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Driving Sustainable Performance

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Title of Tender: REHABILITATION AND TRANSFORMATION OF ICPAR BUILDING INTO MODERN OFFICES AT KACYIRU/ GASABO DISTRICT

Tender Reference Number: 002/SIS/12/2018

Procurement Method: Open Competitive Bidding

November 2018

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TENDER NOTICE

Tender Notice

REHABILITATION AND TRANSFORMATION OF ICPAR BUILDING INTO MODERN OFFICES

1. The Institute of Certified Public Accountants of Rwanda (ICPAR) (hereinafter called ‘’Client”) intends to apply a portion of the funds to eligible payments under the contract for which this Bidding Document is issued. ICPAR now invites, by the present invitation to tender, sealed bids from eligible and qualified bidders for the Rehabilitation and transformation of ICPAR building into modern offices.

   The execution period is: **3 months**.

2. Bidding will be conducted through Open Competitive bidding and is open to all bidders specialized in the field of construction.
   Qualification requirements include both Technical and financial means.

3. The Tender Document may be obtained downloaded from ICPAR website (www.icparwanda.com). Bidders may obtain further information at ICPAR Office at Kacyiru or email to tender@icparwanda.com, not later than 7 days prior to the deadline for submission of bids.

4. Well printed bids in English language, valid for 120 days from the bids submission deadline, accompanied by the Bid Security of 3,000.000RWF, properly bound and presented in four copies, one of which is the original and three copies must reach iCPAR offices not later than, 24/12/2018 at 10: 00 am local time. Copies shall be put into an envelope marked, as follows: **Rehabilitation and transformation of ICPAR building into modern offices**. The opening of bids will take place on the same day at 10: 30 am local time in ICPAR board room.

5. Compulsory site visit is scheduled on 12th December 2018. The venue for departure for site visit is current ICPAR offices at 8:30am. Bidders will cater for their own transport for site visit.

Hadija Murangwa
Director of Strategy and Institutional Sustainability
ICPAR

Section I. Instructions to Bidders Instructions to Bidders (ITB)

A. General

1. Scope of Bid

1.1 The Procuring Entity, as defined in **the Bid Data sheet** invites bids for the construction of Works, as **described in the BDS**.

1.2 The successful Bidder shall be expected to complete the Works by the Intended Completion **Date specified in the BDS**

1.3 Throughout these Bidding Documents:

(a) the term "in writing" means communicated in written form (e.g. by mail, e-mail)

(b) if the context so requires, "singular" means "plural" and vice versa; and

(c) "day" means calendar day.

2. Source of Funds

The Procuring Entity, **as defined in the BDS,** intends to apply part of tits funds towards the to cover eligible payments under the Contract for the Works as defined in BDS.

3. Fraud and Corruption

Bidders are required to observe the highest standard of ethics during the procurement proceedings and execution of such contracts:

(a) For the purposes of this provision, the following terms are defined as follows:
   (i) **"corrupt practice"** means the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence the action of a public official in the procurement process or in contract execution;
   (ii) **"fraudulent practice"** means a misrepresentation or omission of facts in order to influence a procurement process or the execution of a contract;
   (iii) **"collusive practice"** means a scheme or arrangement between two or more Bidders, with or without the knowledge of the Procuring Entity, designed to establish bid prices at artificial, non competitive levels; and

   (iv) **"coercive practice"** means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the procurement process or affect the execution of a contract;

(b) shall reject a proposal for award if it determines that the Bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive or coercive practices in competing for the Contract in question;

(c) shall cancel or renounce to the use of the portion of the fund allocated to a contract if it determines at any time that representatives of the Funding Agency or of a beneficiary of the fund engaged in corrupt, fraudulent, collusive or coercive practices during the procurement or the execution of that contract.

(d) shall sanction a firm or individual, including declaring them ineligible, either indefinitely or for a stated period of time, if it at any time determines that they have, directly or through an agent, engaged, in corrupt, fraudulent, collusive or coercive practices in competing for, or in executing, a contract; and

4. Eligible Bidders

4.1 A Bidder, and all parties constituting the Bidder, may have the nationality of any country, unless otherwise provided for by the BDS. A Bidder shall be deemed to have the nationality of a country if the Bidder is a citizen or is constituted, incorporated, or registered and operates in conformity with the provisions of the laws of that country. This criterion shall also apply to the determination of the nationality of proposed subcontractors.

4.2 A Bidder shall not have a conflict of interest. All Bidders found to have conflict of interest shall be disqualified. Bidders may be considered to have a conflict of interest with one or more parties in this bidding process, if they are associated, or has been associated in the past, directly or indirectly, with the consultant or any other entity that has prepared the design, specifications, and other documents for the Project or being proposed as Project Manager for the Contract. A firm that has been engaged by the Procuring Entity to provide consulting services for the preparation or supervision of the Works, and any of its affiliates shall not be eligible.

5. Qualifications of the Bidder

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

5.2 In the event that prequalification of potential bidders has been undertaken, only bids from prequalified bidders shall be considered for award of Contract. These qualified bidders should submit with their bids any information updating their original prequalification applications or, alternatively, confirm in their bids that the originally submitted prequalification information remains essentially correct as of the date of bid submission. The update or confirmation should be provided in Section IV.

5.3 If the Procuring Entity has not undertaken prequalification of potential bidders, all bidders shall include the following information and documents with their bids in Section IV, unless otherwise **stated in the BDS**:

(a) Copies of original documents defining the constitution or legal status, place of registration, and principal place of business of the Bidder; written power of attorney of the signatory of the Bid to commit the Bidder;

(b) Total monetary value of construction works performed for each of the last five years;

(c) Evidence of relevant experience in the execution of works of similar nature, including the nature and value of the relevant contracts for each of the last five years, as well as works in hand and contractually committed. The evidence must answer at least the criteria indicated to under subparagraph 5.5 below.

(d) Major items of construction equipment proposed to carry out the Contract. The descriptions must demonstrate the bidder's ability to complete the works and should include inter area:

The Bidder must indicate whether such equipment is owned by him, hired or used by subcontractor.

(e) Qualifications and experience of key site management and technical personnel proposed for the Contract with their CVs and academic testimonials

(f) Evidence of adequacy of working capital for this Contract (access to line(s) of credit and availability of other financial resources);

(g) Authority to seek references from the Bidder's bankers;

(h) Information regarding any litigation, current or during the last five years, in which the Bidder was/is involved, the parties concerned, and the disputed amounts; and awards;

(i) Proposals for subcontracting components of the Works amounting to more than 10 percent of the Contract Price. The ceiling for sub contractor's participation is **stated in the BDS.**

5.4 Bids submitted by a JV of two or more firms in partnership shall comply with the following requirements, unless otherwise **stated in the BDS**:

(a) The Bid shall include all the information listed in ITB Sub-Clause 5.3 above for each joint venture partner;

(b) The Bid shall be signed so as to be legally binding on all partners;

(c) All partners shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms;

(d) One of the partners shall be nominated as being in charge, authorized to incur liabilities, and receive instructions for and on behalf of any and all partners of the joint venture; and

(e) The execution of the entire Contract, including payment, shall be done exclusively with the partner in charge.

(f) A copy of the JV Agreement entered into by the partners shall be submitted with the bid; or a Letter of Intent to execute a JV agreement in the event of a successful bid shall be signed by all partners and submitted with the bid, together with a copy of the proposed Agreement.

5.5 To qualify for award of the Contract, bidders shall meet the following minimum qualifying criteria

(a) An average annual financial amount of construction work over the period specified in the **BDS** of at least the multiple indicated in the **BDS**

(b) Experience as prime contractor in the construction of at least the number of works of a nature and complexity equivalent to the Works over the period **specified in the BDS** (to comply with this requirement, works cited should be at least 70 percent complete);

(c) Proposals for the timely acquisition (own, lease, hire, etc.) of the essential equipment **listed in the BDS**;

(d) a Contract Manager with five years' experience in works of an equivalent nature and volume, including no less than three years as Manager; and

(e) Liquid assets and/or credit facilities, net of other contractual commitments and exclusive of any advance payments which may be made under the Contract, of no less than the amount **specified in the BDS**.

A relevant history of litigation or arbitration awards against the Applicant or any partner of a Joint Venture may result in disqualification.

5.6 The figures for each of the partners of a JV shall be added together to determine the Bidder's compliance with the minimum qualifying criteria of ITB Sub-Clauses 5.5 (a) and (e); however, for a joint venture to qualify, each of its partners must meet at least 25 percent of minimum criteria of ITB Sub-Clauses 5.5 (a) and (b) for an individual Bidder, and the partner in charge at least 40 percent of those minimum criteria. Failure to comply with this requirement shall result in rejection of the joint venture's Bid. Subcontractors' experiences and resources shall not be taken into account in determining the Bidder's compliance with the qualifying criteria, unless otherwise **stated in the BDS**.

5.7 Domestic bidders and joint ventures of domestic bidders applying for eligibility for the percent of margin's preference, **as specified in the BDS,** in bid evaluation shall supply all information to satisfy the criteria for eligibility as described in ITB Clause 31.

6. One Bid per Bidder

Each Bidder shall submit only one Bid, either individually or as a partner in a joint venture. A Bidder who submits or participates in more than one Bid (other than as a subcontractor or in cases of alternatives that have been permitted or requested) shall cause all the proposals with the Bidder's participation to be disqualified.

7. Cost of Bidding

The bidder shall bear all costs associated with the preparation and submission of his Bid, and the Procuring Entity shall in no case be responsible or liable for those costs.

8. Site Visit

The Bidder, at the Bidder's own responsibility and risk, is encouraged to visit and examine the Site of Works and its surroundings and obtain all information that may be necessary for preparing the Bid and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the Bidder's own expense.

B. Bidding Documents

9. Contents of Bidding Documents

The set of Bidding Documents comprises the documents listed below and addenda issued in accordance with ITB Clause 11:

Tender Notice /Invitation for Bids

Section I	Instructions to Bidders
Section II	Bid Data Sheet
Section III	Forms of Bid, Qualification Information, Letter of acceptance, Agreement
Section IV	General Conditions of Contract
Section V	Special Conditions of Contract
Section VI	Specifications
Section VII	Drawings
Section VIII	Bill of Quantities
Section IX	Forms of Securities

10. Clarification of Bidding Documents

A prospective Bidder requiring any clarification of the Bidding Documents may notify the PE in writing at the PE's address **mentioned in the BDS.** The PE shall respond to any request for clarification received earlier than (7) days prior to the deadline for submission of bids. Copies of the PE's response shall be forwarded to all potential bidders including a description of the inquiry, but without identifying its source.

11. Amendment of Bidding Documents

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

11.2 Any addendum thus issued shall be part of the Bidding Documents and shall be communicated in writing to all purchasers of the Bidding Documents. Prospective bidders shall acknowledge receipt of each addendum in writing to the P E.

11.3 The PE may, as necessary and in accordance with ITB Sub-Clause 21.2 below, extend the deadline for submission of tenders to give Bidders sufficient time to take modifications into account when preparing their tenders.

C. Preparation of Bids

12. Language of Bid

All documents relating to the bid shall be in the languages **Specified in the BDS**.

13. Documents Composing the Bid

The Bid submitted by the Bidder shall comprise the following document:

(a) The Bid (in the format indicated in Section IV);

(b) Bid Security, in accordance with ITB/TN Clause 17, if required;

(c) Priced Bill of Quantities;

(d) Qualification Information Form and Documents;

(e) Alternative offers where invited;

And any other materials required to be completed and submitted by bidders, as **specified in the BDS.**

14. Bid Prices

14.1 The Contract shall be for the whole Works, as described in ITB/TN Sub-Clause 1.1, based on the priced Bill of Quantities submitted by the Bidder.

14.2 The Bidder shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Items for which no rate or price is entered by the Bidder shall not be paid for by the Procuring Entity when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities. Corrections, if any, shall be made by crossing out, initialing, dating and rewriting and stamped on, if required.

14.3 All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause prior to the deadline for submission of bids, shall be included in the rates, prices, and total Bid price submitted by the Bidder.

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

15. Currencies of the Bid and Payment

15.1 The unit rates and prices shall be quoted by the Bidder entirely in Rwandan Franc. Foreign currency requirements shall be mentioned as percentages of the Bid price (excluding provisional sums) and shall be payable at the Bidder's option in only one bidder's chosen foreign currency.

15.2 The exchange rate to be used by the Bidder in arriving at the local currency equivalent and the percentages mentioned in Para. 15.1 above shall be the selling rates for similar transactions established by the authority **specified in the BDS** prevailing on the deadline for submission of bids. These exchange rates shall be applied for all transactions so that no exchange risk shall be borne by the Bidder. If the Bidder uses other rates of exchange, the provisions of ITB Clause 29.1 shall be applied; in any case, payments shall be computed using the rates quoted in the bid. Bidder shall indicate in advance all the details of any expected foreign currency requirements in the Bid.

15.3 Bidder may be required by the Procuring Entity to clarify the foreign currency requirements and to substantiate that the amounts included in the rates and prices, **if required in the BDS,** are reasonable and responsive to ITB Sub-Clause 15.1.

16. Bid Validity

16.1 Bids shall remain valid for the period **specified in the BDS.**

16.2 In exceptional circumstances, the PE may request that the bidders extend the period of validity for a specified additional period. The request and the bidders' responses shall be made in writing. If a Bid Security is requested in accordance with ITB Clause 17, it shall be extended up to 30 days after the deadline of the extended bid validity period. A Bidder may refuse the request without forfeiting the Bid Security. A Bidder agreeing to the request shall not be required or permitted to modify his/her Bid, except as provided in ITB Clause 17.

17. Bid Security

17.1 The Bidder shall provide as part of its Bid, a Bid Security in original form as specified in the BDS, **if required in the BDS**.

17.2 The Bid Security shall be in the **amount specified in BDS** and denominated in the Rwandan Francs or the currency of the Bid or in another freely convertible currency, and shall:

(a) be in the form of either, a bank guarantee from a banking institution, or surety issued by an financial institution, as the bidder would wish;

(b) Be issued by a reputable institution selected by the bidder and located in any country. If the financial institution issuing the surety is located outside the Republic of Rwanda, it shall have a correspondent financial institution located in the Republic of Rwanda to make it enforceable.

(c) Be substantially in accordance with one of the forms of Bid Security included in Section IX "Security Forms," or other form approved by the Procuring Entity prior to bid submission;

(d) Be payable promptly upon written demand by the Procuring Entity in case the conditions listed in ITB Clause 17.5 are invoked;

(e) Be submitted in its original form; copies shall not be accepted;

(f) Remain valid for a period of 30 days beyond the validity period of the bids, as extended, if applicable, in accordance with ITB Clause 16.2.

17.3 If a Bid Security is required in accordance with ITB Sub-Clause 17.1, any bid not accompanied by a substantially responsive Bid Security in accordance with ITB Sub-Clause 17.1, shall be rejected by the Procuring Entity as non-responsive.

17.4 The Bid Security of unsuccessful Bidders shall be returned as promptly as possible upon the successful Bidder's furnishing of the performance security.

17.5 The Bid Security may be forfeited :

(a) If a Bidder withdraws its bid during the period of bid validity specified by the Bidder on the Bid Submission Sheet, except as provided in ITB Sub-Clause 16.2; or

(b) If the Bidder does not accept the correction of its Bid Price pursuant to ITB Sub-Clause 28.

(c) If the successful Bidder fails within the specified time to:

(i) Sign the Contract; or (ii) furnish the required performance security.

17.6 The Bid Security under JV must be in the name of the JV that submits the bid. If the JV has not been legally constituted at the time of bidding, the Bid Security shall be in the names of all future partners as named in the letter of intent.

18. Alternative Proposals by Bidders

18.1 Alternatives shall not be considered, unless specifically **allowed in the BDS.** If so allowed, ITB Sub-Clauses 18.1 and 18.2 shall govern, and BDS shall specify which of the following options shall be allowed:

(a) Option One. A bidder may submit alternative bids with the base bid and the Procuring Entity shall only consider the alternative bids offered by the Bidder whose bid for the base case was determined to be the lowest-evaluated bid, or

(b) Option Two. A bidder may submit an alternative bid with or without a bid for the base case. All bids received, for the base case, as well as alternative bids meeting the technical specifications and performance requirements pursuant to Section VII, shall be evaluated on their own merits.

18.2 Alternative bids shall provide all information necessary for a complete evaluation of the alternative by the Procuring Entity, including design calculations, technical specifications, breakdown of prices, proposed construction methods and other relevant details.

19. Format and Signing of Bid

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

19.2 The original and all copies of the Bid shall be typed in indelible ink and shall be signed by a person or persons duly authorized to sign on behalf of the Bidder, pursuant to ITB Sub-Clause 5.3 (a). All pages of the Bid where entries or amendments have been made shall be initialed by the person or persons signing the Bid.

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

19.4 The Bidder shall provide information as described in the Form of Bid on commissions or gratuities, if any, paid or to be paid to agents relating to this Bid, and to contract execution if the Bidder is awarded the contract.

D. Submission of Bids

20. Submission, Sealing and Marking of Bids

20.1 Bidders will only submit their bids by hand. The Bidder shall seal the original and all copies of the Bid in two inner envelopes and one outer envelope, duly marking the inner envelopes as "ORIGINAL" and "COPIES."

20.2 The inner and outer envelopes shall

(a) Be addressed to the Procuring Entity at the address **provided in the BDS;**

(b) Bear the name and identification number of the Contract as **defined in the BDS** and SCC; and

(c) Provide a warning not to open before the specified time and date for Bid opening as **defined in the BDS.**

20.3 In addition to the identification required in ITB Sub-Clause 20.2, the inner envelopes shall indicate the name and address of the Bidder to enable the Bid to be returned unopened in case it is declared late, pursuant to ITB Clause 22.

20.4 If the outer envelope is not sealed and marked as above, the Procuring Entity shall assume no responsibility for the misplacement or premature opening of the Bid.

21. Deadline for Submission of Bids

21.1 Bids shall be delivered to the Procuring Entity at the address specified above no later than the time and date **specified in the BDS and in the clause 8 of TN.**

21.2 The Procuring Entity may extend the deadline for submission of bids by issuing an amendment in accordance with ITB Clause 11, in which case all rights and obligations of the Procuring Entity and the bidders previously subject to the original deadline shall then be subject to the new deadline.

22. Late Bids

Any Bid received by the Procuring Entity after the deadline prescribed in ITB Clause 21 and in the TN Clause 8 shall be returned unopened to the Bidder.

23. Withdrawal, Substitution and Modification of Bids

23.1 Bidders may withdraw, substitute or modify their Bids by giving notice in writing before the deadline prescribed in ITB Clause 21 and in the TN Clause 8.

23.2 Each Bidder's withdrawal, substitution or modification notice shall be prepared, sealed, marked, and delivered in accordance with ITB Clauses 19 and 20, with the outer and inner envelopes additionally marked or "WITHDRAWAL," SUBSTITUTION," OR "MODIFICATION" as appropriate.

23.3 No Bid may be substituted or modified after the deadline for submission of Bids.

23.4 Withdrawal of a Bid between the deadline for submission of bids and the expiration of the period of Bid validity specified in the **Bid Data** or as extended pursuant to ITB Sub-Clause 16.2 may result in the forfeiture of the Bid Security pursuant to ITB Clause 17.

23.5 Bidders may only offer discounts to, or otherwise modify the prices of their bids, by submitting Bid modifications in accordance with this clause or included in the initial Bid

E. Bid Opening and Evaluation

24. Bid Opening

24.1 The Procuring Entity shall open the bids, including modifications made pursuant to Clause 23, in the presence of the bidders' representatives who choose to attend at the time and in the place **specified in the BDS.** Any specific opening procedures required if electronic bidding is permitted in accordance with ITB Sub-Clause 20.1, shall be as specified in the BDS.

24.2 Envelopes marked "WITHDRAWAL" shall be opened and read out first. Bids for which an acceptable notice of withdrawal has been submitted pursuant to ITB Clause 23 shall not be opened.

24.3 The bidders' names, the Bid prices, the total amount of each Bid and of any alternative Bid (if alternatives have been requested or permitted), any discounts, Bid withdrawals, substitutions, or modifications, the presence or absence of Bid Security, if required, and such other details as the Procuring Entity may consider appropriate, shall be announced by the Procuring Entity at the opening. No bid shall be rejected at bid opening except for the late bids pursuant to ITB Clause 22. Substitution Bids and modifications submitted pursuant to ITB Clause 23 that are not opened and read out at bid opening shall not be considered for further evaluation regardless of the circumstances. Late, withdrawn and substituted bids shall be returned un-opened to bidders

24.4 The Procuring Entity shall prepare Minutes of the Bid Opening, including the information disclosed, to those present, in accordance with ITB Sub-Clause 24.3.

25. Confidentiality

No Information concerning checking, explanation, opinion and comparison of tenders and recommendations concerning the contract award, will be disclosed to Bidders or any other person not officially involved in the process until the name of the successful Bidders has been announced. Any attempt by a Bidder to contact any member of the Evaluation committee directly or indirectly during the evaluation period will be automatically disqualified.

26. Clarification of Bids

To assist in the examination, evaluation, and comparison of Bids, the Procuring Entity may, at the Procuring Entity's discretion, ask any Bidder for clarification of the Bidder's Bid, including breakdowns of unit rates. The request for clarification and the response shall be in writing, but no change in the price or substance of the Bid shall be sought, offered, or permitted except as required to confirm the correction of arithmetic errors discovered by the Procuring Entity in the evaluation of the Bids in accordance with ITB Clause 28.

27. Examination of Bids and Determination of Responsiveness

27.1. Prior to the detailed evaluation of Bids, the evaluation committee shall determine whether each Bid (a) meets the eligibility criteria defined in ITB Clause 4; (b) has been properly signed; (c) is accompanied by the Security, if required; and (d) is substantially responsive to the requirements of the Bidding Documents.

27.2 A substantially responsive Bid is one which conforms to all the terms, conditions, and specifications of the Bidding Documents, without material deviation or reservation. A material deviation or reservation is one (a) which affects in any substantial way the scope, quality, or performance of the Works; (b) which limits in any substantial way,

inconsistent with the Bidding Documents, the Procuring Entity's rights or the Bidder's obligations under the Contract; or (c) whose rectification would affect unfairly the competitive position of other bidders presenting substantially responsive bids.

27.3 If a Bid is not substantially responsive, it shall be rejected by the evaluation committee, and may not subsequently be made responsive by correction or withdrawal of the nonconforming deviation or reservation**.**

28. Correction of Errors

28.1 Bids determined to be substantially responsive shall be checked by the evaluation committee for any arithmetic errors. Errors shall be corrected by the evaluation committee as follows:

(a) Where there is a discrepancy between the amounts in figures and in words, the amount in words shall govern; and

(b) Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by the quantity, the unit rate as quoted shall govern, unless in the opinion of the Procuring Entity there is an obviously gross misplacement of the decimal point in the unit rate, in which case the line item total as quoted shall govern, and the unit rate shall be corrected.

28.2 The amount stated in the Bid shall be adjusted by the evaluation committee in accordance with the above procedure for the correction of errors and, with the concurrence of the Bidder, shall be considered as binding upon the Bidder. If the Bidder does not accept the corrected amount, the Bid shall be rejected, and the Bid Security may be forfeited executed in accordance with ITB Sub-Clause 17.5 (b).

29 Currency for Bid Evaluation

Bids shall be evaluated as quoted in the Rwandan Franc currency, in accordance with ITB Sub-Clause 15.1, unless a Bidder has used different exchange rates than those prescribed in ITB Sub-Clause 15.2, in which case the Bid shall be first converted into the amounts payable in different currencies using the rates quoted in the Bid and then reconverted to the Republic of Rwanda's currency using the exchange rates prescribed in ITB Sub-Clause 15.2.

30 Evaluation and Comparison of Bids

30.1 The evaluation committee shall evaluate and compare only the bids determined to be substantially responsive in accordance with ITB Clause 27.

30.2 In evaluating the bids, the evaluation committee shall determine for each Bid the evaluated Bid price by adjusting the Bid price as follows:

(a) Making any correction for errors pursuant to ITB Clause 28;

(b) Excluding provisional sums and the provision, if any, for contingencies in the Bill of Quantities, but including Day work, where priced competitively;

(c) Making an appropriate adjustment for any other acceptable variations, deviations, or alternative offers submitted in accordance with ITB Clause 18; and

(d) Making appropriate adjustments to reflect discounts or other price modifications offered in accordance with ITB Sub-Clause 23.5.

30.3 The Procuring Entity reserves the right to accept or reject any variation, deviation, or alternative offer. Variations, deviations, and alternative offers and other factors which are in excess of the requirements of the Bidding Documents or otherwise result in unsolicited benefits for the Procuring Entity shall not be taken into account in Bid evaluation.

30.4 The estimated effect of any price adjustment conditions under GCC Clause 47, during the period of implementation of the Contract, shall not be taken into account in Bid evaluation.

31 Preference for Domestic Bidders

31.1 If so **indicated in the BDS,** domestic contractors may receive a margin of preference in Bid Evaluation in compliance with the relevant provisions in BDS.

31.2 The following procedure shall be used to apply the margin of preference:

(a) Responsive bids shall be classified into the following groups:

(i) Group A: bids offered by domestic bidders and joint ventures meeting the criteria of nationality

(ii) Group B: all other bids.

(b) For the purpose of further evaluation and comparison of bids only, an amount equal to a maximum of 10 per percent of the evaluated Bid prices determined in accordance with ITB Sub-Clause 30.2 shall be added to all bids classified in Group B.

F. Award of Contract

32 Award Criteria

Subject to ITB Clause 33, the Procuring Entity shall award the Contract to the Bidder whose Bid has been selected as being substantially responsive to the Bidding Documents and who has offered the lowest evaluated Bid price, provided that such Bidder has been determined to be (a) eligible in accordance with the provisions of ITB Clause 4, and (b) qualified in accordance with the provisions of ITB Clause 5.

33 Procurement Entity's Right to accept any Bid and to reject any or all Bids

Notwithstanding ITB Clause 32, the Procuring Entity reserves the right to accept or reject any Bid, and to cancel the bidding process and reject all bids, at any time prior to the award of Contract.

34 Notification of Award and Signing of Agreement

34.1 Before the expiry of the bid validity period, the procuring entity shall simultaneously notify the successful and the unsuccessful bidders of the provisional outcome of the bids

evaluation. The notification shall specify that the major elements of the procurement process would be made available to the bidders upon request and that they have three (3) days in which to lodge a protest, if any, before a contract is signed with the successful bidder**.** Upon signature of a procurement contract, the procuring entity shall notify other bidders that their bids were not successful.

The notification letter to the successful bidder (hereinafter and in the GCC called the "Letter of Acceptance") shall state the sum that the Procuring Entity shall pay the Contractor in consideration of the execution, completion, and maintenance of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Contract called the "Contract Price").

34.2 The Letter of Acceptance shall constitute the formation of the Contract, subject to the Bidder furnishing the Performance Security in accordance with ITB Clause 35 and signing the Agreement in accordance with ITB Sub-Clause 34.3.

34.3 The Agreement shall incorporate all agreements between the Procuring Entity and the successful Bidder.

34.3 Only the signed contract will constitute an official commitment on the part of the Procuring Entity, and activities may not begin until the contract has been signed by the contracting authority and the successful bidder.

35 Performance Security

35.1 Within 14 days after receipt of the Letter of notification, the successful Bidder shall sign the contract and deliver to the PE a Performance Security in the amount stipulated in the GCC and in the form **stipulated in the BDS,** denominated in the type and proportions of currencies in the Letter of notification and in accordance with the GCC.

35.2 If the Performance Security is provided by the successful Bidder in the form of a Bank Guarantee, it shall be issued at the Bidder's option, by a bank located in the Republic of Rwanda, or by an acceptable foreign bank.

35.3 If the Performance Security is to be provided by the successful Bidder in the form of a Bond, it shall be issued by a surety who the Bidder has determined to be acceptable to the Procuring Entity.

35.4 Failure of the successful Bidder to comply with the requirements of ITB Sub-Clauses 35.1 and 34.3 shall constitute sufficient grounds for cancellation of the award and forfeiture of the Bid Security. Upon the successful Bidder's, signing of the Agreement and furnishing of the Performance Security pursuant to ITB Clause 35.1, the Procuring Entity shall promptly notify the name of the winning bidder to each unsuccessful bidder and shall discharge the Bid Securities of the unsuccessful bidders pursuant to ITB Clause 17.4.

36 Advance Payment and Security

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

37 Adjudicator

The Procuring Entity proposes the person **named in the BDS** to be appointed as Adjudicator under the Contract, at an hourly fee **specified in the BDS,** plus reimbursable expenses. If the Bidder disagrees with this proposal, the Bidder should so state in the Bid. If, in the Letter of Acceptance, the Procuring Entity has not agreed on the appointment of the Adjudicator, the Adjudicator shall be appointed by the Appointing Authority designated in the BDS and the SCC at the request of either party.

Section II. Bid Data Sheet

A. General

ITB 1.1	The Procuring Entity is: The Institute of Certified Public Accountants of Rwanda (ICPAR) **The Works are: REHABILITATION AND TRANSFORMATION OF ICPAR BUILDING INTO MODERN OFFICES AT KACYIRU/ GASABO DISTRICT**
ITB 1.2	The Intended Completion Date is **3 months.**
ITB 2.1	The Project is THE REHABILITATION AND TRANSFORMATION OF ICPAR BUILDING INTO MODERN OFFICES AT KACYIRU/ GASABO DISTRICT
ITB 5.3	The information required from bidders in ITB Sub-Clause 5.3 is complemented as follows: N/A
ITB 5.3 (i)	The ceiling for sub contractor's participation is: 10%
ITB 5.4	The qualification data required from bidders in ITB Sub-Clause 5.4 are modified as follows: none.
ITB 5.5	The qualification criteria in ITB Sub-Clause 5.5 are modified as follows*:* none.
ITB 5.5 (a)	The period is: 4 years The average annual turnover should be equal to the proposed amount for the bid.
ITB 5.5 (b)	2 similar reference and supported with the completion certificates and copies of contracts.
ITB 5.5 (C)	The essential equipment to be made available for the Contract by the successful Bidder shall be: - One Truck (Benn) $5m^3$ - One Concrete mixer - One Pick-up
ITB 5.5 (d)	Contract manager: Civil engineer or architect with a bachelor's degree in Civil Engineering, 5 years- experience as a contract manager for construction of civil works Site foreman: bachelor's degree in Civil Engineering with 3 years of experience as a site foreman in Construction The bidder is requited to submit in the bid the certified copies of diploma or degree, updated CV signed of key personnel.
ITB 5.5 (e)	Credit line or promise of credit line of at least 10,000,000Rwf
ITB 5.6	Subcontractors' experience and resources shall not be taken into account during evaluation of bids.
ITB5.7	The percentage of margin's domestic preference is none.

B. Bidding Documents	
ITB 10.1	The Procuring Entity address's for further information is: ICPAR Office Kacyiru Email: tender@icparwanda.com
C. Preparation of Bids	
ITB 12.1	The language of the bid is: English
ITB 13.1	Any additional materials required to be completed and submitted by the Bidders are none.
ITB 14.4	The Contract is not subject to price adjustment in accordance with GCC Clause 47.
ITB 15.2	The authority for establishing the rates of exchange shall be: N/A. Bidders are required to bid in Rwanda Francs (Rwf)
ITB 15.3	Bidders are not required to substantiate the rates and prices.
ITB 16.1	Bids shall be valid for 120 days
ITB 17.1	Bid shall include a Bid Security issued by a bank or by surety using the form for bid security included in Section IX. Security Forms.
ITB 17.2	The Bid Security amount is : 3,000,000 RWF
ITB 18.1	Alternative shall not be considered.
ITB 19.1	The number of copies of the Bid to be completed and returned shall be: One original and three copies.
D. Submission of Bids	
ITB 20.2 (a)	Bids shall be submitted to ICPAR office at Kacyiru.
ITB 20.2 (b)	Name and Identification number of the contract as given in ITB 1.1 above in this sheet is "REHABILITATION AND TRANSFORMATION OF ICPAR BUILDING INTO MODERN OFFICES AT KACYIRU/ GASABO DISTRICT''
ITB 20.2 (c)	The warning should read "DO NOT OPEN BEFORE" **the deadline**
ITB 21.1	The deadline for submission of bids shall **24/12//2018 at 09:30pm**
E. Bid Opening and Evaluation	

ITB 24.1	Bids shall be opened on 24/12/2018 at 10:30 am at ICPAR conference room.
ITB 31.1	Domestic contractors shall not receive a margin of preference during Bids evaluation.
F. Award of Contract	
ITB 35.1	The Standard Form of Performance Security acceptable to the Procuring Entity shall be a Bank Guarantee" or Surety from Financial Institution
ITB 36.1	The Advance Payment shall not exceed 20% of the Contract Price.

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

1. Contractor's Bid

*The **Bidder** shall fill in and submit this Bid form with the Bid. If the Bidder objects to the Adjudicator proposed by the Procuring Entity in the Bidding Documents, it should so state in its Bid, and present an alternative candidate, together with the candidate's daily fees and biographical data, in accordance with ITB Clause 37.*

date]

Identification N° and Title of Contract: *[insert identification number and title of the Contract]*

To: *[name and address of Procuring Entity]*

Having examined the Bidding Documents, including addenda *[insert list]*, we offer to execute the *[name and identification number of Contract]* in accordance with the GCC accompanying this Bid for the Contract Price of *[insert amount in numbers]*, *[insert amount in words] [insert name of currency]*.

The written acceptance of this bid shall constitute a binding Contract between us. It is understood that the PE is not bound to accept the lowest or any Bid you receive.

It is hereby confirmed that this Bid complies with the Bid validity and, if required, Bid Security as required by the Bidding Documents and specified in the BDS.
We, including any subcontractors or suppliers for any part of the Contract, have nationalities from eligible countries in accordance with ITB Sub-Clause 4.1;

We have no conflict of interest in accordance with ITB Sub-Clause 4.2;

Our firm, its affiliates or subsidiaries—including any subcontractors or suppliers for any part of the contract.

Authorized Signature: _____

Name and Title of Signatory: _____
Name of Bidder: _____
Address: _____

2. Qualification Information

*[The information to be filled in by **bidders** in the following pages shall be used for the purposes of post qualification or for verification of prequalification as provided for in ITB Clause 5. This information shall not be incorporated in the Contract. Attach additional pages, if needed be.*

1. Individual Bidders or Individual Members of Joint Ventures

1.1 Constitution or legal status of Bidder: *[attach copy]*

Place of registration: *[insert]*

Principal place of business: *[insert]*

Power of attorney of signatory of Bid: *[attach]*

1.2 Annual amounts of construction works performed during the last *[insert number pursuant to BDS sub clause 4.5(a)]* years *[insert amounts in the national currency equivalent]*

1.3 Number *[insert number pursuant to BDS sub clause 4.5 (b)]* of works of a nature and amount similar to the Works performed as prime Contractor over the last *[insert number pursuant to BDS 4.5(b)]* years. *[The amounts should be indicated in the same currency used for Item 1.2 above. Also list details of work under way or committed, including expected completion date(s).]*.

