished with powder coated M.S. Coated base. approved by Architect.	2	Nos		
25	(CH-2) Providing & supplying Low Back Executive chairs for Confrance hall cabin with hydraulic hight adgment with reclining and revolving system stand of 5 legs having saet and back in foam with fabric cloth finish with 3" in seat and 2" in back finished with powder coated M.S. Coated base, approved by Architect.	22	Nos		
26	(CH-3) Providing & supplying Computer Chair for Staff in Fabric finish (Cloth Rs. 250/meter) approved by Architect. standing with 5 legs, revolving tilting and finished with powder coated M.S. Coated base. approved by Architect.	20	Nos		
27	(CH-6) Providing and supplying PVC chairs in dining hall approved by Architect.	20	Nos		
28	(CH-7) Providing and supplying visitor chairs 3 in 1 for waiting area having saet and back in foam with fabric cloth finish with 3" in seat and 2" in back finished with powder coated M.S. Coated base, approved by Architect.	2	Nos		
29	(CH-8) Providing and fixing 4 legged Lab stool, Legs made of 16 Guage 45 MM Outer dimension MS Pipe, Duly painted, With a 304 Grade Stainless steel 12 inch wide seat with a 1 inch collar, Height adjustment via a screw. as per design and drawing and instructions of Engineer in charge.	8	Nos		
30	(CH-9) Providing & fixing chair of Fabric Seat and Back with Chrome Plated Legs, as per design and drawing and instructions of Engineer in charge.	26	Nos		
31	Providing and supplying Modular Bed For Guest House size 2000 x 1200 x 450mm With Corner Table made in made in 18 mm thick Prelaminated particle board, drawer made in 18 mm thick Prelaminated particle board with locking arrangment etc. externally finished with 1.0 mm thick laminate and internally finished with 1.0 and mattress 3 & 4 inches high density foam finished with cotton cloth and including all hardware items, S.S.handle, locks, Teliscopic sliding channels with powder coating, nails, S.S.screws, as per details drawing and as directed by Architect.	2	Nos		

Sr.No.	Description	Quantity	Unit	Rate	Amount
32	Providing and Fixing of Mineral Fibre Board Acoustical Suspended Ceiling System with ultima (Bevelled Tegular) Edge Tiles of size 15mm Exposed GRID. The tiles should have Humidity Resistance (RH) of 99%, NRC 0.7, Light Reflectance 85%, Thermal Conductivity k = 0.052 - 0.057 w/m K, Colour White, Fire Performance UK Class 0 / Class 1 (BS 476 pt - 6 &7) in module size of 600 x 600 x 20mm , suitable for Green Building application, with Recycled content of 32%. The tile shall be laid on precoated G.I.channel on XL2 Clip having a web height of 32 mm with 15 mm wide T - section flanges colour white having rotary stitching on all T sections i.e. the Main Runner, 1200 mm and 600 mm Cross Tees with a web height of 32 mm and a load carrying capacity of 7.7 Kgs/M2 and minimum pull out strength of 100 Kgs.. The T Sections have a Galvanizing of 90 grams per M2 and need to be installed with Suspension system. The Tile and Grid system used together should carry a 10 year warranty. products approved as per GRIHA and BS 476 etc. complete.	373	Sqm		
33	Providing and fixing in position Gypsum board false ceiling with 12.5mm thick Gypsum boards, screwed/fixd to the under structure of suspended G.I. Grid constructed and suspended from the main ceiling consisting of ceiling sections of size 25 x 50 mm maximum center to center distance of 600 milimetre perimeter channel and intermediate channels at maximum center to center distance 1200 milimetre galvanized grid should be fixed to reinforced cement concrete slab. The gypsum board should be fixed to galvanized iron grid with necessary screws. The boards should be taped and filled from underside to give smooth, seamless ceiling. The rate should include necessary additional ceiling sections and intermediate channels. Additional intermediate channels should be fixed to strap hangers for additional support to prevent strapping at every 1200 milimetre item to be completed in all respect including necessary sleeves for ducts finishing of joints cut outs, painting including labour, material, lifts etc. all complete. Spec :As directed by Engineer in charge.	259	Sqm		
34	Providing and Fixing Soft Fibre Acoustical Suspended Ceiling System with Optra (Bevelled Tegular) Edge Tiles of size 15mm Exposed Grid. The tiles should have Humidity Resistance (RH) of 95%, NRC 0.9 - 1.0, Light Reflectance ?85%, Colour White, Fire Performance UK Class 0 / Class 1 (BS 476 pt - 6 &7) in module size of 600 x 600 x 15mm , suitable for Green Building application, with Recycled content of 66% GW and 74% RW. The tile shall be laid on precoated G.I channel 32 with 15 mm wide T - section flanges colour white having rotary stitching on all T sections i.e. the Main Runner, 1200 mm and 600 mm Cross Tees with a web height of 32 mm and a load carrying capacity of 7 Kgs/M2 with a minimum pull out strength of 100 kgs. The T Sections have a Galvanizing of 90 grams per M2 and need to be installed with Suspension system The Tile and Grid system used together should carry a 10 year warranty. products approved as per GRIHA and BS 476 etc. complete.	73	Sqm		

