EXIM

بینک آف پاکستان

Bank of Pakistan

RENOVATION OF EXIM BANK OF PAKISTAN OFFICE
AT 5TH FLOOR, BAHRIA COMPLEX-I, M.T. KHAN ROAD, KARACHI

BIDDING & CONTRACT DOCUMENT
VOLUME– I

INSTRUCTIONS TO BIDDERS
BIDDING DATA SHEET
APPENDICES TO BID
BILL OF QUANTITIES
FORMS
GENERAL CONDITIONS
PARTICULAR CONDITIONS
SPECIFICATIONS

JANUARY 2023

NESPAK

National Engineering Services Pakistan (Pvt.) Ltd.
Architecture & Planning Division
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BIDDING DOCUMENTS

VOLUME– I

- Invitation for Bid
- Instructions to Bidders
- Bidding Data
- Form of Bid & Appendices to Bid
- Appendix-D to Bid - (Bill of Quantities with List of approved Manufacturers)
- Standard Forms
- General Conditions of Contract (Part-I)
- Particular Conditions of Contract (Part-II)
- Specifications-
    - Special Provisions
    - Electrical Works (Section 8001)
    - HVAC Works

INVITATION FOR BID

RENOVATION OF EXIM BANK OF PAKISTAN OFFICE AT 5TH FLOOR, BAHRIA COMPLEX-I, M.T. KHAN ROAD, KARACHI

CORRIGENUM # 1

In continuation to subject Invitation for Bid published in newspapers dated February 10th, 2023, following changes in the IFB may be noted.

1. **RS. 30 million** stated at Sr. No 1(b) and 1(c) of the Invitation for Bid is replaced with **RS. 50 million**.
2. The last date of submission of Bids has been extended till **March 8, 2023,** at **11:00 Hours.** Bids shall be opened on the same day at **11:30 hours.**

All other terms & conditions stated in the Invitation for Bid & Bidding Documents remain unchanged.

Head of Procurement Committee,
Export-Import (EXIM) Bank of Pakistan
Office No. 510-512, 5th Floor, Evacuee Trust Complex,
Agha Khan Road, F5/1, Islamabad.
Tel: 051-9170100, Fax: 051-921 1997
Email: procurement@eximbank.gov.pk

INVITATION FOR BID

RENOVATION OF EXIM BANK OF PAKISTAN OFFICE AT 5TH FLOOR, BAHRIA COMPLEX-I, M.T. KHAN ROAD, KARACHI

Export & Import Bank of Pakistan **(EXIM)** invites sealed bids from interested bidders for carrying out Renovation of EXIM Bank of Pakistan office at 5th Floor, Bahria Complex-I, M.T. Khan Road, Karachi

1. Interested bidders must meet the following requirements:
   a) Having valid license from Pakistan Engineering Council (PEC) in Category C5 or above with Specialization Code CE10, EE04 & EE07.
   b) Two similar size Renovation/Refurbishment/Finishing works having cost Rs. 30 million or above completed during last 05 years.
   c) Last three years' average turnover of minimum Rs. 30 million
   d) Registered with FBR/SRB in Income Tax & Sales Tax & enlisted as Active Taxpayer (copy of the registration certificate issued by FBR/SRB required to be submitted with the bidding documents).
   e) The bidder must submit an Affidavit stating that the firm has never been blacklisted previously by any executing Procuring Agency.

2. A complete set of bidding documents may be downloaded from EXIM website www.eximbank.gov.pk and PPRA website www.ppra.org.pk (free of cost) or can also be collected during working hours from **February 10th, 2023, till March 1st, 2023,** from the NESPAK office Karachi by submitting fee of PKR 15,000/. In shape of pay order or demand draft in favor of NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LIMITED.

3. A pre-bid meeting will be held on **Feb 17th, 2023,** at **11.00 AM** at National Engineering Services Pakistan (Pvt.) Limited (NESPAK) Architecture & Planning Division, 4th Floor, NICL Building, Abbasi Shaheed Road, off Shahrah-e-Faisal, Karachi. A Consolidated bidders' queries matrix shall be uploaded to EXIM website.

4. **Single Stage One Envelope** procedure will be adopted as per **Rule-36(a) of PPRA 2004.**

5. Bid must be accompanied by a **Bid Security amounting to Five Lac Rupees (Rs.500,000/-)** in the form specified in the bidding documents. Bid Security must be attached with the Technical Proposal. Proposal without Bid Security shall be rejected.

6. Partial, incomplete, conditional bids or bids received after the specified date and time shall be rejected. Bids submitted through fax and email shall not be accepted.

7. Bids (technical and financial proposal) and supporting documents must be submitted in a Single Envelope at the office of National Engineering Services Pakistan (Pvt.) Limited (NESPAK) Architecture & Planning Division, 4th Floor, NICL Building, Abbasi Shaheed Road, off Shahrah-e-Faisal, Karachi on or before **Mar 1st, 2023,** at **11:00 Hours** and shall be opened on the same date at **11:30 hours** in the presence of the bidders' representatives & concerns.

8. Procuring Agency reserves the right to reject all or any bids subject to the relevant provisions of Public Procurement Rules 2004.

Head of Procurement Committee,
EXIM BANK of PAKISTAN
Office No. 510-512, 5th Floor, Evacuee Trust Complex, Agha Khan Road,
F-5/1, Islamabad.
Tel: 051-9170100, Fax: 051-9211997
Email: procurement@eximbank.gov.pk

INSTRUCTIONS TO BIDDERS

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INSTRUCTIONS TO BIDDERS

A.GENERAL

IB.1 Scope of Bid

1.1 The Employer as defined in the Bidding Data Sheet hereinafter called "the Employer" wishes to receive bids for the construction and completion of works as described in these Bidding Documents, and summarized in the Bidding Data Sheet hereinafter referred to as the "Works".

1.2 The successful bidder will be expected to complete the Works within the time specified in Appendix-A to Bid.

IB.2 Source of Funds

2.1 The Employer has applied for/received a loan/credit from the source(s) indicated in the Bidding Data Sheet in various currencies towards the cost of the project specified in the Bidding Data Sheet and it is intended that part of the proceeds of this loan/credit will be applied to eligible payments under the Contract for which these Bidding Documents are issued.

IB.3 Eligible Bidders

3.1 This Invitation for Bids is open to bidders duly licensed by the Pakistan Engineering Council (PEC) in the category relevant to the value of the Works as per Notice of Invitation to Bid published in News Paper.

IB.4 One Bid per Bidder

4.1 Each bidder shall submit only one bid either by himself, or as a partner in a joint venture. A bidder who participates in more than one bid (other than alternatives pursuant to Clause IB.16) will be disqualified.

IB.5 Cost of Bidding

5.1 The bidders shall bear all costs associated with the preparation and submission of their respective bids and the Employer will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

IB.6 Site Visit

6.1 The bidders are advised to visit and examine the Site of Works and its surroundings and obtain for themselves on their own responsibility all information that may be necessary for preparing the bid and entering into a contract for construction of the Works. All cost in this respect shall be at the bidder's own expense.

6.2 The bidders and any of their personnel or agents will be granted permission by the Employer to enter upon his premises and lands for the purpose of such inspection, but only upon the express condition that the bidders, their personnel and agents, will release and indemnify the Employer, his personnel and agents from and against all liability in respect thereof and will be responsible for death or personal injury, loss of or damage to property and any other loss, damage, costs and expenses incurred as a result of such inspection.