Project name and country [all completed projects should be proved by the performance certificates issued by the clients]	Name of client and contact person	Type of work performed and year of completion	Value of contract (national currency equivalent)
(a) (b)			

1.4 Major items of Contractor's Equipment proposed for carrying out the Works. *[List all information requested below. Refer also to ITB Sub-Clause 5.3 (d).]*

Item of equipment (Attach the possession and/or leasing evidences]	Description, make, and age (years)	Condition (new, good, poor) and number available	Owned, leased (from whom?), or to be purchased (from whom?)
(a) (b)			

1.5 Qualifications and experience of key personnel proposed for administration and execution of the Contract. *[Attach biographical data, The CVs and academic testimonials. Refer also to ITB Sub-Clause 5.3 (e) and GCC Sub-Clause 9.1.]*

Position	Name	Years of experience (general)	Years of experience in proposed position
(a) (b)			

1.6 Proposed subcontracts and firms involved. Refer to GCC Clause 7.

Sections of the Works	Value of subcontract	Subcontractor (name and address)	Experience in similar work
(a) (b)			

1.7 Financial reports for the last *[insert number]* years: balance sheets, profit and loss statements, auditors' reports, etc. *[List below and attach copies.]*

1.8 Evidence of access to financial resources to meet the qualification requirements: cash in hand, lines of credit, etc. List below and attach copies of support documents.

1.9 Name, address, and telephone, telex, and facsimile numbers of banks that may provide references if contacted by the PE.

1.10 Information on current litigation(s) in which the Bidder is involved.

Other party(ies)	Cause of dispute	Amount involved
(a) (b)		

1.11 Proposed Program (work method and schedule). Descriptions, drawings, and charts, as necessary, to comply with the requirements of the Bidding Documents.

2. Joint Ventures

2.1 The information listed in 1.1 - 1.10 above shall be provided for each partner of the joint venture.

2.2 The information in 1.11 above shall be provided for the joint venture.

2.3 Attach the power of attorney of the signatory (ies) of the Bid authorizing the signature of the Bid on behalf of the joint venture.

2.4 Attach the Agreement among all partners of the joint venture (and which is legally binding on all partners), which shows that:

(a) All partners shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms;

(b) One of the partners shall be nominated as being in charge, authorized to incur liabilities, and receive instructions for and on behalf of any and all partners of the joint venture; and

(c) The execution of the entire Contract, including payment, shall be done exclusively with the partner in charge.

3. Additional Requirements

Bidders should provide any additional information required in the BDS.

3. Letter of Acceptance

[Letterhead paper of the Procuring Entity]

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

[Insert date]

Identification N° and Title of Contract: *[insert identification number and title of the Contract]*

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

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

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

(a) We accept that *[insert name proposed by bidder]* be appointed as the Adjudicator.

(b) We do not accept that *[insert name proposed by bidder]* be appointed as Adjudicator, and by sending a copy of this Letter of Acceptance to *[insert name of the Appointing Authority]*, we are hereby requesting *[insert name]*, the Appointing Authority, to appoint the Adjudicator in accordance with ITB Clause 37.1.

You are hereby instructed to (a) proceed with the execution of the said Works in accordance with the Contract Documents, (b) sign and return the attached Contract Documents, and (c) forward the performance security pursuant to ITB Sub-Clause 35.1, i.e., within 21 days after receipt of this Letter of Acceptance, and pursuant to GCC Sub-Clause 52.1

Authorized Signature: _____
Name and Title of Signatory: _____
Name of the Procuring Entity: _____

Attachment: Agreement and Special condition of contract

4. Agreement

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

Whereas the Employer is desirous that the Contractor execute *[insert name and identification number of Contract]* (hereinafter called "the Works") and the Procuring Entity has accepted the Bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein in the sum of *[insert contract price in words and figures expressed in the contract currency (ies)]* (hereinafter called the "the contract price) .

Therefore this Agreement entered into as follows:

1. In this Agreement, words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to, and they shall be deemed to form and be read and construed as part of this Agreement.

2. Considering the terms and conditions of payments to be made by the Procuring Entity to the Contractor as hereinafter mentioned, the Contractor hereby convenes with the Procuring Entity to execute and complete the Works and remedy any defects therein in conformity in all respects with the provisions of the Contract.

    a. The Procuring Entity hereby convenes to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects wherein the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

    b. The following documents shall constitute the Contract between the Procuring Entity and the Supplier, and each shall be read and construed as an integral part of the Contract:

        i. **Agreement**,
        ii. **Letter of Acceptance,**
        iii. **Contractor's Bid**
        iv. **Special Conditions of Contract,**
        v. **General Conditions of Contract,**
        vi. **Specifications,**
        vii. **Drawings,**
        viii. **Bill of Quantities, and**
        ix. **Any other document listed in the SCC as forming part of the Contract.**

    c. This Contract shall prevail over all other Contract documents. In the event of any discrepancy or inconsistency within the Contract documents, then the documents shall prevail in the order listed above

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

Binding Signature of Procuring Entity *[signature of an authorized representative of the Procuring Entity]*

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

Section IV. General Conditions of Contract

A. General Conditions of Contract

1. Definitions

(a)	The **Adjudicator** is the person appointed jointly by the Procuring Entity and the Contractor to resolve disputes in the first instance, as provided for in GCC Clauses 24 and 25 hereunder.
(b)	**Bill of Quantities** means the priced and completed Bill of Quantities forming part of the Bid.
(c)	**Compensation Events** are those defined in GCC Clause 44 hereunder.
(d)	The **Completion Date** is the date of completion of the Works as certified by the Project Manager, in accordance with GCC Sub-Clause 55.1.
(e)	The **Contract** is the Contract between the Procuring Entity and the Contractor to execute, complete, and maintain the Works. It consists of the documents listed in GCC Clause 2.3 below.
(f)	The **Contractor** is a person or corporate body whose Bid to carry out the Works has been accepted by the Procuring Entity.
(g)	The **Contractor's Bid** is the completed bidding document submitted by the Contractor to the Procuring Entity.
(h)	The **Contract Price** is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract.
(i)	**Days** are calendar days; months are calendar months.

(j) **Day works** are varied work inputs subject to payment on a time basis for the Contractor's employees and Equipment, in addition to payments for associated Materials and Plant.

(k) A **Defect** is any part of the Works not completed in accordance with the Contract.

(l) The **Defects Liability Certificate** is the certificate issued by Project Manager upon correction of defects by the Contractor.

(m) The **Defects Liability Period** is the period **named in the SCC** Sub-Clause 35.1 and calculated from the Completion Date.

(n) **Drawings** include calculations and other information provided or approved by the Project Manager for the execution of the Contract.

(o) The **Procuring Entity** is the party who employs the Contractor to carry out the Works, **as specified in the SCC.**

(p) **Equipment** is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works.

(q) The **Initial Contract Price** is the Contract Price listed in the Procuring Entity's Letter of Acceptance.

(r) The **Intended Completion Date** is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is **specified in the SCC**. The Intended Completion Date may be revised only by the Project Manager by issuing an extension of time or an acceleration order.

(s) **Materials** are all supplies, including consumables, used by the Contractor for incorporation in the Works.

(t) **Plant** is any integral part of the Works that shall have a mechanical, electrical, chemical, or biological function.

(u) The **Project Manager** is the person **named in the SCC** (or any other competent person appointed by the Procuring Entity and notified to the Contractor, to act in replacement of the Project Manager) who is responsible for supervising the execution of the Works and administering the Contract.

(v) **SCC** means Special Conditions of Contract

(w) The **Site** is the area **defined as such in the SCC**.

(x) **Site Investigation Reports** are those that were included in the bidding documents and are factual and interpretative reports about the surface and subsurface conditions at the Site.

(y) **Specification** means the Specification of the Works included in the Contract and any modification or addition made or approved by the Project Manager.

(z) The **Start Date** is **given in the SCC**. It is the latest date when the Contractor shall commence execution of the Works. It does not necessarily coincide with any of the Site Possession Dates.

(aa) A **Subcontractor** is a person or corporate body who has a Contract with the Contractor to carry out a part of the work in the Contract, which includes work on the Site.

(bb) **Temporary Works** are works designed, constructed, installed, and removed by the Contractor that are needed for construction or installation of the Works.

(cc) A **Variation** is an instruction given by the Project Manager which varies the Works.

(dd) The **Works** are what the Contract requires the Contractor to construct, install, and turn over to the Procuring Entity, **as defined in the SCC.**

2. Interpretation

2.1 For the interpretation of these GCC, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Project Manager shall provide instructions clarifying queries about these GCC.

2.2 If sectional completion is **specified in the SCC**, references in the GCC to the Works, the Completion Date, and the Intended Completion Date apply to any Section of the Works (other than references to the Completion Date and Intended Completion Date for the whole of the Works).

2.3 **The documents forming the Contract shall be interpreted in the following order of priority**:

(a) Agreement,

(b) Letter of Acceptance,

(c) Contractor's Bid,

(d) Special Conditions of Contract,

(e) General Conditions of Contract,

(f) Specifications,

(g) Drawings,

(h) Bill of Quantities, and

(i) Any other document listed in the SCC as forming part of the Contract.

3. Language and Law

The Law governing the Contract and the Language of the Contract are **stated in the SCC**.

4. Project Manager's Decisions

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

5. Delegation

The Project Manager may delegate any of his duties and responsibilities to other people except to the Adjudicator, after notifying the Contractor, and may cancel any delegation after notifying the Contractor.

6. Communications

Communications between parties that are referred to in the Conditions shall be effective only when in writing. A notice shall be effective only when it is delivered.

7. Subcontracting

The Contractor may subcontract with the approval of the Project Manager, in compliance with the relevant provisions. Subcontracting shall not alter the Contractor's obligations.

8. Other Contractors

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

9. Personnel

9.1 The Contractor shall employ the key personnel named in the Schedule of Key Personnel, as **referred to in the SCC,** to carry out the functions stated in the Schedule or other personnel approved by the Project Manager. The Project Manager shall approve any proposed replacement of key personnel only if their relevant qualifications and abilities are substantially equal to or better than those of the personnel listed in the Schedule.

9.2 If the Project Manager requests the Contractor to remove a person who is a member of the Contractor's staff or work force, stating the reasons, the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the work in the Contract.

10. Procuring Entity's and Contractor's Risks

The Procuring Entity carries out the risks which this Contract states are Procuring Entity's risks, and the Contractor carries the risks which this Contract states are Contractor's risks.

11. Procuring Entity's Risks

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

(a) The risk of personal injury, death, or loss of or damage to property (excluding the Works, Plant, Materials, and Equipment), which are due to

(i) Use or occupation of the Site by the Works or for the purpose of the Works, which is the unavoidable result of the Works or

(ii) Negligence, breach of statutory duty, or interference with any legal right by the Procuring Authority or by any person employed by or contracted to him except the Contractor and subcontractors.

(b) The risk of damage to the Works, Plant, Materials, and Equipment to the extent that it is due to a fault of the Procuring Entity or in the Procuring Entity's design, or due to war or radioactive contamination directly affecting the country where the Works are to be executed.

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

(a) A Defect which existed on the Completion Date,

(b) An event occurring before the Completion Date, which was not itself an Procuring Entity's risk, or

(c) The activities of the Contractor on the Site after the Completion Date.

12. Contractor's Risks

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

13. Insurance

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

(a) Loss of or damage to the Works, Plant, and Materials;

(b) Loss of or damage to Equipment;

(c) Loss of or damage to property (except the Works, Plant, Materials, and Equipment) in connection with the Contract; and

(d) Personal injury or death.

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

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

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

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

14. Site Investigation Reports

Contractor, in preparing the Bid, shall rely on any Site Investigation Reports **referred to in the SCC,** supplemented by any information available to the Bidder.

15. Queries about the Special Conditions of Contract

The Project Manager shall clarify queries on the **SCC.**

16. Contractor to Construct the Works

The Contractor shall construct and install the Works in accordance with the Specifications and Drawings. The Project Manager shall clarify queries on the **SCC.**

17. The Works to be completed at the Intended Completion Date

The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the Program submitted by the Contractor, as updated with the approval of the Project Manager, and complete them by the Intended Completion Date.

18. Approval by the Project Manager

18.1 The Contractor shall submit Specifications and Drawings showing the proposed Temporary Works to the Project Manager, who is to approve them if they comply with the Specifications and Drawings.

18.2 The Contractor shall be responsible for design of Temporary Works.

18.3 The Project Manager's approval shall not alter the Contractor's responsibility for design of the Temporary Works.

18.4 The Contractor shall obtain approval of third parties to the design of the Temporary Works, where required.

18.5 All Drawings prepared by the Contractor for the execution of the temporary or permanent Works, are subject to prior approval by the Project Manager before this use.

19. Safety

The Contractor shall be responsible for the safety of all activities on the Site.

20. Discoveries

Anything of historical or other interest or of significant value unexpectedly discovered on the Site shall be the property of the Procuring Entity. The Contractor shall notify the Project Manager of such discoveries and carry out the Project Manager's instructions for dealing with them.

21. Possession of the Site

21.1 The Procuring Entity shall give possession of all parts of the Site to the Contractor. If possession of a part is not given by the date **stated in the SCC,** the Procuring Entity shall be deemed to have delayed the start of the relevant activities, and this shall be a Compensation Event.

22. Access to the Site

22.1 The Contractor shall allow the Project Manager and any person authorized by the Project Manager access to the Site and to any place where work in connection with the Contract is being carried out or is intended to be carried out.

23. Instructions, Inspections and Audits

23.1 The Contractor shall carry out all instructions of the Project Manager which comply with the applicable laws where the Site is located.

23.2 The Contractor shall permit the Procuring Entity to inspect the Contractor's accounts and records relating to the performance of the Contractor and to have them audited by auditors appointed by the Procuring Entity.

24. Disputes

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

25. Procedure for Disputes

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

25.2 The Adjudicator shall be paid by the hour at the **rate specified in the BDS and SCC,** together with reimbursable expenses of the types specified in the Contract Data, and the cost shall be divided equally between the Procuring Entity and the Contractor, whatever decision is reached by the Adjudicator. Either party may refer a decision of the Adjudicator to an Arbitrator within 28 days of the Adjudicator's written decision. If neither party refers the dispute to arbitration within the above 28 days, the Adjudicator's decision shall be final and binding.

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

26. Replacement of Adjudicator

The Adjudicator resigns or die, or should the Procuring Entity and the Contractor agree that the Adjudicator is not functioning in accordance with the provisions of the Contract; a new Adjudicator shall be jointly appointed by the Procuring Entity and the Contractor. In case of disagreement between the Procuring Entity and the Contractor, within 30 days, the Adjudicator shall be designated by the Appointing Authority **designated in the SCC** at the request of either party, within 14 days of receipt of such request.

*B. C*ontrol of the schedule

27. Program

27.1 Within the time **stated in the SCC**, after the date of the Letter of Acceptance, the Contractor shall submit to the Project Manager for approval a Program showing the general methods, arrangements, order, and timing for all the activities in the Works.

27.2 An update of the Program shall be a program showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work, including any changes to the sequence of the activities.

27.3 The Contractor shall submit to the Project Manager for approval an updated Program at intervals no longer than the period **stated in the SCC.** If the Contractor does not submit an updated Program within this period, the Project Manager may withhold the amount **stated in the SCC** from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Program has been submitted.

27.4 The Project Manager's approval of the Program shall not alter the Contractor's obligations. The Contractor may revise the Program and submit it to the Project Manager again at any time. A revised Program shall show the effect of Variations and Compensation Events.

28. Extension of the Intended Completion Date

28.1 The Project Manager shall extend the Intended Completion Date if a Compensation Event occurs or a Variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date without the Contractor taking steps to accelerate the remaining work, which would cause the Contractor to incur additional cost.

28.2 The Project Manager shall decide whether and by how much to extend the Intended Completion Date within 21 days of the Contractor asking the Project Manager for a decision upon the effect of a Compensation Event or Variation and submitting full supporting information. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date.

29. Acceleration

29.1 When the Procuring Entity wants the Contractor to finish before the Intended Completion Date, the Project Manager shall obtain priced proposals for achieving the necessary acceleration from the Contractor. If the Procuring Entity accepts these proposals, the Intended Completion Date shall be adjusted accordingly and confirmed by both the Procuring Entity and the Contractor.

29.2 If the Contractor's priced proposals for acceleration are accepted by the Procuring Entity, they are incorporated in the Contract Price and treated as a Variation.

30. Delays Ordered by the Project Manager

The Project Manager may instruct the Contractor to delay the start or progress of any activity within the Works.

31. Management Meetings

31.1 Either the Project Manager or the Contractor may require the other to attend a management meeting. The business of a management meeting shall be to review the plans for remaining work and to deal with matters raised in accordance with the early warning procedure.

31.2 The Project Manager shall record the business of management meetings and provide copies of the record to those attending the meeting and to the Procuring Entity. The responsibility of the parties for actions to be taken shall be decided by the Project Manager either at the management meeting or after the management meeting and stated in writing to all who attended the meeting.

32. Early Warning

32.1 The Contractor shall warn the Project Manager at the earliest opportunity of specific likely future events or circumstances that may adversely affect the quality of the work, increase the Contract Price, or delay the execution of the Works. The Project Manager may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the Contract Price and Completion Date. The estimate shall be provided by the Contractor as soon as reasonably possible.

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

C. Quality Control

33. Identifying Defects

The Project Manager shall check the Contractor's work and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor's responsibilities. The Project Manager may instruct the Contractor to search for a Defect and to uncover and test any work that the Project Manager considers may have a Defect.

34. Tests

If the Project Manager instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a Defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no Defect, the test shall be a Compensation Event.

35. Correction of Defects

35.1 The Project Manager shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins at Completion, and is defined in the SCC. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.

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

36. Uncorrected Defects

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

D. Cost Control

37. Bill of Quantities

37.1 The Bill of Quantities shall contain items for the construction, installation, testing, and commissioning work to be done by the Contractor.

37.2 **The Bill of Quantities is used to calculate the Contract Price**.

The Contractor is paid for the quantity of the work done at the rate in the Bill of Quantities for each item.

38. Changes in the Quantities

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

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

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

39. Variations

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

40. Payments for Variations

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

40.2 If the work in the variation corresponds with an item description in the Bill of Quantities and if, in the opinion of the Project Manager, the quantity of work above the limit stated in Sub-Clause 38.1 or the timing of its execution do not cause the cost per unit of quantity to change, the rate in the Bill of Quantities shall be used to calculate the value of the Variation. If the cost per unit of quantity changes, or if the nature or timing of the work in the Variation does not correspond with items in the Bill of Quantities, the quotation by the Contractor shall be in the form of new rates for the relevant items of work.

40.3 If the Contractor's quotation is unreasonable, the Project Manager may order the Variation and make a change to the Contract Price, which shall be based on the Project Manager's own forecast of the effects of the Variation on the Contractor's costs.

40.4 If the Project Manager decides that the urgency of varying the work would prevent a quotation being given and considered without delaying the work, no quotation shall be given and the Variation shall be treated as a Compensation Event.

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

41. Cash Flow Forecasts

When the Program1 is updated, the Contractor shall provide the Project Manager with an updated cash flow forecast. The cash flow forecast shall include different currencies, as defined in the Contract, converted as necessary using the Contract exchange rates.

42. Payment Certificates

42.1 The Contractor shall submit to the Project Manager monthly statements of the estimated value of the work executed less the cumulative amount certified previously.

42.2 The Project Manager shall check the Contractor's monthly statement and certify the amount to be paid to the Contractor.

42.3 The value of work executed shall be determined by the Project Manager.

42.4 The value of work executed shall comprise the value of the quantities of the items in the Bill of Quantities completed.

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

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

43. Payments

43.1 Payments shall be adjusted for deductions for advance payments and retention. The Procuring Entity shall pay the Contractor the amounts certified by the Project Manager within 45 days of the date of each certificate. If the Procuring Entity makes a late payment, the Contractor shall be paid interest equivalent to 1/1000 for every day of delayed payment. Interest shall be calculated from the date by which the payment should have been made up to the date when the late payment is made.

43.2 If an amount certified is increased in a later certificate or as a result of an award by the Adjudicator or an Arbitrator, the Contractor shall be paid interest upon the delayed payment as set out in this clause. Interest shall be calculated from the date upon which the increased amount would have been certified in the absence of dispute.

43.3 Unless otherwise stated, all payments and deductions shall be paid or charged in the proportions of currencies comprising the Contract Price.

43.4 Items of the Works for which no rate or price has been entered in shall not be paid for by the Procuring Entity and shall be deemed covered by other rates and prices in the Contract.

44. Compensation Events

44.1 The following shall be Compensation Events:

(a) The Procuring Entity does not give access to a part of the Site by the Site Possession Date pursuant to GCC Sub-Clause 21.1.

(b) The Procuring Entity modifies the Schedule of Other Contractors in a way that affects the work of the Contractor under the Contract.

(c) The Project Manager orders a delay or does not issue Drawings, Specifications, or instructions required for execution of the Works on time.

(d) The Project Manager instructs the Contractor to uncover or to carry out additional tests upon work, which is then found to have no Defects.

(e) The Project Manager unreasonably does not approve a subcontract to be let.

(f) Ground conditions are substantially more adverse than could reasonably have been assumed before issuance of the Letter of Acceptance from the information issued to bidders (including the Site Investigation Reports), from information available publicly and from a visual inspection of the Site.

(g) The Project Manager gives an instruction for dealing with an unforeseen condition, caused by the Procuring Entity, or additional work required for safety or other reasons.

(h) Other contractors, public authorities, utilities, or the Procuring Entity does not work within the dates and other constraints stated in the Contract, and they cause delay or extra cost to the Contractor.

(i) The advance payment is delayed.

(j) The effects on the Contractor of any of the Procuring Entity's Risks.

(k) The Project Manager unreasonably delays issuing a Certificate of Completion.

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

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

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

45. Tax

The Project Manager shall adjust the Contract Price if taxes, duties, and other levies are changed between the date 28 days before the submission of bids for the Contract and the date of the last Completion certificate. The adjustment shall be the change in the amount of tax payable by the

Contractor, provided such changes are not already reflected in the Contract Price or are a result of GCC Clause 47.

46. Currencies

Where payments are made in currencies other than the currency of the Republic of Rwanda, the exchange rates used for calculating the amounts to be paid shall be the exchange rates stated in the Contractor's Bid.

47. Price Adjustment

47.1 Prices shall be adjusted for fluctuations in the cost of inputs only if provided for in the SCC. If so provided, the amounts certified in each payment certificate, before deducting for Advance Payment, shall be adjusted by applying the respective price adjustment factor to the payment amounts due in each currency. A separate formula of the type indicated below applies to each Contract currency:

$$\mathbf{P_c = A_c + B_c\ Imc/Ioc}$$

where:

P_c is the adjustment factor for the portion of the Contract Price payable in a specific currency "c."

A_c and B_c are coefficients **specified in the SCC,** representing the nonadjustable and adjustable portions, respectively, of the Contract Price payable in that specific currency "c;" and

Imc is the index prevailing at the end of the month being invoiced and Ioc is the index prevailing 28 days before Bid opening for inputs payable; both in the specific currency "c."

47.2 If the value of the index is changed after it has been used in a calculation, the calculation shall be corrected and an adjustment made in the next payment certificate. The index value shall be deemed to take account of all changes in cost due to fluctuations in costs.

48. Retention

48.1 The Procuring Entity shall retain from each payment due to the Contractor the proportion **stated in the SCC** until Completion of the whole of the Works.

48.2 On completion of the whole of the Works, half the total amount retained shall be repaid to the Contractor and half when the Defects Liability Period has passed and the Project Manager has certified that all Defects notified by the Project Manager to the Contractor before the end of this period have been corrected.

48.3 On completion of the whole Works, the Contractor may substitute retention money with an "on demand" Bank guarantee.

49. Liquidated Damages

49.1 The Contractor shall pay liquidated damages to the Procuring Entity at the rate per day **stated in the SCC** for each day that the Completion Date is later than the Intended Completion Date. The total amount of liquidated damages shall not exceed the amount **defined in the SCC.** The Procuring Entity may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not affect the Contractor's liabilities.

49.2 If the Intended Completion Date is extended after liquidated damages have been paid, the Project Manager shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate. The Contractor shall be paid interest on the overpayment, calculated from the date of payment to the date of repayment, at the rates specified in GCC Sub-Clause 43.1.

50. Bonus

The Contractor shall be paid a Bonus calculated at the rate per calendar day **stated in the SCC** for each day (less any days for which the Contractor is paid for acceleration) that the Completion is earlier than the Intended Completion Date. The Project Manager shall certify that the Works are complete, although they may not be due to be complete.

51. Advance Payment

51.1 The Procuring Entity shall make advance payment to the Contractor of the amounts **stated in the SCC** by the date **stated in the SCC,** against provision by the Contractor of an Unconditional Bank Guarantee in a form and by a bank acceptable to the Procuring Entity in amounts and currencies equal to the advance payment. The Guarantee shall remain effective until the advance payment has been repaid, but the amount of the Guarantee shall be progressively reduced by the amounts repaid by the Contractor. Interest shall not be charged on the advance payment.

51.2 The Contractor is to use the advance payment only to pay for Equipment, Plant, Materials, and mobilization expenses required specifically for execution of the Contract. The Contractor shall demonstrate that advance payment has been used in this way by supplying copies of invoices or other documents to the Project Manager.

51.3 The advance payment shall be repaid by deducting proportionate amounts from payments otherwise due to the Contractor, following the schedule of completed percentages of the Works on a payment basis. No account shall be taken of the advance payment or its repayment in assessing valuations of work done, Variations, price adjustments, Compensation Events, Bonuses, or Liquidated Damages.

52. Securities

52.1 The Performance Security shall be provided to the Procuring Entity not later than the date specified in the Letter of Acceptance and shall be issued in an amount **specified in the SCC,** by a bank of the first order or surety acceptable to the Procuring Entity, and denominated in the types and proportions of the currencies in which the Contract Price is payable. The Performance Security shall be valid until a date 28 days from the date of issue of the Certificate of Completion in the case of a Bank Guarantee, and until one year from the date of issue of the Completion Certificate in the case of a Performance Bond.

53. Day works

53.1 If applicable, the Day works rates in the Contractor's Bid shall be used for small additional amounts of work only when the Project Manager has given written instructions in advance for additional work to be paid for in that way.

53.2 All work to be paid for as Day works shall be recorded by the Contractor on forms approved by the Project Manager. Each completed form shall be verified and signed by the Project Manager within two days of the work being done.

53.3 The Contractor shall be paid for Day works subject to obtaining signed Day works forms.

54. Cost of Repairs

54.1 Loss or damage to the Works or Materials to be incorporated in the Works between the Start Date and the end of the Defects Correction periods shall be remedied by the Contractor at the Contractor's cost if the loss or damage arises from the Contractor's acts or omissions.

E. completion of the Contract

55. Completion

The Contractor shall request the Project Manager to issue a certificate of Completion of the Works, and the Project Manager shall do so upon deciding that the work is completed.

56. Taking Over

The Procurement Authority shall take over the Site and the Works within seven days of the Project Manager's issuing a certificate of Completion.

57. Final Account

The Contractor shall supply the Project Manager with a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Project Manager shall issue a Defects Liability Certificate and certify any final payment that is due to the Contractor within 56 days of receiving the Contractor's account if it is correct and complete. If it is not, the Project Manager shall issue within 56 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Project Manager shall decide on the amount payable to the Contractor and issue a payment certificate.

58. Operating and Maintenance Manuals

58.1 If "as built" Drawings and/or operating and maintenance manuals are required, the Contractor shall supply them by the dates **stated in the SCC**.

58.2 If the Contractor does not supply the Drawings and/or manuals by the dates **stated in the SCC,** or they do not receive the Project Manager's approval, the Project Manager shall withhold the amount **stated in the SCC** from payments due to the Contractor.

59. Termination

59.1 The Procuring Entity or the Contractor may terminate the Contract if one or another party causes a grave breach of the Contract.

59.2 Grave breaches of Contract shall include, but shall not be limited to, the following:

(a) The Contractor stops work for 60 days when no stoppage of work is shown on the current Program and the stoppage has not been authorized by the Project Manager;

(b) The Project Manager instructs the Contractor to delay the progress of the Works, and the instruction is not withdrawn within 60 days;

(c) The Procuring Entity or the Contractor is made bankrupt or goes into liquidation other than for a reconstruction or amalgamation;

(d) A payment certified by the Project Manager is not paid by the Procuring Entity to the Contractor within 90 days of the date of the Project Manager's certificate;

(e) The Project Manager gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Project Manager;

(f) The Contractor does not maintain a Security, which is required; and

(g) The Contractor has delayed the completion of the Works by the number of days for which the maximum amount of liquidated damages can be paid, as **defined in the SCC.**

(h) If the Contractor, in the judgment of the Procuring Entity has engaged in corrupt or fraudulent practices in competing for or in executing the Contract.

For the purpose of this paragraph:

(i) "Corrupt practice" means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution.

(ii) "fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Procuring Entity, and includes collusive practice among Bidders (prior to or after bid submission) designed to establish bid prices at artificial non-competitive levels and to deprive the Borrower of the benefits of free and open competition.

(i) (iii) "Collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of the borrower, designed to establish bid prices at artificial, noncompetitive levels; and

(iv) "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the procurement process or affect the execution of a contract;

59.3 When either party to the Contract gives notice of a breach of Contract to the Project Manager for a cause other than those listed under GCC Sub-Clause 59.2 above, the Project Manager shall decide whether the breach is fundamental or not.

59.4 Notwithstanding the above, the Procuring Entity may terminate the Contract for convenience.

59.5 If the Contract is terminated, the Contractor shall stop work immediately, make the Site safe and secure, and leave the Site as soon as reasonably possible.

60. Payment upon Termination

60.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Project Manager shall issue a certificate for the value of the work done and Materials ordered less advance payments received up to the date of the issue of the certificate and less the percentage to apply to the value of the work not completed, as **indicated in the SCC.** Additional Liquidated Damages shall not apply. If the total amount due to the Procuring Entity exceeds any payment due to the Contractor, the difference shall be a debt payable to the Procuring Entity.

60.2 If the Contract is terminated for the Procuring Entity's convenience or because of a fundamental breach of Contract by the Procuring Entity, the Project Manager shall issue a certificate for the value of the work done, Materials ordered, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works, and less advance payments received up to the date of the certificate.

61. Property

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

62. Release from Performance

If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Procuring Entity or the Contractor, the Project Manager shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which a commitment was made.

63. Suspension of Fund from the Funding Authority

In the event that the Funding Authority suspends the fund the Procuring Authority, from which part of the payments to the Contractor are being made:

(a) The Procuring Entity is obliged to notify the Contractor of such suspension within 7 days of having received the Funding Authority/Agency's suspension notice.

(b) If the Contractor has not received sums due it within the 28 days for payment provided for in Sub-Clause 43.1, the Contractor may immediately issue a 14-day termination notice.

Section V. Special Conditions of Contract

A. General	
GCC 1.1 (m)	The Defects Liability Period is 12 months.

GCC 1.1 (o)	The Procuring Entity is ICPAR.
GCC 1.1 (r)	The Intended Completion Date for the whole of the Works shall be 3 months.
GCC 1.1 (u)	The Project Manager is: To be defined during contract drafting
GCC 1.1 (w)	The Site is located at Kacyiru, Gasabo District
GCC 1.1 (z)	The Start Date shall be: January 2018
GCC 1.1 (dd)	The Works consist of **REHABILITATION AND TRANSFORMATION OF ICPAR BUILDING INTO MODERN OFFICES AT KACYIRU/ GASABO DISTRICT**
GCC 2.2	Sectional Completions are: not allowed.
GCC 2.3	The following documents also form part of the Contract: Agreement, Letter of Acceptance, Contractor's Bid, Special Conditions of Contract, General Conditions of Contract, Specifications, Drawings, Bill of Quantities, and Any other document listed in the SCC as forming part of the Contract.
GCC 3.1	The language of the contract is English The law that applies to the Contract is the law of the Republic of Rwanda.
GCC 8.1	Schedule of other contractors: none.
GCC 9.1	Key Personnel: Contract manager: civil engineer with a bachelor's degree in Civil Engineering, 5 years- experience as a contract manager for construction of civil works Site foreman: bachelor's degree in Civil Engineering with 3 years of experience as a site foreman in Construction
GCC 13.1	The minimum insurance amounts and deductibles shall be 5%
GCC 15.1	Queries. None

B. Time Control	
GCC 27.1	The Contractor shall submit for approval a Program for the Works within 7 days from the date of the Letter of Acceptance.
GCC 27.3	The period between Program updates is 7 days. The amount to be withheld for late submission of an updated Program is 1/1000 par day
C. Quality Control	
GCC 35.1	The Defects Liability Period is: 12 months.
D. Cost Control	
GCC 46.1	The currency of the Procuring Entity's country is: Rwanda Francs.
GCC 47.1	The Contract is not subject to price adjustment in accordance with GCC Clause 47, and the following information regarding coefficients does not apply.
GCC 48.1	The proportion of payments retained is: none
GCC 49.1	The liquidated damages for the whole of the Works are 1/1000 of the final Contract Price per day. The maximum amount of liquidated damages for the whole of the Works is 5% of the final Contract Price.
GCC 50.1	The Bonus for the whole of the Works is 0 % per day. The maximum amount of Bonus for the whole of the Works is 0% of the final Contract Price.
GCC 51.1	The Advance Payments shall not exceed: 20% and shall be paid to the Contractor no later than 30 days.
GCC 52.1	The Performance Security amount is 5% of the final contract price. It will be Bank Guarantee or Surety from Financial Institution.
E. Finishing the Contract	
GCC 58.1	The date by which "as built" drawings are required is 15 days.
GCC 58.2	The amount to be withheld for failing to produce "as built" drawings required in GCC 58.1 is 1/1000 per day.
GCC 59.2 (g)	The maximum number of days is: 30 days.
GCC 60.1	The percentage to apply to the value of the work not completed, representing the Procuring Entity's additional cost for completing the Works, is 10%.

Section VI. Specifications & Performance Requirements

Specifications

Site Location and Conditions:
Site is located at Kigali KAMUTWA/KACYIRO/GASABO. The plot of land to be developed in Phase I is approximately 1842 Sqm in size.
The contractor shall be deemed to have inspected the site and thoroughly acquainted himself with the site conditions availability of water & electricity for construction, storage space for materials, work area available for construction, disposal/stacking of surplus earth from excavation of all kinds of soil/rocks and to acquaint him self with the general nature of the site, sub-soil water table and its other features likely to affect his tender and construction of works. No claim/extension of the time whatsoever shall be entertained on account of prevailing site conditions.