Sr.No.	Description	Quantity	Unit	Rate	Amount
35	Providing and fixing partition with kadappa stone of all sizes and 25mm thick polished on both side and edges to original including fixing in position in cement mortar 1:4 curing polish-ing, cleaning etc complete.	29	Sqm		
36	Providing & laying Vinyle flooring of 2.0mm thick, of approved colour including cutting, laying, all labour and materials etc. complete. as per direction of Architect.	788	Sqm		
37	Providing, supplying and fixing Vertical Vanishing Blinds with 25mm width imported fabric approved by architect with Taiwan made sliding fitting as directed by architect etc. complete. as per direction of Architect.	103	Sqm		
38	Providing and fixing MDF Board Laminated with 1mm thick laminet for Labrotary platform storage internal finish side, bottem, shutters and Shelf etc. complete as per the architectural drawings and as directed by Architect.	17	Sqm		
39	Providing and fixing informatory sign boards in square or rectangular shape of any size made of (2 mm) thick Aralic sheet bounded with approved retro reflective sheeting of Engineering grade having pressure sensitive / heat activated adhesive white retro reflective cut-out border and messages having Red Radiam colour transparent colour over white reflective sheeting having border including G. I. fixtures etc.Complete. as per direction of Architect.	12	Sqm		
CIVIL, WATER SUPPLY & SANITARY WORK					
40	Removing cement tiles, or marble or polished shahabad floor or dado without bed concrete including stacking the materials as directed with all leads, lifts etc. complete.	96	Sqm		
41	Dismantling brick masonry in lime or cement mortar and stacking the materils as directed with all leads, lifts etc..	3	Cum		
42	P-1:-Providing and laying masonry of I.S. Standard C.C. hollow block 100 x 200 x 400 mm with 100mm thick in cement mortar 1:6 proportion for superstructure including curing, scaffolding etc. complete.	332	Cum		
43	P-6 Providing second class Burnt Brick masonry with conventional/ I.S. type bricks in cement mortar 1:4 in half brick thick wall including mild steel longitudinal reinforcement of 2 bars of 6 mm diameter / 2 hoop iron strips 25 mm X 1.6 mm placed at every third course, properly bent and bonded at ends scaffolding, racking out joints and watering etc. complete.	77	Sqm		
44	Providing and laying Cast in situ/Ready Mix cement concrete in M-25 of trap/ granite/ quartzite/ gneiss metal for R.C.C. beams and lintels as per detailed designs and drawings or as directed including steel centering, formwork, cover blocks, laying/pumping, compactionand roughening the surface if special finish is to be provided and curing etc. complete. (Excluding reinforcement and structural steel).with fully automatic micro processor based PLC with SCADA enabled reversibile Drum Type mixer/ concrete Batch mix plant (Pan mixer) etc. complete. With fine aggregate (Natural Sand / Crushed sand VSI Grade finely washed etc)	1	Cum		

Sr.No.	Description	Quantity	Unit	Rate	Amount
45	Providing and fixing in position TMT - FE - 500 bar reinforcement of various diameters for R.C.C. pile caps, footings, foundations, slabs, beams columns, canopies, staircase, newels, chajjas, lintels pardis, copings, fins, arches etc. as per detailed designs, drawings and schedules. including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required complete.	0.1	M.T.		
46	Providing internal cement plaster 12mm thick in single coat in cement mortar 1:4 without neeru finish to concrete or brick surfaces, in all positions including scaffolding and curing etc. complete.	193	Sqm		
47	Providing Internal Cement Plaster 6mm Thick In Single Coat In Cement Mortar 1:3 Without Neeru Finish to concrete or brick surfaces, in all position including scaffolding and curing etc. complet. Spec. No. Bd.L. 2 Page No. 368	484	Sqm		
48	Providing and applying Two coats of wall care Putty on plastered surface and Ceiling and Walls to prepare surface even and smooth of approved make, etc complete.	1341	Sqm		
49	Providing and laying ceramic tiles/antiskid ceramic tiles (Bell, Spartek , Johnson, Pedders, Kajaria, RAK etc). conforming to IS:13712-1993, of approved colour including cement float, filling the joints with matching colour, with pigments added to white cement slurry cleaning etc. complete.	124	Sqm		
50	Providing sills of polished Kadappa stone 25mm to 30mm thick, on a bed of 1:4 cement mortar including cement float, filling joints with slurry, curing polishing and cleaning etc. complete.	4	Sqm		
51	Providing and laying in position flooring of telephone black / Amba White / Cat bary brown / Ruby red / Ocean Brown granite stone of approved shade and size 18 mm to 20 mm thick on bed 1:6 cement mortar including cement floats striking joints, pointing in C.M. 1:3 curing and cleaning etc. complete.	119	Sqm		
52	Providing and fixing solid core flush door shutter in single leaf 32 mm thick decorative type of exterior grade as per detailed drawings approved face veneers 3 mm thick on both faces or as directed, all necessary beads, mouldings and lipping, wrought iron hold fasts, chromium plated fixtures and fastenings, with brass mortise lock, chromium plated handles on both sides, and finishing with French Polish etc. complete.	26	Sqm		
53	Providing and fixing fiber glass reinforced polyster door shutter 30 mm thick as per IS 14856 (2000) (Reaffirmed 2006) without ventilator including chromium plated fixtures and fastening with chromium plated han	8	Sqm		
54	Providing and fixing in position (as per 1868 / 1982) Alluminium sliding window of three tracks with rectangular pipe 95 x 38.10 x 0.90 mm at weight 0.637 kg/Rmt. with window frame bottom track section 92 x 31.75 x 1.30 mm at weight 1.070 kg/Rmt.. Top and side track section 92 x 31.75 x 1.30 mm at weight 0.933 kg/Rmt. The shutter should be of bearing bottom 40 x 18 x 1.25 mm at weight 0.417 kg/Rmt. Inter locking section 40 x 18 x 1.10 mm at weight 0.469 kg/Rmt. and handle and top section 40 x 18 x 1.25 mm at weight 0.417 kg/Rmt. As per detailed drawings and as directed by Engineerincharge with all necessary Aluminium sections fixtures and fastenings such as roller bearing in nylon casting and self locking catch fitted in vertical section of shutter including 5 mm thick plain glass and aluminium mosquito net shutter with stainless steel jail with all required screws and nuts etc, complete. With colour Anodising with box.	58.5	Sqm		