B. BIDDING DOCUMENTS

IB.7 Contents of Bidding Documents

7.1 The Bidding Documents, in addition to invitation for bids, are those stated below and should be read in conjunction with any Addenda issued in accordance with Clause IB.9.

1. Instructions to Bidders.
2. Bidding Data Sheet.
3. General Conditions of Contract, Part-I (GCC).
4. Particular Conditions of Contract, Part-II (PCC).
5. Specifications – Special Provisions.
6. Specifications – Technical Provisions.
7. Form of Bid & Appendices to Bid.
8. Bill of Quantities (Appendix-D to Bid).
9. Form of Bid Security.
10. Form of Contract Agreement.
11. Forms of Performance Security and Mobilization Advance Guarantee/Bond and Form of Indemnity Bond for Secured Advance.
12. Drawings.

7.2 The bidders are expected to examine carefully the contents of all the above documents. Failure to comply with the requirements of bid submission will be at the Bidder's own risk. Pursuant to Clause IB.26, bids which are not substantially responsive to the requirements of the Bidding Documents will be rejected.

IB.8 Clarification of Bidding Documents

8.1 Any prospective bidder requiring any clarification (s) in respect of the Bidding Documents may notify the Employer in writing at the Employer's address indicated in the Invitation for Bids. The Employer will respond to any request for clarification which he receives earlier than 28 days prior to the deadline for submission of bids.

Copies of the Employer's response will be forwarded to all purchasers of the Bidding Documents, including a description of the enquiry but without identifying its source.

IB.9 Amendment of Bidding Documents

9.1 At any time prior to the deadline for submission of bids, the Employer may, for any reason, whether at his own initiative or in response to a clarification requested by a prospective bidder, modify the Bidding Documents by issuing addendum.

9.2 Any addendum thus issued shall be part of the Bidding Documents pursuant to IB 7.1 hereof and shall be communicated in writing to all purchasers of the Bidding Documents. Prospective bidders shall acknowledge receipt of each addendum in writing to the Employer.

9.3 To afford prospective bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer may extend the deadline for submission of bids in accordance with Clause IB.20.

C. PREPARATION OF BIDS

IB.10 Language of Bid

10.1 The bid and all correspondence and documents related to the bid exchanged by a bidder and the Employer shall be in the bid language stipulated in the Bidding Data Sheet and Particular Conditions of Contract. Supporting documents and printed literature furnished by the bidders may be in any other language provided the same are accompanied by an accurate translation of the relevant parts in the bid language, in which case, for purposes of evaluation of the bid, the translation in bid language shall prevail.

IB.11 Documents Comprising the Bid

11.1 The Bid shall comprise two envelopes submitted simultaneously, one called the Technical Bid and other the Priced Bid, containing the documents listed in Bidding Data Sheet under the heading of IB 11.1 A & B respectively. Both envelopes to be enclosed together in an outer single envelope called the Bid. Each bidder shall furnish all the documents as specified in Bidding Data Sheet 11.1 A & B.

11.2 Bids submitted by a JV shall include a copy of the Joint Venture Agreement entered into by all partners. Alternatively, a Letter of Intent to execute a Joint Venture 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. The role to be played by each partner to be specified therein. Bids submitted by a joint venture of two (2) or more firms shall comply with the following requirements:

a. In case of a successful bid, the Form of JV Agreement shall be signed so as to be legally binding on all partners within 7 days of the receipt of letter of acceptance failing which the contract and the letter of acceptance shall stand void and redundant.

b. One of the joint venture partners shall be nominated as being in charge; and this authorization shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all the joint venture partners;

c. The partner-in-charge shall always be duly authorized to deal with the Employer regarding all matters related with and/or incidental to the execution of Works as per the terms and Conditions of JV Agreement and in this regard to incur any and all liabilities, receive instructions, give binding undertakings and receive payments on behalf of the joint venture;

d. All partners of the joint venture shall at all times and under all circumstances be liable jointly and severally for the execution of the Contract in accordance with the Contract terms and a statement to this effect shall be included in the authorization mentioned under Sub-Para (b) above as well as in the Form of Bid and in the Form of JV Agreement (in case of a successful bid); and

e. A copy of JV agreement shall be submitted before signing of the Contract, stating the conditions under which JV will

function, its period of duration, the persons authorized to represent and obligate it and which persons will be directly responsible for due performance of the Contract and can give valid receipts on behalf of the joint venture, the proportionate participation of the several firms forming the joint venture, and any other information necessary to permit a full appraisal of its functioning. The JV Agreement shall be made part of the contract. No amendments / modifications whatsoever in the joint venture agreement shall be agreed to between the joint venture partners without prior written consent of the Employer.

11.3 The Bidder shall furnish, as part of the Technical Bid, a Technical Proposal including a statement of work methods, equipment, personnel, schedule and any other information as stipulated Bidding Forms, in sufficient detail to demonstrate the adequacy of the Bidders' proposal to meet the work requirements and the completion time referred to in Sub-Clause 1.2 hereof.

IB.12 Bid Prices

12.1 Unless stated otherwise in the Bidding Documents, the Contract shall be for the whole of the Works as described in IB 1.1 hereof, based on the unit rates and / or prices submitted by the bidder.

12.2 The bidders shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Items against which no rate or price is entered by a bidder will not be paid for by the Employer when executed and shall be deemed covered by rates and prices for other items in the Bill of Quantities.

12.3 All duties, taxes and other levies payable by the Contractor under the Contract, or for any other cause, as on the date 28 days prior to the deadline for submission of bids shall be included in the rates and prices and the total Bid Price submitted by a bidder.

Additional / reduced duties, taxes and levies due to subsequent additions or changes in legislation shall be reimbursed / deducted as per Sub-Clause 70.2 of the General Conditions of Contract Part-I.

12.4 The rates and prices quoted by the bidders are subject to adjustment during the performance of the Contract in accordance with the provisions of Clause 70 of the Conditions of Contract. The bidders shall furnish the prescribed information for the price adjustment formulae in Appendix C to Bid and shall submit with the bids such other supporting information as required under the said clause.

IB.13 Currencies of Bid and Payment

13.1 The unit rates and the prices shall be quoted by the bidder entirely in Pak rupees. A bidder expecting to incur expenditures in other currencies for inputs to the Works supplied from outside the Employer's country (referred to as the "Foreign Currency Requirements") shall indicate the same in Appendix-B to Bid. The proportion of the Bid Price (excluding Provisional Sums) needed by him for the payment of such Foreign Currency Requirements either (i) entirely in the currency of the Bidder's home country or, (ii) at the bidder's option, entirely in Pak rupees provided always that a bidder expecting to incur expenditures in a currency or

currencies other than those stated in (i) and (ii) above for a portion of the foreign currency requirements, and wishing to be paid accordingly, shall indicate the respective portions in his bid.

13.2 The rates of exchange to be used by the bidder for currency conversion shall be the TT & OD Selling Rates published or authorized by the State Bank of Pakistan prevailing on the date 28 days prior to the deadline for submission of bids. For the purpose of payments, the exchange rates used in bid preparation shall apply for the duration of the Contract.