Scope of Work
GENERAL:
The Scope of Work comprises construction and completion of Civil, Structural, Architectural, Plumbing, External Electrical work, Fire Fighting, Landscaping and all other allied works as per design, specifications, and BOQ mentioned in the Contract or other connected / relevant documents and its maintenance thereof and except in so far as the Contract otherwise provides, the provision of all labour, materials, construction plant of temporary or permanent nature, works and everything whether of a temporary or permanent nature, required in and for such construction, completion and maintenance so far as the necessity for providing the same is specified in or reasonably to be inferred from the Contract. Maintenance thereof means rectification of defects observed during the defects liability period of one year to be reckoned from the date of handing over to ICPAR.
Works shown upon the drawing but not mentioned in the specifications or described in the specifications without being shown on the drawings shall nevertheless be held to be included in the same manner as if they had been specifically shown upon the drawings and described in the specifications
In these contract documents unless otherwise stated specifically, the singular shall include the plural and vice versa wherever the context so requires
Wherever it is mentioned in the Specifications that the Contractor shall perform certain work or provide certain facilities, it is understood that the contractor shall do so at his cost.
The materials, design and workmanship shall satisfy the relevant British Standard, International Building Codes and specification, the Specifications contained herein and codes referred to. Where the Specifications stipulate requirements in addition to those contained in the standard codes and specifications, these additional requirements shall also have to be satisfied and Contractor's quoted rates shall deemed to have included the same.

The brief scope of work is mentioned below:
i. Wall finishes

ii. External wall finishes
iii. Internal wall finishes
iv. Partition wall
v. Aluminium Curtain wall system
vi. Floor Finishes
vii. Staircase finishes

viii. Ceiling Finishes
ix. WINDOWS
x. DOORS
x. Landscaping & associated works. & septic tank
The above are only brief description of scope of work to be executed as per the Schedule of Rates (SOR), Specifications, Drawings etc under this contract . However all other associated works not specifically mentioned above but shown in drawings, SOR, specifications and tender documents etc are also to be executed under this contract.
NOTE:

The quoted rates are inclusive of all staging, scaffolding etc at all heights, wherever required to execute given items.

Contractor shall make all necessary arrangement for Dewatering etc if required to keep site, excavated pit etc free from waterlogging. The contractor`s quoted rate shall deemed to have included the same. Nothing extra shall be payable on this account.

TECHNICAL SPECIFICATIONS FOR CIVIL WORK

GENERAL

Scope

This specification applies to the Civil, walling , Finishing of ground floor & first floor Core Areas and Facade and External Development Works and building works to be executed by the Contractor. It is to be read in conjunction with and subject to the general conditions of contract and in conjunction with the drawings, the Bill of Quantities and such other documents as may from time to time be agreed upon as comprising part of this contract. Where these specifications are not clear, relevant codes and IBC specifications shall be followed with prior permission of Project Manager.

The Project is to conform to green building and all the methods of construction and measures adopted during construction and materials and specifications have to be in accordance of the green building regulation. Any make / material specified in BOQ not conforming to green building regulation shall be replaced under approval of Clients and Project Manager and nothing extra shall be payable to the Contractor in this regard.

Clearing

The contractor shall clear the site of all rubbish and old buildings remove all grass and low vegetation and remove all bush wood, trees, stumps of trees, and other vegetation only after consultation with the Project Manager as to which bushes and trees shall be saved., other obstructions met with during excavation shall be dug out and cleared.

Cleaning up and handing over

Upon completion of the work all the areas should be cleaned. All floors, doors, windows, surface, etc. shall be cleaned down in a manner which will render the work acceptable to the Project

Manager. All rubbish due to any reason, shall be removed daily from the site and an area of up to ten metres on the outer boundaries of the premises will be cleaned by the contractor as a part of the contract. Upon completion of the project, the contractor shall turn over to the Project Manager the following:

a) Written guarantee and certificates.
b) Maintenance manuals, if any, and
c) Keys.

Samples

The contractor shall submit to the Project Manager samples of all materials for approval and no work shall commence before such samples are duly approved. Samples of precast concrete panels, masonry units, building insulation, finished hardware, metal window and door frames, flooring, gypsum, tiles, granite, glass etc. and every other work requiring samples in the opinion of the Project Manager shall be supplied to the Project Manager, and these samples will be retained as standards of materials and workmanship. The cost of the samples shall be borne by the contractor. Throughout this specification, types of material may be specified by manufacturers' name in order to establish standard of quality, price and performance and not for the purpose of limiting competition. Unless specifically stated otherwise, the tenderers may assume the price of 'approved equivalent' except that the burden is upon the contractor to prove such equality, in writing.
A detailed programme shall be submitted by the Contractor for the material approvals, within four weeks of the Project Manager's order to commence. The detailed programme shall include but not limited to:

Date/s of submitting the various material samples.
Date/s by which the Project Manager’s approval is required.
Date/s of placing orders on the Manufacturers/Suppliers.
Date/s of arrival of the approved material/s on to the site.

Date/s of the completion of the `Mock-ups', wherever required, and the Date/s by which the Project Manager's inspection of such `Mock-ups' should be completed and the Date/s by which the Project Manager should fully approve the said Mock ups.

Tests

All materials and methods of tests shall conform to the latest rules, regulation and/or specifications of the following authorities where specified herein as applicable. British Standards Code of Practice (BS.The Project Manager will have the option to have any of the materials tested and if the test results show that the materials do not conform to the specifications, such materials shall be rejected. A reasonable number of representative tests will be deemed to be included in the rates tendered.

Mode of Measurements

All measurements will be taken in accordance with International Building codes latest issue unless otherwise specified in the BOQ and specifications.

MAKING GOOD

The contractor shall cut, leave or form holes, recesses, chases etc., in concrete, MASONRY work, walls, ceilings, floors and in any other situations as required or as directed by the Project Manager and make good in cement and sand mortar (1:3)/PCC (1:2:4) as decided by Project Manager and finish to match the adjoining surfaces. No extra payment shall be admissible in this regard.

GUIDELINES TO BE FOLLOWED BY CONTRACTORS DURING CONSTRUCTION

The Contractor should follow the Erosion and Sedimentation Control (ESC) plan as per Annexure – A of these technical specifications.
The Contractor should follow the Air Quality Management Plan (AQMP) as per Annexure B of these technical specifications.
The Contractor should have the First Aid kit as per the provisions listed in Annexure C of these technical specifications.
All the above are in addition to the conditions prescribed anywhere else in the tender. The Contractor is supposed to quote rates considering the above provisions in contract and nothing extra on any account shall be admissible to the contractor.

SITE DEVELOPMENT AND EARTH WORK

General
This specification deals with the clearance of the Site of Works and preparation of the same to commence the proposed construction activities. Wherever applicable, this is deemed to include all preliminary works like Dismantling/Demolition.
The contractor shall visit the site, No claim on account of extras will be entertained in consequences of any misunderstanding or incorrect information or ignorance of the existing conditions.

PREPARATORY WORK
Before starting of works ,the layout of building and commencing the construction, contractor shall carry out the matrials to be demolished. The rate of surface excavation deems to include this provision in the quoted rate.

Form Work and scaffolding / STAGING:-
Form work to the fresh concrete shall be sufficiently rigid and shall be such as to prevent loss of slurry from the concrete and details and design of the form work shall conform to International Building codes. The tolerances on the shape, lines and dimensions shall be as per International Building codes .

MODES OF MEASUREMENTS
Formwork shall be measured as the area (in square metres) of shuttering in contact with the concrete including covers, angles, splays, mitres, bevels, etc. for which no special rate shall be allowed.

Steel Reinforcement
The reinforcement steel shall in general comply the following specifications; these specifications shall also be binding on the contractor in case reinforcement steel is supplied by the Owner / Project Manager. Recycled Steel shall be given preference to be used as per green building provisions.

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Quality Assurance Plans and SUPERVISION:

A competent person shall be employed full time whose first duty will be to supervise all stages. All test on materials, the making and testing of cubes and the maintenance and calibration of all mixing and measuring plant shall be carried out under his direct supervision in the presence of the Project Manager. Contractor shall set up a laboratory with all testing arrangement at site. On award of the work contractor shall submit their quality assurance plans, complete methodology & sequence of construction for all activities.

Cement

Cement shall in general comply the following specifications:-

Types

The cement used shall be Portland Pozzolana cement with 30% fly ash content conforming to International Building codes (Latest revision) of grade 43 for all works and/ or directed by the Project Manager (use of Grade 53 cement is strictly prohibited).

All cement shall be fresh when delivered. Cement shall be delivered in sound and properly secured bags or other packages ready for immediate use and shall be used direct from the bag. The contractor shall maintain for Project Manager' inspection a record of receipts and consumption of cement indicating the source, the age and the date of receipt of cement. Cement containing lumps which cannot be broken by a light touch of fingers shall not be used in the works. Admixtures shall not be used without written consent of the Project Manager.

Sources

Cement shall be obtained from sources, which are approved by the Project Manager. Makes and sources of cement shall not be varied from those used for trial mixes; should a change be unavoidable the contractor shall submit his proposals for the prior approval of the Project Manager and then carry out new trial mixes unless otherwise directed by the Project Manager. Cement of different kinds shall not be mixed at any stage.

Manufacturers' Test Certificates for Cement

The Contractor shall request the cement manufacturer to forward to his site office the Certificate of conformity in accordance with International Building codes (Latest Revision), and he shall cause a copy to be supplied to the Project Manager within 48 hours of the arrival of the certificate, which shall not be later than 14 days from the day of delivery of the relevant consignment. The test certificate shall be related to the date of delivery at site of consignment. The frequency of deliveries shall be such as to ensure that no cement is more than 3 months old when used in the works.

Samples of Cement

Samples of cement to be used in the works shall be deposited with the Project Manager for his approval together with a certificate stating the name and address of the Manufacturer, the name and address of the supplier from whom it was purchased. The Project Manager may from time to time take samples of the cement being used in the works for testing.

Storage of Cement

The contractor shall provide a proper separate weather-proof store building with raised floor for cement storage on the site and shall at all times protect the cement from damp or any other deleterious influences. Each consignment of cement shall be kept separately and the contractor shall be careful to ensure the consignments are used in the order in which they are received.

Cement shall be stored over dry platform at least 20cm high in such a manner as to prevent deterioration due to moisture or intrusion of foreign matter. In case of storerooms, the stock should be at least 20cm above from floors and 60 cm away from walls. It shall be ensured that tested and untested cement are segregated and stored separately with distinct identification. The cement godown shall be provided with two locks on each door. The key of one lock at each door shall remain with the Project Manager or his representative and that of the other lock with the contractor's authorised representative at site of works so that cement is removed from the godown only according to daily requirement with the knowledge of both the parties

In case cement gets affected from damp or any other deleterious influence, such cement shall not be used for construction work.

Cement shall be procured by the contractor from the main producers of cement:

The particulars of the manufacturer/ supplier of cement along with the date of manufacture shall be produced by the contractor for every lot of cement separately. The documents in support of the purchases of cement shall be produced before the Project Manager for verification.

The following conditions shall have to be satisfied before PPC can be allowed to be used in the work:-

PPC should meet the strength criteria as per International Building codes.
The minimum period before striking off formwork while using PPC shall be as given in PS Clause 3.8 hereinafter.
While procuring PPC, the following requirements are to be ensured and certificate to the effect is to be obtained by the contractor for each batch from the manufacturer and the same shall be submitted to the GE for approval to procure PPC.
The quality of fly ash is strictly as per International Building codes .
Minimum Fly ash content is 30%.
Fly ash is inter-ground with clinker and not mixed with cement.
Dry fly ash is transported in closed containers and stored in
Only pneumatic pumping should be used.
The fly ash received from thermal power plants using high temperature combustion above 1000 deg C should be used.

SCHEDULING OF SUPPLY:-

Schedule of procurement of cement shall be finalised by the contractor with Project Manager and shall be incorporated in the CPM chart so that procurement is in accordance with the progress contemplated in the CPM prepared. The complete requirement of cement shall be worked out before making any RAR payment and procurement of cement by the contractor shall be completed sufficiently in advance of the execution of work.

FINISHING WORKS

General

All plaster work shall be of the best workmanship and in strict accordance with the dimensions of the drawings. All plastering shall be finished to true levels including plumbs, without

imperfections, and square with adjoining work. It shall form proper foundations for finishing materials such as paint etc. Masonry and concrete surface to which plaster is to be applied shall be clean, free from efflorescence, sufficiently rough and keyed to ensure proper bond.

Wherever directed all joints between RCC frames and masonry walls, shall be expressed by a groove in the plaster. This groove will exactly coincide with the joint beneath. At the corners of all windows and doors or other openings and wherever instructed, 24 gauge expanded galvanized metal mesh strips 300 mm wide shall be placed diagonally to prevent plaster cracks.

Where grooves are not called for, the joint between concrete and masonry in filling, chasing for conduits, pipes, boxes etc. shall be covered by 24 gauge expanded galvanized metal strips, 300 mm wide installed before plastering. The contractor shall supply all necessary labour, material, tools and scaffolding necessary for the completion of the work detailed. He shall be responsible to take proper precautions to all works from damage. Any work rejected through non-compliance with the specifications or damaged work shall be removed and replaced at the expense of the contractor.

All chasing, installation of conduits, boxes, etc. shall be completed before any plastering is commenced on a surface. Chasing or cutting of plaster will not be permitted. Broken corners shall be cut back less than 150 mm on both sides and patched with plaster of Paris as directed. All corners shall be rounded to a radius. Contractor shall get samples of each type of plaster work approved by the Project Manager.

The materials used for plastering shall be proportioned by volume by means of gauge boxes. Alternatively it may be required to proportion the materials by weight.

Plaster Work

The joints in the brick work, concrete blocks, shall be raked to a depth of 15 mm while the masonry is green. Concrete surfaces to receive plaster shall be suitably roughened. All walls shall be washed with water and kept damp for 10 hours before plastering.

The plaster unless specified otherwise shall be average of 15 mm thick on walls and minimum 6 mm thick for the ceiling. The finished texture shall be as approved by the Project Manager. The mix for plaster unless otherwise specified, shall be one part cement and four parts sand, to walls and one part cement, 3 parts sand to ceiling.

The interior plaster shall be applied in one coat only. The surface shall be trowelled smooth to an approved surface. All plaster work shall be kept continuously wet for seven days.

The external plaster shall be minimum 20 mm or as specified in SOR. Preparations of walls to receive plaster work shall be the same as in internal plaster. Both layers of all external plaster shall be waterproofed with approved water proofing powder added to cement in proportion of 1.5 Kg. to 50 Kg. of cement as per the manufacturers' instruction, for both the coats.

For sand faced cement plaster, the finishing coat shall be in cement mortar 1:3, sand used shall be of selected colour, properly graded and washed so as to give a grained texture. Finishing plaster coat shall be 8 mm thick, uniformly applied and surface finished with special rubbing by sponge pads and other tools and recommended by the Project Manager.

For rough cast plaster, the backing shall be floated with 3 mm thick cement mortar 1:4 with fine sand, spread in small areas not exceeding 2 Sq.mt. at a time. While this coat is still wet, the rough cast containing a mixture of 1 part of cement, 2 parts of fine sand and 1 part of gravel, 3 to 6 mm size, shall be dashed on the floating coat, to a uniform thickness of 15 mm thick and finished even.

Mode of Measurements
Length and breadth shall be measured correct to a cm and area shall be calculated in square metres correct to two places of decimal.

Thickness of the plaster shall be exclusive of the thickness of the key i.e. grooves, or open joints in brickwork.

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 or skirting to the ceiling for the height. Depth of coves or cornices if any shall be deducted.

The following shall be measured separately from wall plaster:

Plaster bands 300mm wide and under in running metre specifying the width of the band.
Cornice beading and architrave or architrave moulded wholly in plaster.
Circular work not exceeding 6m in radius shall be measured in sqm.

Plaster over masonry plaster will be measured and paid for as plaster only.

A coefficient of 1.63 shall be adopted for the measurement of one side plastering on honeycomb work having 60 x 100-mm openings.

Deductions in measurements, for opening etc. as follows:
No deduction will be made for openings or ends of joists, beams, posts, girders, steps etc. upto 0.5 sqm in area and no additions shall be made either, for the jambs, soffit and sills of such openings. The above procedure will apply to both faces of wall.

Deduction for opening exceeding 0.5sqm but not exceeding 3 sqm each shall be made for reveals, jambs, soffit, sills, etc. of these openings.

When two faces of walls are plastered with same plaster, deductions shall be made for one face only.

When two faces of walls are plastered with different types of plaster or if one face is plastered and other is pointed or one face is plastered and other is unplastered. The deduction shall be made from the plaster or pointing on the side of the frame for the doors, windows etc. on which width of reveals is less than that on the other side but on deduction shall be made on the other side.

Where width or reveals on both faces of wall are equal, deduction of 50% of area of opening on each face shall be made from area of plaster and / or pointing as the case may be.

For opening having doorframe equal to or projecting beyond thickness of wall, full deduction for opening shall be made from each plastered face of wall.

For opening exceeding 3sqm in area, deduction will be made in the measurements for the full opening of the wall treatment on both faces, while at the same time; jambs, sills and soffits will be measured for payment.

In measuring jambs, sills and soffits, deduction shall not be made for the area in contract with the frame of doors, windows etc.

CERAMIC TILE IN DADO/ SKIRTING

TILES
The tiles shall be of approved make/manufacturer. They shall be flat, and true to shape and free from cracks, crazing, spots, chipped edge and corners. The surface shall be of uniform shade except for patterned tile.

The tiles shall be of nominal sizes of 300 x 300 mm or as approved. The thickness of the tiles shall be 7 to 7.5mm unless otherwise mentioned.

Technical	Standards
Determination of Dimension	-
Sides	± 0.5%
Thickness	± 0.5%
Straightness of sides	± 0.5%
Rectangularity	± 0.6%
Surface Flatness	± 0.5%
Surface Quality	95% free from visible defects
Water Absorption	> 10%
Flexion Resistance	> 10%
MOHS Hardness	Min. 3

Color and pattern
The tiles shall be as approved.

Preparation of surfaces
The joints shall be racked out to a depth of at least 12 mm in masonry walls, while the masonry is being laid. In case of concrete walls, the surfaces shall be backed and roughened with wire brushes. The surface shall be cleaned thoroughly, washed with water and kept wet before skirting/dado is commenced.

Mortar
12mm thick plaster of cement, mortar 1:3 (1 cement : 3 coarse sand) shall be applied and allowed slightly to harden. The plaster shall be roughened with wire brushes or by scratching diagonal at close intervals.

LAYING OF TILES
The tiles shall be soaked in water, adequately washed clean, and a coat of neat cement slurry applied liberally at the back of tiles and set in the bedding mortar. The tiles shall be tamped and

corrected to proper plane and lines. The tiles shall be set in the required pattern and butt jointed. The joints shall be as fine as possible and uniform. Top of dado shall be truly horizontal and joints truly vertical except where otherwise indicated. Where full size tiles cannot be fixed these shall be cut to the required size and their edges rubbed smooth. Care shall be taken to ensure that as far as possible cut tile are in non-exposed locations. Works shall be carried out in all areas only after the Consultant has approved a sample panel.

Pointing
After laying is complete, the joints shall be cleaned off the grey cement grout with wire brush and all dust and loose mortar removed. The joints shall then be flush pointed with white cement slurry added with approved pigments to match the colour of tiles.

Curing and finishing
The surface shall be cleaned and kept wet by sprinkling water for seven days. The finished surface shall be clean, free of patches and glossy and shall not sound hollow. Finished dry surfaces shall be washed with mild organic acid, if so required. The finished surface shall meet the approval of the Consultant.

Measurements
Length and breadth shall be measured correct to a cm before laying skirting, dado or wall plaster and the area calculated in square meter correct to two places of decimal. Where covers are used at the junctions, the length and breadth shall be measured between the lower edges of the coves.

No deduction shall be made or extra paid for voids not exceeding 0.20 square meters.
Deductions for ends of dissimilar materials or other articles embedded shall not be made for areas not exceeding 0.10 square meter.

The rate for flooring shall include the cost of all materials and labour involved in all the operations described above. Nothing extra shall be paid for the use of cut (sawn) tiles in the work.

WOODEN LAMINATED FLOORING

Standards

Description	Minimum Requirement
Usage	Method of test shall be as per EN 13329
Wear resistance	As per EN 13329
Impact Resistance	As per EN 13329
Stain resistance	As per EN 13329
Cigarette burns	As per EN 13329
Colour fastness	As per EN 13329
Slip resistance	Shall not be less than 0.60 (As per ASTM C 1028)
End joint displacement	A minimum of 200mm between joints shall be maintained
Indentation resistance	Shall not be less than 600 kg / sqcm. (As per DIN 52185)
Electrostatic charge	0.9 kV (As per DIN 54345)
Formaldehyde emission	As per EN 717 – 2
Fire resistance	B1 (As per DIN 4102)

Material

Laying of Floor
The laminate flooring shall be of first quality and shall adhere to all the relevant international or equivalent Indian standards. It shall be of approved shade, make, design and quality and shall be laid in a pattern / layout as per the specific requirements of the architect. The flooring planks shall be hard, durable and shall require minimal maintenance.

Workmanship

Laying of Floor
The floor shall be installed at room temperature strictly as the guidelines prescribed by the manufacturer. The floor may be installed as a floating floor at the discretion of the Engineer. The sub floor shall be dry, rigid, even and clean. Care shall be taken to ensure that the floor is not laid in wet rooms or in rooms provided with floor drains.

A polyethylene film of minimum 0.2 mm thickness shall be provided as a moisture barrier over the sub floor prior to laying the laminate flooring. The contractor shall ensure to provide a gap of about 12 to 15mm from all the walls and fixed objects to allow for the flooring to settle in the environment. The plank profiles shall be fixed securely into the sub floor.

An approved flexible sealant made out of acrylic or polyurethane shall be used for fixing the flooring. The entire expansion space shall not be filled. The planks shall be installed lengthwise, parallel to the side walls in small corridors and passages. The planks shall be fixed preferably in a direction towards incoming light. The top layer shall be of polyurethane type finish in order to maintain the aesthetics of the flooring.

Protection and Maintenance
Whenever glue is used for fixing, the excess glue during fixing shall be removed immediately with a scraper and damp cloth. A constant indoor room climate of 40 to 60% RH, shall be ensured at the time of installation. No furniture or any other heavy object should be dragged on the floor after installation. The flooring shall be cleaned with an upright vacuum cleaner or a damp cloth and a dry broom. Steam cleaners shall not be used. The floor shall not be sanded, waxed, lacquered or treated with film forming agents or abrasive materials.

Testing
The testing for various properties shall conform to the various international standards as listed in standards above. The flooring after installation may be tested for straightness and evenness using a straight edge. If any undulations are noticed, the same may be rectified complete to satisfaction of the Engineer

Measurement
The contract rate shall be per square metre of the floor area covered by the flooring of the specified type. All work shall be measured net. The length and width of the flooring shall be measured net between the faces of skirting or dados or plastered faces of walls. Paving under the dado, skirting or plaster shall not be measured.

Rate
The rate for the item shall include the following.

All labor, materials and equipment, cleaning the sub-base, installation of the flooring including all operations as mentioned above.
Any cutting and waste if required.
Cleaning & protecting the floor from all stains, etc.

WOOD WORK AND JOINERY
The Contractor shall be responsible for providing all plant, tools, materials, labour and all things necessary for the proper execution, completion and maintenance of the works.

TIMBER
Timber used for joinery shall be the best of its respective class, seasoned for a minimum of six months by air-drying, of natural growth and free from defects such as cracks, splits, shakes, dead knots, soft spongy spots and waves of injurious open stakes. When one kind of timber is used it shall be of uniform colour to the satisfaction of the Architect.

Grains shall be reasonably larger than 6 square centimetres and the aggregate of all knots shall not exceed 0.5% area of any one piece.

Timber shall be kiln dried to international building codes and conform to international building codes in regard to moisture content. The maximum permissible limit shall be +3% for the average moisture content of all samples from a given lot and +5% from individual samples from a given lot. This shall apply when the thickness of timber is more than 50mm. Small size timber tolerances shall be +/- 2% and +/- 3% respectively.

The Contractor shall provide samples of all timber and other materials to be used in the work for the approval of the Architect. All timber and other materials brought on to the Site shall strictly comply with the approved samples.

Timber shall be seasoned, chemically treated and treated with a 10 (ten) year guaranteed and approved anti-termite treatment to render it free from decay and insect attack.

The moisture content of the timber during manufacture, delivery to site, storage, site working, assembly, installation shall be 10 to 12 percent.

Timber shall be Ivory Coast Teak Wood / Ghana Teak Wood / Champ Wood, soft or hardwood, shall be FSC certified and shall be suitable for the purpose for which it is intended. It shall be seasoned or Kiln dried, absolutely free from worm holes, large loose or dead Knots or other defects which would effect strength or usability and shall be flat, straight non-splitting and dressed on all sides. It shall be matched for colours and graining.

Recycled wood or rapidly renewable wood can also be used such as poplar, eucalyptus, bamboo etc only after confirmation of Project Manager.

Ivory Coast Teak Wood / Ghana Teak Wood / Champ Wood wherever specified in the drawings / schedule of quantities , it is Ist quality Light Grained of reasonably straight grains, light vein free of Knots and sap.

DOORS

Doors shall be solid flush doors as described, external flush doors being made with weatherproof plywood. Flush doors shall conform to international building codes and commercial veneers shall conform to international building codes.
Decorative veneers shall be Grade 1 and conform to the requirements for decorative veneers specified for Grade 1 decorative plywood interior grade with a thickness not exceeding 1 mm.

Lippings shall be of best quality hardwood. Teak lippings, where described, shall conform to the specification for best quality teakwood. Lippings around doors shall be of one piece not less than 25mm wide with a depth equal to the door thickness. Double leaf doors shall have lippings on the meeting stiles not less than 35/40 mm deep.

Approved plastic or laminated veneers shall be provided where specified and fixed with "Fevicol" or other equal and approved adhesive. Finished surfaces shall be thoroughly cleaned with wax polish.

WINDOWS
Windows shall be as specified and, unless otherwise described, shutters shall have one pair of hinges, two tower bolts (one 225mm long and the other 150mm long), one handle and one hook with eye and a pegstay. Ventilators shall have two mild steel holdfasts and hinges, one handle and one hook and eye at each end with one tower bolt in the centre.

CUPBOARDS AND CABINETS
Cupboards, wooden cabinets shall be provided as shown on the drawings. Doors may be either hinged type or sliding type as detailed. Dimensions shown on the drawings shall be strictly followed.

RAILINGS AND ARCHITRAVES
Railings and architraves shall conform to the shape shown on the drawings or as approved by the Consultant/PMC and fixed by means of screws, counter- sunk or otherwise, or bolts.

GLAZING IN WINDOWS, DOORS
Glazed windows, louvers, ventilators and doors shall be provided with either clear, float or pinheaded glass 5.5mm thick or as otherwise described, shall be free from all blemishes and conform to International Building codes.

IRONMONGERY AND FITTINGS
Fittings and fixtures and other ironmongery shall be as detailed drawing and shall comply with the relevant IBC Standards and Codes of Practice.

All nails, screws, fixings, and the like shall be of hot dip galvanized or brass or non-ferrous material as described.

WORKMANSHIP

General
Workmanship shall be of the best quality and the Contractor shall check all dimensions on Site prior to putting joinery work in hand.

All joinery work shall be accurately set out in strict accordance with the drawings and shall be framed together in the best possible manner and with the best possible method of jointing.

No timber shall be painted, tarred, oiled or the like before it has been inspected by the Consultant /PMC. Any effort to hide defects by plugging, painting and the like shall lead to the timber being rejected by the Consultant/PMC. All rejected timber shall be immediately removed from the Site.

Thickness specified for wrought timber are, unless otherwise specified, prior to planning and an allowance of 3mm shall be made for wrought faces.

Sawing and planning of timber shall be done in straight lines and planes to produce uniform thickness. Joinery work shall be wrought on all faces and finished off by hand with sandpaper with slightly rounded arises.

Before joining wood frame members shall be planed smooth and accurate to the final size. Rebates, roundings, mouldings and the like shall be made before the members are jointed.

Mortice and tenon and dovetailed joints as required shall be strong, neat and shall fit without wedging and/or filling. Joints of frames shall be pinned with 10 to 15mm diameter hardwood pins and white lead after the members have been glued and pressed together.

Joinery work which splits, fractures, shrinks or shows flaws or other defects due to unsoundness, inadequate seasoning or bad workmanship shall be immediately removed and replaced with sound material at the Contractor's own cost.

Door and Window Frames
Door, window and ventilator frames, transoms and mullions shall be rebated. Top frame members of doors and top and bottom frame members of windows and ventilators shall project about 150mm in brickwork. Vertical members of door-frames shall project about 50mm below finished floor levels.
Door and window frames shall be provided on each side with 3 nos. 225 x 25 x 6mm mild steel flat split hold-fasts which shall be built into masonry or cast into concrete work in accordance with International Building codes.

Frames shall be finished smooth to receive paint, polish or any other specified finish. Surfaces of timber fixed to masonry or concrete shall be painted with hot bitumen coal tar or any other approved wood preservative or primer before being placed in position.

Door and Window Shutters
Door and window shutters shall conform to the requirements of International Building codes If required, flush door panels shall be tested in accordance with the requirements of International Building codes.

All faces of door and window shutters shall be at right angles, free from twist and warp in the plane. Faces shall be sanded to obtain a smooth, even texture.

Shutters shall be painted on the commercial side with two coats of synthetic enamel paint over an approved coat of primer. Decorative veneer sides shall be wax or French or Melamine polished with two or more coats as specified.

Double leaf shutters shall have meeting stiles rebated 20mm deep and shall be either splayed or square type with teak wood lipping not less than 35/40 mm deep.

Care shall be taken to prevent damage of any kind or loss of shape during transport, handling, stacking and hanging.

MEASUREMENT AND PAYMENT

Timber frame for Doors, windows, ventilators and louvers will be measured in cubic metres. Shutter for Doors Windows shall be measured in square metre. Quoted rates shall be deemed to be inclusive of nails, screws and other types of fixing and glazing, unless otherwise described. Hardware and ironmongery shall be measured separately, unless otherwise described in the Bill of Quantities. Quoted rates shall be deemed to the exclusive of polishing and/or painting.

FIXING

The carpentry timber shall be fixed with nails, spikes, bolts screws, hangers, stirrups, anchors, ties or any other accessories which are suitable to develop the full strength of the member to which they are attached, as directed.

Carpentry timber where fixed to solid masonry or concrete shall be secured with expansion bolts or other positive methods of mechanical fastening. MS hold fast grouted in CC block shall be used to hold the door frames.

TIMBER - TREATMENT

All timber shall be protected with an organic solvent water repellent wood preservative to give a highly efficient protection against termite, spider, worm, all insects and fungus and rot attach and shall, where exposed, enhance the appearance of the timber. Colour of the product shall be such as to bring out the natural colour of the respective timbers. Fire retardant paint to timber shall be applied as per the recommendations of manufacturer and shall comply with the requirement of IBC / B.S. code and local fire requirements.

VENEERS

Veneer shall be of the timber species of International origin shown on drawings. Veneers are to be kept in sequence as they are being cut from wood and supplied as such to the site for accurate matching or figuring. The veneer shall be finished as specified and shall be equal or superior quality to that laid down in International Building codes or as approved.

PLYWOOD

All ply wood shall be of best / high quality close grained suitable for veneering, painting or bonding plastic laminate. It shall be resin bonded and weather proof. Exposed edges shall be finished with an edge strip of solid teak wood. tongued and grooved and glued , or as detailed. The plywood of approved brand and manufacture only shall be used in the work. The thickness shall be in accordance with the drawings /schedule of quantities.

FLUSH DOORS

All flush door shall be solid core as specified. It shall conform to the relevant specifications to International Building codes and shall be obtained from IBC approved manufacturers. The finished thickness of the shutter shall be as mentioned in the items. Face veneers shall be of the pattern and colour approved by the Architects and an approved sample shall be deposited with the Architects for reference. The solid core shall be wood laminates prepared from battens of well-seasoned and treated good quality wood having straight grains.

GYPSUM BOARD

Gypsum -Board (Glass Fibre Reinforced Board) or Equivalent conforming to International Building codes shall be used. Technical detailing for fixing Gypsum-Board along with jointing compound, paper tape, primer, screws, edge bead, angle bead etc. shall be as per Manufacturers specification. Proper care is to be taken while handling, storing and cutting the Gypsum-board as per manufacturer's manual and the work shall be done in technical co-ordination /assistance with the trained staff of Manufacturer, such services being offered free by them.

MIRRORS AND GLASSES

Mirrors shall be fabricated from best clear plate or float glass of approved quality in imported variety and shall match the International Standards. All fixed panel mirrors shall be +/- 0.30mm tolerance. The edges of mirrors shall be polished and bevelled and mitred as per IBC specifications wherever, it's indicated in the drawing.

All vision glasses shall be float glass of specified thickness. The edges shall be bevelled as indicated in drawings and shall be done at approved source.

The Etching wherever specified in drawings, shall be done at approved sources as per full-scale drawing approved by the Project Manager. The etched panel shall be chemically washed /treated as per specialist specifications to have a permanent dust free surface.

The Contractor shall be responsible for protecting all mirrors and glasses fixed by him and shall replace at his own expense any broken or damaged mirror / glass caused through lack of adequate protection or care in installation or handling.

MODE OF MEASUREMENT

Framework

Unless otherwise specified all works shall be measured net in decimal system as fixed in position for finished dimension without any allowance for the wastage or for dimension beyond specified .No extra measurement shall be made for shape, joints etc.

Woodwork wrought framed and fixed shall be measured for finished dimension with out any allowance for wastage. However in case of members having mouldings, roundings or rebates. The finished dimension shall be taken as the sides of smallest square or rectangular from which section can be cut length shall be measured & nearest cm.(Inclusive of projection forten & width & thickness shall be measured to nearest mm and quantity shall be worked out to nearest Cum

For sections other than rectangular shall be measured as the least rectangle from which section can be obtained. In case of varying section largest section shall be measured.

Mitred pieces shall be measured along the longest length.

Circular or segmental portion shall be measured net separately.

In measuring framed timber, length of tenons and scarf's shall be added to site length of framed member. Extra length where required to be embedded in walls/floors shall be added in the site length.

The work where specified 'fixed' and 'framed and fixed' shall be measured separately. The work 'framed and fixed' shall be that which involve mortise and tenons or dovetailed joint.

Unless otherwise specified the tolerance of 1.5mm is only permitted in the wrought face.