Sr.No.	Description	Quantity	Unit	Rate	Amount
55	Providing and fixing in position powder coated aluminium louvered windows / ventilator of various sizes with powder coating as per detailed drawing and specifications including aluminium frames 80 x 38 mm x 1.22 mm box type, 5 mm thick sheet glass louvers, of approved quality etc. complete. Spec as directed by engineer in charge.	4.86	Sqm		
56	Providing and fixing mild steel grill work for windows, ventilators etc. 20 kg/sqm as per drawing including fixtures, necessary welding and painting with one coats of anticorrosive paint and two coats of oil painting complete.	108	Sqm		
57	Providing and applying plastic emulsion paint of approved quality, colour and shade to new surface in three coats including scaffolding, preparing the surface. (excluding primer coat) etc. complete.	50	Sqm		
58	Providing and applying pearl/ luster finish paint of approved colour and shade to the existing plaster surface including scaffolding, preparing the surface, applying the acrylic wall putti etc. complete.	1341	Sqm		
59	Providing and applying two coats of synthetic enamel paint of approved colour to new /old structural steel work and wood work in buildings, including scaffolding if necessary, cleaning and preparing the surface (excluding primer coat) etc. complete.	50	Sqm		
60	Providing and fabricating structural steel work in rolled sections like joists, channels, angles, tees etc. as per detailed design and drawings or as directed including cutting, fabricating, hoisting, erecting, fixing in position making riveted / bolted /welded connections without connecting plates, braces etc. and including one coat of anticorrosive paint and over it two coats of oil painting of approved quality and shade etc. complete.	0.72	M.T.		
	WATER SUPPLY & SANITARY WORK				
61	Providing and fixing white european type wall-hung pan, of size 350mm x 355mm x 570 mm concealed flush tank with floormounting frame installing kit and drain pipe connection set for wall hung WC, with approved make square control plates including soil pipe, vent pipe upto the outside face of wall, 100mm dia C.I. plug bend inlet pipe all fittings, cutting & making good walls, floors etc. complete.	13	Nos		
62	Providing and fixing wall-hung white wash basin of size 470x575x190mm of approved make half pedestal, pillar cock, C.P. Angular stop cock, long thread continental including S.S. bottle trap of having necessary pipe connections up to the outside face of the wall.etc complete.	8	Nos		
63	Providing and fixing Coloured Glazed Earthenware Full Stall Type Urinal with pressmatic urinal flush valve auto closing system with built in control cock & wall flange etc. _Jaquar _PRS-077, with inlet pipes , fitting, flush pipe with fittings and flushing arrangement including lead soil pipe, lead trap soil pipe connection up to the outside face of the wall. Spec. No. Bd.V.23 Page No. 562	4	Nos		