IB.14 Bid Validity

14.1 Bids shall remain valid for the period stipulated in the Bidding Data Sheet after the Date of Bid Opening specified in Clause IB.23.

14.2 In exceptional circumstances, prior to expiry of the original bid validity period, the Employer may request that the bidders extend the period of validity for a specified additional period which shall in no case be more than the original bid validity period. The request and the responses thereto shall be made in writing. A bidder may refuse the request without forfeiting his Bid Security. A bidder agreeing to the request will not be required or permitted to modify his bid, but will be required to extend the validity of his Bid Security for the period of the extension, and in compliance with Clause IB.15 in all respects.

IB.15 Bid Security

15.1 Each bidder shall furnish, as part of his bid, a Bid Security in the amount stipulated in the Bidding Data Sheet in Pak Rupees or an equivalent amount in a freely convertible currency.

15.2 The Bid Security shall be, at the option of the bidder, in the form of Deposit at Call or a Bank Guarantee issued by a Scheduled Bank in Pakistan or from a foreign bank duly counter guaranteed by a Scheduled Bank in Pakistan in favor of the Employer valid for a period 28 days beyond the Bid Validity date.

15.3 Any bid not accompanied by an acceptable Bid Security shall be rejected by the Employer as non-responsive.

15.4 The bid securities of unsuccessful bidders will be returned as promptly as possible, but not later than 28 days after the expiration of the period of Bid Validity.

15.5 The Bid Security of the successful bidder will be returned when the bidder has furnished the required Performance Security and signed the Contract Agreement.

15.6 The Bid Security may be forfeited:

a. if the bidder withdraws his bid except as provided in IB 22.1;
b. if the bidder does not accept the correction of his Bid Price pursuant to IB 27.2 hereof; or
c. In the case of successful bidder, if he fails within the specified time limit to:
   i. furnish the required Performance Security
   ii. sign the Contract Agreement ; or

Furnish the required JV agreement within 7 days of the receipt of letter of acceptance.

IB.16 Alternate Proposals by Bidder

16.1 Should any bidder consider that he can offer any advantages to the Employer by a modification to the designs, specifications or other conditions, he may, in addition to his bid to be submitted in strict compliance with the Bidding Documents, submit any Alternate Proposal(s) containing (a) relevant design calculations; (b) technical specifications; (c) proposed construction methodology; and (d) any other relevant details / conditions, provided always that the total sum entered on the Letter of Price Bid shall be that which represents complete compliance with the Bidding Documents. The technical details and financial implication involved are to be submitted in two separate sealed envelopes as to be followed in main bid proposals.

16.2 Alternate Proposal(s), if any, of the lowest evaluated responsive bidder only may be considered by the Employer as the basis for the award of Contract to such bidder.

IB.17 Pre-Bid Meeting

17.1 The Employer may, on his own motion or at the request of any prospective bidder(s), hold a pre-bid meeting to clarify issues and to answer any questions on matters related to the Bidding Documents. The date, time and venue of pre-bid meeting, if convened, has been stipulated in the Bidding Data Sheet. All prospective bidders or their authorized representatives shall be invited to attend such a pre-bid meeting.

17.2 The bidders are requested to submit questions, if any, in writing so as to reach the Employer not later than seven (7) days before the proposed pre-bid meeting.

17.3 Minutes of the pre-bid meeting, including the text of the questions raised and the replies given, will be transmitted without delay to all purchasers of the Bidding Documents. Any modification of the Bidding Documents listed in IB 7.1 hereof, which may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an Addendum pursuant to Clause IB.9 and not through the minutes of the pre-bid meeting.

17.4 Absence at the pre-bid meeting will not be a cause for disqualification of a bidder.

IB.18 Format and Signing of Bid

18.1 Bidders are particularly directed that the amount entered on the Letter of Price Bid shall be for performing the Contract strictly in accordance with the Bidding Documents.

18.2 All appendices to Bid are to be properly completed and signed.

18.3 No alteration is to be made in the Letters of Price and Technical Bids nor in the Appendices thereto except in filling up the blanks as directed. If any such alterations be made or if these instructions be not fully complied with, the bid may be rejected.

18.4 The Bidder shall prepare one original of the Technical Bid and one original of the Price Bid comprising the Bid as described in Bidding Data Sheet against IB11 and clearly mark it "ORIGINAL TECHNICAL BID" and "ORIGINAL - PRICE BID". In addition, the Bidder shall submit two (2) copies of the Bid and clearly mark each of them "COPY." In the event of any discrepancy between the original and the copies, the original shall prevail.

18.5 The original and all copies of the Bid shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Bidder. This authorization shall consist of a written confirmation as specified in the Bidding Data Sheet and shall be attached to the bid. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the Bid, except for unamended printed literature, shall be signed or initialed by the person signing the bid.

18.6 Any amendments such as interlineations, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the bid.

18.7 Bidders shall indicate in the space provided in the Letter of Technical and Price Bids, their full and proper addresses at which notices may be legally served on them and to which all correspondence in connection with their bids and the Contract is to be sent.

18.8 Bidders should retain a copy of the Bidding Documents as their file copy.

D. SUBMISSION OF BIDS FOR SINGLE STAGE TWO ENVELOPE BIDDING PROCEDURE

IB.19 Sealing and Marking of Bids

19.1 Each bidder shall submit his bid as under:

a. ORIGINAL and each copy of the Bid shall be separately sealed and put in separate envelopes and marked as such.

b. The envelopes containing the ORIGINAL and copies will be put in one sealed envelope and addressed / identified as given in IB 19.2 hereof.

c. The technical bid should comprise of documents listed in IB 11.1 (A) & the price bid should comprise of documents listed in IB 11.1 (B) which shall be placed in separate envelopes in accordance with IB 11.1.

19.2 The inner and outer envelopes shall:

a. be addressed to the Employer at the address provided in the Bidding Data sheet;

b. bear the name and identification number of the contract as defined in the Bidding Data sheet; and

c. provide a warning not to open before the time and date for bid opening, as specified in the Bidding Data sheet.

19.3 In addition to the identification required in IB 19.2 hereof, the inner envelope 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 Clause IB.21.

19.4 If the outer envelope is not sealed and marked as above, the Employer will assume no responsibility for the misplacement or premature opening of the Bid.

IB.20 Deadline for Submission of Bids

20.1 a. Bids must be received by the Employer at the address specified no later than the time and date stipulated in the Bidding Data Sheet.

b. Bids with charges payable will not be accepted, nor will arrangements be undertaken to collect the bids from any delivery point other than that specified above. Bidders shall bear all expenses incurred in the preparation and delivery of bids. No claims will be entertained for refund of such expenses.

c. Where delivery of a bid is by mail and the bidder wishes to receive an acknowledgment of receipt of such bid, he shall make a request for such acknowledgment in a separate letter attached to but not included in the sealed bid package.

d. Upon request, acknowledgment of receipt of bids will be provided to those making delivery in person or by messenger.

20.2 The Employer may, at his discretion, extend the deadline for submission of Bids by issuing an amendment in accordance with Clause IB 9, in which case all rights and obligations of the Employer and the bidders previously subject to the original deadline will thereafter be subject to the deadline as extended.