All lineal labours such as rebates straight or splayed, beads and chambers shall not be measured separately and shall be included in the item description

Paneled glazed or paneled and glazed shutters:
Unless otherwise specified framework and Panelling shall be measured separately.The overall length and width of the frame work of the shutter shall be measured nearest to 0.01m in fixed position (overlaps not to be measured in case of double leafed shutter) and the area calculated in square metres correct to two places of decimetre. No deduction shall be made to form panel openings or louvers. No extra payments shall be made for shape, joints and labour involved in all operations described above.
For Panelling of each type or for glazed panel length and width of opening for panels inserts or glazed panels shall be measured correct to a 0.01m before fixing the beading and the area shall be calculated to the nearest 0.01sqm. The portions of the panel insert or glazed panel inside the grooves or rebates shall not be measured for payment.

Flush Door Shutters
Length and width of the shutters shall be measured to the nearest 0.01m in closed position covering the rebates of the frames but excluding the gap between the shutter and the frame. Overlap of two shutters shall not be measured. All work shall be measured net as fixed and area calculated in square metres to nearest two places of decimal. No deduction shall be made for providing Venetian opening and opening for glazing.

Lipping of hard wood shall be provided to shutter the thickness/ depth of lipping shall not be less than 5mm. For double leaved shutter depth of lipping at meeting of stiles shall not be less than 5mm. Joints should not be provided in the lipping. Lipping shall not be measured separately unless otherwise specified.

Molding and architraves
Moulding and architraves shall be measured in running metres to the nearest 0.01m. The section out of which such moulding, architrave, cornice etc. are made shall be specified.

Fittings and fixtures
Unless otherwise specified hardware fixed to wood and metal shall be specified and measured as per the BOQ. In case hardware is fixed flush to frame it shall be described.

Glazing
Unless otherwise specified all works shall be measured net in decimal system as fixed in position for finished dimension without any allowance for the wastage or for dimension beyond specified. Each pane of glass shall be measured to the nearest 5mm both in width and height.

Irregular shaped or circular panes shall be measured as the smallest square or rectangular area from which the irregular or circular pane can be cut. Irregular panes shall be measured separately and described as irregular shapes (measured square).

All cutting on glass and glazing sheets (other than straight cutting on sheet glass) shall be described and measured separately in running metres. Straight cutting on sheet glass shall not be measured separately but included in the description of item.

Circular cutting on all types of glass and glazing sheets shall be measured in running metres.
All glazing shall be measured in square metres and grouped according to the thickness and type of glass.
Holes drilled in glass and sheet shall be enumerated stating the diameter of the hole, type and thickness of the glass / sheet and size of the pane.

In the case of wired glass, the type, design or pattern of reinforcement shall be described.
Frosted glass shall be measured separately and described whether frosted on one or both sides.

Itched glass shall be measured separately and described whether itching in one side or both side and shall be measured in sqm.

Bevelling of edges/ sides shall be measured in running metres specifying the width and whether on one side or both side.

Grinding, polishing and rounding off edges of glass or glazing sheet, if required, shall be described and measured in running metres.

9. FIRE DOORS GENERAL SPECIFICATIONS

FIRE DOORS (GENERAL)

Fire resisting, means that the construction is designated as capable of resisting the passage of flame and smoke, and providing insulation as defined in under the prescribed conditions of test appropriate to such construction in accordance with the current British Standard 476.

- FD30 doors generally should not be less than 44mm in thickness,
- FD60 doors generally should not be less than 54mm in thickness,

Where Fire Doors are (Typically) Required
(a). All doors to staircases from corridors or rooms, cross corridor partition doors, all doors to Laboratories, Workshops, Storerooms, Plant Rooms, Service Ducts, Kitchens & Tea Points; and to defined fire compartments.

(b). Certain circulation areas, which extend the escape route from the stair to a final exit or to a place of safety, entrances & lobbies; all doors leading onto external fire escapes (except the top door) and doors between basement and upper floors etc.

(c). Corridors that are protected from adjoining accommodation by fire resisting construction principally, all doors leading off the corridor including bedrooms (seeping accommodation) in dead-end conditions (where escape is only available in one direction)

All Fire-Resisting Doors Should Be:
(1). Close fitting to the frame with a maximum gap of 5 mm, but 3 mm is the accepted working gap and hung by a minimum of 1½ pairs of all metal hinges with a melting point of not less than 800°C (both nylon and nylon bushed hinges are unacceptable).

(2). Fitted with an effective self-closing device (not normally a Perko Type) capable of closing the door tight against the stop, overcoming the resistance of any latch or lock provided.

Door Frames:
The selection and installation of doorframes is as important as the door itself. Where purpose built frames are installed they should be matched with the recommended door as the fire resistance of one may depend on design features of the other. In special instances a purpose built door may be installed in an existing frame, advice should be sought from the door manufacturer. Whichever method is adopted the following guidance should be considered:

• Any gaps between the rear of the frame and the wall must be infilled with mineral wool, plaster or intumescent paste.

• When intumescent material on a frame faces the same on the door edge, they must be of the same type.

• Door frames will not be accepted if they are less than 30mm thick for FD30 doors and 44mm thick (hardwood) for FD60 doors unless accompanied by a relevant test certificate.

• Steel doorframes are subject to distortion when heated and will only be accepted if a relevant test certificate can be provided.

Air Transfer Grilles:
Air transfer grilles in fire doors will not only allow air to pass through but smoke and fire also. It is, therefore, essential that whatever fire door a transfer grille is fitted, the fire and smoke resisting qualities of the door must not be reduced as a result.

• Where a fire door is fitted purely to resist the passage of fire and not to resist the combination of fire and smoke, a heat activated fire damper is usually acceptable.
These are normally of the intumescent honeycomb or fusible strut type of operation.

• Where a fire door is fitted to protect an internal escape route and especially if the door has ‘Smoke Seals’ fitted, the only air transfer grille permitted is one that resists the passage of smoke as well as fire. This type of damper is electro-magnetically released by the activation of a smoke detector located on the risk side(s) of the door [e.g. a Gilbert Damper]. Air transfer grilles in fire doors should not be fitted higher than 1000
mm from the floor threshold.

IRONMONGERY
Ironmongery - provide strong and fully functioning ironmongery that is approved for use with fire doors.

• Essential Ironmongery - Items vital to achieve the fire resistance performance of a fire door assembly,

• Non-Essential Ironmongery - Items which are not required to achieve the fire resistance performance of a fire door assembly but which if fitted may affect the performance,

• Lock - A mechanism combining, in one case, a spring bolt and a dead bolt operated respectively by handle and a removable key,

• Latch - A device, operable from both sides and generally self-engaging, for holding closed a door, gate or the like, consisting of a moveable part operated by a handle, falling by gravity or sliding or moving by means of a spring into a retaining member, 3.1.
Locks - locking devices fitted with Thumb Turns (T/T) should always be used on the inside leaf in direction of escape, unless other types of escape furniture is to be provided; or no locking furniture at all designated 'Free From Fastenings' (FFF) for Means of Escape purposes.

A regular programme of maintenance should be undertaken to ensure that the correct operational performance is maintained for the life of the building.

GLAZING IN FIRE DOORS
If a Vision Panels or glazing is required in a fire door or partition then the glazing has to be Fire Resisting Glazing of 30 / 60 minutes integrity (FRG30/60) meeting BS 476: Part 22 - 1987 - Fire tests on building materials and structures - methods for determination of the fire resistance of non-load bearing elements of construction.

Note 1: Clear Fire Glazing - It is extremely important to be able identify clear fire glazing (Pyro) this is general done by ensuring each glass sheet is provided with an ‘Acid Etching’ giving the trade name in the corner of the pane and marked with BS 476 Part 22.

Note 2: If the acid etched trade name or BS 476: Part 22 information is NOT visible then the UCL Fire Officer may not accept the glazing as FRG30 - and may be required to be replaced for correct specification!

Note 3: Safety Glazing - glazing that is marked with BS 6206: 1981 / BS 6262 Series is not fire resisting glazing. It is often is mistaken for FRG30 and the UCL Fire Officer will require this glazing to be replaced for FRG where necessary.

Glazing to FRG30 in design, imbedded in intumescent paste rebates etc
Fanlights above fire doors are to be sealed so they cannot be opened and the construction to meet either FRG30 or FR30, as required.

TECHNICAL SPECIFICATION FOR FIRE STEEL DOORS

SCOPE

This specification covers the design, supply of materials, Manufacture and installation of factory made special type of approved make steel fire doors of 1 Hour, 2 Hrs. Fire Rating and General Purpose Doors (FD-1 Hr., FD-2 Hr. & G.D.Series), an ISO 9001-2000 Certified Company with all accessories and including supply and installation of hardwares

CODES AND STANDARDS

All standards, specifications, acts, and codes of practice referred to herein shall be the latest editions including all applicable official amendments and revisions.

GENERAL

The Contractor shall furnish all materials, labour, operations, equipment, tools & plant, scaffolding and incidentals necessary and required for the completion of all metal work in connection with steel doors, as called for in the drawings, specifications and bill of quantities which cover the major requirements only. Anything called for in the tender documents shall be considered as applicable to the items of work concerned. The supply and installation of additional fastenings, accessory features and other items not specifically mentioned, but which are necessary to make a complete functioning installation shall form a part of this contract.

All metal work shall be free from defects, impairing strength, durability and appearance and shall be of the best quality for purposes specified made with structural proprieties to withstand safety strains, stresses to which they shall normally be subjected to.

All fittings shall be of high quality and as specified and as per approval.

The Contractor shall strictly follow, at all stages of work, the stipulations contained in the British Standard and the provisions of the safety code and the provision of the safety rules as specified in the General Conditions of the Contract for ensuring safety of men and materials.

Any approval, instructions, permission, checking, review, etc., whatsoever by the PMC/AEC, shall not relieve the Contractor of his responsibility and obligation regarding adequacy, correctness, completeness, safety, strength, quality, workmanship, etc.

PRODUCTS

Materials
All materials and finishes are to be new and free from defects which may impair the appearance, strength, function and durability of the exterior window system and related construction of the external coverings.

Aluminum: The aluminum-extruded sections shall conform IBC designation HE/HV/9WP alloy with chemical composition and mechanical properties as per International Building codes wall thicknesses to meet required loadings, with minimum for trim being 2.6mm. Test certificate for alloy and its extrusion from the manufacturer is required to be submitted by the contractor for its conformity. Recycled aluminum of approved make shall be used for International Building codes and no extra shall be admissible on this account.

Coating/Anodizing:
All aluminum sections shall be anodized or powder coated. Anodizing shall conform to International Building codes and shall be of AC 25 grade with minimum thickness of 25 +/- 3 microns when measured as per International Building codes and the density shall be at least 32mg/square inch. All sections are to be matt anodized in colour as per sample available with the architects. The anodic coating shall be properly scaled by steam or boiling in de-ionized water as per International Building code. In case of powder coating, factory applied electrostatic powder coated sections 60+/- 5 micron will be considered for approval. Colour consistency shall be accurate. Abrasion Resistance shall confirm to International Building codes.

No visual variation in shade shall be permitted. The fabricator shall clearly indicate the shade variation tolerance as measured by standard equipment.

Structural and weather seal silicone sealant with Low VOC content of approved make duly approved is to be provided at shop and field joints which are sealed as part of assembly and installation procedures. It is to be applied appropriate for joint sizes, movement and substrate. Preshimmed tape shall be used against surfaces with grooves having backer rod at the groove of sufficient size and spacing to prevent shim migration.

Polysulphide sealant is to be applied between wall surface and door & window frames in clear shade with preshimmed tape to prevent shim migration.

Glass and glazing:
External glass shall be Double galzed unit as per BOQ / SOR.

Glass thickness shown is minimum thickness and shall be as per requirement to withstand loads criteria and their performance.

For all the glasses in glazing works 'edge distance' is to be clearly ascertained and maintained.

TECHNICAL SPECIFICATIONS OF 15 KV SWITCH BOARDS

GENERAL

The technical specifications cover the equipment to be supplied for a 15 kV Switchboards suitable for 15 kV 3 phase earthed system. 50 HZ AC supply with a fault level of 350 MVA at 15kV. The equipment shall be suitable for continuous operation at the ambient conditions (Temperature form 0 to 50OC , Relative Humidity 10% to 100%).

STANDARDS AND CODES

Relevant British and/or IEC Standards shall be applicable.

BS certified equipment shall be used as a part of the Contract in line with Government Regulations. Necessary Test Certificates in support of the certification shall be submitted prior to supply of the equipment.

It is to be noted that updated and current Standards shall be applicable irrespective of those listed below.

IEC 62271-100
CEI-EN 62271
ANSI/IEEE C37.54-C37.09- C37.04-C37.55 Standards

15000 VOLT CIRCUIT BREAKERS

Technical Parameters
The 15000 volt circuit breakers shall be triple pole Vacuum type suitable for indoor mounting and shall comply with the requirements of the relevant Indian Standards. The Circuit Breakers shall be suitable for operation at 15000 volts 3 phase 50 Hz supply system and shall have a certified symmetrical breaking capacity of 350 MVA at 15000 volts or as stipulated in schedule of quantities.

Technical Specifications

The Circuit Breakers shall be Vacuum type and shall consist of three identical single pole vacuum interrupter units which shall comprise of a pair of butt contacts enclosed within a sealed ceramic body with SS end plates. The moving contacts shall be sealed into the enclosure via a SS steel bellow which shall permit axial movement of the contact. The contact arrangement shall be surrounded by SS sputter shield to prevent condensation of metal on the inside of the insulating envelop and also to provide good voltage grading across the gap and the outer envelope. The contact material and the contact geometry shall be suitable for the purpose so as to attain current chopping at minimum current to prevent build-up of unduly high over voltages and to prevent the arc to cause localised high spots on the contact.

The Circuits Breaker shall be suitable for switching duty of Transformers

CIRCUIT BREAKER CONSTRUCTIONAL FEATURES

The 15000 volt circuit breaker shall be flush front, metal clad, truck mounted , drawout type and fully interlocked. The truck that carries the Circuit Breaker shall be of rigid fabricated construction. Each Circuit Breaker shall be housed in a separate compartment enclosed on all sides.

Each withdrawable truck shall have its own Circuit Breaker.

All electrical connections on the truck shall be brought to secondary plugs which engage similar sockets in the housing.

The Circuit Breakers shall be of the double break type. Interphase barriers and tank lining of insulating meterial shall be provided.

The drawout mechanism shall be so designed and constructed as to permit smooth withdrawal and insertion. The movement shall be free of jerks, easy to operate and positive.

All current carrying parts in the Circuit Breaker shall be silver plated and suitable arcing contacts shall be provided to protect the main contacts.

Isolating contacts of the spring loaded self aligning pattern shall be provided for the Circuit Breaker. Suitable arc control devices shall be mounted around the fixed contacts.

Terminal insulators of synthetic resin bonded paper shall be provided suitable for the specified short circuit level

Sheet steel barriers shall be provided between

- Instrument Panel and Potential Transformer
- Instrument Panel and Current Transformers
- Busbar chamber and Ciruit Breaker compartments

CIRCUIT BREAKER OPERATING MECHANISM

The Circuit Breaker shall be trip free and equipped with a motor power operated closing mechanism. The operating mechanism shall be such that the Circuit Breaker is at all times free to open immediately the trip coil is energised.

Mechanical ON/OFF position indication shall be provided on the front of the circuit breaker.

The operating mechanism shall be mounted on the front panel of the truck.

The operating handle and the mechanical trip push button shall be at the front of and integral with the Circuit Breaker.

The operating mechanism shall provide four distinct and separate positions of the Circuit Breaker on the cradle

- Service
- Test
- Isolated
- Maintenance

CIRCUIT BREAKER INTERLOCKING

Each Circuit Breaker shall be provided with the following mechanical safety interlocks to ensure protection to the equipment and the operator.

The Circuit Breaker cannot be closed unless it is in the 'PLUGGED IN' position.

The Circuit Breaker cannot be withdrawn from or pushed into the housing unless the main contacts are open.

The Circuit Breaker cannot be put into service without making the secondary connections between the truck and housing.

The cover of the drawout voltage transformer cannot be opened unless the transformer is isolated.

CIRCUIT BREAKER AUXILIARY CONTACTS
The Circuit Breaker shall have a minimum of 6 N.O. and 6 N.C. auxiliary contacts rated at 5 amps. These contacts shall close before the main contacts when the Circuit Breaker is plugged in and vice versa when the Circuit Breaker is lowered.

PROTECTIVE RELAYS
The Circuit Breaker shall have overcurrent, earth fault protection and auxiliary relay devices as specified in the Schedule of Quantities. These relays shall be mounted flush on a separate compartment with access from the rear for wiring and maintenance.

POTENTIAL AND INSTRUMENT TRANSFORMERS
A drawout type cast resin voltage transformer shall be mounted in the panel and connected to the line. The tank shall be arranged for horizontal isolation.

TECHNICAL SPECIFICATIONS AUTOMATIC FIRE DETECTION & ALARM SYSTEM

SCOPE
This specification covers the supply, installation, testing and commissioning of the Fire Detection Systems and generally comprise

- Provision of Smoke and Heat Detectors
- Provision of Manual Call Points
- Provision of Response Indicator Units
- Provision of Audio Alarm units
- Local and Main Control Unit for the System
- Public Address System
- Wiring between Detectors and Control Units to make the complete System

STANDARDS AND CODES
National Fire Protection Association (NFPA) - USA:

Specification for Smoke Detectors	BS 5445: 1984/ NFPA-72
Specification for Heat Sensitive Detectors for use in automatic fire alarm Systems	NFPA-72
Code of Practice for installation of automatic	NFPA-72

Fire Alarm System using Heat sensitive type Fire Detectors

Code of Practice for Electrical Wiring installations (System voltage not exceeding 660 volts)	NFPA-70
Automatic Fire Alarm Systems in buildings	BS 3116 Part I/ NFPA-72
Control and indicating equipment	BS 3116 Part IV/ NFPA-72
British Code of practice for installation and servicing of Fire Alarm Systems	CP 1019: 1972/ NFPA-72
Life Safety Code	NFPA101
European Standards	EN 54

Underwriters Laboratories Inc. (UL) - USA:

Smoke Detectors for Fire Protective Signaling Systems	UL 268
Control Units for Fire Protective Signaling Systems 9th Edition Listed	UL 864
A Smoke Detectors for Duct Applications	UL 268
Heat Detectors for Fire Protective Signaling Systems	UL 521
Audible Signaling Appliances	UL 464
Manually Actuated Signaling Boxes	UL 38
Water flow Indicators for Fire Protective Signaling Systems	UL 346
Visual Notification Appliances	UL 1971

Door Holders	UL 228
Loss Prevention Certification Board of UK	LPCB

All equipment and the installation shall be as per the relevant Indian Standards Specifications. Where these Standards do not exist, the relevant British Standards or any other internationally accepted Standard shall apply.

PHOTO ELECTRIC TYPE SMOKE DETECTORS

GENERAL

The Photo-electric type Smoke Detectors shall be capable of sensing fire in the smoldering or the incipient stage. Smoke Detectors shall be sensitive to visible products of combustion in accordance with the sensitivity requirements of BS 5445 Part 7 : 1984.

CONSTRUCTIONAL FEATURES

Detector Head

The Smoke Detector enclosure shall be of white plastic moulded with high impact self extinguishing polycarbonate and shall be fitted to the base by a twist and lock action. Correct alignment of the electrical contacts in the base with the terminal pins of the Detector shall be ensured. The twist and lock action shall ensure a good electrical contact with the wiping action. Apertures in the Detector housing shall allow the free ingress of smoke through a stainless steel gauze and into the fire sensing photo-optic chamber.

Detector Bases

The Detector bases shall be suitable for mounting directly on a 75 mm recessed round box or as required at the site. The bases shall have terminals which shall be suitable for receiving 1.5 sq mm

PVC copper conductor or 2.5 sq mm PVC aluminium conductor cables. Access to the terminals shall be available from the front of the base after removing the Detector. A plastic cover shall be provided with each base to be fixed to the rear to eliminate the ingress of dust, water and insect into the Detector

Led Indication Lamp
A LED lamp shall be incorporated which shall normally flicker at the rate of six flashes per minute indicating alertness and shall turn steady when a fire is sensed enabling immediate identification of the Detector.

Electronics
The Printed Circuit Board electro tinned copper tracks shall be protected from corrosion by a green epoxy solder resist coating. The tracks and solder joints shall be protected against fungus growth by an insulating varnish coating.

The sensitive electronic components shall be protected by a high resistivity silicone encapsulation compound. All electronic components shall be electrostatically screened.

The electronic design and circuit shall provide the following safety devices:

- protection against high voltage spikes on the supply line
- protection against polarity reversal
- protection of the ionization chamber monitoring circuits from high voltage static discharges
- protection against high frequency transients
- detection of alarm at the control unit even in the event of LED failure
- protection against transient spikes on long lead lines to the remote indicators

Detector Wiring
The Smoke Detector shall be suitable for 2 wire monitored supply.

Operational Parameters
The Detectors shall be suitable for operation at a maximum ambient temperature of 60 deg C. and a minimum of 0 deg C with a maximum relative humidity of 93%.

The Detector sensitivity shall remain constant and not vary with change in the ambient temperature, humidity, pressure or voltage by more than +/- 10%.

The performance of the Detectors shall not be effected by continuous air flows upto 10 meters per second.

The Detectors shall be suitably protected against the accumulation of dust and insects.

The Smoke Detectors shall comply to the requirements of BS 5445 Part 7 : 1984 and EN 54 Part 7 : 1984 for Vibration, Impact and Shock parameters.

The Smoke Detectors shall be designed and constructed to meet the requirements of IP 43.

Detector Testing In Situ
It shall be possible to functionally test the Detector as well as assess its actual sensitivity without having to remove the same.

Detector Certification
The Smoke Detector shall be UL Listed and tested and approved by independent Authorities for certified compliance and acceptance to the relevant Standards. The Detectors shall be approved by the Local Fire Authorities and relevant documentation shall be supplied with the tender.

HEAT SENSITIVE RATE OF RISE CUM FIXED TEMPERATURE TYPE DETECTORS

GENERAL
The Heat Sensitive Detectors shall be of the rate of rise cum fixed temperature detection type and shall comply to the requirements of and NFPA Standard 721. The detectors shall respond to a rate of rise in temperature of 8 deg C per minute and a fixed temperature of 57 deg C.

CONSTRUCTIONAL FEATURES
The Heat Detectors shall be of the plug-in type and shall be attached to the mounting plate by a twist and lock motion. The Detector body shall be of moulded plastic, white in colour. The electrical contacts and other moving parts of the Detector shall be enclosed in such a manner that will afford protection against moisture, dust, insects and other foreign matter. All make and break contacts shall be of silver or any other metal or alloy of equivalent characteristics.

The body and other parts shall be made of material inherently resistant to corrosion.

Any adjustments made at the factory shall be sealed and all adjustment screws shall be provided with a reliable means of locking to avoid disturbance of the adjustments in transit. In addition, the means of adjustment shall be rendered inaccessible to prevent tampering when the Detector is being installed or during its operation.

MOUNTING PLATES
All Detectors shall be installed on mounting plates moulded from white self extinguishing thermoplastic. The Detector shall be attached to the mounting plate with a twist and lock motion. The mounting plate shall be suitable for installation on a 75 mm round recessed box.

DETECTOR OPERATION
The Detector head shall house a thermostat or a fusible alloy as a fixed temperature element. When activated the external heat collector shall drop to provide a visual confirmation that the fixed temperature element has operated.

A pneumatic element shall sense the rate of rise in temperature by expansion of air within a sealed chamber faster than it can escape through the calibrated vent. The resultant increase in pressure shall depress a diaphragm causing the electrical contacts to close a circuit and trigger an alarm. The rate of rise element shall be of the self-restoring type.

DETECTORS APPROVALS
The Detectors shall meet the performance requirements as per International Standards. The Detectors shall be UL Listed and FM approved and shall meet the approval requirements of the Local Fire Authorities. Test certificates from independent authorities and the approvals for the Detectors shall be furnished with the tender.

HEAT SENSITIVE FIXED TEMPERATURE TYPE DETECTORS

GENERAL

The Heat Sensitive Detectors shall be of the fixed temperature detection type and shall comply to the requirements of NFPA Standard 721. The detectors shall respond to a fixed temperature of 57 deg C. or 94 deg C as specified.

CONSTRUCTIONAL FEATURES

The Heat Detectors shall be of the plug-in type and shall be attached to the mounting plate by a twist and lock motion. The Detector body shall be of moulded plastic, white in colour. The electrical contacts and other moving parts of the Detector shall be enclosed in such a manner that will afford protection against moisture, dust, insects and other foreign matter. All make and break contacts shall be of silver or any other metal or alloy of equivalent characteristics.

The body and other parts shall be made of material inherently resistant to corrosion.

Any adjustments made at the factory shall be sealed and all adjustment screws shall be provided with a reliable means of locking to avoid disturbance of the adjustments in transit. In addition, the means of adjustment shall be rendered inaccessible to prevent tampering when the Detector is being installed or during its operation.

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DETECTORS CERTIFICATION

The Detectors shall meet the performance requirements as per International Standards. The Detectors shall be UL Listed and FM approved and shall meet the approval requirements of the Local Fire Authorities. Test certificates from independent authorities and the approvals for the Detectors shall be furnished with the tender.

MANUAL CALL POINTS

Manual Call Points shall consist of a push button switch housed in a dust tight sheet steel enclosure of 1.5 mm thick sheet to manually initiate audio visual alarms. The front shall be sealed with a breakable glass cover fixed in such a way that the actuating push button is kept depressed as long as the glass is intact and released automatically when the glass is broken. The front face of the Manual Call Box shall have an area not less than 5000 sq mm and the element shall have an exposed area of not less than 1600 sq mm in the shape of a square or a rectangle.

A small steel hammer shall be attached to the assembly with a steel chain to facilitate breaking of the glass front. The Manual Call Box shall be suitable for surface or recessed mounting as required. The words "IN CASE OF FIRE BREAK GLASS" 5 mm high shall be painted in red on the front face.

RESPONSE INDICATOR

The Response Indicator shall consist of a red LED mounted in a sheet steel enclosure of 1.5 mm thick sheet suitable for surface or recessed mounting on walls or partitions as required. These shall be connected to the Detectors in the enclosed area to indicate the status of the Detector. In normal circumstances the lamp shall flicker but in the event of the Detector inside the enclosed area sensing a fire, the lamp shall glow steadily.

ILLUMINATED SIGNS

The Illuminated Signs shall have the letters "FIRE EXIT" or "NO FIRE EXIT" painted in red on a white Perspex sheet as the front face of a sheet steel enclosure constructed with 1.5 mm thick sheet. The Perspex sheet shall be back lit with an integral battery back up facility so as to operate independent of the mains supply in the event of a mains failure. The preferred dimensions of the Illuminated Signs shall be 450 mm length and 225 mm height with 100 mm high lettering. They shall be suitable for surface or recessed mounting as required.

ALARM SIRENS

Electronic audio alarm sirens shall be suitable for operation on the DC supply of the System and will be actuated from the Main Control Panel in the event of a fire. These shall have a two tone modulated alarm signal for continuous service with an output of 100 dB at a distance of 3 metres.

MAIN CONTROL PANEL

GENERAL

The Main Control Panel (MCP) shall be centrally located and shall form the nerve centre of the total System. The MCP shall continuously monitor the status of each Fire Zone.

REMOTE CONTROL PANELS

Remote Control Panels shall generally comply to the Specifications of the Main Control Panels as detailed in para 5.10.3 above. These shall be located remotely and will indicate the status of each Zone and the MCP but without any controls. The indications to be provided on the Remote Control Panel shall be :

"FIRE" indication one per zone
"FAULT" indication one per zone
"DETECTOR FAILURE - OPEN CIRCUIT - SHORT CIRCUIT" indication one per Zone
"DETECTOR REMOVED" indication one per Zone
"BREAK IN WIRING" indication one per zone
"MAINS ON" indicating lamp
"SYSTEM ON" indicating lamp
"MAINS FAILURE" indication
"BATTERY LOW" indication
"STANDBY ON" indication

BATTERY AND BATTERY CHARGER

Adequately rated 24 volt lead acid rechargeable DC battery with 12 hour autonomy shall be provided for the System. The capacity shall be such as to feed the full load of the Fire Detection System including the Illuminated Signs in the event of a mains failure. It shall be connected to the MCP via a mains failure relay.

The battery shall be complete with a Battery trickle charger set and shall be maintained in a charged condition with the constant trickle charge. It shall be possible to boost the charging of the battery by the manual operation of the trickle/boost toggle switch when 'Battery Low' indication is observed on the Main Control Panel.

WIRING

The wiring for the Fire Detection System shall in general comply with the requirements of BS.6346. The Detectors in each loop shall be wired upto the Main Control Panel with a 2 core 1.5 sq. mm. copper conductor or 2 core 2.5 sq mm aluminium conductor FRLS PVC insulated 660/1100 volt grade wires in concealed or surface conduit as required. Crimped terminations shall be used throughout the System.

TEST CERTIFICATES

Type test certificates from a recognized independent agency shall be furnished for all the equipment. The equipment shall comply to the requirements of the Indian, International Standards, Fire Insurance Authorities and all National and Local Regulations in force.

SENSITIVITY ADJUSTMENTS

The sensitivity of all Detectors shall be set/adjusted by the Supplier to suit the site conditions.

INSTALLATION, COMMISSIONING AND ACCEPTANCE TESTS

The following installation, commissioning and acceptance tests shall be conducted by the Contractor and shall be apart from the Standard/Routine tests prescribed and normally conducted by the Supplier. These tests shall be carried out as a part of the installation irrespective of whether or not these are covered by the Standard/Routine tests.

INSTALLATION TESTS

After installation of the Detector Bases and prior to installation of the Detectors, the wiring shall be tested for continuity and insulation resistance. A high voltage insulation meter 500 to 1000 volts shall be used to measure the insulation resistance between each conductor and between each conductor and earth. The value of insulation resistance shall not be less than 1 Mega ohm.

The insulation resistance of the wiring to the Response Indicators shall also be checked as above prior to the installation of the Indicators.

COMMISSIONING AND ACCEPTANCE TESTS
Each zone shall be tested by a test fire or by a heat source on all or any one or more of the Detector selected by the Architects. The time required for detection shall be noted and shall be within prescribed limits.

Each alarm circuit shall be energised separately and the sound level reading taken to check for conformity with the minimum standards.

Open circuit and removal of a Detector from a detection circuit shall be tested.

Short circuit operation for each detection circuit will be tested

Tests to prove satisfactory operation of the system shall be conducted simulating the conditions of

Mains Failure
Battery disconnection
Open circuit and short circuit conditions of each alarm circuit

The results of all the tests conducted shall be so recorded and approved by the Clients/Architects prior to acceptance of the System.

TECHNICAL SPECIFICATIONS OF IP CCTV SURVEILLANCE SYSTEM:

INTENT OF SPECIFICATION

This specification is intended to cover the following activities and services in respect of IP video surveillance system for Plant Surveillance System with all components and accessories. The Activities are: -

Designing of complete system using specification for different equipment and cables.

Procurement of all required materials by contractor and organizing pre-dispatch inspection at contractor's place.

Providing engineering data, drawings and O&M manuals of all equipment for Owner's records.

Packing and transportation from the contractor's place to the site. In case of imported items Customs / port clearance, if required shall be organized by the contractor.

Receipt, unloading, handling, storage, insurance, preservation and conservation of equipment at site. However client may provide space for site office.

Pre-assembly fabrication if any, erection, testing, commissioning and putting into satisfactory operation of all the equipment, cabling and complete IP video surveillance system in a planned and systematic manner acceptable to the Owner. This includes the earthing of camera & equipments also. All items required for earthing and erecting work is to be done by vendor.

Furnishing of spares on FOR site basis.

The bidder shall be responsible for providing all material, equipment and services specified or otherwise which are required to ensure and fulfill the intent of operability, maintainability and the reliability.

It is not intended to specify completely herein all aspects of design and construction of equipment; nevertheless, the equipment shall conform in all workmanship and shall be capable of performing in continuous commercial operation in industrial environment round the clock.

The equipment offered by the Bidder shall be complete in all respects. Any material and component not specifically stated in this specification shall be deemed to be included unless specifically excluded. All such Equipment/ accessories shall be supplied without any extra cost.

Design and manufacturing shall be such that equipment/accessories of same type and ratings are interchangeable.

SCOPE OF WORK

The scope of work includes design, manufacture, shop testing, packing and transport to site/storage before erection, installation, commissioning and testing of the complete system. The details of scope of work are as follows: -

Preliminary survey of the site and locations of IP cameras and cable route, finalization of same in consultation with engineer-in-charge and submission of detailed time schedule for executing the work.

Submission of final drawing as detailed.
Design, manufacture and shop testing of all the equipment as per Bill of Material at vendor's place and organizing the pre-dispatch inspection as per quality plan. This includes the NVR application and client software also (original with licenses).
Packing, transporting and then storage of the material at site till installation of equipment.
Organizing and executing the cable trenching, cable laying, termination / finalized in the route and erection of GI pole for IP camera at designated locations.
Fixing of cameras and junction boxes on the GI pole.
Fixing of network switches, media converters at different locations in racks.
All interconnections, all IO terminations, all cores of fiber optic cable, power cable, media convertors, access points as per the requirement.
Installation of network video recorder (NVR servers), PCs, RAID all software, keyboards in both control room as per the requirement.
Installation, testing and commissioning of the complete system and test run of the same for 15 days.
Demonstration of all features of the system to client and commencing the trial run for 15 days after test run.
Submission of all test reports, as built drawings, all technical documents, manuals etc.
Any supply of item and work to be executed related with successful working of complete system reliability (with all features working) which is not included in the above points has to be informed by the vendor and same has to be supplied /executed by them at no extra cost.
Providing training to client personnel on all aspects of the system, programming and maintenance.
Warranty period shall be for a period of 36 months for the entire system from the date of acceptance by client i.e. issue of completion certificate by competent authority. All systems including units, assemblies, and sub assemblies shall be covered under warranty. Any parts found defective during warranty period shall be replaced by the contractor without any charges whatsoever.
The contractor should attend all breaks down jobs within 24 hours.

ECHNICAL SPECIFICATION OF LIGHTING

Referenced Standards:

Material PDC – Aluminum Body / Heat SinkHigh Purity AL Refector and
Engineering Plastic cover
Mounting Recessed / Suspended

Specially designed housing to ensure IP65 ingress protection.

Access to the gear compartment is from the side, with out use of any tools, making it trouble free to connect and maintain. The gear tray accommodates a ballast, capacitor and ignitor (for SON & HPI version only) all pre-wired upto the terminal block.

Aluminium reflector electro-chemically brightened and anodized for better optics and longer life, giving a very even light distribution. Separate reflectors are available to suit Narrow beam and Wide beam applications.

For dusty environments it is provided with a heat resistant and toughened glass with EPR gasket (Enclosed version).