Sr.No.	Description	Quantity	Unit	Rate	Amount
64	Providing and fixing floor trap connection 75mm diameter unplasticized polyvinyl chloride (UPVC) ultra violet stabilized multi floor deep seal Nahani trap including PVC grating conforming to IS 4985, rubber plug and piece of PVC pipes of suitable diameter and length upto outside face of wall and making all joints water tight with providing rubber socketed packing and sealing with suitable and durable water tight resins and making holes in masonry / concrete, redoing the same with cement mortar 1:4 and curing etc. complete. As directed by Engineer in charge.	17	Nos		
65	Providing and fixing Hand shower (health faucet) with 8mm dia. 1m long flexible tube having wall hook with approved make including necessary sockets/ union nut etc. complete as directed by Engineer in charge.	13	Nos		
66	Providing and fixing C.P.Two way BIB cock of approved make continental including necessary sockets/union nut etc. complete.	14	Nos		
67	Providing and fixing C.P. sink cock with raised J" shaped swinging casted spout of approved make including necessary sockets/ union nut etc. complete."	7	Nos		
68	Providing and fixing C. P. Angular Stop Clock With Wall Flange Jaquar Make Or Equivalent Continental (CAT. NO. CON 059) including necessary sockets / union nut etc. complete. Spec.No. As directed by Engineer in charge.	8	Nos		
69	Providing and fixing stainless steel sink of size 600 x 510 x 200 mm includng coupling, outlet pipe, elbow and other necessary fitting, finishing etc. complete.	7	Nos		
70	Providing and fixing 450mm x 550mm size superior type Belgium mirror with 16mm dia. nickel plated towel rod etc. complete.	8	Nos		
71	Providing and fixing Chromium Plated Towel Rod 16 mm Dia And 75 Cm. In Length including all accessories complete. Spec. No. As directed by Engineer in charge.	8	Nos		
72	Providing and fixing Chromium Plated Toilet Paper Holder Jaquar _Continental (Cat No.AQ 7751) including all accessories complete. Spec. No. As directed by Engineer in charge.	13	Nos		
73	Providing & Fixing of Chromium Plated Soap Dish (polyurethane) Jaquar make Contitental (Cat.no.AQN 7733) including all accessories complete for basins, lab sinks etc.complete.Spec. No. As directed by Engineer in charge.	8	Nos		
74	P.V.C. pipe 40mm dia.10kg/cm2 pressure(class IV)	30	RMT		
75	P.V.C. pipe 50mm dia.10kg/cm2 pressure(class IV)	30	RMT		
76	Providing, laying & jointing in position best quality UPVC soil, waste & vent pipes with all fitting like junction of various angles, jointing with rubber ring joints & sealents etc. complete & fixing below floor / ground with bricks supports etc. complete Make - Astral / Prince / Finolex				
	A)75 mm dia	50	RMT		

Sr.No.	Description	Quantity	Unit	Rate	Amount
	B)110mm dia.	20	RMT		
77	Providing and laying cast iron pipes of B class of 150mm diameter with sockets and spigot ends/ flanges and cast centrifugally/ vertically including specials, laying pipes and back filling the trench complete including excavation.	20	RMT		
78	Providing and laying cast iron pipes of B class of 100mm diameter with sockets and spigot ends/ flanges and cast centrifugally/vertically including specials, laying pipes and back filling the trench complete including excavation.	15	RMT		
79	Providing and fixing 15 cm rigid PVC Nahani trap including PVC grating, bend, connectingpiece of UPVC pipe up to the outside face of wall, making the good damaged surface and testing etc. complete (Prior approval of sample and brand by Ex. Engr. is necessary before use)	18	Nos		
80	Providing and fixing on walls/ ceiling/ floor 15 mm dia. CPVC pipe with necessary fittings, remaking good the demolished portion etc. complete. Including removing existing pipe line if necessary and conveying and stacking the same in PWD chowky or as directed etc. complete.	20	RMT		
81	Providing and fixing on walls/ceiling/floor 20 mm dia. CPVC pipe with necessary fittings, remaking good the demolished portion etc. complete. Including removing existing pipe line if necessary and conveying and stacking the same in PWD chowky or as directed etc. complete.	30	RMT		
82	Providing and fixing on walls/ ceiling/ floor 25 mm dia. CPVC pipe with necessary fittings, remaking good the demolished portion etc. complete. Including removing existing pipe line if necessary and conveying and stacking the same in PWD chowky or as directed etc. complete.	20	RMT		
83	Providing and fixing on walls/ ceiling/ floor 32 mm dia. CPVC pipe with necessary fittings, remaking good the demolished portion etc. complete. Including removing existing pipe line if necessary and conveying and stacking the same in PWD chowky or as directed etc. complete.	20	RMT		
84	Providing and fixing on walls/ ceiling/ floor 50 mm dia. CPVC pipe with necessary fittings, remaking good the demolished portion etc. complete.	10	RMT		
85	Supplying, erecting, testing and commissioning selfcontained water cooler 230/250V 50 cycles nominal cooling capacity of 40 litres/hr and storage capacity 80 litres with partially stainless steel body complete. specification no. APWCR/ WC	2	Nos		