IB.21 Late Bids

21.1 a. Any bid received by the Employer after the deadline for submission of bids prescribed in Clause IB.20 will be returned unopened to such bidder.

b. Delays in the mail, delays of person in transit, or delivery of a bid to the wrong office shall not be accepted as an excuse for failure to deliver a bid at the proper place and time. It shall be the bidder's responsibility to determine the manner in which timely delivery of his bid will be accomplished either in person, by messenger or by mail.

IB.22 Modification, Substitution and Withdrawal of Bids

22.1 Any bidder may modify, substitute or withdraw his bid after bid submission provided that the modification, substitution or written notice of withdrawal is received by the Employer prior to the deadline for submission of bids.

22.2 The modification, substitution, or notice for withdrawal of any bid shall be prepared, sealed, marked and delivered in accordance with the provisions of Clause IB.19 with the outer and inner envelopes additionally marked "MODIFICATION", "SUBSTITUTION" or "WITHDRAWAL" as appropriate.

22.3 No bid may be modified by a bidder after the deadline for submission of bids except in accordance with IB 22.1 and 27.2.

22.4 Withdrawal of a bid during the interval between the deadline for submission of bids and the expiration of the period of bid validity specified in the Form of Bid may result in forfeiture of the Bid Security in pursuance to Clause IB.15.

E. BID OPENING AND EVALUATION FOR SINGLE STAGE TWO ENVELOPE BIDDING PROCEDURE

IB.23 Bid Opening

23.1 The Employer will open the Technical Bids in public at the address, date and time specified in the Bidding Data Sheet in the presence of Bidders' designated representatives and anyone who choose to attend. The Price Bids will remain unopened and will be held in custody of the Employer until the specified time of their opening.

23.2 First, envelopes marked "WITHDRAWAL" shall be opened and read out and the envelope with the corresponding bid shall not be opened, but returned to the Bidder. No bid withdrawal shall be permitted unless the corresponding Withdrawal Notice contains a valid authorization to request the withdrawal and is read out at bid opening.

23.3 Second, outer envelopes marked "SUBSTITUTION" shall be opened. The inner envelopes containing the Substitution Technical Bid and/or Substitution Price Bid shall be exchanged for the corresponding envelopes being substituted, which are to be returned to the Bidder unopened. Only the Substitution Technical Bid, if any, shall be opened, read out, and recorded. Substitution Price Bid will remain unopened in accordance with IB 23.1.

No envelope shall be substituted unless the corresponding Substitution Notice contains a valid authorization to request the substitution and is read out and recorded at bid opening.

23.4 Next, outer envelopes marked "MODIFICATION" shall be opened. No Technical Bid and/or Price Bid shall be modified unless the corresponding Modification Notice contains a valid authorization to request the modification and is read out and recorded at the opening of Technical Bids. Only the Technical Bids, both Original as well as Modification, are to be opened, read out, and recorded at the opening. Price Bids, both Original and Modification, will remain unopened in accordance with IB

23.1. The Bidders' representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record. A copy of the record shall be distributed to all Bidders.

23.5 Other envelopes holding the Technical Bids shall be opened one at a time, and the following read out and recorded:

a. the name of the Bidder;
b. whether there is a modification or substitution;
c. the presence of a Bid Security, if required; and
d. Any other details as the Employer may consider appropriate.

No Bid shall be rejected at the opening of Technical Bids except for late bids, in accordance with IB 21.1. Only Technical Bids read out and recorded at bid opening, shall be considered for evaluation.

Preliminary Examination of Technical Bids

23.6 a. The Employer shall first examine qualification and experience Data as per appendix M and N submitted by the Bidder. The technical proposal examination of those bidders only shall be taken in hand who meet the minimum requirement as mentioned in appendix M and N. Only substantially responsive qualification shall be considered for further evaluation.

b. The Employer shall examine the Technical Bid to confirm that all the documents have been provided, and to determine the completeness of each document submitted.

23.7 The Employer shall confirm that all the documents and information have been provided for evaluation of Technical bid as required under these bidding documents.

23.8 At the end of the evaluation of the Technical Bids, the Employer will invite only those bidders who have submitted substantially responsive Technical Bids and who have been determined as being qualified for award to attend the opening of the Price Bids.

The date, time, and location of the opening of Price Bids will be advised in writing by the Employer. Bidders shall be given reasonable notice for the opening of Price Bids.

23.9 The Employer will notify Bidders in writing who have been rejected on the grounds of their Technical Bids being substantially non-responsive to the requirements of the Bidding Document and return their Price Bids unopened before inviting others, who are determined as being qualified, to attend the opening of Price Bids.

23.10 The Employer shall conduct the opening of Price Bids of all Bidders who submitted substantially responsive Technical Bids, publically in the presence of Bidders' representatives who choose to attend at the address, date and time specified by the Employer. The Bidder's representatives who are present shall be requested to sign a register evidencing their attendance.

23.11 All envelopes containing Price Bids shall be opened one at a time and the following read out and recorded:

(a) The name of the Bidder;

(b) Whether there is a modification or substitution;

(c) The Bid Prices, including any discounts and alternative offers; and

(d) Any other details as the Employer may consider appropriate.

Only Price Bids and discounts, read out and recorded during the opening of Price Bids shall be considered for evaluation. No Bid shall be rejected at the opening of Price Bids.

23.12 If this Bidding Document allows Bidders to quote separate prices for different contracts, and the award to a single Bidder of multiple contracts, the methodology to determine the lowest evaluated price of the contract combinations is that which is most economical to the Employer.

IB.24 Process to be Confidential

24.1 Information relating to the examination, clarification, evaluation and comparison of bid and recommendations for the award of a contract shall not be disclosed to bidders or any other person not officially concerned with such process before the announcement of bid evaluation report which shall be done at least ten 10 days prior to issue of Letter of Acceptance. The announcement to all Bidders will include table(s) comprising read out prices, discounted prices, price adjustments made, final evaluated prices and recommendations against all the bids evaluated. Any effort by a bidder to influence the Employer's processing of bids or award decisions may result in the rejection of such bidder's bid. Whereas any bidder feeling aggrieved may lodge a written complaint not later than fifteen (15) days after the announcement of the bid evaluation report. However mere fact of lodging a complaint shall not warrant suspension of the procurement process.

IB.25 Clarification of Bids

25.1 To assist in the examination, evaluation and comparison of bids, the Employer may, at his discretion, ask any bidder for clarification of his 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 Employer in the evaluation of the bids in accordance with Clause IB.28.

25.2 If a Bidder does not provide clarifications of its Bid by the date and time set in the Employer's request for clarification, its bid may be rejected.

IB.26 Examination of Bids and Determination of Responsiveness

26.1 Prior to the detailed evaluation of bids, the Employer will determine whether each bid is substantially responsive to the requirements of the Bidding Documents.

26.2 A substantially responsive bid is one which (i) meets the eligibility criteria; (ii) has been properly signed; (iii) is accompanied by the required Bid Security; (iv) Includes signed Integrity Pact where required as per clause IB.35 and (v) conforms to all the terms, conditions and specifications of the Bidding Documents, without material deviation or reservation. A material deviation or reservation is one (i) which affect in any substantial way the scope, quality or performance of the Works; (ii) which limits in any substantial way, inconsistent with the Bidding Documents, the Employer's rights or the bidder's obligations under the Contract; (iii) adoption/rectification whereof would affect unfairly the competitive position of other bidders presenting substantially responsive bids. Only substantially responsive bid shall be considered for further evaluation.