LUMINAIRE TYPE A
18W LED 3000k 400x400mm surface mounted panel for offices

LUMINAIRE TYPE B
18W LED 200mm Dia. Surface mounted Downlight fitting. FOR CIRCULATION & TOILETS

LUMINAIRE TYPE C
18W LED 200mm Dia waterproof flash mounted for terrace

LUMINAIRE TYPE D
LED 11W up down outdoor light fitting at the entrance

LUMINAIRE TYPE E
LED 11W outdoordecirative light fitting for fence

Switches, 230V, 10A, IP20 with appropriate box :

One gang one way switch
Two gang one ways switch
dimmer switch
one gangs two ways switch
two gangs two ways switch
Movement sensitive switch

	Socket outlets Single White power socket 2P+E,230V,16A IP20 with appropriate box and face plate. FOR mounting on WALLS Twin White power socket 2P+E,230V,16A IP20 with appropriate box and face plate. FOR mounting on WALLS Single White power socket 2P+E,230V,16A IP20 with appropriate box and face plate. FOR mounting on TRUNKING Twin White power socket 2P+E,230V,16A IP20 with appropriate box and face plate. FOR mounting on TRUNKING 25A DP standard 240V socket outlet for flush wall mounting at 1200mm affl for the KITCHEN	

As per NF C 17 – 102, the ESE air terminal should be tested with the "Switching Impulse Voltage" of 700 KV & "Direct Voltage" of 70 KV

The details of the lightning protection system shall also confirm to the requirements of all relevant local codes, as applicable, together with the additional requirements referred to in this specification and drawings, whichever is more stringent and acceptable to the engineer.

Air Terminal

The ESE air terminal shall be of the type that responds dynamically to the appearance of a lightning down leader by creating free electrons between outer floating four panels and an earthed central finial rod. The lightning air terminal shall be configured as a spheroid which is comprised of separate electrically isolated panels surrounding an earthed central finial. The central finial shall be elevated above the spheroid to a length of 90mm. The Insulation material used to electrically isolate the panels shall be comprised of a base polymer which provides high Ozone & UV resistance with a di-electric strength of 24-38 KV/mm tested as per NFC 17-102 & IEC 60-1:1989

The unit shall detect the lightning when it approaches and emit an electronically controlled streamer within few micro seconds. ESE air Terminals shall be manufactured as per NFC 17-102 standard. A dedicated wired ESE tester should be available for maintenance purpose. The manufacturer should be ISO 9001 certified. Performances of the air-termination should have been tested in High Voltage Laboratory (CPRI) as well as in the international laboratories as per IEC 60-1:1989.

The Air terminal should work under Early Streamer Emission (ESE) Technology and the attractive radius of the air termination shall be traceable to known and acceptable lightning research and statistics. The ESE air terminal shall have no moving parts, no electronic circuits and will have no dependence on external power supply or batteries. The ESE air terminal shall not have any solar panels.

The ESE air terminal should deliver a unique gain time in efficiency, anticipating the natural formation of an upward leader. The ESE air terminal generates a leader that propagates rapidly to capture the Lightning stroke and conduct it towards the ground.

Arcing is not to be continuous and shall only occur during the progress of the lightning leader.

The air termination shall not cause high frequency radio interference except during the millisecond intervals associated with the progress of the lightning leader and during the main return strike of lightning events in the region.

The Materials of the air termination shall be non –corroding in normal atmosphere.
The Height of the air terminal support mast should be minimum 2mts and the height will be increase as per the coverage design.

The support shall be securely installed and guy wires shall be used where necessary to enable the air termination and mast system to withstand maximum locally recorded wind velocities.
Air Termination Support: The Air Termination shall be fixed at the top of a GI or FRP elevation pole so as to be at least 2 meters above the top of the structure to be protected. The elevation pole should have a minimum dia of 35mm to 50mm with a thread at the top to fix the unit. Guy wires may be used in order to ensure the stability of the installation.

Down Conductor
The down conductor should be used 70 sq mm copper cable or 25x 3 mm copper strip. Two down conductors shall be used in case of the structure height is above 28mts and both should be connected with maintenance- free Grounding system.

The down conductor shall be routed as directly as possible to the ground avoiding electrical shafts and sharp bends (minimum bending radius of 0,5m). Any metallic object located less than 1 meter shall be connected to it as per IEC 62305 standards.

The main copper conductor shall be connected directly to the air termination.

The down conductor shall be installed in accordance with the manufacturer’s instructions and should not be subject to sharper bends.

The down conductor must be kept in constant physical contact with the structure via conductive mounting clamps.

Lightning Strike Recorder
The Lightning systems shall be installed complete with the lightning strike recorder. The lightning strike recorder shall contain a mechanical 6 digit display which will register all lightning discharges with a sensitivity of 1500A 8/20 µs peak current impulse.

The lightning strike recorder shall be housed in a IP 65 rated enclosure and operate without reliance on batteries or on any other external power source.

As per IEC 60-1:1989, the lightning strike recorder should withstand a maximum current impulse equivalent to 450 KA (8/20 micro sec waveform)

Grounding System

The Lightning arrestor grounding system reading shall not exceed 10 ohms static impedance except with prior approval by the specifying engineer or manufacturer of the lightning protection system.

Grounding will be done by 10 feet 5/8” mm dia copper bonded (250 microns) steel core ground rods especially designed for lightning grounding.

Bonding of the grounding system to metallic parts of the building, the structural reinforcing steel of the building to arriving services is recommended. Electrically conductive, non soluble LPI RESLO (mixture of Sulphate, Silica, Alumina, Iron Oxide, Titanium Oxide, Calcium Oxide, Potassium Oxide, Chloride, Magnesium Oxide, Sodium Oxide, Zinc Oxide, etc) Resistance Lowering Grounding Minerals. The Chemical compound RESLO shall be tested and certified by an International accredited and BIS (Bureau of Indian Standards) accredited laboratory. The testing laboratory shall be ISO 9001 & ISO 14001 certified.

TECHNICAL SPECIFICATIONS OF EARTHING

GENERAL

All the non-current carrying metal parts of electrical installation shall be earthed properly. All metal conduits, trunking, cable sheaths, switchgear, distribution fuse boards, light fittings and all other parts made of metal shall be bonded together and connected by means of specified earthing conductors to an efficient earthing system. All earthing shall be in conformity with Indian Electricity Rules.

The Earthing System shall in totally comprise the following:-

Earth Electrodes
Earthing Leads
Earth Conductors

All three phase equipment shall have two separate and distinct body earths and single phase equipment shall have a single body earth.

STANDARDS

IEC 60364: Electrical Installation of Buildings.

BS 1432: Specification for copper for electrical purposes: high conductivitycopper rectangular conductors withdrawn or rolled edges.

BS 1433: Specification for copper for electrical purposes. Rod and bars.

BS 2871: Specification for copper and copper alloys.

BS 4360: Specification for weldable structural steel.

BS 6360: Specification for conductors in insulated cables and cords.

BS 6651: Code of practice for protection of structures against lightning.

BS 6746: Specification for PVC insulation and sheath of electric cables.

BS 7430: Code of Practice for Earthing

EARTHING MATERIAL

Materials of which the protective system is composed shall be resistant to corrosion or be adequately protected against corrosion. The material shall be as specified in the schedule of quantities and shall comply to the following requirements:

Copper - When solid or stranded copper wire is used it shall be of the grade ordinarily required for commercial electrical work generally designated as being of 98% conductivity when annealed, conforming to Indian standard specifications.

Galvanised Steel - Galvanised steel used shall be thoroughly protected against corrosion by hot dipped Zinc coating. The material coating shall withstand the test specified in IS 2309:1969.

The strips to be used shall be in maximum lengths available as manufactured normally avoiding unnecessary joints.

EARTH ELECTRODES

Plate Earth Electrode

The plate electrodes shall be of copper/ GI as called for in the schedule of quantities. The minimum dimensions of the electrodes shall be 600 mm x 600 mm. Thickness of copper electrodes shall not be less than 3 mm and of GI electrodes not less than 6 mm.

The electrode shall be buried in ground with its face vertical and top not less than 4 meters below ground level.

Earth Electrode Pit

Method of Installing Watering Arrangement

In the case of plate earth electrode, a watering pipe of 20 mm dia of medium class G.I. Pipe shall be provided and attached to the electrode. A funnel with mesh shall be provided at the top of this pipe for watering the earth. The watering funnel attachment shall be housed in masonry enclosure of not less than 1000 x 500 x 600 mm. A precast RCC frame & cover shall be suitably embedded in the masonry enclosure.

Location Of Earth Electrode

The following guidelines shall be followed for locating the earth electrodes

An earth electrode shall not be situated less than 5 metres from any building.

The excavations for electrode shall not affect the column footings or foundations of the buildings. In such cases electrode may be further away from the building.

The location of the earth electrode shall be such where the soil has reasonable chance of remaining moist, as far as possible.

Entrances, pavements and road ways shall not be used for locating the earth electrode.

Number Of Earth Electrodes

In all cases the relevant provision of rule 33, 61 & 67 of the Indian Electricity Rules 1956 as amended shall be complied with.

Metallic covers or supports of all medium or H.T. apparatus or conductors shall, in all cases be connected to not less than two separate and distinct earth electrodes.

EARTHING LEADS

The strip earthing leads shall be connected to the Earth Electrode at one end and to the metallic body of the main equipment at the other end. The earthing lead shall connect to the earthing network in the installation.

Earthing Lead Sizes

Strip earthing leads shall be of copper/GI and as per specifications.

Earthing Lead Installation

The length of buried strip earthing lead shall be not less than 15 metres and shall be buried in trench not less than 0.5 m deep.

If conditions necessitates use of more than one earthing lead they shall be laid as widely distributed as possible preferably in a single straight trench or in a number of trenches radiating from one point.

Method Of Connecting Earthing Lead To Earth Electrode

In the case of plate earth electrode the earthing lead shall be securely bolted to the plate with two bolts, nuts, checknuts and washers as required by IS 3043 : 1987.

All materials used for connecting the earth lead with electrode shall be GI in case of GI Pipe and GI plate earth electrodes or tinned brass in case of Copper plate electrode.

Protection Of Earthing Lead

The earthing lead from electrode onwards shall be suitably protected from mechanical injury and corrosion by a 15 mm dia GI pipe in case of wire and 100/40 mm dia medium class GI Pipe

The portion of the G.I. pipe within ground shall be buried at least 30 cm deep (to be increased to 60 cm in case of road crossing or pavements). The portion within the building shall be recessed in walls and floors to adequate depth.

EARTHING CONDUCTORS

Earthing conductors shall form the earthing network throughout the installation for earthing of all non- carrying metal parts.

Connection Of Earthing Conductors

Main earthing conductors shall be taken from the earth connections at the main switch boards to all other switchboards in the network.

Sub-mains earthing conductors shall run from the main switch board to the sub distribution boards and to the final distribution boards.

Loop earthing conductors shall run from the distribution boards and shall be connected to any point on the main/sub-main earthing conductor, or its distribution board or to an earth leakage circuit breaker.

Metal conduits, cable sheathing and armouring shall be earthed at the ends adjacent to switch boards at which they originate, or otherwise at the commencement of the run by an earthing conductor in effective electrical contact with cable sheathing, Switches, accessories, lighting fitting etc shall be effectively connected to the Loop Earthing Conductors. These though rigidly secured in effective electrical contact with a run of metallic conduit shall not be considered earthed, even though the run of metallic conduit is earthed.

Earthing Conductor Installation

The earthing conductors inside the building wherever exposed shall be properly protected from mechanical injury by running the same in GI pipe of adequate size.

Joints shall be revetted and brazed in approved manner.

Sweated lugs of adequate capacity and size shall be used for termination. Lugs shall be bolted to the equipment body to be earthed after the metal body is cleaned of paint and other oily substances and properly tinned.

Sizing Of Earthing Conductors

All fixtures, outlet boxes and junction boxes shall be earthed with Bare copper wires as specified.

All 3 phase switches and distribution boards upto 60 amps rating shall be earthed with 2 Nos. distinct and independent 4 mm dia copper/6 mm dia GI wires. All 3 phase switches and distribution boards upto 100 amps rating shall be earthed with 2 Nos. distinct and independent 6 mm dia copper/8 mm dia GI wires. All switches, bus bar, ducts and distribution boards of rating 200 amps and above shall be earthed with a minimum of 2 Nos. separate and independent 25 mm x 3 mm copper/25mm x 6 mm GI tape.

PROHIBITED CONNECTIONS

Neutral conductor, sprinkler pipes, or pipes conveying gas, water, or inflammable liquid, structural steel work, metallic enclosures, metallic conduits and lighting protection system conductors shall not be used as a means of earthing an installation or even as a link in an earthing system.

RESISTANCE TO EARTH

No earth electrode shall have a greater ohmic resistance than 3 ohms as measured by an approved earth testing apparatus. In rocky soil the resistance may be upto 5 ohms. The electrical resistance measured between earth connection at the main switchboard and any other point on the completed installation shall be low enough to permit the passage of current necessary to operate fuses or circuit breakers, and shall not exceed 1 ohm.

ROUTINE AND COMPLETION TESTS

INSTALLATION COMPLETION TESTS

At the completion of the work, the entire installation shall be subject to the following tests:

Wiring continuity test
Insulation resistance test
Earth continuity test
Earth resistivity test

Besides the above, any other test specified by the local authority shall also be carried out. All tested and calibrated instruments for testing, labour, materials and incidentals necessary to conduct the above tests shall be provided by the contractor at his own cost.

WIRING CONTINUITY TEST

All wiring systems shall be tested for continuity of circuits, short circuits, and earthing after wiring is completed and before installation is energised.

INSULATION RESISTANCE TEST

The insulation resistance shall be measured between earth and the whole system conductors, or any section thereof with all fuses in place and all switches closed and except in concentric wiring all lamps in position of both poles of the installation otherwise electrically connected together, a direct current pressure of not less than twice the working pressure provided that it does not exceed 1100 volts for medium voltage circuits. Where the supply is derived from AC three phase system, the neutral pole of which is connected to earth, either direct or through added resistance, pressure shall be deemed to be that which is maintained between the phase conductor and the neutral. The insulation resistance measured as above shall not be less than 50 megohms divided by the number of points provided on the circuit the whole installation shall not have an insulation resistance lower than one megohm.

The insulation resistance shall also be measured between all conductors connected to one phase conductor of the supply and shall be carried out after removing all metallic connections between he two poles of the installation and in those circumstances the insulation shall not be less than that specified above.

The insulation resistance between the frame work of housing of power appliances and all live parts of each appliance shall not be less than that specified in the relevant Standard specification or where there is no such specification, shall not be less than half a megohm or when PVC insulated cables are used for wiring 11.5 megohms divided by the number of outlets. Where a whole installation is being tested a lower value than that given by the above formula subject to a minimum of 1 Megohms is acceptable.

TESTING OF EARTH CONTINUITY PATH

The earth continuity conductor including metal conduits and metallic envelopes of cable in all cases shall be tested for electric continuity and the electrical resistance of the same alongwith the earthing lead but excluding any added resistance of earth leakage circuit breaker measured from the connection with the earth electrode to any point in the earth continuity conductor in the completed installation shall not exceed one ohm.

TESTING OF POLARITY OF NON-LINKED SINGLE POLE SWITCHES

In a two wire installation a test shall be made to verify that all non-linked single pole switches have been connected to the same conductor throughout, and such conductor shall be labeled or marked for connection to an outer or phase conductor or to the non-earthed conductor of the supply. In the three of four wire installation, a test shall be made to verify that every non-linked single pole switch is fitted to one of the outer or phase conductor of the supply. The entire electrical installation shall be subject to the final acceptance of the Architect as well as the local authorities.

EARTH RESISTIVITY TEST

Earth resistivity test shall be carried out in accordance with IS Code of Practice for earthing IS 3043.

PERFORMANCE

Should the above tests not comply with the limits and requirements as above the contractor shall rectify the faults until the required results are obtained. The contractor shall be responsible for providing the necessary instruments and subsidiary earths for carrying out the tests. The above tests are to be carried out by the contractor without any extra charge.

TESTS AND TEST REPORTS

The Contractor shall furnish test reports and preliminary drawings for the equipment to the Architect/owners for approval before commencing supply of the equipment. The Contractor should intimate with the tender the equipment intended to be supplied with its technical particulars. Any test certificates etc., required by the local Inspectors or any other Authorities would be supplied by the Contractor without any extra charge.

SPECIAL INSTRUCTIONS TO TENDERERS

GENERAL
Only the approved makes of material as stipulated shall be accepted.

Installation of light fittings shall be with the use of two junction boxes placed 600 mm apart for 36/40-watt fixtures and 300 mm apart for 20-watt fixtures. The junction boxes shall form a part of the conduiting and shall be placed in the slab at the time of concreating.

For any fixtures and fittings required to be fixed to the RCC slab, the Contractor shall drill the required holes with the use of an appropriate drilling machine with drill bits and no extra charges shall be payable on this account.

The rates quoted shall be for work to be carried out at all heights and levels as at site and no extra payment shall be made for the same.

The rates quoted for wiring shall be applicable for concealed or surface conduiting as required

CONDUITING
The rates to be quoted by tenderers shall include any or all of the following. No additional costs shall be paid for tools etc. as required to complete the work.

All cutting of chassis in brick walls shall be with chase cutting tools.

Whenever required chases shall be cut in stone walls with a chase cutting machine and with specific tools as required prior to plastering.

In case of exposed stone walls the conduits shall be laid alongwith the construction of the wall and co-ordinated with civil activity.

SWITCHES, OUTLETS AND ACCESSORIES
All switches, socket outlets and other accessories shall be approved by the Owners prior to installation. The Contractor shall furnish samples of all materials within 7 days of the award of the work.

MAINS AND SUB-MAINS
The rate for all items shall include:

ISI approved & marked MS / PVC conduits.
Conduit accessories conforming to IS
MS draw, inspection and junction boxes.
Providing and fixing approved saddles, hangers, trays, etc., and grouting the same as required for exposed conduits.
Embedding conduits and accessories in walls and floors etc during construction and/or cutting chases and making good as necessary in the case of concealed conduit work and/or providing and fixing saddles, hangers, stirrups etc. and grouting of the same as required for surface conduiting.
Providing and fixing junction boxes with 3-mm thick Perspex sheet covers including painting covers on inner side to match the colour of the surrounding walls.

Insulated copper earth wire for fixture, switch, outlet box and third pin of socket outlet to common earth.
Effecting adequate and proper connections at termination.
Providing all fixing accessories such as clamping devices, nuts, bolts and screws.
Providing sealing compound thimbles, crimping etc., at joints and terminations as called for.

DISTRIBUTION BOARDS
The rates for the distribution boards apart from the switches, and instruments shall also include:

Supporting rigid steel framework.
Cubicle type 2-mm thick M S sheet enclosure with 1.6 mm thick MS sheet door.
Interconnections.
Proper bonding of earth.
Touching up all damaged paint with one coat of red oxide primer and two finishing coats of approved synthetic enamel paint.
Painting/lettering on switches and distribution boards, the location they serve, providing on each board its circuit diagram.
Termination of incoming cables at the incoming unit in the distribution boards.

EARTHING
The rates for earthing items include:
All fixing accessories such as brass saddles, brass screws rawl plugs, etc.
Jointing by riveting and soldering after tinning.
Cutting chases, holes and making good the same wherever required.
Effecting adequate and proper interconnections.
Use of tinned copper thimbles.
Excavation of earth, refilling, watering and ramming and making good as approved.

FIXING OF LIGHTING FIXTURES
The rates shall include the following:

1. All components that may be required to make the installation complete in all respects such as :

a) Suitable length of down rod, hanger and connecting wires where called for. The Down rod shall be paid for separately on a running metre basis.
b) Internal wiring between accessories.
c) Wiring for connecting the fixtures to the point through connection blocks.
d) All metal blocks to serve as base of fixtures.
e) Bonding with earth wires.

2. Drilling holes in supports where required.

3. Fixing clamps, GI bolts and nuts, brass screws, saddles, rawl bolts and other fixing accessories as required.

DRAWINGS
General Arrangement drawings with constructional details shall be submitted to the Owner for all Distribution Boards etc and their approval obtained prior to commencement of fabrication.

Equipment shall not be accepted unless the drawings have been approved by the Owner. These drawings shall be prepared and submitted within one month of the award of work.

WIRES AND CABLES

ALL WIRES AND CABLES USED SHALL BE OF THE STIPULATED MAKE. THE CONTRACTOR SHALL PROVIDE A CERTIFICATE FROM THE MANUFACTURER CONFIRMING THAT ALL WIRES AND CABLES SUPPLIED TO SITE ARE OF THEIR MAKE, IRRESPECTIVE OF WHETHER THE WIRES/CABLES ARE PURCHASED FROM THE MANUFACTURER DIRECTLY OR THROUGH A DEALER.

PAYMENT FOR WIRES/CABLES SHALL NOT BE MADE WITHOUT THE MANUFACTURER'S CERTIFICATE BEING FURNISHED TO THE OWNERS.

TECHNICAL SPECIFICATIONS FOR PLUMBING WORKS

SECTION – I: SEWERAGE AND STORM WATER DRAINAGE.

SCOPE OF WORK

Work under this section shall consist of furnishing all labour, materials, equipment and appliances necessary and required to completely install all the drainage system as required by the drawings and specified hereinafter or given in the Schedule of Quantities.

Without restricting to the generality of the foregoing, the drainage system shall include:-

Sewer lines including excavations, pipe lines, manholes, drop connections and connections to the Sewage Treatment Plant.

Storm water drainage, excavation, pipe lines, manholes, catch basins, drain channels, recharging pits and overflows to external low areas

GENERAL REQUIREMENTS

All materials shall be new of the best quality conforming to specifications and subject to the approval of the

Drainage lines and open drains shall be laid to the required gradients and profiles.

All drainage work shall be done in accordance with the local municipal bye-laws.

Contractor shall obtain necessary approval and permission for the drainage system from the municipal or any other competent authority.

Location of all manholes, etc. shall be as per site plan drawings. No drains or sewers shall be laid in the middle of road unless otherwise specifically shown on the drawings or directed by the Project Manager.

EXCAVATION

ALIGNMENT AND GRADE
The sewer pipes shall be laid to alignment and gradient shown on the drawings but subject to such modifications as shall be ordered by the Project Manager. No deviations from the lines, depths of cutting or gradients of sewers shown on the plans and sections shall be permitted except by the express direction in writing of the Project Manager.

CEMENT CONCRETE AND MASONRY WORKS (FOR MANHOLES AND CHAMBERS ETC.)

MATERIALS

WATER
Water used for all the constructional purposes shall be clear and free from oil, acid, alkali, organic and other harmful matters, which shall deteriorate the strength and/or durability of the structure. In general, the water suitable for drinking purposes shall be considered good enough for constructional purpose.

AGGREGATE FOR CONCRETE
The aggregate for concrete shall be in accordance with NFPA. In general, these shall be free from all impurities that may cause corrosion of the reinforcement. Before actual use these shall be washed in water, if required as per the direction of Project Manager. The size of the coarse aggregate shall be done as per NFPA.

SAND

Sand for various constructional purposes and its grading shall comply in all respects with NFPA. It shall be clean, coarse hard and stone, sharp, durable, uncoated, free from any mixture of clay, dust, vegetable matters, mica, iron impurities soft or flaky and elongated particles, alkali, organic matters, salt, loam and other impurities which may be considered by the Project Manager.

CEMENT

The cement used for all the constructional purposes shall be ordinary Portland cement or rapid hardening Portland cement.

MILD STEEL REINFORCEMENT

The mild steel for the reinforcement bars shall be in the form of round bars conforming to all requirements.

BRICKS

Brick shall have uniform colour, thoroughly burnt but not over burnt, shall have plain rectangular faces with parallel sides and sharp right angled edges. They should give ringing sound when struck. Brick shall not absorb more than 20% to 22% of water, when immersed in water for 24 hours. Bricks to be used shall be approved by the Project Manager.

OTHER MATERIALS

Other materials not fully specified in these specifications and which may be required in the work shall conform to the NFPA. All such materials shall be approved by the Project Manager.

CEMENT CONCRETE (PLAIN OR REINFORCED)

Cement concrete for pipes bedding, cradles, foundations and R.C.C. slabs for all works shall be mixed by a mechanical mixer where quantities of the concrete poured at one time permit. Hand mixing on properly constructed platforms may be allowed for small quantities by the Project Manager. Rate for cement concrete shall be inclusive of all shuttering and centring at all depth and heights.

Concrete work shall be of such thickness and mix as given in the Schedule of Quantities.

All concrete work shall be cured for a period of at least 7 days. Such work shall be kept moist by means of gunny bags at all times.

MASONRY WORK

Masonry work for manholes, chambers, septic tanks, and such other works as required shall be constructed with bricks as specified in the Schedule of quantities in cement mortar of mix as specified in schedule of quantities. All joints shall be properly raked to receive plaster.

MANHOLES, CATCH BASINS & RAMP DRAINS

All manholes and catch basins shall be measured by numbers and shall include all items specified above and necessary excavation, refilling & disposal of surplus earth.

SECTION – III: SPECIFICATION FOR WATER SUPPLY, DRAINAGE PUMPS & EQUIPMENT

SCOPE OF WORK

Work under this section shall consists of furnishing all labour, materials, equipment and appliances necessary and required to supply install and commission the water supply and drainage pumps as described hereinafter and given in the schedule of quantities and/or shown on the drawings.

GENERAL REQUIREMENTS

All materials shall be new of the best quality conforming to specifications and subject to the approval of Project Manager.

All equipment shall be of the best available make manufactured by reputed firms.

All equipment shall be installed on suitable foundations true to level and in a neat workmanlike manner.

Equipment shall be so installed as to provide sufficient clearance between the end walls and between equipment to equipment.

Piping within the pump house shall be so done as to prevent any obstruction in the movement within the pump house.

Each pumping set shall be provided with a butterfly valve on the suction and delivery side and a flap type non return valve on the delivery side

All pump couplings and belt guards for air compressors shall be totally enclosed with 5 mm mesh.

SYSTEM OF WATER SUPPLY

The water supplied by the authorities will be chlorinated on line and stored in the domestic U.G. tank.

Tube well water shall be stored in a separate tank and after treatment in filter, softener and chlorination will be stored in the same domestic tank.

Water from this common U.G. tank shall be pumped to O.H. Tanks at terrace of each of the tower by separate pumps.

MEASUREMENT

General

Unit rate for individual items, e.g, Pumps, MCC and level controller are for purposes of payments only. Piping, headers, valves, accessories, cabling and MCC to measured separately in this contract only.

All items must include all accessories fittings as described in the specifications, BOQ and shown on the drawings.

13.4 Recirculation water pumps

Pumps shall be measured by numbers and shall include all items as given in the specifications and schedule of quantities to provide a complete working system.

13.5 Drainage Pumps

Drainage pumps shall be measured by numbers and shall include all items as given in the specifications and schedule of quantities to provide a complete working system.

Level controllers & Alarms

Level controllers for each set of pumps shall be measured by number and inclusive of probes, cabling unto surface box near the pump and shall include all items as given in the specifications and schedule of quantities to provide a complete working system.

Piping Work

Suction and delivery headers for each pumping system shall be measured per linear meter of finished length and shall include all items as given in the schedule of quantities. Painting shall be included in rate of headers.

G.I. pipes between various equipment's shall be measured per linear meter of the finished length and shall include all fittings, flanges, jointing, clamps for fixing to walls or hangers and testing. Flanges shall include 3 mm thick insertion rubber gasket, nuts, bolts and testing.

Water Tank, Vibration eliminators, "Y" strainers, butterfly valves, slim non return valves shall be measured by numbers and shall include all items as given in the schedule of quantities and specifications.

End of Section III

SECTION – IV: SPECIFICATION FOR WATER TREATMENT EQUIPMENT

GENERAL REQUIREMENTS

All materials shall be new of the best quality conforming to specifications and subject to the approval of Project Manager.

All equipment shall be of the best available make manufactured by reputed firms.

All equipment shall be installed on suitable foundations, true to level and in a neat workmanlike manner.

Equipment shall be so installed as to provide sufficient clearance between the end walls and between equipment to equipment.

Piping within the pump house shall be so done as to prevent any obstruction in the movement within the pump house.

Each pumping set shall be provided with a butterfly valve on the suction and delivery side and a flap type non return valve on the delivery side

All pump couplings and belt guards for air compressors shall be totally enclosed with 5 mm mesh.

CORROSION RESISTANT MATERIAL

All piping, valves and accessories from outlet of raw water to inlet of treated water tank shall be of material fully resistant to internal and external corrosion. Such material may be stainless steel, PVC, rubber or other type of lining material accepted in international water works engineering practice.

WATER FILTERS FOR WATER SUPPLY

Filter shall be designed in accordance with the code of unfired pressure vessel.

Water filter shall be pressure quartz pressure filter with graded sizes of pure quartz media. Design may be altered to suite contractor’s own design of the most efficient performance.

Specification shall apply for water filtration system

Pressure filters shall be manufactured with factory made bobbin wound polyester fibre glass multilayer filters fitted with internal uPVC distribution pipe with polypropelene diffusers on top, collector pipes and arms, inlet and outlet header vertical water pressure dished ends complete with initial charge of filter media, uPVC/G.I. face piping, accessories testing and commissioning complete. Working Pressure 2.4 kg/cm2 (Test pressure 3.75 kg/cm2).

Each vessel will be provided with suitable pressure tight manhole cover appropriately located for inspection and repairs.

Multi Port Valves

Each vessel will be provided with multi port valves to operate and regulate the normal flow, backwash and rinsing, rapid washing, on the face piping.

Provide suitable sampling cocks to draw water samples for raw water and treated water.

Face Piping
Each vessel shall be provided with non-corrosive face piping from the inlet to the outlet. Face piping shall be uPVC 10 kg/cm2 class with injection moulded fittings and solvent weld and flanged joints

All valves shall be butterfly valves as specified in the piping section over 65 mm dia and for pipe dia below 50 mm dia shall be provided with ball valves.

CHEMICAL DOSING PUMP

Pump applications
Chlorination of raw water from tubewells,
Chlorination of drinking water transfer pump

Dosing system comprising of an electronic metering pump with, 100 lit capacity uPVC/HDPE solution tank with level gauge and lid on top.

Electronic driven metering pumps with mechanically actuated diaphragm with oil lubricated gear mechanism. The output of the pump should be adjustable for operation from 10-100%. Pump construction shall be corrosion resistant polypropylene or similar material. Pump electrical circuit shall be interlocked with the main raw water /pool recirculation pumps so that they operate only when the pumps are operating.

PIPE & FITTINGS (FOR HEADERS AND CONNECTIONS)
Pump suction and delivery headers shall be of approved corrosion resistant material with matching fittings. The pipe joints shall be threaded or as per manufacturer’s instructions.

Valves
Valves 50 mm dia and above shall be rubber lined butterfly valves.
Non return valves shall be rubber lines cast iron slim type of approved make.

FLOW MEASUREMENT

Provide rota meter reading "LPH" or "LPM" on delivery line of the plant.

Provide one direct reading flanged type water meter with strainer on outlet of water softener or water filter.

PAINTING AND CLEANUP

On completion of the installation contractor shall scrub clean all pumps, piping, filters and equipment and apply one coat of primer.

Apply two or more coats of synthetic enamel paint of approved make and shade on steel pipes.

Provide painted identification legend and direction arrows on all equipment and piping as directed by engineer-in-charge.

On final completion of the work, contractor shall cleanup the site, filter room of all surplus materials rubbish and leave the place in a broom-clean condition.

CABLES

Contractor shall provide all power and control cables from the motor control centre to various motors, level controllers and other control devices.

All power and wiring cables shall be aluminium conductor PVC insulated armoured and PVC sheathed of 1100 volts grade.

All control cables shall be copper conductor PVC insulated armoured and PVC sheathed 1100 volts grade.

All cables shall have stranded conductors. The cables shall be in drums as far as possible and bear manufacturer's name.

All cable joints shall be made in an approved manner as per standard practice.

CABLES TRAYS

Contractor shall provide M.S. Slotted cables trays at locations as shown on the drawings and of sizes as given in the schedule of quantities.
Cables trays shall be supported from the bottom of the slab at intervals of 30 cms at both ends by welding support rods with insert plates or to reinforcement bars. Cutting of holes in the slab for exposing of reinforcement bars and making good the same after welding of support rods shall be included in the rate of the tray and no separate payment shall be made on this account.

Cost of clips, bolts, nuts, supports rods and any other materials required to fix the trays in proper manner shall be included in the ate for trays.

Cables trays shall of Mek or Dexion make.

EARTHING

All equipment installed by the contractor shall be suitably earthed by making proper connection by means of G.I. wires to the main earthing system laid by the electrical contractors.

Activated Carbon Filter
The system is provided with an activated carbon Filter. The main purpose of the filter is to remove the free chlorine, organics, colour or odour etc. The Filter is provided with Inlet Distributor, Bottom Collector & Filtration Media like Activated carbon of high i-value and supporting media to achieve effective filtration. Externally, the filter has either a Multiport Valve or mesh of valves to assist in various service requirements like Filtration, Backwash & Rinse.

Micron Cartridge Filter
A micron filter of 5 micron is included in the system to prevent passage of particulates to the high pressure pump and membrane. The micron filter is of PP housing. The micron cartridge will be polypropylene.

Reverse Osmosis System:

High Pressure Pump
The system is provided with a high pressure pump of suitable flow rate, head & material of construction. The pump is provided with low pressure switch to ensure smooth operation.

Reverse Osmosis Block
The RO Block comprises of membranes encased inside the pressure tubes. The membranes considered are thin film composite in spiral wound construction. The feed water at high pressure enters the RO block and gets separated in to permeate (product) and reject (waste) streams. The product water is usually taken to a tank & pumped for further use. The reject water is drained in nearby drain. The RO Block is provided with adequate instrumentation & interlocks to ensure smooth operation. The RO block is also provided with automatic flush valve on reject line. This valve ensures the flushing of accumulated salts & maintains the clean membrane surface.

POST TREATMENT:-

UV System
The system is provided with an ultraviolet based system for final disinfection of treated water before entering into treated water tank. The UV system comprises of a quartz based UV lamp, SS housing and display panel.

PH Correction Dosing Set (optional)
The system is provided with a tank (HDPE) & dosing pump to dose the appropriate solution to increase the PH. Usually Sodium Hydroxide (non drinking applications) or

SECTION – VI: INSTALLATION, COMMISSIONING & GUARANTEES

INSTALLATION

Contractor shall supply three copies of foundation drawings giving weight, vibration and other loads required for the proper designing of the foundations.

All equipment shall be installed in a true workman like manner true to level and grade in accordance with the best current practice.

Contractor shall employ sufficient and proper equipment for lifting and placing of heavy equipment and in a manner which shall not strain or cause damage to the existing structures. If any damage is done, the same shall be made good to the satisfaction of the Project Manager without any additional cost.

All equipment and pipes shall be painted with one coat of red oxide before dispatch to the site.