Sr.No.	Description	Quantity	Unit	Rate	Amount
86	Supplying and erecting ultra violet water purifier with softener for safe drinking water consisting of UV germicidal tube of 8W capacity, choke made of copper wire, two indicator lamps, dual function cartridge with output of purified water 2 litre/min. with activated carbon filter and softener operating on 230 V single phase AC supply.	2	Nos		
TOTAL OF CIVIL WORK (A)					
PART 'B'- INTERNAL ELECTRIFICATION WORK					
87	Supplying and erecting PVC trunking (PVC casing-n-capping) of size 25 mm with accessories on wall/ceiling as per specification No: WG-MA/CON.	500	RMT		
88	Supplying and erecting PVC trunking (PVC casing-ncapping) of size 32 mm with accessories on wall/ceiling as per specification No: WG-MA/CON.	200	RMT		
89	Supplying and erecting PVC trunking (PVC casing-ncapping) of size 40 mm with accessories on wall/ceiling as per specification No: WG-MA/CON.	415	RMT		
90	Supplying & erecting mains with 2x1.5 sq.mm FRLSH copper PVC insulated wire laid in provided conduit/trunking/inside pole/Bus bars or any other places as per specification No: WGMA/ BW	1000	RMT		
91	Supplying & erecting mains with 2x2.5 sq.mm FRLSH copper PVC insulated wire laid in provided conduit/trunking/inside pole/Bus bars or any other places. as per specification No: WGMA/BW	1000	RMT		
92	Supplying and erecting ISI mark modular type electronic step regulator for fan two module, duly erected on provided plate and box with wiring connections complete.	40	Nos		
93	Point wiring for light/fan/bell concealed type in min 20 mm ISI marked HMS PVC conduit with 1.5 sq.mm. (2+1E) FR grade copper wires, modular type switch, earthing and required accessories as per specification No: WG-PW/CW	569	Nos		
94	Supplying and erecting ISI mark modular switch with LED indicator available to connect in a switch board to glow LED when connected load is off, on provided double mounting plate complete duly erected.	150	Nos		
95	Supplying and erecting regular/ standard model ceiling fan of 1400mm. sweep complete erected in position as per specification no. FG-FN/CF	40	Nos		
96	Supplying and erecting fresh air cum exhaust fan of light duty 250V A.C. 50 cycles 300mm. 1400 RPM rust proof body & blades, wire mesh, duly erected in an approved manner.	11	Nos		
97	Supplying & erecting on line UPS pure sine wave of 10 kVA capacity complete with standard features, along with necessary SMF batteries for 30 mins battery backup, as per specification no. AP-UPS	2	Nos		
98	Supplying and erecting 12 V/80Ah to 88 Ah tubular battery with battery terminal wire, duly charged complete with 36 months warranty complete	32	Nos		
99	Supplying erecting and marking double pole isolator only switch version of miniature circuit breaker of 40A with required wiring connections and lugs etc. in provided distribution board complete.	138	Nos		

Sr.No.	Description	Quantity	Unit	Rate	Amount
100	Supplying erecting and marking four pole isolators only switch version of miniature circuit breakers of 63A in provided distribution board complete.	20	Nos		
101	Supplying and erecting triple pole and neutral distribution board (TPNDB) surface/ flush mounted suitable for SPMCB of 24 ways on iron / GI frame (horizontal busbar type) as per specification no. SW-SWR/MCDB	6	Nos		
102	Providing & erecting 4 Pole MCCB of 315/400A, 415V capacity with S.C. rating 36 kA (Ics=100% of Icu), adjustable thermal and magnetic setting with provided leads, provision for installation of shunt/ UV/ trip alarm contact and MCCB should have phase barriers both sides, in provided enclosure on iron /GI frame as per specification no. SW-SWR/MCCB	1	Nos		
103	Providing & erecting floor / wall mounting, MCCB panel board with door suitable for four pole incoming 250A, 4 ways four pole outgoing upto 100 A MCCB's on iron frame, as per specification no SW-SWR/MCCBPB. (Excluding MCCB'S)	1	Nos		
104	Supplying and erecting GI sheet of 1.25mm (18 SWG) size 200 x 150 mm duly painted with red oxide & enamel paint for displaying the department, date of erection of the electrical installation with approved shade complete.	4	Nos		
105	Supplying and erecting metal work in CRCA sheet with fabrication of boxes panel boards etc. including cutting,bending, drilling, welding, rivetting etc. treated with anti-rust treatment and duly power coated or painted with one coat of red lead paint and 2 coats of enamel paint as complete	40	Kg		
106	Supplying and erecting panel mounting type digital ammeter having three and half digit LED display, external CT operated, calibrated for suitable to operate on 500V, 0 to 1000A AC supply with necessary PVC wire leads and lugs and mounting hardware on provided panel complete with calibration certificate from manufacturer.	1	Nos		
107	Supplying and erecting panel mounting type digital voltmeter having three and half digit LED display, calibrated for 0 to 750V AC suitable to operate on 500V AC supply with necessary PVC wire leads and lugs and mounting hardware on provided panel complete with calibration certificate from manufacturer.	1	Nos		
108	Supplying and erecting digital frequency meter of 3 digit LED display having 0 to 100 Hz range suitable to operate on 500V AC supply with necessary PVC wire leads and lugs and mounting hardware on provided panel complete with calibration certificate from manufacturer.	1	Nos		
109	Supplying and erecting 525 V 3 phase, 50 Hz., MPP type capacitor having minimum overcurrent capacity of 1.8 In, peak inrush current capacity 300 In and minimum life 150000 hours kVAR bank of all polypropylene condensers (APP) with the standard capacities of 2, 3, 5, 7, 10, 12.5 and 15 kVAR units of P.F. correction for operation on 3 phase 50 Hz. with externally discharging resistances, earthing terminals and built on angle iron or channel iron frame work and provided with terminal cover box complete erected on provided iron bracket or on floor duly tested by licensee.	25	KVAR		