26.3 If a bid is not substantially responsive, it may not subsequently be made responsive by correction or withdrawal of the non-conforming material deviation or reservation. The Employer may, however, seek confirmation/ clarification in writing which shall be responded in writing.

IB.27 Correction of Errors

27.1 Bids determined to be substantially responsive will be checked by the Employer for any arithmetic errors. Errors will be corrected by the Employer as follows:

a. where there is a discrepancy between the amounts in figures and in words, the amount in words will govern; and
b. where there is a discrepancy between the unit rate and line item total resulting from multiplying the unit rate by quantity, unit rate as quoted will govern, unless in the opinion of Employer there is an obviously gross misplacement of the decimal point in unit rate, in which case line item total as quoted will govern & unit rate will be corrected.

27.2 The amount stated in the Letter of Price Bid will be adjusted by the Employer in accordance with the above procedure for the correction of errors and with the concurrence of the bidder, shall be considered as binding upon the bidder. If the bidder does not accept the corrected Bid Price, his Bid will be rejected, and the Bid Security shall be forfeited in accordance with IB.15.6 (b) hereof.

IB.28 Evaluation and Comparison of Bids

28.1 The Employer will evaluate and compare only the Bids determined to be substantially responsive in accordance with Clause IB.26.

28.2 In evaluating the Bids, the Employer will determine for each Bid the evaluated Bid Price by adjusting the Bid Price as follows:

a. making any correction for errors pursuant to Clause IB.27;
b. excluding Provisional Sums and the provision, if any, for contingencies in the Summary Bill of Quantities, but including competitively priced Day work; and

making an appropriate adjustment for any other acceptable variation or deviation.

28.3 The estimated effect of the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract, shall not be taken into account in Bid evaluation.

28.4 If the Bid of the successful bidder is seriously unbalanced in relation to the Employer's estimate of the cost of work to be performed under the Contract, the Employer may require the bidder to produce detailed price analyses for any or all items of the Bill of Quantities to demonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, the Employer may require that the amount of the Performance Security set forth in Clause IB.32 be increased at the expense of the successful bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful bidder under the Contract.

F. AWARD OF CONTRACT

IB.29 Award

29.1 Subject to Clauses IB.30 and IB.34, the Employer will award the Contract to the bidder whose bid has been determined to be substantially responsive to the Bidding Documents and who has offered the lowest evaluated Bid Price, provided that such bidder has been determined to be eligible in accordance with the provisions of Clause IB.3 and qualify pursuant to IB 29.2.

29.2 The Employer, at any stage of the bid evaluation, having credible reasons for or prima facie evidence of any defect in bidder's capacities, may require the bidders to provide information concerning their professional, technical, financial, legal or managerial competence whether already pre-qualified or not. Provided that such qualification shall only be laid down after recording reasons in writing. They shall form part of the records of that bid evaluation report.

IB.30 Employer's Right to Accept any Bid and to Reject any or all Bids

30.1 Notwithstanding Clause IB.29, the Employer reserves the right to accept or reject any Bid, and to annul the bidding process and reject all bids, at any time prior to award of Contract, without thereby incurring any liability to the affected bidders or any obligation except that the grounds for rejection of all bids shall upon request be communicated to any bidder who submitted a bid, without justification of grounds. Rejection of all bids shall be notified to all bidders promptly.

IB.31 Notification of Award

31.1 Prior to expiration of the period of bid validity prescribed by the Employer, the Employer will notify the successful bidder in writing ("Letter of Acceptance") that his Bid has been accepted. This letter shall name the sum which the Employer will pay the Contractor in consideration of the execution and completion of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Conditions of Contract called the "Contract Price").

31.2 No Negotiation with the bidder having evaluated as lowest responsive or any other bidder shall be permitted.

31.3 The notification of award and its acceptance by the bidder will constitute the formation of the Contract, binding the Employer and the bidder till signing of the formal Contract Agreement.

31.4 Upon furnishing by the successful bidder of a Performance Security, the Employer will promptly notify the other bidders that their Bids have been unsuccessful and return their bid securities.

IB.32 Performance Security

32.1 The successful bidder shall furnish to the Employer a Performance Security in the form and the amount stipulated in the Bidding Data Sheet and the Conditions of Contract within a period of 28 days after the receipt of Letter of Acceptance.

32.2 Failure of the successful bidder to comply with the requirements of IB.32.1 or IB.33 or IB.35 shall constitute sufficient grounds for the annulment of the award and forfeiture of the Bid Security.

IB.33	**Signing of Contract Agreement**	33.1	Within14 days from the date of furnishing of acceptable Performance Security under the Conditions of Contract, the Employer will send the successful bidder the Contract Agreement in the form provided in the Bidding Documents, incorporating all agreements between the parties.
		33.2	The formal Agreement between the Employer and the successful bidder shall be executed within 14 days of the receipt of the Contract Agreement by the successful bidder from the Employer.
IB.34	**General Performance of the Bidders**	34.1	The Employer reserves the right to obtain information regarding performance of the bidders on their previously awarded contracts/works. The Employer may in case of consistent poor performance of any Bidder as reported by the employers of the previously awarded contracts, inter-alia, reject his bid and/or refer the case to the Pakistan Engineering Council (PEC). Upon such reference, PEC in accordance with its rules, procedures and relevant laws of the land take such action as may be deemed appropriate under the circumstances of the case including black listing of such Bidder and debarring him from participation in future bidding for similar works.
IB.35	**Integrity Pact**	35.1	The Bidder shall sign and stamp the Integrity Pact provided at Appendix-L to Bid in the Bidding Documents for all Federal Government procurement contracts exceeding Rupees ten million. Failure to provide such Integrity Pact shall make the bidder non- responsive.
IB.36	**Instructions not part of Contract**	36.1	Bids shall be prepared and submitted in accordance with these Instructions which are provided to assist bidders in preparing their bids, and do not constitute part of the Bid or the Contract Documents.

BIDDING DATA SHEET

The following specific data for the Works to be bidded shall complement, amend, or supplement the provisions in the Instructions to Bidders. Wherever there is a conflict, the provisions herein shall prevail over those in the Instructions to Bidders.

Instructions to Bidders Clause Reference	
Clause IB.1	**Scope of Bid**
Sub Clause 1.1	**Name and address of the Employer**
	The Employer is:
	EXIM Bank of Pakistan, Islamabad
	(Hereinafter called "The Employer" Which expression shall include the successors, legal representatives and permitted assignees).
	The Employer's Representative is:
	Manager Admin & Procurement, EXIM Bank of Pakistan Office No. 510-512, 5th Floor, Evacuee Trust Complex, Agha Khan Road, F-5/1, Islamabad. Tel: 051 - 9211997, Fax: 051 – 9170100 Email: procurement@eximbank.gov.pk
	Name of the Project & Summary of the Works
	The name of the Project is:
	"Renovation of EXIM Bank Office at 5th Floor, Bahria Complex-I, M. T. Khan Road, Karachi."
	The Summary of Works:
	EXIM Bank of Pakistan invites sealed bids from interested eligible bidders for carrying out Renovation of EXIM Bank Office Karachi located at 5th floor of Bahria Complex-I, M. T. Khan Road, Karachi
	The scope of works mainly comprises furnishing, renovation works including civil, electrical, HVAC and networking works, etc. lying within the boundaries and limits shown on the Drawings and any such additional areas adjacent thereto as may be designated by the Engineer from time to time for the construction to be performed under the Contract, and all such areas and additional areas shall comprise the Site.
Sub Clause 1.2	**Time for Completion**
	03 Calendar Months
Clause IB.2	**Source of Funds**
Sub Clause 2.1	The Employer has sufficient funds of its own to cover the Cost of the entire Project for which these Bidding Documents are issued.