COMMISSIONING

On completion of the work in all its aspects, the contractor shall start up the equipment in a manner normally done for the continuous operation for a period of not less than 48 hours and shall rectify and adjust the equipment for leakages and balancing the system.

After satisfactory commissioning of the plant, the contractor shall conduct performance tests on the equipment to satisfy the Project Manager that all equipment is performing to the rated outputs. Any or all equipments shall be rectified or replaced if the same is are not performing in accordance with the specifications.

GUARANTEES

On completion of the work contractor shall submit a guarantee covering the quality and performance of all materials supplied and installed under the contract. This guarantee shall cover each and every material whether manufactured by the contractor or not.

Contractor shall specify a suitable procedure to test the rated performance of the equipments and shall provide all necessary equipments, gauges etc. for conducting such tests.

The guarantee shall cover a period of one year from the date of installation and handing over.

COMPLETION

On completion of the job, the contractor shall hand over to the Project Manager the following:-

One flow chart drawn in ink on thick paper and mounted in a glass frame showing the flow diagram of the process including legend showing valves to be normally open or closed and instructions for back washing, operation and maintenance of chlorination & other chemical feeding pumps and other equipments.

Five sets of operating and maintenance instructions with spare parts list and their manufactures and/or suppliers.

Five sets of catalogues and drawings for all equipment supplied.

TECHNICAL SPECIFICATIONS FOR INTERNAL PLUMBING WORKS:

SECTION - I: BASIS OF DESIGN

BASIS OF DESIGN
The internal Plumbing, Sanitary, Drainage System for the project is designed keeping in view the following:
Gail Gas Management Center at Belapur, Mumbai.

Requirement of adequate and equal pressure availability of hot and cold water lines in Public/common toilet, Kitchen will be existing as it is already installed.

Adequate storage of water in under ground raw + treated domestic water tanks, are already exists at site.

The execution of works and materials used shall be as per the latest relevant I.S. specifications.

Wherever reference has been made to International Standard or any other specifications, the same shall mean to refer to the latest specification irrespective of any particular edition of such specification being mentioned in the specifications below or Schedule of Quantities.

PLUMBING/SANITARY WORKS:

GENERAL

The work shall be carried out in the accordance with the drawings and design as would be issued to the Contractor by the Design Consultant duly signed and stamped by him. The Contractor shall not take cognizance of any drawings, designs, specifications etc. not bearing Design Consultant signature and stamp. Similarly the Contractor shall not take cognizance of instructions given by any other Authority except the instructions given by the Client's Representative in writing.

The work shall be executed and measured as per metric dimensions given in the Bill of Quantities, drawings etc.

The Contractor shall acquaint himself fully with the partial provisions for supports that may or may not be available in the structure and if are available then utilize them to the extent possible. In any case the Contractor shall provide all the supports regardless of provisions that they have been already made. Nothing extra shall be payable for situations where insert plates (for supports) are not available or are not useful.

Shop coats of paint that may be damaged during shipment or erection shall be cleaned off with mineral spirits, wire brushed and spot primed over the affected areas, then coated with paint to match the finish over the adjoining shop painted surface.

The Contractor shall protect / handle the material carefully and if any damage occur while handling by the Contractor then the sole responsibility shall be of the Contractor. Such damages shall be rectified/recovered by the Contractor at no extra cost whatsoever.

The Contractor shall, within twenty one (21) days of receipt of the Notice of Award for the Project, where applicable, complete the submission of shop drawings to the Client's Representative for approval by the Design Consultants in order to conform to the contract schedule.

MEASUREMENTS:
All measurements shall be taken in accordance with relevant NFPA codes, unless otherwise specified.

SECTION - II SANITRY FIXTURE & PIPE FITTINGS

SCOPE

Work under this section shall consist of transportation, furnishing, installation, testing and commissioning and all labour as necessary as required to completely install all sanitary fixtures, brass and chromium plated fittings and accessories as required by the drawings and specified hereinafter or given in the Bill of Quantities.

GENERAL REQUIREMENTS

All fixtures and fittings shall be fixed with all such accessories as are required to complete the item in working condition whether specifically mentioned or not in the Bill of Quantities, specifications, drawings.

All fixtures and accessories shall be fixed in accordance with a set pattern matching the tiles or interior finish as per architectural design requirements. Wherever necessary the fittings shall be centered to dimensions and pattern desired.

Fixing screws shall be half round head chromium plated brass with C.P. washers wherever required as per directions of Client's Representative.

All fittings and fixtures shall be fixed in a neat workmanlike manner true to levels and heights shows on the drawings and in accordance with the manufacturers recommendations. Care shall be taken to fix all inlet and outlet pipes at correct positions. Faulty locations shall be made good and any damage to the finished floor, wall or ceiling surfaces shall be made good at Contractors cost.

All fixtures of the similar materials shall be by the same manufacturers.

All fittings shall be of the chromium plated materials.

Without restricting to the generally of the foregoing the sanitary fixtures shall include all sanitary fixtures, C.P. fittings and accessories etc. necessary and required for the building.

Whether specifically mentioned or not all fixtures and appliances shall be provided with approved fixing devices, nuts, bolts, screws, hangers as required. These supports shall have the necessary adjustment to allow for irregularities in the building area construction.

For the installation of the CP fittings, teflon tape shall be used.

EUROPEAN W.C:

European type water closet straight / offset type flexible single body push fit type WC

Waste pipes may be exposed on wall or concealed in chase as directed by the Client's Representative.

URINAL PARTITIONS:
White vitreous china urinal partition of 680x300mm app. size, fixed with expandable anchor fasteners with C.P. brass bolts and washers, embedded in wall and set in cement concrete complete

Urinal partitions shall be white glazed vitreous china, marble, granite or any other material selected by the Project Manager.

Urinal partitions shall be fixed at proper heights with C.P. brass bolts, anchor fasteners and M.S. Clips as recommended by the manufacturer and directed by Project Manager..

WASH BASINS:
Under Counter wash basin for under counter mounting, specially fabricated brackets painted white and connection pipe to wall with C.P. wall flange and rubber adopter for waste connection complete, including cutting and making good the walls

Wash basin shall be of under counter drop in type shall be supported on a pair of rolled steel brackets of approved design and shall be mounted on a countertop. So that rim and basin bowl is exposed from top.

Wash basin shall be provided with single lever mixer with chain and rubber plug, chromium plated brass bottle trap of approved quality, design and make where hot water required. Single tap where hot water is not required.

Wash basin shall be fixed at proper location and height and truly horizontal as shown on drawing or as directed by Client's Representative.

SINKS:
Stainless steel sink with drain board with C.I. brackets, C.P. brass chain and rubber plug with connection pipe to wall and C.P. wall flange, rubber adapter for waste connection complete including cutting and making good the walls wherever required.

Sinks shall be of stainless steel material as specified in the Bill of Quantities/Drawings.

Each sink shall be provided with R. S. brackets and clips and securely fixed. Counter top sinks shall be fixed with suitable angle iron clips or brackets as recommended by the manufacturer. Each sink shall be provided with 40 mm dia Chromium Plated waste with chain and plug or P.V.C. waste with Escutcheon plates. Fixing shall be done as directed by Client's Representative.

Supply fittings for sinks shall be mixing fittings or C.P. taps, angle cocks etc. all as specified in the Bill of Quantities/Drawings.

SINK BIB COCK
bib cock complete, including cutting and making good the walls wherever required.

HAND DRIER
Metal hand drier (Automatic Sensor Type) to be operated with 220 volts, single phase, with fully hygienic condition, with all accessories

The hand drier shall be no touch operating type with solid state time delay to allow user to keep hand in any position.

The hand drier shall be fully hygienic, rated for continuous repeat use.

The rating of hand drier shall be such that time required to dry a pair of hands upto wrists is approximately 30 seconds.

The hand drier shall be wall mounting type suitable for 230 volts, single phase, 50 Hz, A.C. power supply.

LIQUID SOAP DISPENSER
Liquid soap Gel dispenser horizontal /vertical with simple push lever & filled with liquid soap (one time), capable to dispenses only 0.5 ml soap gel every time the lever is pushed, including cutting and making good the walls, wherever required.

Liquid Soap Dispenser shall be wall/counter mounted suitable for dispensing liquid soaps, lotions, detergents. The cover shall lock to body with concealed locking arrangement, opened only by key provided.

Liquid soap dispenser body and shank shall be of high impact resistance material.

TOWEL RING
C.P. brass towel ring "Square" fixed to wooden / PVC cleats with C.P. brass screws including cutting and making good the walls wherever required.

ACCESSORIES:

C.P cast brass double coat hook fixed to wooden / PVC cleats with C.P. brass screws.

C.P brass airpurifier Can container, fixed to wooden cleats with C.P brass screws, complete.

Accessories shall be fixed with stainless steel half round head screws and cup washers in wall with rawl plugs or nylon sleeves and shall include cutting and making good the walls.

Porcelain accessories shall be fixed in walls and set in cement mortar 1:2 (1 cement: 2 coarse sand) and fixed in relation to the tiling work. The flange of the recessed fixture shall cover the recess in the wall fully.

HEALTH FAUCET/SPRAY (OPTIONAL)
CP Health faucet with 1.0 metre and CP Flexible Tube & wall hook.

A chromium plated spray with integral hand control valve and connected to a flexible pipe and angle valve with wall flange and hook are fixed as shown on the drawings or directed by the Project Manager. The angle valve and flange shall be paid under relevant item.

TOILET PAPER HOLDER
Toilet paper holder shall be white glazed vitreous china or chrome plated of size, shape and type specified in the Schedule of Quantities.

Porcelain toilet paper holder shall be fixed in walls and set in cement mortar 1:2 (1 cement : 2 coarse sand) and fixed in relation to the tiling work.

The latter (chrome) shall be fixed by means of screws/capping having finish similar to the toilet paper holder in wall/temper partitions with raw l plugs or nylon sleeves. When fixed on timber partition, it shall be fixed on a solid wooden base member provided by the Owner’s Site Representative.

ANGLE VALVE
C.P.brass angular stop cock regulating valve with wall flange of standard design

COCKROACH TRAP
Stainless steel cockroch trap consisting of 0.45 mm thick inner and outer cup and 1.00 mm thick top grating (Jali) with ring to be fixed inside ‘P’ traps with cement concrete.
HOSE CONNECTION
450 MM long 15mm dia Braided hose Connection Pipe with Two Nos. 15mm Nuts & Rubber Washer

2 WAY BIB TAP
These shall be chromium plated brass heavy quality of "EGO" type or equivalent, and shall be easy type with capstone head. The size shall beas specified in the Bill of Quantities.

ROBE HOOK
CP brass robe hooks providing & fixing C.P brass screws, washers, rawl plug etc.

GLASS MIRROR
The mirrors shall be of size specified in the material schedule with or without bevelled edges.The mirrors glass shall be free from all defects & shall give clean undisturbed image at any distance &

angle.The mirror shall be mounted on Asbestos sheets or 6mm plywood with brass counter sunk screws with washers and detachable G.P.caps.

DRINKING WATER FOUNTAIN

Drinking water fountain shall be well mounting type made of vitreous china, stainless steel or any other material as given in the Schedule of Quantities.

The drinking water fountain shall be with anti-squirt bubble less, self closing valve type with automatic volume regulator.

The drinking water fountain shall be provided with an anti-splash back and integral strainer with 32mm or 40mm cast brass trap.

UPVC PIPES & FITTINGS

Soil, Waste and Anti-siphon age pipes and fittings shall be uPVC. All pipes shall be straight and smooth as specified in Schedule of Quantities.

Pipes and fittings for main vertical stacks & branches 110 mm, & 75 mm dia shall be Soil, Waste & Rainwater System known in the short form as SWR drainage system with injection moulded fittings with approved type of socket & 'O' rubber ring joints.

Joints shall be done as per the manufacturer's recommendations. The pipes and fittings must have matching dimension for perfect joints in the system. 'O' ring fittings must have sufficient gap (approx. 10 mm) for thermal expansion of pipes.

uPVC pipes shall be clamped to the wall with approved type uPVC saddle clamps/U clamps and G.I. rod fixed to the angle iron support system within the shaft.

Use proper uPVC pipe adapters for connections between cast iron pipes, traps & uPVC pipes where necessary. Such joints shall be made of an approved type of 'Putty'.

SS GRATING

Floor gratings shall be hinged type cast / sheet stainless steel grating with matching recessed rim. Each grating will be provided with a cockroach trap. Each floor drain shall be provided with a specially fabricated sheet metal stainless steel double anti-cockroach internal grating to prevent ingress of cockroaches inside the building.

CLEAN OUT PLUG

Clean out plug for Soil, Waste or Rainwater pipes laid under floors shall be provided near pipe junctions bends, tees, "Y's" and on straight runs at such intervals as required as per site conditions. Cleanout plugs shall terminate flush with the floor levels. They shall be threaded and provided with key holes for opening. Cleanout plugs shall be Cast Brass screwed to a G.I. socket. The socket shall be lead caulked to the drain pipes.

INLET FITTING

Traps and connections shall ensure free and silent flow of discharging water. Where specified, Contractor shall provide a special type cast iron or uPVC inlet hopper without or with one or two or three inlet sockets to receive the waste pipe. Joint between uPVC waste pipe and hopper inlet socket shall be Drip seal joint. Hopper shall be connected to a uPVC 'P' or 'S' trap with at least 50mm seal (hopper and traps shall be paid for separately). Floor trap inlet hoppers and the traps

shall be set in cement concrete blocks/and supports as specified under clause 7.1 Floor trap above without extra charge.

P TRAP
P traps where specified shall be of multi inlet uPVC traps (SWR) having a minimum 50 mm deep seal. The trap and waste pipes when buried below ground shall be set and encased in cement concrete blocks firmly supported on firm ground or when installed on a sunken RCC structural slab. The blocks shall be in 1:2:4 mix (1 cement: 2 coarse sand: 4 stone aggregate 20 mm nominal size).

Contractor shall provide all necessary shuttering and centring for the blocks. Size of the block shall be 30x30 cms of the required depth.

FLOOR DRAIN
As per OEM (Original equipment manufacturer) / Manufacturer's standards.

RAIN WATER PIPES
All open terraces shall be drained by rain water down takes.

Rainwater down takes are separate and independent of the soil and waste system and will discharge into the open ground Storm water Drainage system of the Complex.

Rain water in open courtyards shall be collected in catch basins and connected to the storm water drainage line.

UPVC PIPES & FITTINGS
Pipes and fittings shall be uPVC. All pipes shall be straight and smooth as specified in Schedule of Quantities.

Pipes and fittings for main vertical stacks & branches 110 mm, & 160 mm dia shall be Rainwater System known in the short form as drainage system with injection moulded fittings with approved type of socket & 'O' rubber ring joints.

Joints shall be done as per the manufacturer's recommendations. The pipes and fittings must have matching dimension for perfect joints in the system. 'O' ring fittings must have sufficient gap (approx. 10 mm) for thermal expansion of pipes.

uPVC pipes shall be clamped to the wall with approved type uPVC saddle clamps/U clamps and G.I. rod fixed to the angle iron support system within the shaft.

Use proper uPVC pipe adapters for connections between traps & uPVC pipes where necessary. Such joints shall be made of an approved type of 'Putty'.

KHURRA
As per OEM (Original equipment manufacturer) / Manufacturer's standards.

MEASUREMENT:
Sanitary fixtures shall be measured by numbers.

Rates for all items mentioned above shall be inclusive of cutting holes and chases and making good the same, stainless steel screws, nuts, bolts and any fixing arrangements required and recommended by manufacturers, testing and commissioning.

Project Manager's decision with respect to the correct interpretation regarding mode of measurement shall be final and binding on the contractor.

End of Section II

SECTION-III WATER SUPPLY SYSTEM

SCOPE OF WORK

Work under this section consists of furnishing all labour, materials equipment and appliances necessary and required to completely install the water supply system as required by the drawings, specified hereinafter and given in the Schedule of Quantities.

Without restricting to the generality of the foregoing, the water supply system shall include the following:-

Distribution system from main supply headers to all fixtures and appliances for cold & hot water.
Cold water supply lines from city water connections to Under Ground Water Tank.
Garden irrigation system
Excavation and refilling of pipes trenches.
Pipe protection and painting.
Control valves, masonry chambers and other appurtenances.
Connections to all plumbing fixtures, tanks, appliances and municipal mains
Inserts for R.C.C. tanks

GENERAL REQUIREMENTS

All materials shall be new of the best quality conforming to specifications. All works executed shall be to the satisfaction of the Project Manager.

Pipes and fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workmanlike manner.

Short or long bends shall be used on all main pipe lines as far as possible. Use of elbows shall be restricted for short connections.

Pipes shall be fixed in a manner as to provide easy accessibility for repair and maintenance and shall not cause obstruction in shafts, passages etc.

Pipes shall be securely fixed to walls and ceilings by suitable clamps at intervals specified.

Clamps, hangers and supports on RCC walls, columns & slabs shall be fixed only by means of approved made of expandable metal fasteners inserted by use of power drills.

All pipe clamps, supports, nuts, bolts, washers shall be galvanised MS steel throughout the building. Painted MS clamps & MS nuts, bolts & washers shall not be accepted.

Valves and other appurtenances shall be so located as to provide easy accessibility for operations, maintenance and repairs.

WATER SUPPLY SYSTEM

Contractor should study the site plan and the water supply systems one for domestic water supply.

Source Water supply will be acquired from Municipal Corporation water mains (as available) to a service connection and collected in water storage tanks located underground.

The system has been connected to a gravity feed system from overhead tanks to all parts of the building

It is proposed to provide flushing cistern for all WCs. Infra red NO-TOUCH flush valves shall be provided for Urinals. These will be fed from over head tank by gravity.

Domestic water supply shall be provided with cold water system only. Hot water provisions to kitchen and all toilets connected to a local electric hot water storage geyser other than add on solar system at terrace for inlet of geyser in kitchen etc.

(CPVC) G.I. PIPES & FITTINGS
All pipes inside the buildings for domestic hot and cold water supply shall be CPVC conforming to CTs SDR-13.5 at a working pressure of 320 PSI at 23 deg.C. and 80 PSI at 82 deg. C.

Solvent welded CPVC fittings etc. tees, elbows, couplers, unions, reducers, brushing etc. including transition fittings (connection between CPVC and metal pipes/G.I. ie. Brass adopters conforming to ASTM D-2846) shall be provided.

All pipes shall be fixed in accordance with layout and alignment shown on the drawings. Care shall be taken to avoid air pockets. G.I. pipes inside toilets shall run above false ceiling with vertical drop in wall chases for all fixtures. No pipes to run inside sunken floor as far as possible. Pipes may run under the ceiling or floors and other areas as shown on drawings.

JOINING PIPES & FITTINGS

Cutting
Pipes shall be cut either with a wheel type plastic pipe cutting or hacksaw blade and care shall be taken to make a square cut. All burrs should be removed for proper contact between pipe and fittings during jointing.

SOLVENT CEMENT APPLICATION
Only CPVC solvent cement conforming to ASTM-F-493 should be used for joining pipe with fittings. An even coat of solvent cement should be applied on the pipe end and a thin coat inside the fitting socket.

ASSEMBLY
After applying the solvent cement on both pipe and fitting socket, pipe should be inserted into the fitting socket within 30 seconds, and rotating the pipe ¼ to ½ turn while inserting so as to ensure even distribution of solvent cement with the joint. The assembled system should be held for 10 seconds (approximately) in order to allow the joint to set up.

TESTING
The system should be hydrostatically pressure tested at 150 psi (10 Bar) for one hour. During pressure testing, the system should be fitted with water and if a leak is found, the joint should be cut out the replaced with new one.

TRANSITION OF FLOW GUARD CPVC IN METALS
When making a transition connection to metal threads, special brass/plastic transition fitting (Male and female adapters) should be used. Plastic threaded connections should not be over torque.

Threaded sealants
Teflon tape shall be used to make threaded connections leak proof.

Solvent Cement
Only CPVC solvent cement conforming to ASTMF 493 should be used for joining pipe with fittings and valves.

HANGERS AND SUPPORTS
For Horizontal runs, support should be given at 3 feet (90 cms) intervals for diameters of one inch and below and at 4 feet (1.2 m) intervals for larger sizes.

Supports should be as per the below mentioned table:

Size of pipe	20ºC	49ºC	71ºC	82ºC
Inch	Ft.	Ft.	Ft.	Ft.
½”	5.5	4.5	3.0	2.5
¾”	5.5	5.0	3.0	2.5
1”	6.0	5.5	3.5	3.0
1¼”	6.5	6.0	3.5	3.5
1¼”	7.0	6.0	3.5	3.5
2”	7.0	6.5	4.0	3.5

ANCHOR FASTENERS
All pipe supports, hangers and clamps to be fixed on RCC walls, beams, columns, slabs and masonry walls 230mm thick and above by means of galvanised expandable anchor fasteners in drilled holes of correct size and model to carry the weight of pipes. Drilling shall be made only by approved type of power drill as recommend and approved by manufacturer of the anchor fasteners. Failure of any fastening devices shall be the entire responsibility and contractor shall redo or provide additional supports at his own cost. He shall also compensate the DPL for any damage that may be caused by such failures.

UNIONS
Contractor shall provide adequate number of unions on all pipes to enable easy dismantling later when required. Unions shall be provided near each gunmetal valve, stop cock, or check valve and on straight runs as necessary at appropriate locations as required and/or directed by Project Manager.

FLANGES
Flanged connections shall be provided on pipes as required or where shown on the drawings, all equipment connections as necessary and required or as directed by the Project Manager. Connections shall be made by correct number and size of GI nuts, bolts & washers with 3 mm thick gasket. Where hot water connections are made insertion gasket shall be of suitable high temperature grade and quality approved by the Project Manager. Bolt hole dia for flanges shall conform to match the specification for C.I. sluice valve and C.I. butterfly valve.

TRENCHES
All water supply pipes below ground shall be laid in trenches with a minimum cover of 60 cms. The width and depth of the trenches shall be as follows:-

Dia of pipe	Width of trench	Depth of trench
15 mm to 50 mm	30 cms	75 cms
65 mm to 150 mm	45 cms	100 cms

SAND FILLING

G.I. pipes in trenches shall be protected with fine sand 15 cms all round before filling in the trenches.

PAINTING (PAINTING FOR CPVC PIPES NOT REQUIRED)

All pipes above ground shall be painted with one coat of red lead and two coats of synthetic enamel paint of approved shade and quality. Pipes shall be painted to standard colour code given in this documents or specified by Project Manager.

PIPE PROTECTION (PROTECTION FOR CPVC PIPES NOT REQUIRED)

All G.I. pipes in wall chase /below floors or laid under ground shall be protected against corrosion by the application of two coats of bitumen paint covered with polythene tape and a final coat of bitumen paint.

G.I. waste pipes buried in ground or sunken slab shall be protected with multilayer bitumen membrane tape 3mm thick with a final coat of hot or cold applied bitumen. Pypkote or equivalent.

BALL VALVES

Valves upto 40 mm dia. shall be screwed type Ball Valves with stainless steel balls, spindle, teflon seating and gland packing tested to a hydraulic pressure of 20 kg/cm2, and accompanying couplings and steel handles.(to BS 5351)

BUTTERFLY VALVES

Valves 50 mm dia and above shall be cast iron butterfly valve to be used for isolation. The valves shall be bubble tight, resilient seated suitable for flow in either direction and seal in both direction with accompanying flanges and steel handle.

MOTORISED WATER VALVE:

The Motorized Water Valve shall consist of gunmetal valve body with stainless steel trim and equal percentage flow characteristics, modulating motor and linkage.

TESTING

All pipes, fittings and valves after fixing at site, shall be tested by hydrostatic pressure of 1.5 times the working pressure or 10 kg/cm2 whichever is more.

Pressure shall be maintained for a period of at least thirty minutes without any drop.

A test register shall be maintained and all entries shall be signed and dated by Contractor (s) and Project Manager.

In addition to the sectional testing carried out during the construction, Contractor shall test the entire installation after connections to the overhead tanks or pumping system or mains. He shall rectify all leakages and shall replace all defective materials in the system. Any damage done due

to carelessness, open or burst pipes or failure of fittings, to the building, furniture and fixtures shall be made good by the Contractor during the defects liability period without any cost.

After commissioning of the water supply system, Contractor shall test each valve by closing and opening it a number of times to observe if it is working efficiently. Valves which do not effectively operate shall be replaced by new ones at no extra cost and the same shall be tested as above.

MEASUREMENT
CPVC or G.I. pipes above ground shall be measured per linear meter (to the nearest cm) and shall be inclusive of

all fittings e.g. coupling, tees, bends, elbows, unions, flanges and U clamps with nuts, bolts & washers fixed to wall or other standard supports.

Jointing with teflon tape, white lead and insertion gasket of appropriate temperature grade.

Cutting holes, and chases in walls, floors, any pipe support required for pipes below ground & making good the same.

Excavation, back filling, disposal of surplus earth and restoring the ground & floor in original condition.

PIPE SUPPORTS.
Fabricated and galvanised supports shall be measured by weight. Weight for each type of clamp shall be calculated on basis of the quantity of structural and MS used from the theoretical weight calculated on basis of the components theoretical weight of the sections.

Rate quoted for supports & hangers shall be inclusive of:-
Expandable anchor fastens.
Galvanising of all supports & hangers.
Cutting holes in walls, ceilings on floors and making good where permitted.
Nuts, bolts and washers for fixing and assembling.
Wooden/PVC pipe saddles for vertical or horizontal runs.

JANITOR'S SINK
The Alder heavy-duty cleaners sink is suitable for use in public buildings, schools and hospitals. It is designed for cleaners, janitors and utility rooms in public building applications.

It is made from fireclay and has a 31cm high splashback and bucket grating. Bib taps such as Armitage Shanks Alterna quadrant are ideal for use with this sink.

As an option, the sink can be mounted with stainless steel legs and aluminium alloy bearers. Legs can be reduced in height on site.
TECHNICAL SPECIFICATIONS FOR HVAC WORKS

SPECIFICATION - VARIABLE REFRIGERANT VOLUME SYSTEM

SCOPE

The scope of this section comprises the supply, erection testing and commissioning Variable Refrigerant Volume System with Scroll Compressor conforming to these specifications and in accordance with the requirements of Drawing and Schedule of Quantities

TYPE
Units shall be air cooled, variable refrigerant volume air conditioner of R-410A gas based consisting of one outdoor unit and multiple indoor units. Each indoor units having capability to cool or heat independently for the requirement of the rooms.

It shall be possible to connect multiple indoor units on one refrigerant circuit. The indoor units on any circuit can be of different type and also controlled individually. Following type of indoor units shall be connected to the system:

Ceiling mounted ductable type
Floor mounted ductable type
Ceiling mounted cassette type
Wall mounted type (Hi-Wall)

Compressor installed in outdoor unit shall be equipped with at least one inverter compressor up to 18 HP, two inverter compressors up to 36 HP and above this, three inverter compressors. The system shall be capable of changing the rotating speed of inverter compressor by inverter controller to follow variations in cooling and heating load.

Outdoor unit shall be suitable for mix match connection of all type of indoor units.

The refrigerant piping between indoor units and outdoor unit shall be extended up to 165m with maximum 50m level difference without any oil traps.

Both indoor units and outdoor unit shall be factory assembled, tested and filled with first charge of refrigerant before delivering at site.

OUTDOOR UNIT
The outdoor unit shall be factory assembled, weather proof casing, constructed from heavy gauge mild steel panels and coated with baked enamel finish. The unit should be completely factory wired tested with all necessary controls and switch gears:

All outdoor units above 8 HP shall have minimum two scroll compressors and be able to operate even in case one of compressor is out of order.
In case of outdoor units above 18HP, the outdoor unit shall have at least 2 inverter compressors so that the operation is not disrupted with failure of any compressor.
It should also be provided with duty cycling for switching starting sequence of multiple outdoor units.
The noise level shall not be more than 68 dB(A) at normal operation measured horizontally 1m away and 1.5m above ground level.
The outdoor unit shall be modular in design and should be allowed for side by side installation
The unit shall be provided with its own microprocessor control panel.

The outdoor unit should be fitted with low noise, aero spiral design fan with large airflow and should be designed to operate compressor-linking technology. The unit should also be capable to deliver 78 Pa external static pressure to meet long exhaust duct connection requirement.

The condensing unit shall be designed to operate safely when connected to multiple units, which have a combined operating nominal capacity up to 130 % of indoor units for outdoor units up to 84 HP.

COMPRESSOR
The compressor shall be highly efficient scroll type and capable of inverter control. It shall change the speed in accordance to the variation in cooling or heating load requirement:

The inverter shall be IGBT type for efficient and quiet operation.

All outdoor units shall have at least 10 steps of capacity control to meet load fluctuation and indoor unit individual control. All parts of compressor shall be sufficiently lubricated stock. Forced lubrication may also be employed.

Oil heater shall be provided in the compressor casing.

HEAT EXCHANGER

The heat exchanger shall be constructed with copper tubes mechanically bonded to aluminum fins to form a cross fin coil.

THE INDOOR UNIT SHALL BE BOTH COOLING AND HEATING SYSTEM.
The aluminum fins shall be covered by anti-corrosion resin film.
The unit shall be provided with necessary number of direct driven low noise level propeller type fans arranged for vertical discharge. Each fan shall have a safety guard.

REFRIGERANT CIRCUIT
The refrigerant circuit shall include liquid & gas shut-off valves and a solenoid valves at condenser end.

All necessary safety devices shall be provided to ensure the safely operation of the system.

SAFETY DEVICES
All necessary safety devices shall be provided to ensure safe operation of the system.
Following safety devices shall be part of outdoor unit; high pressure switch, fuse, crankcase heater, fusible plug, over load relay, protection for inverter, and short recycling guard timer.

OIL RECOVERY SYSTEM
Unit shall be equipped with an oil recovery system to ensure stable operation with long refrigeration piping lengths.

INDOOR UNIT
This section deals with supply, installation, testing, commissioning of various type of indoor units confirming to general specification and suitable for the duty selected. The type, capacity and size of indoor units shall be as specified in detailed Bill of Quantities

GENERAL
Indoor units shall be either ceiling mounted cassette type, or ceiling mounted ductable type or wall mounted type or other as specified in BOQ. These units shall have electronic control valve to control refrigerant flow rate respond to lead variations of the room.

The address of the indoor unit shall be set automatically in case of individual and group control.
Incase of centralized control, it shall be set by liquid crystal remote control.

The fan shall be dual suction, aerodynamically designed turbo, multi blade type, statically & dynamically balanced to ensure low noise and vibration free operation of the system. The fan shall be direct driven type, mounted directly on motor shaft having supported from housing.

The cooling coil shall be made out of seamless copper tubes and have continuous aluminum fins. The fins shall be spaced by collars forming an integral part. The tubes shall be staggered in the direction of airflow. The tubes shall be hydraulically/ mechanically expanded for minimum thermal contact resistance with fins. Each coils shall be factory tested at 21kg/sqm air pressure under water.

Unit shall have cleanable type filter fixed to an integrally molded plastic frame. The filter shall be slide away type and neatly inserted.

Each indoor unit shall have computerized PID control for maintaining design room temperature. Each unit shall be provided with microprocessor thermostat for cooling and heating.

Each unit shall be with wired LCD type remote controller. The remote controller shall memorize the latest malfunction code for easy maintenance. The controller shall have self-diagnostic features for easy and quick maintenance and service. The controller shall be able to change fan speed and angle of swing flat individually as per requirement.

DIRECT EXPANSION PRECISION PACKAGED UNITS

SCOPE

The scope of this section comprises of supply; installation, testing and commissioning of self contained direct expansion type Precision air conditioning units suitable for operation on R410a refrigerant & should have advanced microprocessor and electronically communicated motors conforming to these specifications and in accordance with the Schedule of Quantities.

GENERAL

Modular construction Precision air conditioning unit suitable for operation on R-410a refrigerant with bottom discharge arrangement consisting of inlet filter, blow through direct drive Electronically communicated Motors and Backward curved Plug fans, fan motor assembly to deliver desired air quantity, Direct Expansion Cooling Coil, Multistage Heater banks Variable capacity Humidifier, condensate drain pan of aluminum construction, Microprocessor panel, programmable control complete with LCD display. The unit shall be suitable for operation on 415 V, 50 Hz, AC supply.

UNIT BASE & CASING

Base panel shall be constructed out of sandwich panels of galvanized steel and painted with epoxy powder. All four side panels (including front door) shall be double skinned sandwiched panels. The panels shall be insulated on the inside with minimum 32 Kg/ cum glass wool, for fire insulation class A0. Unit shall be complete with space for refrigeration equipment, fans, cooling coils, liquid receiver and multistage strip heaters and modulating Humidifiers. Unit shall be provided with welded tubular steel floor stand with adjustable legs and requisite vibration isolation pads.

FAN

The units should be equipped with direct driven backward curved EC radial fans with electronically commutated brushless motors; the technology employed by these motors allows straightforward control of fan speed by means of the electronic controller in order to obtain step less adjustment of air flow rate and static pressure to ensure correct distribution of the treated air. The motor's high efficiency should make for less energy absorption, especially at partial loads and during starting (lowering of peak current), which means a reduction in power consumption of approximately 30% compared to AC motor. The motor shall have minimum IP54 Protection.

FILTERS

The filter chamber shall be an integral part of the system and withdraw able from the front of the unit. Filtration shall be provided by deep V form G4 performance dry disposable media to AS1324.

EVAPORATOR COIL

Precision packaged unit shall comprise of cooling coil of copper tubes expanded into aluminium fins with corrugated profile and hydrophilic treatment. Face and surface areas shall be such as to assure rated capacity and the air velocity across the coil and Filter shall not exceed 2.5 m/s. The cooling coil shall be minimum of 3/4 rows deep and the fin spacing shall not exceed 1.8 mm. Coil selection to be suitable for SHF > 0.95 and provided with hydrophilic coating to minimize / eliminate water carry over into the airflow stream. Drain pan shall be made of stainless steel.

COMPRESSORISED SYSTEMS

Scroll Compressor

The compressor shall be of the high efficiency scroll design operating with R410A refrigerant and 400V/3~/50 Hz supply. Compressors, the humidifier shall be isolated from the air flow in the version with downward flow, and in the air flow in versions with upward output. The compressor shall be charged with mineral oil and designed for operation on environment friendly refrigerantR410a. Each compressor shall have internal motor protection and be mounted on vibration isolators.

REFRIGERATION CIRCUIT

The refrigeration system shall be of the Single/ Multiple circuit direct expansion type and incorporate hermetic scroll compressors, complete with crankcase heaters. The system shall include a manual reset high pressure control; auto reset low pressure switch, safety valve, electronic expansion valve, high sensitivity refrigerant sight glass, liquid receiver, filter drier, solenoid valve for interception of liquid refrigerant, and charging/access ports in each circuit. Each refrigeration circuit shall include rigidly mounted isolation valves in the discharge and liquid lines to aid servicing and installation.