Sr.No.	Description	Quantity	Unit	Rate	Amount
110	Supplying, erecting & terminating XLPE armoured cable 1100 V. 3½ core 185 sq. mm. aluminium conductor with continuous 12.97 sq. mm. (8 SWG) G.I. earth wire complete erected with glands & lugs, on wall/ trusses/pole or laid in provided trench/ pipe as per specification no. CB-LT/AL	80	RMT		
111	Supplying, erecting & terminating XLPE armoured cable 4 core 120 sq. mm. aluminium conductor with continuous 12.97 sq. mm. (8 SWG) G.I. earth wire complete erected with glands & lugs, on wall/ trusses/pole or laid in provided trench/ pipe as per specification no. CB-LT/AL	200	Rmt		
112	Providing earthing with galvanized iron earth plate size 60 x 60 x 0.6 cm complete with all materials, testing & recording the results as per specification no. EA-EP	6	Nos		
113	Providing earthing with copper earth plate size 30 x 30 x 0.315 cm complete with all materials, testing & recording the results as per specification no. EA-EP	2	Nos		
114	Supplying and erecting copper strip of required size used for earthing on wall and/or any other purpose with necessary copper clamps fixed on wall painted with bituminous paint in an approved manner with joints required. As per specification no. EA-EP.	30	Kg		
115	Supplying and erecting GI strip of required size used for earthing on wall and/or any other purpose with necessary GI clamps fixed on wall painted with bituminous paint in an approved manner with joints required. As per specification no EA-EP.	50	Kg		
116	Providing printed instruction chart for treating persons suffering from electric shock, printed in English & Marathi and duly laminated complete.	1	Nos		
117	Supplying standard first aid box with necessary antiseptic cream, medicine for use on wounds due burn, crepe bandage, gauge bandage, medicated ready to use bandage (Band-Aid) adhesive tape for medicinal use, scissors, anti-septic solution, etc. (All above contents shall be of standard makes)	2	Nos		
118	Supplying and fixing PVC synthetic elastomer electrically insulating mat with class B insulation conforming to IS: 15652 – 2006 & CPRI tested having 2.5 mm thickness upto 11 kV	4	Sqm		
119	Supplying, erecting and commissioning of diesel generating set with alternator of 62.5 kVA output continuous rating, 3 phase, 415 V, 50c/s 0.8 p. f. A.C a totally enclosed air cooled / liquid cooled multi-cylinder diesel engine developing suitable BHP at 1500 rpm with 10% overload for 1 hour in 12 hours, along with standard accessories, self-excited, self-regulated, screen protected alternator with static excitation system running at 1500 RPM as per IS 4722- 2001 with voltage regulation +/- 5 %. Both the engine and alternator direct coupled on a common fabricated steel base frame and mounted on anti-vibrating pads with standard control panel comprising meters, switchgears, indicators connected with suitable wires/cables, the complete set enclosed in composite acoustic enclosure as fully assembled integral unit made of 16 SWG CRCA Sheet, sound absorbing material to restrict sound level upto 75 dB at 1.0 m, provided with first filling of oil, diesel etc. as per specification no. GEN-DG	1	Nos		

Sr.No.	Description	Quantity	Unit	Rate	Amount
120	Supplying, erecting, testing and commissioning of Microprocessor based AMF panel suitable for diesel generating set of above 62.5 kVA upto 82.5 kVA capacity Single/Three phase, 230/415 Volts, 50Hz A.C. with all standard features, safeties etc as per specification no. GEN-AMF.	1	Nos		
121	Supplying and erecting rectangular shaped CRCA /die-cast aluminium powder coated housing LED panel (slim edge-lit) 300x1200mm of suitable for 36 to 40 W with provision for plane front frame with translucent cover fixed to the housing complete.	28	Nos		
122	Supplying and erecting square shaped CRCA / die-cast aluminium powder coated housing LED Panel light (slim edge-lit) 600 x 600 mm suitable for 36 W to 40 W with provision for plane front frame with translucent cover fixed to the housing complete. (Make - Philips/Wipro)	85	Nos		
123	Supplying and erecting LED square / circular 16 to 20W downlighter having pressure die-cast aluminium housing, opal translucent cover, mounting arrangement with board for surface type or spring loaded mounting clips for flush type complete. (Make - Philips/Wipro)	119	Nos		
124	Supplying, Erecting, testing and Commissioning of Indoor decorative luminaire suitable for T5 lamps as of Wipro make cat no. WRF 80128 SG 1x28w FTL (T5). Including choke, lamp & all accessories	33	Nos		
125	Supplying, Erecting, testing and Commissioning of Functional glare free lumi for surface mounting suitable for TLD/TL fluorescent lamp with opal acrylic cover as of Philips Cat No. TCS 019 1xTLD 36W EBS. Including choke, lamp & all accessories	8	Nos		
126	Supplying, installing, testing and commissioning cassette type variable speed inverter technology split room air conditioning unit 3 TR capacity having ISEER maximum 4.50, suitable to operate on 230V /415 V, 50 cycles, AC supply having 1 no. air handling unit false ceiling mounting type complete with refrigerant R32/R410A & copper condenser coil at position with provided copper piping and drainage pipe.	2	Nos		
127	Providing & erecting Hot dipped galvanized ladder type cable tray manufactured from 16 swg (1.6 mm thick) GI sheet of 150 mm width & 100 mm height comprising all required standard accessories.	250	Rmt		
128	Supplying & fixing anchor type fastener fan hook, with 2 nos. of 10 mm dia x 75 mm long with necessary materials for ceiling fan.	92	Nos		
129	Supplying and erecting 'B' grade G.I. pipe / M.S. pipe down rod duly painted for fan complete erected with PVC three core flexible cable 1 sq. mm copper PVC wire.	25	Nos		
130	Dismantling the existing light, fan, bell, clock, independent plug point, wiring including circuit mains of all types along with accessories etc. complete as per specification No: WG-DM/PW	70	Point		
	CCTV Work				
131	Supplying, erecting and Testing RG 59 Coaxial Video Cable 4+1 including all labour charges etc. complete.	600	Rmt		
132	Supplying, erecting and Testing IR dome Cameras Day and Night vij. IR Rang of 4 Mtrs. With 18 LED's 600 TVL Normal Resolution camera 3.6 mm fixed Lens including all labour charges etc. complete.	12	Nos		