Clause IB 3.1 **Eligible Bidders**

The bidder/manufacturer has the technical, financial and production capability (eligibility) necessary to perform the Contract as follows:

a) Having valid license from Pakistan Engineering Council (PEC) in Category C5 or above with Specialization Codes CE10, EE04 & EE07.
b) Two (02) similar size Refurbishment/finishing works having construction cost Rs. 50 Million or above completed during last 05 years. *(Information regarding similar projects completed shall be supported by attested copies (by Notary Public) of documents such as Letter of Award, Contract Agreement, Taking Over/Completion Certificate, Defects Liability Certificate and any other relevant document showing the cost of works at award/completion).*
c) Last three years' average turnover of minimum Rs. 50 Million *(Information shall be supported by attested copies of Audited Financial Reports carried out by External Auditors/Charted Firm)*
d) Registered with FBR/SRB enlisted as Active Tax Payer.
e) The bidder should submit an Affidavit to the effect that the firm has never been blacklisted previously by any executing Procuring Agency.

Clause IB.7 Contents of Bidding Documents

Sub-Clause 7.1 Delete the text of Sub-Clause 7.1 and substitute with the following:

The Bidding Documents are those stated below, and should be read in conjunction with any Addenda issued in accordance with Clause IB.9.

7.1.1 **Volume - I**

- Instruction to Bidders.
- Bidding Data.
- Letter of Bid & Appendices to Bid
- Form of Contract Agreement
- Forms of Irrevocable Bank Guarantee for Performance Security, Mobilization Advance Bank Guarantee
- Part-I - General Conditions of Contract.
- Part-II - Particular Conditions of Contract.
- Specifications.

7.1.2 **Volume – II**

- Tender Drawings (Bid Drawings).

Clause IB.8 **Clarification of Bidding Documents**

Sub-Clause 8.1 **Time limit for clarification**

Any prospective bidder requiring any clarification (s) in respect of the Bidding Documents may notify the Employer in writing; either through e-mail at the Employer's e-mail address or via personal delivery to the Employer's address indicated in the Invitation for Bids.

The Employer will respond to any request for clarification which he receives earlier than 7 days prior to the deadline for submission of bids.

Copies of the Employer's response will be forwarded to all purchasers of the Bidding Documents, including a description of the enquiry but without identifying its source.

Clause IB.10	**Language of Bid**
Sub-Clause 10.1	English.
Clause IB.11	**Documents Accompanying the Bid**
11.1	The Bidder shall fill, sign and stamp the bidding documents listed at IB7.1 above and return/submit with Bid Security and Company Profile comprising information/documents required to ascertain its eligibility stated at IB 3.1 above
Sub-Clause 11.2	Delete the Sub-Clause 11.2 in its entirety.
Clause IB.12	**Bid Prices**
Sub-Clause 12.2	Delete the text of Sub–Clause 12.2 and substitute with the following:
	The bidders shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Unit rate offered for an item shall be considered up to two significant decimals places for evaluation purposes. Items against which no rate or price is entered by a bidder will not be paid for by the Employer when executed and shall be deemed covered by rates and prices for other items in the Bill of Quantities. Corrections in rates and prices, if any, shall be made by crossing out, initialing, dating and re-writing.
Sub-Clause 12.3	Delete the text of Sub–Clause 12.3 and substitute with the following:
	The Bidder shall obtain all information as to Pakistan Income Tax, Salaries Tax, Company Taxes, Municipal Octories, Levies and any other taxes imposed by the Government of Pakistan/Provincial Governments/local bodies, export and import duties and necessary permits and conform the requirements thereof at his own responsibility and include the same in quoted Bid Price. The quoted Bid Price shall also include the cost of accepting the general risks/ liabilities and obligations set forth or implied in the Contract. No claim at any later stage on this account will be entertained.
	All duties / stamp duty, taxes and other levies under the Contract, or for any other cause, as on the date 28 days prior to the deadline for submission of bids shall be included in the rates and prices and the total Bid Price submitted by a bidder.
	Additional/reduced duties, taxes and levies due to subsequent additions or changes in legislation shall be reimbursed / deducted as per Sub-Clause 70.2 of the General Conditions of Contract Part-I.
Sub-Clause 12.4	Text of Sub-Clause 12.4 is deleted in its entirety
Clause IB.13	**Currencies of Bid and Payment**
Sub-Clause 13.1	Delete the text of Sub–Clause 13.1 and substitute with the following:
	The unit rates and the prices shall be quoted by the bidder entirely in Pak Rupees (PKR). The payments to the Contractor for the works done shall be made in Pakistani Rupees (PKR).
Sub-Clause 13.2	The Sub-Clause is deleted in its entirety.
Clause IB.14	**Bid Validity**
Sub-Clause 14.1	**Period of Bid validity:** One Hundred Fifty Two (152) days.

One Hundred Fifty Two (152) days.

Clause IB.15 **Amount of Bid Security**

Sub-Clause 15.1 Bid Security shall be **Rs. 500,000/-.**

Sub-Clause 15.2 Delete the text of Sub-Clause 15.2 and substitute with the following:

The Bid Security shall be, at the option of the bidder, in the form of CDR/ Demand Draft/ Pay Order in favor of the Employer valid for a period 28 days beyond the Bid Validity date.

Clause IB.16 **Alternate Proposals by Bidder**

The Clause is deleted in its entirety.

Clause IB.17 **Pre-Bid Meeting**

Sub-Clause 17.1 **Date, time, and venue of the pre-Bid meeting:**

The Bidder or his official representative are invited to attend a Pre-Bid meeting which will take place on the date, time and venue as stated in Invitation for Bids.

Sub-Clause 17.2 Delete the text of Sub-Clause 17.2 and substitute with the following:

The Bidders are requested to submit clarification/query in writing through e-mail, to reach the Employer three (03) days before the date given for pre-bid meeting in the Invitation for Bids.

Employer's e-mail address for purpose of correspondence is as follows:

procurement@eximbank.gov.pk

Clause IB.18 **Format and Signing of Bid**

Sub-Clause 18.4 **Number of copies of Bid:**

The Bidder shall prepare and submit the original and one copy documents comprising the Bid as described in Clause 7 of these Instructions to Bidders, and clearly marked "**ORIGINAL**" and **COPY**.

Sub-Clause 18.5 Delete the text of Sub–Clause 18.5 and substitute with the following:

The Bid shall be typed or written in indelible ink and shall be signed by a person or persons duly authorized to sign on behalf of the Bidder pursuant to Sub-Clause 11.1 hereof. All pages of the Bid shall be initialed and stamped by the person or persons signing the Bid. One (1) copy of Power of Attorney must be attached to the Bid submitted to the Employer if this Bid is signed / executed by a person other than the President, Partner or Owner of the Bidder's Company.