EXPANSION DEVICE: ELECTRONIC EXPANSION VALVE (EEV)

The unit should have Electronic Expansion Valve, which offers the following advantages:

Fast, high precision adjustment of refrigerant flow;
Fast arrival of the unit at steady-state conditions;
Superheating value remains constant in variable thermal load conditions;
Efficient operating conditions of the compressor, especially in the presence of low room temperatures;
Wide working range with consequent extension of the unit's operating limits.

These properties result in enhanced performance of the unit and make it possible to obtain very significant energy savings.

AIR COOLED CONDENSER

Condenser shall be air-cooled type, suitable for outdoor installation and shall be suitable for operating at high ambient of 44 deg C db and at low ambient of upto 5 deg C db temperatures. Condenser shall be in copper tube & aluminum fins construction. Condenser coil shall be of maximum 4 rows deep and the fin spacing shall not exceed 2mm.

The condenser fan/s shall be of propeller type with max 1000 RPM variable voltage electric motor complete with IP-54 protection. Motor shall be speed controlled to ensure a stable operation for varying ambient; by a factory fitted direct acting head pressure activated stepless variable speed drive. The condenser shall be complete with provisions for refrigerant piping connections, shut off valves and any other standard accessories necessary with the equipment supplied.

ELECTRIC STRIP HEATERS

Each packaged unit shall be provided with multistage electric heaters with heating elements constructed from a non- oxidable material. Electric strip heaters shall be of the low temperature totally enclosed strip type fitted with radiation fins and suitable for operating at black heat. If overheating occurs, a safety thermostat should cuts off the voltage supply to the heaters and triggers an alarm.

HUMIDIFIER

Boiling water in a polypropylene steam generator shall provide humidification. The humidifier shall be capable of providing continuous auto modulation in steam generation from 30-100% as per the steam requirement per hour. The humidifier shall be fully serviceable with replaceable electrodes. Waste water shall be flushed from the humidifier by initiation of water supply valve via U-trap. The microprocessor should be able to display the current drawn and actual steam output in the microprocessor.

DE-HUMIDIFICATION
De-humidification cycle shall operate by reducing the speed of EC fan to reduce ADP of coil. Hence, by reduction of fan speed there shall be additional power saving.

WATER SENSOR :
The system shall be provided with relevant water detection kit which shall have sensors with wire of minimum 2 mtrs and each of the sensor must be capable to detect individually any water below the false floor near the unit, the sensor must be connected to the unit microprocessor thus enabling the controller to give an alarm incase of wet floor.

MICROPROCESSOR CONTROL SYSTEM

Logic Circuitry
A microprocessor shall continuously monitor operation of each Server room air-conditioning unit continuously digitally display room temperature and room relative humidity, alarm on system malfunction and simultaneously display problem. When more than one malfunction occurs, flash fault in sequence with room temperature, remember alarm even when malfunction cleared, and continue to flash fault until reset.

Malfunctions
Power Loss, Loss of Airflow, High Room Temperature, Low Room Temperature, High Humidity, Low Humidity, Supply Fan Overload, and Water Under Floor / Fire alarm.

The standby unit should immediately come in action in the event of any alarm/failure of the working unit without waiting for the temperature to increase to the high temperature limit thereby controlling the temperature of the data Centre.

The unit should also be capable of starting the standby unit incase the temperature is not able to achieve with the working units.

Automatic lead unit sequencing to extend equipment life and automatic rotation of standby unit should be part of the microprocessor itself. Microprocessor must be suitable to control multiple units if required with hard wiring which can be done at a later date.

In case of power failure the precision packaged unit shall start automatically without any body's intervention. Controllers shall be Microprocessor based with capability to generate alarm and networking of all units to rotate (working + standby) units, equalized run time capability (for 2 or 3 packaged units), programmable timer, with display of all parameters.

Computer Generated Selection sheet shall be attached along with the offer. The same needs to be demonstrated incase required at the time of finalization.

CEILING MOUNTED DUCTABLE TYPE UNIT (TFA)

Unit shall be suitable for ceiling mounted type. The unit shall include pre filter, fan section & DX coil section. The housing of unit shall be light weight powder coated galvanized steel. The unit shall have high static fan for ductable arrangement with outdoor unit.

FLOOR MOUNTED DUCTABLE TYPE UNIT (TFA)

Unit shall be suitable for floor mounted type. The unit shall include pre filter, fan section & DX coil section. The unit shall be light weight powder coated galvanized steel and weather proof put on terrace. The unit shall have high static fan for ductable arrangement with outdoor unit.

AXIAL FLOW FANS

Axial flow fan shall be of vane axial type and shall be suitable for mounting in duct or floor/slab as required/indicated on the tender drawings.

IMPELLERS:

Single piece cast aluminium or steel impeller shall be with blades of aerofoile design to give maximum efficiency and shall vary in twist and width from hub to top to effect equal air distribution along the blade length. Single piece fan and hub shall be statically and dynamically balanced. Maximum clearance between blade tip and the fan housing at the specified speed shall be 5 mm. Impellers blades shall be whirl tested to a speed 25% above the design operating speed. Extended grease leads for external lubrication shall be provided. The fan blade shall be adjustable type so that actual air flow can be achieved at site as per indicated in Drawings & BOQ.

CASING:

Casing shall be constructed of 14 gauge sheet steel, properly reinforced for rigidity. Fan casing, motor mount and straightening vanes shall be of welded steel construction motor mounting plate shall be minimum 20 mm thick and machined to receive motor flanges. Casing shall be provided with two nos. wide, hinged doors which open easily. Inspection doors with handle and neoprene gasket shall be provided. Casing shall have flanged connection on both ends for ducted applications. Support brackets for ceiling suspensions shall be welded to casing for connection to hanger bolts. Straightening vanes shall be aerodynamically designed for maximum efficiency by converting velocity pressure to static pressure potential and minimizing turbulence. Casing shall be bondorized, primed and finish coated with enamel paint.

MOTOR:

Motor shall be squirrel cage, totally enclosed, fan cooled, constant speed, suitable for 415 ± 10% volts, 50 Hz, 3 phase power supply, motor nameplate horsepower shall be more than brake horse power by a minimum of 10%. Motor speed shall not exceed 1450 R.P.M (4 pole). The fan and motor combination selected for particular requirement shall be of the most efficient type so that sound level and energy consumption is minimum. Motor conduit box shall be mounted on exterior of the casing. Wires from the motor to the conduit box shall be protected from the air stream by enclosing in a flexible metal conduit. The motor shall have ‘E’ class insulation.

DRIVE:

For Duct/Wall Mounted Fan:
For duct/wall mounted fans the impeller shall be mounted directly on the motor. Drive unit and impeller shall be totally enclosed inside the duct.

For Floor/Ceiling Mounted Fan:
The fan shall be provided with belt drive and adjustable motor sheave, standard sheet steel belt guard with vented front for heat dissipation. Belt shall be of the oil resistant type.

Vibration Isolation:
Base shall be provided for each fan. Base for both fan and motor shall be built as an integral part and shall be mounted on a concrete foundation through spring type of vibration isolators. The concrete foundations shall be at least 15 cm above the finished floor level and shall be further isolated from the structural floor through 5 cm. Thick layers of sand all around, topped with bitumen. In case ceiling hung fan within the ceiling shall be provided Vibration Isolation Suspension (VIS) shall be provided in each of string.

IN-LINE FANS
In-line fans shall be Centrifugal type direct/belt driven complete with motor, belt guard, motor mount and vibration isolation type suspension arrangement mounted within/end of duct.

PROPELLER FANS
The exhaust fans shall be propeller type with steel hub and blades, mounted directly on the shaft of a totally enclosed motor.

The fan blades shall be of pressed steel of aerofoil design for high efficiency and static pressure.

The mounting frame shall be of cast /sheet steel brackets to connect the frame, with the fan/motor assembly. Rubber mounts shall be provided between the mounting frame and the mounting brackets.

The fan motor shall be totally enclosed squirrel cage type.

All wall mounted exhaust fans shall be provided with gravity back draft louvers

LINEAR SUPPLY AND RETURN AIR GRILLS:
The linear continuous supply / return air grills shall be made of powder coated extruded aluminum construction with fixed horizontal bars. The thickness of fixed bar louvers shall be 5mm in front and the flange shall be 20mm wide with round edges. The register shall be suitable for concealed fixing and horizontal bars of the grills shall mechanically crimped from the back to hold them.

The colour of grills shall be as per the approval of the Engineer in Charge. The volume control device made of extruded aluminum construction in black anodised finish shall be provided in supply air duct collars only.

FRESH & EXHAUST AIR GRILLE
The Exhaust & Fresh air grilles shall be fabricated from MS powder coated sections. The grilles shall have single louvers. The front horizontal louvers shall be of extruded section, fixed/adjustable

type. The rear vertical louvers where required shall of MS extruded sections and adjustable type. The grille shall have single horizontal extruded section fixed louvers. The grilles shall have an outer frame on all four sides.

FRESH & EXHAUST AIR LOUVERS WITH BIRD SCREEN:
The fresh air intake louvers at least 50mm deep will be made of powder coated extruded aluminum construction. Bird / insect screen will be provided with the intake louvers. The blades shall be inclined at 45 degree on a 40mm blade pitch to minimize water ingress. The lowest blade of the assembly shall be extended out slightly to facilitate disposal of rain water without falling on door / wall on which it is mounted.

The intake louvers shall be provided with factory fitted aluminum construction volume control dampers in black anodized finish.

DUCT FABRICATION
All Galvanized ducts shall be factory fabricated from lock form grade galvanized sheet steel zinc coated, coating grade 120 or aluminum sheets (wherever aluminum ducts are specified) and installed in a workman like manner.

Ducts shall be straight and smooth on the inside with neatly finished joints. All joints shall be made airtight by applying sealant during the assembly of the ductwork, Sealing of the seams shall be accomplished by using approved sealant. Transverse joints shall be made using sponge rubber sulphur-free foam rubber gasketing (3mm thick and 20mm wide) All exposed ducts within conditioned spaces shall have only slip joints and no flanged joints. The internal ends of slip joints shall be made in the direction of Air flow.

Changes in dimensions and shape of ducts shall be gradual. Curved elbows, unless otherwise approved, shall have a center line radius equal to one and half times the width of the duct. Air turns shall be installed in all abrupt elbows and shall consist of curved metal blades or vanes, arranged to permit the air to make the turns without appreciable turbulence.

All ducts shall be rigid and shall be adequately supported and braced where required with standing seams to keep the ducts true to shape and to prevent buckling, vibration or breathing.

All sheet metal connections, partitions and plenums required to confine the flow of air to and through the filters and fans, shall be constructed out of 18 gauge galvanized steel sheet, thoroughly stiffened with 25mm x 25mm x 3mm angle iron braces and fitted with all necessary doors, to give access to all parts of the apparatus. Doors shall not be less than 45cm x 45cm in size. Volume control dampers wherever indicated on the drawings shall be installed as a minimum. The final duct design may call for additional volume control dampers based on final duct configuration

INSULATION OF DUCT

NITRILE RUBBER OR POLYETHYLENE EXTERNAL THERMAL INSULATION
The duct insulation with Nitrile Rubber or Cross linked polyethylene external thermal insulation shall be provided.

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 rubber sheets to size with

sufficient allowance in dimension. 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 as per manufacturer recommendations. The adhesive shall be strictly as recommended by the manufacturer.

ACOUSTIC LINING OF DUCT:
Material shall be resin bonded fibre glass of 32kg/m3 density. Thickness of the material shall be as specified for the individual application.

Ducts so identified and marked on drawings and included in Schedule of Quantities shall be provided with acoustic lining of thermal insulation material for a distance of minimum 5 meters as follows:

The inside surface for the ducts shall be cleaned, and provided with 22 gauge GI Channels 25 x 25 mm scrolled back to back and fixed on the inside of duct, spaced not more than 60 cm center to form a frame work of 60 x 60 cms square. Cut panels 60 x 60 cms of fiber 25 mm thick shall be fitted in the squares. The insulation panels shall be fired to the sheet metal with cold setting adhesive compound and covered with fibre glass tissue paper.

The inner most surface shall be covered with 28 gage peforated aluminium sheet having at least 15 percent perforations. The aluminium sheet shall be scrolled to GI channels using cup washer and neatly finished to give true inside surface.

MOTORIZED FIRE & SMOKE DAMPERS:
All supply and return air ducts at AHU room crossings and at all floor crossings shall be provided with Motor operated Fire & smoke damper of at least 90 minutes rating. These shall be of multi-leaf type and provided with Spring Return electrical actuator having its own thermal trip for ambient air temperature outside the duct and air temperature inside the duct. Actuator shall have Form fit type of mounting, metal enclosure and guaranteed long life span.

Fire damper blades and outer frames shall be of 16G galvanized steel construction fitted with 18 gauge extended sleeves on both sides. The damper blade shall be pivoted on both ends using chrome plated spindles in self lubricated bronze bushes. Stop seals shall be provided on top and bottom of the damper housing made of 16G galvanized sheets steel. For preventing smoke leakage metallic compression seals will be provided.

The electric actuator shall be energized either upon receiving a signal from smoke detector installed in AHU room supply air duct / return air duct or temperature sensor. The fire damper shall also close upon sensing temperature rise in supply air ducts thru the electronic temperature sensor.

Each damper shall be provided with its own control panel, mounted on the wall and suitable for 240 VAC supply. This control panel shall be suitable for spring return actuator and shall have at least the following features

Potential free contacts for AHU fan ON/ Off and remote alarm indication.
Accept signal from external smoke / fire detection system for tripping the electrical actuator.

Test and reset facility.
Indicating lights / contacts to indicate the following status:
Power Supply On
Alarm
Damper open and close position.

REFRIGERANT PIPING
Refrigerant piping from outdoor to indoor of liquid/Gas flare of copper insulated with nitrile rubber.

All refrigerant piping for the air conditioning system shall be constructed from soft seamless up to 19.1mm and hard drawn copper refrigerant pipes for above 19.1mm with copper fittings and silver-soldered joints. The refrigerant piping arrangements shall be in accordance with good practice within the air conditioning industry, and are to include charging connections, suction line insulation and all other items normally forming part of proper refrigerant circuits.

All joints in copper piping shall be sweat joints using low temperature brazing and or silver solder. Before jointing any copper pipe or fittings, its interiors shall be thoroughly cleaned by passing a clean cloth via wire or cable through its entire length. The piping shall be continuously kept clean of dirt etc. while constructing the joints. Subsequently, it shall be thoroughly blown out using nitrogen.

After the refrigerant piping installation has been completed, the refrigerant piping system shall be pressure tested using nitrogen at pressure of 38Kg per sq.cm. Pressure shall be maintained in the system for 24 hours. The system shall then be evacuated to minimum vacuum if 700mm hg and held for 24 hours.

The air-conditioning system supplier shall be design sizes and erect proper interconnections of the complete refrigerant circuit.

The thickness of copper piping shall not be less than mentioned below:

PIPE SIZE IN MM DIA (OD)

a)	41.3	f) 15.9
b)	34.9	g) 12.7
c)	28.6	h) 9.5
d)	22.2	j) 6.4
e)	19.1	

PIPING SUPPORTS:
Rigid supports shall be used in conjunction with Gripple hangers to assist with alignment of services. Rigid support must also be used in conjunction with Gripple hangers with pipe work at each change of direction or connection. For insulated pipe, provide protective sleeve to protect the entire circumference of the pipe insulation. Support piping in accordance with Schedule II at the end of this Section.

PIPE INSULATION

Refrigerant Pipe Insulation

The whole of the liquid and suction refrigerant lines including all fittings, valves and strainer bodies, etc. shall be insulated with 19mm /13 mm thick elastomeric nitrile rubber.

Drain Pipe Insulation
Drain pipes carrying condensate water shall be insulated with 6 mm thick elastomeric nitrile rubber insulation.
For proper drainage of condensate, U Trap shall be provided in the drain piping (wherever required). All pipe supports shall be of pre fabricated & pre painted slotted angle supports, properly installed with clamps etc.

CONTROL
Computerized PID control shall be used to maintain correct room temperature. Units shall be equipped with self-diagnosis for easy and quick maintenance and service. The LCD remote controller shall memorize the latest malfunction code for easy maintenance. It shall be possible to control all the indoor units and change fan speed and angle of swing flap individually in the group.

TECHNICAL SPECIFICATIONS FOR FIRE FIGHTING WORKS

SECTION – I: FIRE HYDRANT SYSTEM AND SPRINKLER SYSTEM

SCOPE OF WORK

Work under this section shall consist of furnishing all labour, materials, equipment and appliances necessary and required to completely install wet riser fire hydrant and sprinkler system as required by the drawings and specified hereinafter or given in the Schedule of Quantities.

Without restricting to the generality of the foregoing, the work shall include but not limited to the following:-

Piping for wet riser hydrant systems and for yard hydrants.
Landing valves, canvas hose pipes, hose reels, hose cabinets & connections to mains.
Fully automatic sprinkler system
Isolation valves, non-return valves, installation valves, flow control switches and accessories.

GENERAL

All materials shall be new of the best quality conforming to the specifications and subject to the approval of the Project Manager.

Pipes and fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workmanlike manner.

Pipes shall be fixed in a manner as to provide easy accessibility for repair and maintenance and shall not cause obstruction in shafts, passages etc.

Pipes shall be securely fixed to walls, and ceilings by suitable clamps at intervals specified. Only approved type of anchor fasteners shall be used for RCC ceilings and walls.

Valves and other appurtenances shall be so located that they are easily accessible for operations, repairs and maintenance.

The rules and regulations of Local Fire Authority as per the statutory regulations applicable for obtaining the occupation certificate from the Local Development / Fire Authority.

Drawings issued with the tenders are schematic and indicate the concept. Contractor shall make his shop drawings on basis of Architectural and Interior design drawings issued by the Engineer-in-Charge. Work will be executed only as per approved shop drawings.

It is the contractor's responsibility to ensure the competence of design to meet the above requirements.

PIPES
All pipes within and outside the building in exposed locations and shafts including connections buried under floor shall be M.S. pipes confirming to NFPA-14 of Heavy Class.

PIPE FITTINGS
Pipes and fittings means tees, elbows, couplings, flanges, reducers etc. and all such connecting devices that are needed to complete the piping work in its totality.

Screwed fittings shall be approved type malleable or cast iron with reinforced ring on all edges of the fittings suitable for screwed joints.

Forged steel fittings of approved type with "V" groove for welded joints.

Fabricated fittings shall be not being permitted for pipe diameters 50 mm and below. When used, they shall be fabricated, welded and inspected in workshops whose welding procedures have been approved by the TAC as per TAC rule 4102 for sprinkler system and applicable to hydrant and sprinkler System under the supervision of Project Manager. For "T" connections, pipes shall be drilled and reamed. Cutting by gas or electrical welding will not be accepted.

JOINTING

SCREWED (50 MM DIA PIPES AND BELOW)
Joint for black steel pipes and fittings shall be metal to metal thread joints. A small amount of red lead may be used for lubrication and rust prevention. Joints shall not be welded or caulked.

WELDED (65 MM DIA AND ABOVE)
Joints between M.S. and pipes and fittings shall be made with the pipes and fittings having "V" groove and welded with electrical resistance welding in an approved manner. Butt welded joints are not acceptable.

FLANGED
Flanged joints shall be provided on:
Straight runs not exceeding 30 m on pipe lines 80 mm dia and above.
Both ends of any fabricated fittings e.g. bend tees etc. of 65 mm dia or larger diameter.

For jointing all types of valves, appurtenances, pumps, connections with other type of pipes, to water tanks and other places necessary and required as per good engineering practice.
Flanges shall be as per NFPA with appropriate number of G.I. nuts and bolts, 3 mm insertion neoprene gasket complete.

UNIONS
Approved type of dismountable unions on pipes lines 65 mm and below in similar places as specified for flanges.

EXCAVATION

Excavation for pipe lines shall be in open trenches to levels and grades shown on the drawings or as required at site. Pipe lines shall be buried to a minimum depth of 1.2 meter or as shown on drawings.

Wherever required contractor shall support all trenches or adjoining structures with adequate timber supports.

On completion of testing and pipe protection, trenches shall be refilled with excavated earth in 15 cms layers and consolidated.

Contractor shall dispose off all surplus earth within a lead of 200 m or as directed by Project Manager.

ANCHOR THRUST BLOCKS

Contractor shall provide suitably designed anchor blocks in cement concrete to encounter excess thrust due to water hammer & high pressure.

Thrust blocks shall be provided at all bends & tees & such other location as determined by the Project Manager.

Exact location, design, size and mix of the concrete block shall be approved by the Project Manager prior to execution of work.

VALVES

GUNMETAL VALVES
Valves 65 mm dia & below shall be heavy gunmetal full way valves or globe valves with female screwed ends.

All valves shall be approved by the Project Manager before they are allowed to be used on work.

C.I. IRON BUTTERFLY VALVES/SLUICE VALVES
All valves 80 mm dia and above shall be C.I. double flanged butterfly valves. Each sluice valve shall be provided with wheel for valves in exposed positions and cap top for underground valves. Contractor shall provide suitable operating keys for Sluice Valves with cap tops.

Butterfly valves shall be of best quality conforming NFPA of class specified and sluice valves shall conform to NFPA.

NON-RETURN VALVES (CHECK VALVES)
Non-return valves shall be cast iron double flanged with cast iron body and gunmetal internal parts conforming to NFPA.

AIR VALVES
25 mm dia screwed inlet cast iron single acting air valve shall be provided on all high points in the system or as shown on drawings.

ORIFICE FLANGES
Orifice flanges fabricated from 6 mm thick stainless steel plate shall be provided to reduce pressure on individual hydrants to restrict the operating pressure to 3.5 kg/cm2 and allow a discharge of 560 lpm. The contractor shall submit design of the orifice flanges for approval before installation.

DRAIN VALVE
50 mm dia black steel pipe (heavy class) with 50 mm gunmetal fullway valve shall be provided for draining any water in the system in low pockets.

PRESSURE GAUGE
Pressure gauge shall be provided near all connections to hydrant system and isolation valves of sprinkler system and where required. Pressure gauge shall be 100 mm dia gunmetal Bourden type with gunmetal isolation cock, tapping and connecting pipe and nipple. The gauge shall be installed at appropriate level and height for easy readability.

HYDRANT/VALVE CHAMBERS

Contractor shall provide suitable brick masonry chambers in cement mortar 1:5 (1 cement: 5 coarse sand) on cement concrete foundations 150 mm thick 1:5:10 mix (1 cement: 5 fine sand: 10 graded stone aggregate 40 mm nominal size) 15 mm thick cement plaster inside and outside finished with a floating coat of neat cement inside with cast iron surface box approved by fire brigade including excavation, back filling complete.

Valve chambers shall be of following size:-
for depths 100 cms and beyond 120x120 cms.

FIRE BRIGADE CONNECTIONS

As shown on drawings separate gunmetal 2-3 way collecting head Fire brigade connection each with two or three 63 mm instantaneous type inlets with built in check valves and 150 mm dia inlet/outlet connected to the fire and sprinkler main as given in BOQ shall be provided. Both shall be installed on a stand post and provided with horizontal C.I. reflux valve and location to be approved by Project Manager. Etched gunmetal label plates with 80 mm high letters shall be fixed along with necessary enclose cabinet. The plates should be firmly fixed to the FB connection and any support system.

FIRE HYDRANTS

EXTERNAL HYDRANTS

Contractor shall provide stand post type external hydrants. The hydrants shall be controlled by a cast iron sluice valve installed in underground lockable chambers. Hydrants shall have instantaneous type 63 mm dia outlets. The hydrants valve shall be single outlet conform to NFPA-14 with C.I duck foot bend and flanged riser of required height to bring the hydrant to correct level above ground.

Contractor shall provide for each external fire hydrant two numbers of 63 mm dia. 15 m long controlled percolation type hose pipes with gunmetal male and female instantaneous type couplings machine wound with G.I. wire, gunmetal branch pipe with nozzle.

INTERNAL HYDRANTS

Contractor shall provide on each landing and other locations as shown on the drawings one single headed gunmetal oblique landing valves with 63 mm dia outlet mounted on a common 80 mm inlet conforming to NFPA-14. Landing valve shall have flanged inlet and instantaneous type outlets as shown on the drawings.

Instantaneous outlets for fire hydrants shall be of standard pattern approved and suitable for fire brigade hoses.

Contractor shall provide for each internal fire hydrant station two numbers of 63 mm dia. 15 m long rubberized fabric linen hose pipes with gunmetal male and female instantaneous type coupling machine wound with G.I. wire, fire hose reel conforming to NFPA-14, gunmetal branch pipe with nozzle and Fire man's axe.

Each hose box shall be conspicuously painted with the letters "FIRE HOSE".

FIRE HOSE REELS

Contractor shall provide standard fire hose reels with 20 mm dia high pressure Dunlop or equivalent rubber hose 36.5 m long with gunmetal nozzle and control valve, shut off valve, all mounted on circular hose reel of heavy duty mild steel construction and cast iron brackets. Hose reel shall be connected directly to the wet riser.

HOSE CABINETS

All internal fire hydrants shall be enclosed in M.S. glazed cabinet. Hose cabinets shall be fabricated from 16 gauge M.S. sheet of fully welded construction with hinged double front door partially glazed with locking arrangement stove enameled fire red paint with "FIRE HOSE" written on it prominently. (Sizes are as given in the Bill of Quantities).

PIPE PROTECTION
All pipes above ground and in exposed locations shall be painted with one coat of zinc chromate primer and two or more coats of synthetic enamel paint of approved shade.

Pipes in chase or buried underground shall be painted with two coats of zinc chromate primer and wrapped with one layer of 4 mm thick PYPKOAT mutilayer sheet as per standard manufacturer's specifications.

PIPE SUPPORTS
All pipe clamps and supports shall be galvanised steel. When fabricated from M.S. steel sections, the supports shall be factory galvanised before use at site. Welding of galvanised clamps and supports will not be permitted.

Pipes shall be hung by means of expandable anchor fastener of approved make and design (Dash Fastners or equivalent). The hangers and clamps shall be fastened by means of galvanised nuts and bolts. The size/diameter of the anchor fastner and the clamp shall be suitable to carry the weight of water filled pipe and dead load normally encounted.

INSTALLATION VALVE
Installation valves shall be installed on the sprinkler circuits as shown on the drawings.

Contractor shall submit his detailed shop drawings showing the exact location, details of installation of the valve and alarm in all its respects.

Installation valve shall comprise of a cast iron sluice valve with gunmetal trim, pressure gauge, double seated clapper check valves as alarm valve with pressure gauge, test valve and orifice assembly and drain pipe with pressure gauge, bye pass on check valve to regulate differential pressure and false alarm, turbine water gong including all accessories necessary and required and as supplied by original equipment manufacturer and required for full and satisfactory performance of the system.

TESTING
All piping in the system shall be tested to a hydrostatic pressure of 1.5 times the working pressure or 14 kg/sq.cm(whichever is more) without drop in pressure for at-least 2 hours.
Rectify all leakages, make adjustments and retest as required and directed.

Drill.

ANNUNCIATION PANEL
Provide one solid state electronic annunciation panel, fully wired with visual display unit to indicate.
Flow condition in any flow indicating valve
The panel should give a visual and audible alarm for any of the above conditions.
The panel should be standard manufacturer's factory made. All details shall be submitted with the tender.

CABLES

Contractor shall provide control cables from supervisory valves and switches to the annunciation panels.

All control cables shall be copper conductor PVC insulated armoured and PVC sheethed 1100 volt grade.

All cables shall have stranded conductors. The cables shall be in drums as far as possible and bear manufacturer's name.

All cable joints shall be made in an approved manner as per standard practice.

CABLE TRAYS
All cables shall be routed in approved locations in coordination with all other services in a proper manner.

Cable trays shall be of galvanized steel and hung from the ceiling by galvanised rods supported by appropriate size and type of expandable expansion fasteners drilled into the slabs and walls by an electric drill.

MEASUREMENT
Mild steel pipes shall be measured in linear metres of the finished length correct upto one cm.and shall include all fittings, flanges, welding, jointing, clamps for fixing to walls or hangers, anchor fasteners, painting and testing complete in all respects.

Sluice and fullway valves, check valves, installation valves, air valves & flow switches shall be measured by numbers and shall include all items necessary and required for fixing and as given in the specifications and bill of quantities.

Fire hydrants, hose reels, fire brigade connections, orifice flanges shall be measured by number and include all items given in the specifications and bill of quantities.

Fire hose and boxes specified shall be measured by number and include all items given in specifications and Bill of Quantities.

Cables and cable trays shall be measured in linear metre correct upto cm shall include clamps, hangers, anchor fasteners complete in all respects.

End of Section I

SECTION – II: HAND APPLIANCES

SCOPE OF WORK

Work under this section shall consist of furnishing all labour, material, appliances and equipment necessary and required to install fire extinguishing hand appliances.

Without restricting to the generality of the foregoing the work shall consist of the following:- Installation of fully charged and tested fire extinguishing hand appliances CO2 foam, dry chemical powder type as required by these specifications and/drawings.

GENERAL REQUIREMENTS

Fire extinguishers shall conform to the following International Standard Specifications and shall be with NFPA-10 approved stamp as revised and amended up to date :-

Fire extinguishers shall be installed as per International Standard "Code of Practice for Selection, Installation and Maintenance of Portable First Aid Appliances".

Hand appliances shall be installed in readily accessible locations with the appliance brackets fixed to wall by suitable anchor fasteners.

Each appliance shall be provided with an inspection card indicating the date of inspection, testing, change of charge and other relevant data.

All appliances shall be fixed in a true workmanlike manner truly vertical and at correct locations.

MEASUREMENT

Fire extinguishers shall be measured by numbers and include installation and all items necessary and required and given in the specifications.

End of Section II

SECTION – III: FIRE PUMPS & ANCILLARY EQUIPMENT

SCOPE OF WORK

Work under this section shall consist of furnishing all labour, materials, equipment and appliances necessary and required to completely install electrically operated and diesel engine driven pumps as required by the drawings and specified hereinafter or given in the schedule of quantities.

Without restricting to the generality of the foregoing, the pumps and ancillary equipment shall include the following:-

Electrically operated and diesel engine driven pumps with motors, base plates and accessories.
Alarm system with all accessories wiring and connections
Pressure gauges with isolation valves & piping,.
M.S. pipes, valves, suction strainers, delivery and suction headers & accessories.
Foundations, vibration eliminator pads and foundation bolts.

GENERAL REQUIREMENTS

Pumps shall be installed true to level on suitable concrete foundations. Base plate shall be firmly fixed by foundation bolts properly grouted in the concrete foundations.

Pumps and motors shall be truly aligned by suitable instruments.

All pump connections shall be standard flanged type with appropriate number of bolts. In case of non standard flanges companion flanges shall be provided with the pumps.

Manufacturer's instructions regarding installation, connections and commissioning shall be followed with respect to all pumps and accessories.

Contractor shall provide necessary test certificates and performance charts with NPSH requirement of the pumps from the manufacturer. The Contractor shall provide facilities to the Project Manager or their authorised representative for inspection of equipment during manufacturing and also to witness various tests at the manufacturer’s works without any cost to the DPLs.

Each pump shall be provided with a 150 mm dia pressure gauge, isolation cock and connecting piping, bleed and block valve.

Adequate vibration eliminating pad and connectors for each pump shall be provided.

The Contractor shall submit with this tender a list of recommended spare parts for two years of normal operation and quote the prices for the same.

FIRE & JOCKEY PUMPS

Pumping Sets

Pumping sets shall be single stage horizontal centrifugal single outlet with cast iron body and bronze dynamically balanced impellers. Connecting shaft shall be stainless steel with bronze sleeve and grease lubricated bearings.

Pumps shall be connected to the drive by means of spacer type love joy couplings which shall be individually balanced dynamically and statically.

The coupling joining the prime movers with the pump shall be provided with a sheet metal guard.

Pumps shall be provided with approved type of mechanical seals.

Pumps shall be capable of delivering not less than 150% of the rated capacity of water at a head of not less than 65% of the rated head. The shut off head shall not exceed 120% of the rated head.

The pump shall meet the requirements of the Tariff Advisory Committee and the unit shall be design proven in fire protection services.

ELECTRIC DRIVE

Electrically driven pumps shall be provided with totally enclosed fan cooled induction motors. For fire pumps the motors should be rated not to draw starting current more than 3 times normal running current.

Motors for fire protection pumps shall be atleast equivalent to the horse power required to drive the pump at 150% of its rated discharge and shall be designed for continuous full load duty and shall be design proven in similar service.

Motors shall be wound for class B insulation and winding shall be vacuum impregnated with heat and moisture resistant varnish glass fibre insulated.

Motors for fire pumps shall meet all requirements and specifications of the Tariff Advisory Committee.

Motors shall be suitable for 415 ±10% volts, 3 phase 50 cycles a/c supply and shall be designed for 380C ambient temperature.

Motors shall be designed for two start system.

Motors shall be capable of handling the required starting torque of the pumps.

Contractor shall provide inbuilt heating arrangements for the motors for main pumps to ensure that motor windings shall remain dry.

Speed of the motor shall be compatible with the speed of the pump.

AIR VESSEL

One air vessel fabricated from 10 mm M.S. plate with dished ends and suitable supporting legs shall be provided. Air vessel shall be provided with a 100 mm dia flanged connection from pump, one 25 mm dia drain with valve, one gunmetal water level gauge and 15 mm sockets for pressure switches. The vessel shall be 450 mm dia x 2000 mm high and tested to 20 kg/sq cm pressure.

The fire pumps shall operate on drop of pressure in the mains as given in para 7 below. The pump operating sequence shall be arranged in a manner to start the pump automatically but should be stopped manually by starter push buttons only.

OPERATING CONDITIONS FOR FIRE PUMPS.

Cut in	Cut out	
Operating pressure	15.0 kg/cm2	15.0 Kg/cm2
Jockey pump	14.5 kg/cm2	15.0 kg/cm2
Fire Electric Pump	13.5 kg/cm2	manual
Diesel engine driven pump	13.0 kg/cm2	manual

Notes:

Jockey pump shall start and stop through pressure switch automatically.
Jockey pump shall stop when main pump starts.
Main pump shall start automatically on fall of pressure but stopping shall be manual.

VIBRATION ELIMINATORS

On all suction and delivery lines double flanged reinforced neoprene flexible pipe connectors shall be provided. Connectors should be suitable for a working pressure of each pump and tested to the test pressure given in the relevant head. Length of the connector shall be as per manufactures details.

SECTION – IV: COMMISSIONING AND GUARANTEES

SCOPE OF WORK

Work under this section shall consist of pre-commissioning, commissioning, testing and providing guarantees for all equipment, appliances and accessories supplied and installed by the contractor under this contract.

GENERAL REQUIREMENTS:

2.1 The rates quoted in this tender shall be inclusive of the works given in this section.

2.2 Contractor shall provide all tools equipment, metering and testing devices required for the purpose.

2.3 On award of work, contractor shall submit a detailed proposal giving methods of testing and gauging the performance of the equipment to be supplied and installed under this contract.