Sr.No.	Description	Quantity	Unit	Rate	Amount
133	Supplying, erecting and Testing IR Bullet Cameras IR Rang of 10 Mtrs. With 26 LED's 650 TVL Normal Resolution camera ncluding all labour charges etc. complete.	8	Nos		
134	Supplying, erecting and Testing of digital video recorder with all asseceries ncluding all labour charges etc. complete.	1	Nos		
	EPABX And LAN Work				
135	Supplying and erecting ISI marked modular type telephone socket one gang with safety shutter, duly erected on provided plate and box with wiring connections complete.	45	Nos		

Sr.No.	Description	Quantity	Unit	Rate	Amount
136	Supplying and erecting ISI mark modular type computer jack RJ 45 with safety shutter, duly erected on provided plate and box with wiring connections complete.	55	Nos		
137	Supplying & erecting jelly filled armoured telephone copper cable 50 pair with 0.5 mm dia. laid in provided trench as per specification No. WG-TW	50	Rmt		
138	Supplying, erecting & commissioning MDF Box 60 x 60 pairs as per specification No. WG-TW	1	Nos		
139	Supplying & installing UTP networking cat-6 cable suitable for LAN / WAN Computer net-working as per specification No. WG-COC/NC	1200	Rmt		
140	Supplying, installing & testing UTP connector (RJ-45) as per specification No. WG-NAS/UTPC.	55	Nos		
141	Supplying and fixing 24 port patch panel with tool-less keystone jacks in provided U Rack complete as per specification no. WG-NAS/PP	2	Nos		
142	Supplying & erecting jelly filled armoured telephone copper cable 10 pair with 0.5 mm dia. laid in provided trench as per specification No. WG-TW	250	Rmt		
143	Supplying & erecting jelly filled unarmoured telephone copper cable 20 pair with 0.5 mm dia. laid in provided PVC casing capping / conduit as per specification No. WG-TW	500	Rmt		
144	Supplying and installing, testing & commissioning of digital (hybrid) type EPABX of 6 x 24 extensions suitable upto 96 extensions complete.	1	Job		
145	Supplying & erecting jelly filled armoured telephone copper cable 20 pair with 0.5 mm dia. laid in provided trench as per specification No. WG-TW	750	Rmt		
146	Supplying, erecting & commissioning 10 pair module for connection & disconnection of telephone cable as per specification No. WG-TW	4	Nos		
147	Supplying, installing, testing & commissioning push button telephone instrument desk top/wall mount with caller ID unit as per specification complete.	5	Nos		
148	Supplying, installing, testing & commissioning push button telephone instrument desk top/wall mount unit as per specification complete	40	Nos		
TOTAL OF INTERNAL ELECTRIFICATION (B)					