Clause IB.19 **Sealing and Marking of Bids**

Sub-Clause 19.1 Delete the text of Sub–Clause 19.1 (c) and substitute with the following:

(c) the bid shall comprise of documents listed in IB-11.1

Sub-Clause 19.2	(a) Employer's address for the purpose of Bid submission is as follows: **Manager Admin & Procurement,** EXIM Bank of Pakistan Office No. 510-512, 5th Floor, Evacuee Trust Complex, Agha Khan Road, F-5/1, Islamabad. Tel: 051 - 9211997, Fax: 051 – 9170100 Email: procurement@eximbank.gov.pk (b) Name of the Project is stated at IB 1.1 above, identification Number: **EXIM/Proc/Admn-Karachi Office/02/2023**
Sub-Clause 20.1(a)	Time and date of bid submission and bid opening shall be as per the data provided in the Invitation for Bids.
Clause IB.23	**Bid Opening**
Sub-Clause 23.1	**Venue, time, and date of Bid opening.** As provided in Invitation for Bids.
Sub-Clause 23.6	i) Initially Bid Security shall be checked for Responsiveness of Bid. Absence/failure of submission of required bid Security will result in rejection of Bid and sealed Bid shall be returned at the instant. ii) All bids received shall be opened and evaluated as per eligibility criteria stated above. Initially eligibility of the lowest bidder only is carried out to determine its responsiveness as per information or documents required and so provided; if he fails to be responsive, then same exercise is repeated for 2nd lowest bidder and so on till responsive bidder or lowest/most advantageous evaluated bid is determined. iii) Verification and up-to-date information: Procuring agency can verify the previous working, experience and financial statements made by the bidders in their bids;
Clause IB-28	**Evaluation and Comparison of Bids**
Sub-Clause 28.2	Delete the sub-clause IB-28.2 (c) in its entirety.
Clause IB.32	**Performance Security**
Sub-Clause 32.1	Delete the text of Sub–Clause 32.1 and substitute with the following: The successful bidder shall provide a Performance Security in the prescribed Form annexed to these Documents. The said Security shall be furnished by the successful bidder within fourteen (14) days from the date of Letter of Acceptance. The Performance Security shall be of an amount equal to ten percent (10%) of the Contract Price in the currency (PKR) of the Contract, in the form of a Bank Guarantee from any Scheduled Bank in Pakistan.
Clause IB.33	**Signing of Contract Agreement**
Sub-Clause 33.1	Delete the text of Sub–Clause 33.1 and substitute with the following: The successful Bidder shall submit along with the Performance Security a

draft copy of Agreement as per the Form of Agreement within the time period stipulated in clause IB-32.1 provided in the Bidding Documents, incorporating all agreements between the parties.

Sub-Clause 33.2 The formal Agreement between the Employer and the successful bidder shall be executed within fourteen (14) days from the date of the Letter of Acceptance but not before acceptance by the Employer of the Performance Security as per Sub-Clause 32.1 hereof.

FORM OF BID

(LETTER OF OFFER)

Renovation of EXIM Bank Office Karachi located at 5th floor of Bahria Complex-I, M. T. Khan Road, Karachi

To:

_____
_____
_____

Gentlemen,

1. Having examined the Bidding Documents including Instructions to Bidders, Bidding Data, Conditions of Contract, Contract Data, Specifications, Drawings, if any, Schedule of Prices and Addenda Nos. _____ for the execution of the above-named Works, we, the undersigned, being a company doing business under the name of and address _____ _____ and being duly incorporated under the laws of Pakistan hereby offer to execute and complete such Works and remedy any defects therein in conformity with the said Documents including Addenda thereto for the Total Bid Price of Rs_____(Rupees_____) or such other sum as may be ascertained in accordance with the said Documents.

2. We understand that all the Schedules attached hereto form part of this Bid.

3. As security for due performance of the undertakings and obligations of this Bid, we submit herewith a Bid Security in the amount of _____ _____ drawn in your favour or made payable to you and valid for a period of twenty eight (28) days beyond the period of validity of Bid.

4. We undertake, if our Bid is accepted, to commence the Works and to deliver and complete the Works comprised in the Contract within the time(s) stated in Contract Data.

5. We agree to abide by this Bid for the period of _____ days from the date fixed for receiving the same and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

6. Unless and until a formal Agreement is prepared and executed, this Bid, together with your written acceptance thereof, shall constitute a binding contract between us.

7. We undertake, if our Bid is accepted, to execute the Performance Security referred to in Conditions of Contract for the due performance of the Contract.

8. We understand that you are not bound to accept the lowest or any bid you may receive.

9. We do hereby declare that the Bid is made without any collusion, comparison of figures or arrangement with any other person or persons making a bid for the Works.

Dated this_____day of _____, 2023

Signature _____

in the capacity of _____duly authorized to sign bid for and on behalf of _____
(Name of Bidder in Block Capitals)

(Seal)

Address

_____

_____

_____

_____

_____

_____

Witness:

(Signature)_____

Name:_____

_____

Address:

_____

_____

SPECIAL STIPULATIONS

		Clause Conditions of Contract	
1.	Engineer's Authority to issue Variation in emergency	2.1	2% of the Contract Price stated in the Letter of Acceptance
2.	Variation	2.1 (b) viii (b)	No approval is required by the engineer if the amount needed is up to or less than Rs.500,000/- (Five Hundred thousand only)
3.	Law Applicable	5.1 (b)	The law to be applied is the law of Islamic Republic of Pakistan
4.	Amount of Performance Security	10.1	Ten percent (10%) of the Contract Price stated in Letter of Acceptance.
5.	Time for Furnishing Programme	14.1	Within seven (7) days from the date of Letter of Acceptance.
6.	Minimum amount of Third Party Insurance	21.1 23.2	Rupees Five hundred thousand (Rs. 500,000) per occurrence with number of occurrences unlimited.
7.	Time for Commencement	41.1	Within seven (7) days from the date of Engineer's Notice to Commence which shall be issued within seven (7) days after signing of Contract Agreement.
8.	Time for Completion	43.1	03 Calendar Months from the date of Engineer's Notice to Commence.
9.	Amount of Liquidated Damages	47.1	Zero point three three percent (0.33%) for each day of delay in completion of the Works subject to a maximum of ten percent (10%) of Contract Price stated in Letter of Acceptance.
10.	Amount of Bonus	47.3	Not Applicable

11.	Defects Liability Period	49.1	Twelve (12) Calendar Months from the effective date of Taking Over Certificate.
12.	Percentage of Retention Money	60.2	05 percent (5%) of the amount of Interim Payment Certificate.
13.	Limit of Retention Money	60.2	Five percent (5%) of Contract Price stated in Letter of Acceptance.
14.	Minimum amount of Interim Payment Certificates (Running Bills)	60.2	30% of Contract Price.
15.	Time of Payment from delivery of Engineer's Interim Payment Certificate to the Employer	60.10	Fourteen (14) days
16.	Mobilization Advance	60.11	Ten percent (10%) of Contract Price stated in the Letter of Acceptance against Bank Guarantee, of an equivalent amount, from Scheduled Bank in Pakistan.