PRE-COMMISSIONING

On completion of the installation of all pumps, piping, valves, pipe connections, and water level controlling devices the contractor shall proceed as follows:-

Fire protection system:
Check all hydrant valves and close if any valve is open. Also check that all suction and delivery connections are properly made.
Test run and check rotation of each motor and correct the same if required.

Pipe work
Check all clamps, supports and hangers provided for the pipes.
Fill up pipes with water and apply hydrostatic pressure to the system as given in the relevant section of the specifications. If any leakage is found, rectify the same and retest the pipes.

COMMISSIONING & TESTING

FIRE HYDRANT SYSTEM

Pressurise the fire hydrant system by running the main fire pump and after attaining the required pressure shutoff the pump.

Open byepass valve and allow the pressure to drop in the system. Check that the jockey pump cuts-in and cuts out at the pre-set pressures. If necessary adjust the pressure switch for the jockey pump. Close bye-pass valve.

Open hydrant valve and allow the water to flow into the fire water tank in order to avoid wastage of water. The main fire pump should cut-in at the pre-set pressure and should not cutout automatically on reaching the normal line pressure. The main fire pump should stop only by manual push button. However the jockey pump should cut-out as soon as the main pump starts.

Switch off the main fire pump and test check the diesel engine driven pump in the same manner as the electrically driven pump.

When the fire pumps have been checked for satisfactory working on automatic controls, open five hydrant valves simultaneously and allow the hose pipes to discharge water into the fire tank to avoid wastage. The electrically driven pump should run continuously for eight hours so that its performance can be checked.

Check each landing valve, male and female couplings and branch pipes for compatibility with each other. Any fitting which is found to be incompatible and does not fit into the other properly shall be replaced by the contractor. Landing valves shall also be checked by opening and closing under pressure.

HANDING OVER

All commissioning and testing shall be done by the contractor to the complete satisfaction of the Project Manager, and the job handed over to the Project Manager, or his authorised representative.

Contractor shall also handover, to the Project Manager, all maintenance & operation manuals and all other items as per the terms of the contract.

GUARANTEES

The contractor shall submit a warranty for all equipment, materials and accessories supplied by him against manufacturing defects, malfunctioning or under capacity functioning.

The form of warranty shall be as approved by the Project Manager.

The warranty shall be valid for a period of one year from the date of commissioning and handing over.

The warranty shall expressly include replacement of all defective or under capacity equipment. Project Manager may allow repair of certain equipment if the same is found to meet the requirement for efficient functioning of the system.

The warranty shall include replacement of any equipment found to have capacity lesser that the rated capacity as accepted in the contract. The replacement equipment shall be approved by the Project Manager.

Section VII. Drawings

List of plans (Available at the ICPAR Offices)

Ground plan

Side view plans

Right View

Front view

Left view

Sections

N.B These drawings will be given to successful bidder

Section VIII. Bill of Quantities

Note on the bill of quantities: The prices to be quoted should include all applicable taxes and bidders are required to indicate the total price with taxes and the total price without taxes

DEMOLITION WORKS					
Item	**Description**	**Unit**	**Qty**	**Rate (Rwf)**	**Amount (Rwf)**
	CAREFULL REMOVING/ DEMOLITION				
A	Remove with care all existing external and internal timber doors; overall size 900 x 2100 mm high with permanent vent 400mm high; complete with frame and ironmongery; setting aside for disposal by the contractor (to the place designated by the client or by the local authority); (11 No.)	**Item**	**1**		
B	Alminium door size 3355x2950 mm high (1) ditto.	**Item**	**1**		
C	Alminium door size 900x2400 mm high (1) ditto.	**Item**	**1**		
D	Alminium window	**Item**	**1**		
	DEMOLISH UP TO DOWN				
E	demolishing a brick wall of 8M.S	**Item**	**1**		
F	Ceiling	**Item**	**1**		
	TOTAL DEMOLITIONS				

	GROUND FLOOR				
ITEM	**DESRIPTION**	**UNIT**	**QTY**	**RATE**	**RWF**
	1.0 FINISHES				
	Wall finishes				
	External wall finishes				
	.				
	12mmCement and sand (1:4)backings etc to:				
A	External wall to receive Wallmaster	S.M	187		
	Prepare and apply Wallmaster paste in approved patterns				
B	Prepare and apply 5-6mm thick Wallmaster to walls	S.M	187		
	Cement and sand (1:4)backings etc				
C	12mm plaster finished to receive ceramic wall tiles (m.s)	S.M	40		
	Stone tiles				

	FIRST FLOOR				
ITEM	**DESRIPTION**	**UNIT**	**QTY**	**RATE**	**RWF**
	1.0 FINISHES				
	Wall finishes				
	External wall finishes				
	12mmCement and sand (1:4)backings etc to:				
A	External wall to receive Wallmaster	S.M	73		
	Prepare and apply Wallmaster paste in approved patterns				
B	Prepare and apply 5-6mm thick Wallmaster to walls	S.M	73		
	Cement and sand (1:4)backings etc				
C	12mm plaster finished to receive ceramic wall tiles (m.s)	S.M	35		
	Stone tiles				
D	Stone coated Wall tiles size 600 x 50 x 10mm thick bedded in cement sand mortar mix 1:4 m/s to detail	S.M	35		
	Internal wall finishes				
	10mmCement and sand (1:3)backings etc to:				
E	masonry surfaces internally	S.M	313		
	Silk Vinly paint				
F	Prepare and apply one coat of stuccco paint and tree coats of silky vinly paint in approved color	S.M	313		
	Cement and sand (1:4)backings etc				
G	12mm plaster finished to receive ceramic wall tiles (m.s)	S.M	32		
	ceramic wall tiling of approved quality complete with coping and corner beads				
H	Supply and fix 250 x 400 x 8mm thick coloured ceramic	S.M	32		
	Partition wall				
I	150mm thick partition in 12mm thick gypsum boards fixed with screws to almminium size 150x50x4mm sections and frames	S.M	20		

	Aluminium Curtain wall system				
J	Supply and fix aluminium powder coated curtain wall system in approved heavy duty mullions and transoms framing of 5mm thick in-filled with 6mm x 9Air x 6mm thick clear or obscure ST 136 DGU plate glass as per SAINT-GOBAIN Manufacturer; with rubber glazing strips , including all necessary bolts, plates, anchorages and accessories all as per architect and specialist's details and approval	S.M.	155		
	Floor Finishes				
	Cement and sand (1:3) screeds, backings, beds etc				
A	32mm bed finished to receive coloured ceramic floor tiles	S.M	220		
B	Ditto 32mm to receive Anti -slip ceramic floor tiles for wet area	S.M	7		
C	Ditto 32 mm to receive granite floor tiles	S.M	22		
D	Ditto but 10mm thick to receive ceramic skirting	L.M	79		
	Ditto but 10mm thick to receive ceramic skirting	L.M	11		
E	Ditto but 10mm thick to receive granite skirting	L.M	18		
	First grade imported ceramic floor tiling of approved quality				
F	600 x 600 x 10 mm Non Slip Ceramic on screeded bed (m.s) with and including water proofed sealmaster tile grout with continous joints not exceeding 5 mm wide in both direction*).*	S.M	220		
G	Ditto but 300x300x10mm Anti -slip ceramic floor tiles for wet area	L.M.	7		
H	10 mm Thick skirting ditto.	L.M.	79		
I	10 mm Thick skirting ditto.	L.M.	11		
	Granite tiles supplied of approved type and source as described in all with patterned and colored as per Architect's details:-				

J	600 x 600 x 20 mm Polished tiles fixed on screeded bed with and including water proofed sealmaster tile grout a with continous joints not exceeding 5 mm wide in both direction*).*	S.M	22		
K	100 mm Thick skirting ditto.	L.M.	18		
	Ceiling Finishes				
	Gypsum Ceiling				
A	Supply and fix 17 mm Thick dropped suspended gypsum ceiling fixed on and including brandering in 9mm thick Metal galvanised framing at 600x600mm centres both ways and including all necessary hangers, screws and painting works as per Architect's details.	SM	242		
	Metallic Ceiling				
B	Mettalic Ceiling panels fix on 2mm thick metal galvanised framing at 600mm centre one way, including hangers and grids with necessary supports and paint to architects details & approval	SM	7		
	FINISHES TOTAL TO SUMMARY				
	2.0 WINDOWS				
	Aluminium				
	Purpose made alminium Windows in Aluminium sextion 75x50x2mm thick.including 6mm thick glazing and silicone jointing painting and iron mongery to details				
A	Windows of 700x2400 mm Sizes	SM	5		
B	Ditto but 500x1500 mm sizes	SM	2		
C	Ditto but 1500x1500 mm sizes	SM	5		
D	Ditto but 900x1800 mm sizes	SM	3		
E	Ditto but 2000x2000 mm sizes	SM	4		
F	Ditto but 2500x2000 mm sizes	SM	5		
	WWINDOWS TOTAL TO SUMMARY				
	3.0 DOORS				

	Purpose made alminium Windows in Aluminium sextion 75x50x6mm thick.including 6mm thick glazing and silicone jointing painting and iron mongery to details				
G	Aluminiium door of 1500x2400 mm	SM	4		
H	Ditto but 900x2100 mm high	SM	9		
	Timber in wrot mahogany or Approved Soft Wood prime grade				
I	40mm thick solid core timber well treated mahoganny door with edge lipping all round with frame architrave and lock 900x2100mm high	No	2		
	DOORS TOTAL TO SUMMARY				
	SUMMARY				
4	FINISHES.				
5	WINDOWS.				
6	DOORS.				
	TOTAL First floor				

D	Stone coated Wall tiles size 600 x 50 x 10mm thick bedded in cement sand mortar mix 1:4 m/s to detail	S.M	40		
	Internal wall finishes				
	10mmCement and sand (1:3)backings etc to:				
C	E	S.M	326		
	Silk Vinly paint				
F	Prepare and apply one coat of stuccco paint and tree coats of silky vinly paint in approved color	S.M	326		
	Cement and sand (1:4)backings etc				
G	12mm plaster finished to receive ceramic wall tiles (m.s)	S.M	108		
	ceramic wall tiling of approved quality complete with coping and corner beads				
H	Supply and fix 250 x 400 x 8mm thick coloured ceramic	S.M	108		
	Partition wall				

I	150mm thick partition in 12mm thick gypsum boards fixed with screws to almminium size 150x50x4mm sections and frames	S.M	31		
	Aluminium Curtain wall system				
J	Supply and fix aluminium powder coated curtain wall system in approved heavy duty mullions and transoms framing of 5mm thick in-filled with 6mm x 9Air x 6mm thick clear or obscure ST 136 DGU plate glass as per SAINT-GOBAIN Manufacturer; with rubber glazing strips , including all necessary bolts, plates, anchorages and accessories all as per architect and specialist's details and approval	S.M.	60		
	Floor Finishes				
	Cement and sand (1:3) screeds, backings, beds etc				
A	32mm bed finished to receive coloured ceramic floor tiles	S.M	158		
B	Ditto but 300x300x10mm Anti -slip ceramic floor tiles for wet area	S.M	12		
C	Ditto 32 mm to receive granite floor tiles	S.M	68		
D	Ditto but 10mm thick to receive ceramic skirting	L.M	72		
E	Ditto but 10mm thick to receive granite skirting	L.M	39		
	First grade imported ceramic floor tiling of approved quality				
F	600 x 600 x 10 mm Non Slip Ceramic on screeded bed (m.s) with and including water proofed sealmaster tile grout with continous joints not exceeding 5 mm wide in both direction*).*	S.M	158		
G	Ditto but 300x300x10mm Anti -slip ceramic floor tiles	S.M	12		
H	100 mm Thick skirting ditto.	L.M.	72		
	Granite tiles supplied of approved type and source as described in all with patterned and colored as per Architect's details:-				
I	600 x 600 x 20 mm Polished tiles fixed on screeded bed with and including water proofed sealmaster tile grout a with continous joints not exceeding 5 mm wide in both direction*).*	S.M	68		

J	100 mm Thick skirting ditto.	L.M.	39		
	Staircase finishes				
	Cement and sand (1:3) screeds, backings, beds etc				
A	32mm bed finished to receive granite tiles to landing (m.s)	SM	3		
B	20mm thick to treads, 320mm wide to receive ditto	LM	20		
C	12mm thick to risers, 150mm high to receive ditto	LM	20		
	Supply and fix First grade imported Non slip granite floor tiling of				
	approved quality and approved surface texture finish including all necessary nosing as per Architect's details and approval to:				
D	15mm thick granite floor tiles to landing	SM	16		
E	350mm wide ditto to treads with non-slip grooves	LM	108		
F	150mm high ditto to risers	LM	18		
	Ceiling Finishes				
	12mm (minimum) two coat lime plaster as described to				
A	Soffits of ceilings	SM	0		
B	Ditto, sloping soffits of staircase	SM	5		
	Gypsum Ceiling				
C	Supply and fix 9mm Thick dropped suspended gypsum ceiling fixed on and including brandering in 2mm thick Metal galvanised framing at 600x600mm centres both ways and including all necessary hangers, screws and painting works as per Architect's details.	SM	196		
	Metallic Ceiling				
D	Mettalic Ceiling panels fix on 2mm thick metal galvanised framing at 600mm centre one way, including hangers and grids with necessary supports and paint to architects details & approval	SM	42		
	FINISHES TOTAL TO SUMMARY				

	2.0 WINDOWS				
	Aluminium				
	Purpose made alminium Windows in Aluminium sextion 75x50x2mm thick.including 6mm thick glazing and silicone jointing painting and iron mongery to details				
A	Windows of 600x2500 mm Sizes	SM	6		
B	Ditto but 700x2500 mm sizes	SM	2		
C	Ditto but 2500x2500 mm sizes	SM	6		
D	Ditto but 500x1500 mm sizes	SM	2		
E	Ditto but 1500x1500 mm sizes	SM	9		
F	Ditto but 900x1800 mm sizes	SM	3		
G	Ditto but 2000x2000 mm sizes	SM	8		
H	Ditto but 1000x1500 mm sizes	SM	2		
I	Ditto but 2500x2000 mm sizes	SM	5		
	WWINDOWS TOTAL TO SUMMARY				
	3.0 DOORS				
	Purpose made alminium Windows in Aluminium sextion 75x50x6mm thick.including 6mm thick glazing and silicone jointing painting and iron mongery to details				
J	Aluminiium sliding door of 3355x2950 mm	SM	10		
K	Aluminiium door of 1500x2950 mm	SM	4		
L	Ditto but 900x2400 mm high	SM	2		
M	Ditto but 900x2100 mm high	SM	9		
	Timber in wrot mahogany or Approved Soft Wood prime grade				
N	40mm thick solid core timber well treated mahoganny door with edge lipping all round with frame architrave and lock 900x2100mm high	No	6		
	DOORS TOTAL TO SUMMARY				
	SUMMARY				

4	FINISHES.				
5	WINDOWS.				
6	DOORS.				
	TOTAL Ground Floor				

	ROOF				
ITEM	**DESRIPTION**	**UNIT**	**QTY**	**RATE**	**RWF**
	1.0 FINISHES				
	Wall finishes				
	External wall finishes				
	.				
	12mmCement and sand (1:4)backings etc to:				
A	External wall to receive Wallmaster	S.M	22		
	Prepare and apply Wallmaster paste in approved patterns				
B	Prepare and apply 5-6mm thick Wallmaster to walls	S.M	22		
	Cement and sand (1:4)backings etc				
C	12mm plaster finished to receive ceramic wall tiles (m.s)	S.M	10		
	Stone tiles				
D	Stone coated Wall tiles size 600 x 50 x 10mm thick bedded in cement sand mortar mix 1:4 m/s to detail	S.M	10		
	Aluminium Curtain wall system				
E	Supply and fix aluminium powder coated curtain wall system in approved heavy duty mullions and transoms framing of 5mm thick in-filled with 6mm x 9Air x 6mm thick clear or obscure ST 136 DGU plate glass as per SAINT-GOBAIN Manufacturer; with rubber glazing strips , including all necessary bolts, plates, anchorages and accessories all as per architect and specialist's details and approval	S.M.	19		
	2.0 WINDOWS				
	Aluminium				
	Purpose made alminium Windows in Aluminium sextion 75x50x2mm thick.including 6mm thick glazing and				

	silicone jointing painting and iron mongery to details				
A	Windows of 1200x600 mm Sizes	SM	1		
	WWINDOWS TOTAL TO SUMMARY				
	SUMMARY				
4	FINISHES.				
5	WINDOWS.				
	TOTAL Roof				

ELECTRICAL INSTALLATIONS / BILLS OF QUANTITIES

Ref.	Description	Unit	Qty.	Rate (Frw)	Amount (Frw)
	All items depending on the category shall be as per the following brands or equivalent and approuved :LEGRAND, MENVIER, MERLIN GERIN, ABB, SCHINDLER, OTIS, KONE, THORN, PHILLIPS, OSRAM, SYLVANIA, SDMO, FRANKLIN FRANCE, EAST AFRICAN CABLES, METSEC, NEXAN, HIKVISION				
	All prices are comprisive of the supply, the handling and the installation as per the specifications and the plans,charges for EUCL connection are not part of this price				
	A. Lighting				
	Luminaries				
	LUMINAIRE TYPE A				
1	18W LED 3000k 400x400mm surface mounted panel for offices	No	48		
2	LUMINAIRE TYPE B				
	18W LED 200mm Dia. Surface mounted Downlight fitting. FOR CIRCULATION & TOILETS	No	14		
3	LUMINAIRE TYPE C				
	18W LED 200mm Dia waterproof flash mounted for terrace	No	4		
4	LUMINAIRE TYPE D				
	LED 11W up down outdoor light fitting at the entrance	No	2		
	LUMINAIRE TYPE E				
5	LED 11W outdoordecirative light fitting for fence	No	4		

	Switches, 230V, 10A, IP20 with appropriate box :				
	One gang one way switch	No	14		
6	Two gang one ways switch	No			
7	dimmer switch	No			
8	one gangs two ways switch	No	5		
9	two gangs two ways switch	No			
10	Movement sensitive switch	No			
	SUB TOTAL A. LIGHTING				
	B. Power				
	Socket outlets				
	Single **White power socket** 2P+E,230V,16A IP20 with appropriate box and face plate. FOR mounting on WALLS	No	50		
1					
	Twin **White power socket** 2P+E,230V,16A IP20 with appropriate box and face plate. FOR mounting on WALLS	No			
2					
	Single **White power socket** 2P+E,230V,16A IP20 with appropriate box and face plate. FOR mounting on TRUNKING	No	4		
3					
	Twin **White power socket** 2P+E,230V,16A IP20 with appropriate box and face plate. FOR mounting on TRUNKING	No			
4					
	25A DP standard 240V socket outlet for flush wall mounting at 1200mm affl for the KITCHEN	No	6		
5					
	SUB TOTAL B. POWER				
	C. Wiring				
	Wiring with copper conductors and PVC insulation and shield, for the voltage 1KV:				
1	2,5mm^2 Cu wire	m	24		

2	3x4 mm^2 Cu cable PVC/PVC insulated For KITCHEN OUTLET SOCKET	m			
3					
	Accessories				
4	PVC rigid conduits 25 mm	m			
5	PVC rigid conduits 32 mm	m			
6	CCTV Camera	ff	1		
	SUB TOTAL C. WIRING				
	SUB-TOTAL A				
	SUB-TOTAL B				
	SUB-TOTAL C				
	TOTAL PRICE FOR ELECTRICAL, DATA, FIRE ALARM				

	SUMMARY	**RWF**

MECHANICAL INSTALLATIONS / BILLS OF QUANTITIES

Item	Designation	Unit	Qty	Unity Price	Total Price
				FRW	FRW
	WASTE and RAIN WATER DRAINAGE COLLECTION				
	Supply and install soil, waste and vent pipes in horizontal branches and vertical stacks made of uPVC ,PN10 pipes and fittings. Fittings should include Bends, Tees, Branches, Clean outs, Reducers, etc. Joints are to be done with selvent wall. All horizontal branch pipes shall be laid at a slope of 2%. Unit price shall include all the necessary assistance work to the installation, such as chiseling of walls, slabs, floors etc., and closing them with concrete. All pipes entering manholes shall be trapped.				
1	PVC 93 mm Pipe with all accessories	m	8		
2	Supply and fix Stainless steel **SBDB KITCHEN SINK** cast iron screw-to-wall basin support rail brackets, two chrome plated taps with integral plug and chain, dia. 32mm slotted and chrome-plated brass basin waste drain hole, a slotted overflow outlet and brass bottle trap all chrome plated and complete with all the necessary accessories. Complete with water Tap Mixer.	No	1		

1.0	DEMOLITION	
2.0	Ground Floor	

3	Supply and install **WASH HAND BASSIN** set conforming to BS 3402 and comprising. White glazed vitreous china basin with two tap holes, a pair of white plastic coated cast iron screw-to-wall basin support rail brackets, two chrome plated taps with integral plug and chain, dia. 32mm slotted and chrome-plated brass basin waste drain hole, a slotted overflow outlet and brass bottle trap all chrome plated and complete with all the necessary accessories. Size 500 x 400 mm.	No	5		
4	Supply and install low level **WATER CLOSET (Consealed and Wall hang)** , 4 liters capacity white vitreous flushing cistern with cover, uPVC syphon fittings, overflow pipe, float valve, and in built S-trap, chrome plated fitment, fixing screws, high impact resistant solid plastic seat and cover with plastic hinges, rod and spacers. Complete with water Tap.	No	6		
5	Supply and install low level **WATER CLOSET (TURKEY)** conforming to BS 3402 and comprising. White glazed vitreous china WC pan with horizontal diameter 110mm. outlet, 4.5 liters capacity white vitreous china flushing cistern with cover, uPVC pipe and fittings, overflow pipe, float valve, and in built S-trap, chrome plated fitment, fixing screws.	No	-		
6	900mm Square shower tray comp with partition glass, cobra bib tap,tree spray and shower head	No	1		
7	Supply and fix crystal **MIRROR GLASS**, including chrome plated brass, clips, and screws and shelves and bathroom accessories Size 500 x 400 mm	pcs	3		
8	Supply and fix **TOILET PAPER HOLDER** holder in white vitreous china with concealed fixing and white plastic tubular roller including fixing screws with overall dimension. Size 153 x 50 x 92mm	pcs	4		
9	Supply and fix **TOWEL HOLDER** holder in stainless stell or Aluminium				
	with concealed fixing	pcs	1		

10	Supply and fix **SOAP DISPENSOR** in Aluminium to be fixed on counter.	pcs	3		
11	Supply and fix **FLOOR DRAIN** in Stainless steel or plastic to be fixed on floor, size: 110mm.	pcs	-		
	Consealed Water tap mixer	No	3		
12	Kitchen water tap mixer	No	1		
13	Supply and install 10.0m³ capacity plastic water tank complete with floating valve, inlet, outlet overflow, vent and drain pipes and other necessary accessories.	No	-		
	TOTAL PRICE FOR Mechanical Installation				

3.0	First Floor	
4.0	Roof	
5.0	Mechanical installations	
6.0	Electrical Works	
	Grand total	

Section IX. Forms Securities

Samples of acceptable forms of Bid, Performance, and Advance Payment Securities are provided in this Section X. Bidders shall not complete the Performance and Advance Payment Security forms at this stage of the procurement process. **Only the successful Bidder shall be required to provide these two securities.**

Form of Bid Security (Bank Guarantee)

*[If required, the **Bank** shall fill in this Bank Guarantee form in accordance with the instructions indicated in brackets.]*

_____

[Bank's Name, and Address of Issuing Branch or Office]

Beneficiary: _____ *[Name and Address of Procuring Entity]*

Date: _____

BID GUARANTEE N°.: _____

We have been informed that *[name of the Bidder]* (hereinafter called "the Bidder") has submitted to you its bid dated (hereinafter called "the Bid") for the execution of *[name of contract]* under Invitation for Bids No. *[IFB number]* ("the IFB").

Furthermore, we understand that, according to your conditions, bids must be supported by a bid guarantee.

At the request of the Bidder, we *[name of Bank]* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of *[amount in figures]* (*[amount in words]*) upon receipt by us of your first demand in writing stating that the Bidder is in breach of its obligation(s) under the bid conditions, because the Bidder:

(a) has withdrawn its Bid during the period of bid validity specified by the Bidder in the Form of Bid; or

(b) having been notified of the acceptance of its Bid by the Procuring Entity during the period of bid validity, (i) fails or refuses to Sign the Contract or (ii) fails or refuses to furnish the performance security, in accordance with the Instructions to Bidders.

(c) does not accept the arithmetic corrections made to his bill of quantities and price list of his bill

This guarantee will expire: (a) if the Bidder is the successful bidder, upon our receipt of copies of the contract signed by the Bidder and the performance security issued to you upon the instruction of the Bidder; or (b) if the Bidder is not the successful bidder, upon the earlier of (i) our receipt of a copy of your notification to the Bidder of the name of the successful bidder; or (ii) thirty days after the expiration of the Bidder's Bid.

Consequently, any demand for payment under this guarantee must be received by us at the office on or before that date.

Date:……..

Name of Authorized Representative person ……Address:……
Position:…….

Signature:……. Seal:……

Form of Bid Security (Surety from Financial Institution)

BOND NO. _____

BY THIS SURETY *[name of Bidder]* as Principal (hereinafter called "the Principal"), and *[name, legal title, and address of surety]*, **authorized to transact business in** *[name of country of Procuring Entity]*, as Surety (hereinafter called "the Surety"), are held and firmly bound unto *[name of Procuring Entity]* as Obliged (hereinafter called "the *Procuring Entity*") in the sum of *[amount of surety]*[2] *[amount in words and in figures]*, for the payment of which sum, well and truly to be made, we, the said Principal and Surety, bind ourselves, our successors and assigns, jointly and severally, firmly by these presents.

WHEREAS the Principal has submitted a written Bid to the *Procuring Entity* dated the ___ day of _____, 20__, for the construction of *[name of Contract]* (hereinafter called the "Bid").

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the Principal:

(a) withdraws its Bid during the period of bid validity specified in the Form of Bid; or

(b) having been notified of the acceptance of its Bid by the *Procuring Entity* during the period of Bid validity; (i) fails or refuses to execute the Contract Form, if required; or (ii) fails or refuses to furnish the Performance Security in accordance with the Instructions to Bidders;

(c) (c) does not accept the arithmetic corrections made to his bill of quantities and price list of his bill

then the Surety undertakes to immediately pay to the *Procuring Entity* up to the above amount upon receipt of the *Procuring Entity*'s first written demand, without the *Procuring Entity* having to substantiate its demand, provided that in its demand the *Procuring Entity* shall state that the demand arises from the occurrence of any of the above events, specifying which event(s) has occurred.

The Surety hereby agrees that its obligation will remain in full force and effect up to and including the date 30 (thirty) days after the date of expiration of the Bid validity as stated in the Invitation to Bid or extended by the *Procuring Entity* at any time prior to this date, notice of which extension(s) to the Surety being hereby waived.

IN TESTIMONY WHEREOF, the Principal and the Surety have caused these presents to be executed in their respective names this ____ day of _____ 20__.

Date:……..

Name: of Authorized Representative person……Address:……Position:…… Signature:……. Seal:……)

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[2] The amount of the Bond shall be denominated in the currency of the Republic of Rwanda or the equivalent amount in a freely convertible currency.

Performance Bank Guarantee

(Unconditional)

*[The **bank** providing the Guarantee shall fill in this form in accordance with the instructions indicated in brackets, if the Procuring Entity requires this type of security.]*

[insert bank's name, and address of issuing branch or office]

Beneficiary: *[insert name and address of Procuring Entity]*

Date: *[insert date]*

PERFORMANCE GUARANTEE No.: *[insert Performance Guarantee number]*

We have been informed that *[insert name of Contractor]* (hereinafter called "the Contractor") has entered into Contract No. *[insert reference number of the Contract]* dated with you, for the execution of *[insert name of Contract and brief description of Works]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Contractor, we *[insert name of Bank]* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of *[insert amount in figures]* (*[insert amount in words]),*[3] such sum being payable in the types and proportions of currencies in which the Contract Price is payable, upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation(s) under the Contract, without your needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall expire no later than thirty days from the date of issuance of the Taking-Over Certificate, calculated based on a copy of such Certificate which shall be provided to us, or on the [*insert number* day of *[insert month], [insert year],*[4] whichever occurs first. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

Date:……..

Name:……Address:……

Position:…….

Signature:…… **Seal:……**

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[3] *The Guarantor (bank) shall insert an amount representing the percentage of the Contract Price specified in the Contract and denominated either in the currency (ies) of the Contract or a freely convertible currency acceptable to the Procuring Entity.*

[4] *Insert the date twenty-eight days after the expected Completion date. The Procuring Entity should note that in the event of an extension of the time for completion of the Contract, the Procuring Entity would need to request an extension of this Guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the Guarantee. In preparing this Guarantee, the Procuring Entity might consider adding the following text to the form, at the end of the penultimate paragraph: "The Guarantor agrees to a one-time extension of this Guarantee for a period not to exceed [six months][one year], in response to the Procuring Entity's written request for such extension, such request to be presented to the Guarantor before the expiry of the Guarantee."*

Performance Bond

*[The **Surety** providing the Bond shall fill in this form in accordance with the instructions indicated in brackets, if the Procuring Entity requires this type of security]*

By this Bond, *[insert name and address of Contractor]* as Principal (hereinafter called "the Contractor") and *[insert name, legal title, and address of surety, bonding company, or insurance company]* as Surety (hereinafter called "the Surety"), are held and firmly bound unto *[insert name and address of Procuring Entity* as Obliged (hereinafter called "the Procuring Entity") in the amount of *[insert amount of Bond] [insert amount of Bond in words]*,[5] for the payment of which sum well and truly to be made in the types and proportions of currencies in which the Contract Price is payable, the Contractor and the Surety bind themselves, their heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

Whereas the Contractor has entered into a Contract with the Procuring Entity dated[6] the *[insert number]* day of *[insert month]*, *[insert year]* for *[insert name of Contract]* in accordance with the documents, plans, specifications, and amendments thereto, which to the extent herein provided for, are by reference made part hereof and are hereinafter referred to as the Contract.

Now, therefore, the Condition of this Obligation is such that, if the Contractor shall promptly and faithfully perform the said Contract (including any amendments thereto), then this obligation shall be null and void; otherwise it shall remain in full force and effect. Whenever the Contractor shall be, and declared by the Procuring Entity to be, in default under the Contract, the Procuring Entity having performed the Procuring Entity's obligations hereunder, the Surety may promptly remedy the default, or shall promptly:

(1) complete the Contract in accordance with its terms and conditions; or

(2) obtain a Bid or bids from qualified bidders for submission to the Procuring Entity for completing the Contract in accordance with its terms and conditions, and upon determination by the Procuring Entity and the Surety of the lowest responsive Bidder, arrange for a Contract between such Bidder and Procuring Entity and make available as work progresses (even though there should be a default or a succession of defaults under the Contract or Contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the Contract Price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term "Balance of the Contract Price," as used in this paragraph, shall mean the total amount payable by the Procuring Entity to the Contractor under the Contract, less the amount properly paid by the Procuring Entity to the Contractor; or

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[5] *An amount is to be inserted by the Surety, representing the percentage of the Contract Price specified in the Contract Data, and denominated either in the currency(ies) of the Contract or in a freely convertible currency of type and amount acceptable to the Procuring Entity.*

[6] *Date of Letter of Acceptance or Agreement.*

(3) pay the Procuring Entity the amount required by the Procuring Entity to complete the Contract in accordance with its terms and conditions up to a total not exceeding the amount of this Bond.

The Surety shall not be liable for a greater sum than the specified penalty of this Bond.

Any suit under this Bond must be instituted before the expiration of one year from the date of issuance of the Certificate of Completion.

No right of action shall accrue on this Bond to or for the use of any person or corporation other than the Procuring Entity named herein or the heirs, executors, administrators, successors, and assigns of the Procuring Entity.

In testimony whereof, the Contractor has hereunto set its hand and affixed its seal, and the Surety has caused these presents to be sealed with its corporate seal duly attested by the signature of its legal representative, this *[insert day]* day of *[insert month]*, *[insert year]*.

Date of issue:……..

Name:……Address:……

Position:…….

Signature: *[insert signature(s) of authorized representative(s)]*
Seal:……
on behalf of *[name of Contractor]* in the capacity of *[insert title(s)]*

Bank Guarantee for Advance Payment

*The **bank/successful bidder** providing the Guarantee shall fill in this form in accordance with the instructions indicated in brackets, if an Advance Payment is to be provided under the Contract*

[insert Bank's name, and address of issuing branch or office]

Beneficiary: *[insert name and address of Procuring Entity]*

Date: *[insert date]*

ADVANCE PAYMENT GUARANTEE No.: *[insert number]*

We have been informed that *[insert name of Contractor]* (hereinafter called "the Contractor") has entered into Contract No. *[insert reference number of the contract]* dated *[insert date]* with you, for the execution of *[insert name of contract and brief description of Works]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, an advance payment is to be made against an advance payment guarantee in the sum or sums indicated below.

At the request of the Contractor, we *[insert name of Bank]* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of *[insert amount in figures]* (*[insert amount in words]*[7]) upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation under the Contract because the Contractor used the Advance Payment for purposes other than the costs of mobilization in respect of the Works.

It is a condition for any claim and payment under this guarantee to be made that the Advance Payment referred to above must have been received by the Contractor on its account number *[insert account number]* at *[insert name and address of Bank]*.

The maximum amount of this guarantee shall be progressively reduced by the amount of the Advance Payment repaid by the Contractor as indicated in copies of interim statements or payment certificates which shall be presented to us. This guarantee shall expire, at the latest, upon our receipt of a copy of the Interim Payment Certificate indicating that eighty (80) percent of the Contract Price has been certified for payment, or on the *[insert number]* day of *[insert*

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[7] *The Guarantor shall insert an amount representing the amount of the Advance Payment and denominated either in the currency(ies) of the Advance Payment as specified in the Contract, or in a freely convertible currency acceptable to the PROCURING ENTITY.*

month], [insert year],[8] whichever is earlier. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

Date of issue:……..

Name:……Address:……

Position:…….

Signature: *[insert signature(s) of authorized representative(s of bank)]*
Seal:……
on behalf of *[name of Contractor]* in the capacity of *[insert title(s)]*

[8] *Insert the expected expiration date of the Time For Completion. The Procuring Entity should note that in the event of an extension of the Time For Completion of the Contract, the Procuring Entity would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the Procuring Entity might consider adding the following text to the form, at the end of the penultimate paragraph: " We agree to a one-time extension of this guarantee for a period not to exceed [six months][one year], in response to the Procuring Entity's written request for such extension, such request to be presented to us before the expiry of the guarantee."*