Sr.No.	Description	Quantity	Unit	Rate	Amount
	PART 'C'- FIRE FIGHTING WORK				
	DETECTORS				
149	Supplying, installing, testing and commissioning optical type smoke detector complete on box as per specification no. FFFAS/ SD	106	Nos		
	MANUAL CALL POINT				
150	Supplying, installing, testing and commissioning manual call point (Pill box) with break glass push button in metal enclosure complete as per specification no. FF-FAAS/MCP	7	Nos		
	ELECTRONIC HOOTERS				
151	Supplying, installing, testing and commissioning hooters with CRCA enclosure complete as per specification no. FF FAAS/HTR	7	Nos		
	RESPONSE INDICATORS				
152	Supplying, installing, testing and commissioning remote response indicators complete as per specification no. FF-FAAS/RI	15	Nos		
153	Supplying, installing, testing and commissioning FR, XLPE armoured cable 2 core 1.5 sq.mm. copper conductor complete erected on wall/ ceiling complete as per specification no. CBLT/ CU	1300	Rmt		
154	Supplying, installing, testing and commissioning of 8 Zones Microprocessor based conventional fire alarm control panel (FACP) with standard accessories complete as per specification no. FF-FAAS/FACP	1	Nos		
	EXTINGUISHER				
155	Supplying and erecting D.C.P. type fire extinguisher 6 kg capacity cartridge type with gun metal cap 150 gram CO2 gas cartridge, powder and brackets conforming to IS 2171-1985/ IS 15683 and complete erected with necessary clamps made from 50x6 mm M.S. flat with nuts & bolts grouted in wall complete.	22	Nos		
156	Supplying & erecting Carbon Dioxide (CO2) fire extinguisher of 4.5 kg. capacity cartridge type conform to IS 2878 /15683 complete erected with necessary clamp made from 50 x 6 mm. M. S. flat with nut & bolts grouted in wall complete.	22	Each		
	G.I. Pipes				
	Supplying and installing G.I.pipe of 'C' class ERW conforming to IS: 1239, alongwith necessary fittings and M.S. angle iron supports or GI threaded U clamps, pipe supports with one coat of red oxide primer and two coats of Post office fire red enamel paint, duly tested to 1.5 times of working pressure, in an approved manner.				
157	Supplying and erecting G.I. pipe above ground of 'C' class ERW of size 25 mm dia with necessary fittings as per specification no.FF-PP	450	RMT		
158	Supplying and erecting G.I. pipe above ground of 'C' class ERW of size 50 mm dia with necessary fittings as per specification no.FF-PP	210	RMT		
159	Supplying and erecting G.I. pipe above ground of 'C' class ERW of size 75 / 80 mm dia with necessary fittings as per specification no.FF-PP	30	RMT		
	SPRINKLER				

Sr.No.	Description	Quantity	Unit	Rate	Amount
160	Supplying and erecting, testing and commissioning of 15 mm (½") dia. NBCM Body chrome finished quartzoid bulb sprinkler having 68° C fixed temperature rating with deflector disc of conventional construction as per specification No. FF-SPR	300	Each		
161	Supplying & erecting, testing and commissioning vane type water flow detector suitable for detecting flow of water in wet sprinkler pipe of main line or branch lines of 100 mm dia having following features 1) Visual Switch Activation 2) Rugged Switch Assembly 3) Heavy Duty Alluminium pipe Saddles 4) Durable Metal Encloser 5) Steel U Bolts For Secure Mounting 6) Two SPDT (Single Pole Double Track) Synchronised Switches 7) Serviceable Without Draining Pipes	2	Each		
TOTAL OF FIRE FIGHTING WORK (C)					
PART C- C AIR CONDITIONING WORK					
HI-SIDE WORKS					
162	SUPPLY OF AIR COOLING UNIT				
	Supply of Evaporative air cooling unit with U.V. stabilized polymer body ,electrical motor , cell deck pad , water circulation pump , water distribution system and coarded remote to operate single speed unit.Capacity : 6500 CFM at 8mm static pressure. MAKE: Eco air (Three Phase unit) (Excluding electrical connection , we will required 4c x 2.5 Sq.mm. copper cable)	9	Nos		
163	LOW SIDE WORKS				
	Installation of evaporative air cooling units, Air Flow : 6000 CFM	9	Nos		
SHEET METAL DUCTING					
164	Supply, Installation, Testing & Commissioning of following: Rectangular ducting complete with proper painted M.S. supports, air tight joints with proper thickness neoprene rubber gasket, applied with sealant etc. Nut bolts should be plated. Ducting as per drawings. Make for GI Sheet :- Jindal / uttam /Tata				
	24 Gauge GI	7000	Sq.ft.		
	22 Gauge GI	2000	Sq.ft.		
165	Supply and installation of alluminium powdercoated grill with volume control damper for supply air	90	Sq.Ft.		
166	Supply and installation of alluminium powdercoated grill without volume control damper for Exhaust air	1	Sq.Ft.		
ALL TYPES OF INSULATION					
167	External ducting Insulation with 50 mm thick TF quality thermocole, with bituminous compound, Wiremesh 24G .Sand cement plaster is in client scope.	2000	Sq.Ft.		
168	Thermal Insulation with 9 mm thick nitrile rubber insulation. Make : Armaflex , K- flex , Supreme .	1	Sq.Ft.		
169	Accoustic insulation with 25 mm thick open cell insulation	1000	Sq.Ft.		

Sr.No.	Description	Quantity	Unit	Rate	Amount
	Make : Armaflex , K- flex , Supreme .				
	M.S. FABRICATION WORK				
170	M.S. fabrication work for air washer stand with proper painting	500	Kg.		
	FRP LINING .				
171	FRP lining at duct entry and wall finishing joint to restrict the water leakage	300	Sq.Ft.		
	ELECTRICAL CABLING WORK.				
172	Electrical cabling work				
	4 pair lan cable for remote extension if require	50	Rmt		
	Cable Make - Polycab , indoplast , KEI etc				
GRAND TOTAL OF AIR CONDITIONING WORK (D)					
TOTAL OF PART (A+B+C+D)					
SAY					