Authorized Signature and official Seal: _____

Name: _____

Date: _____

FOREIGN CURRENCY REQUIREMENTS

NOT USED

Authorized Signature and official Seal: _____

Name: _____

Date _____

PRICE ADJUSTMENT UNDER CLAUSE 70 OF CONDITIONS OF CONTRACT

Not Used

Authorized Signature and official Seal: _____

Name: _____

Date: _____

APPENDIX D TO BID

SCHEDULE OF PRICES (Bill of Quantities)

1. Preamble to Schedule of Prices

2. Schedule of Prices
   (a) Summary of Bid Prices

   (b) Detailed Schedule of Prices

PREAMBLE TO SCHEDULE OF PRICES

1. General

1.1 The Schedule of Prices shall be read in conjunction with the Conditions of Contract, Specifications, Drawwings, List of approved Manufacturer's etc.

1.2 The Contract shall be for the whole of the Works as described in these Bidding Documents. Bids must be for the complete scope of works.

2. Description

2.1 The general directions and descriptions of works and materials are not necessarily repeated nor summarized in the Schedule of Prices. References to the relevant sections of the Bidding Documents shall be made before entering prices against each item in the Schedule of Prices.

3. Units & Abbreviations

3.1 Units of measurement, symbols and abbreviations expressed in the Bidding Documents shall comply with the oot-pound-second system of units.

4. Rates and Prices

4.1 Except as otherwise expressly provided under the Conditions of Contract, the rates and amounts entered in the Schedule of Prices shall be the rates at which the Contractor shall be paid and shall be the full inclusive value of the works set forth or implied in the Contract; except for the amounts reimbursable, if any to the Contractor under the Contract.

4.2 Unless otherwise stipulated in the Contract Data, the rates and prices entered by the bidder shall not be subject to adjustment during the performance of the Contract.

4.3 All duties, taxes and other levies shall be included in the rates and prices.

4.4 The whole cost of complying with the provisions of the Contract shall be included in the items provided in the Schedule of Prices, and where no items are provided, the cost shall be deemed to be distributed among the rates and prices entered for the related items of the Works and no separate payment will be made for those items.

The rates, prices and amounts shall be entered against each item in the Schedule of Prices. Any item against which no rate or price is entered by the bidder will not be paid for by the Employer when executed and shall be deemed covered by the rates and prices for other items in the Schedule of Prices.

4.5 (a) The bidder shall be deemed to have obtained all information as to and all requirements related thereto which may affect the bid price.

(b) The Contractor shall be responsible to make complete arrangements for the transportation of the Plant to the Site.

4.6 The Contractor shall provide for all parts of the Works to be completed in every respect. Notwithstanding that any details, accessories, etc. required for the complete installation and satisfactory operation of the Works, are not specifically mentioned in the Specifications, such details shall be considered as included in the Contract Price.

5. Bid Prices

5.1 Break-up of Bid Prices

The various elements of Bid Prices shall be quoted as detailed by the Employer in the format of Schedule of Prices.

The bidder shall recognize such elements of the costs which he expects to incur the performance of the Works and shall include all such costs in the rates and amounts entered in the Schedule of Prices.

5.2 Total Bid Price

The total of bid prices in the Schedule of Prices shall be entered in the Summary of Bid Prices.

EXIM BANK OF PAKISTAN

RENOVATION OF EXIM BANK OFFICE AT 5TH FLOOR BAHRIA COMPLEX, KARACHI

SUMMARY OF BID PRICE

		DESCRIPTION	AMOUNT IN PAK.RUPEES
1	C.	CIVIL WORKS	
2	E.	ELECTRICAL WORKS	
3	T.	TELECOMMUNICATION WORKS a) CABLING, PASSIVE EQUIPMENTS & RELATED ITEMS b) FIRE ALARM, ACCESS CONTROL, CATV & MISC ITEMS c) ACTIVE EQUIPMENTS	
4	FS.	FIRE SUPPRESSION SYSTEM (Automatic Portable Clean agent Extinguishers)	
5	H.	HVAC WORKS	
6	G	60KVA DG Set including relevant components	
7	FU	Supply of Furniture	
8		**SUB-TOTAL BID PRICE (1+2+3+4+5+6+7) (Rs.)**	
9		**Add Sindh Sales Tax on Services @13% on 8**	
10		**TOTAL BID PRICE (8+9)**	

TOTAL BID PRICE IN WORDS (8+9)

(Rupees .....)

National Engineering Services Pakistan Ltd. A&P DIVISION Karachi

EXIM BANK OF PAKISTAN

RENOVATION OF EXIM BANK OFFICE AT 5TH FLOOR BAHRIA COMPLEX, KARACHI

CIVIL WORKS **BILL OF QUANTITIES**

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT RATE (Rs)	TOTAL AMOUNT (Rs)
	C. CIVIL WORKS Providing, fabricating and applying at any height except where otherwise stated in the specific item of the Bill of Quantities including all material, labour, plant etc. for the following items complete in all respects as per drawings, approved shop drawings, technical specifications, miscellaneous details and instructions by the Architect.				
01-01C	Demolition of existing interior partition walls, removal of existing floor, false ceiling, electrical wiring / fittings / fixtures, all useable materials will be property of the Employer and Contractor shall shifted at the designated place as instructuted by the Employer / Architect. The Contractor will remove all the debris & demolished/un-usable materials from site to out of municipal limits and/or as directed by Architect.	Job	1		
	Unit Rate in words				
	BLOCK MASONRY				
01-02C	Providing and laying cement concrete machine made **solid block masonry** in super structure using graded screened 'bajri' set in 1:5 cement sand mortar including staging, raking out joints, curing etc., complete in all respects and/or as directed by the Engineer.				
	a) 4" thick	Cft	15		
	Unit Rate in words				
	b) 6" thick	Cft	330		
	CEMENT PLASTER				
01-03C	Providing and laying plaster with cement sand mortar mortar with G.I. expanded metal at the interfaces of structures of different materials in staging and curing etc. complete in all respects and/or as directed by the Engineer.				
	a) 1/2" thick 1:6 cement sand mortar	Sft.	1,180		
	Unit Rate in words				

RENOVATION OF EXIM BANK OFFICE AT 5TH FLOOR BAHRIA COMPLEX, KARACHI

CIVIL WORKS **BILL OF QUANTITIES**

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT RATE (Rs)	TOTAL AMOUNT (Rs)
01-04C	Providing and laying full body **Porcelain tile** ***locally made premium quality tiles of reputable brands*** on floor of the following approved quality colour/shade, surface preparation by scratching/tucking existing surface, cement sand motar mixed with tile bond, filling the joint with matching grouting, washing, cleaning and curing etc. complete in all respects floor pattern as per drawings/details and/or as directed by the Architect.				
	a) Porcelain tile 24"X24"	Sft.	1,900		
	Unit Rate in words				
	b) Porcelain tile 4"X24" Wooden Texture	Sft.	1,200		
	Unit Rate in words				
	c) Porcelain tile 12"X24"	Sft.	100		
	Unit Rate in words				
01-05C	Same as above item **skirting/dado** with 1/2" thick base plaster complete in all respects and/or as directed by the Architect.				
	a) 4" high skirting	Sft.	330		
	Unit Rate in words				
	b) 8'-0" high dado 12" x 24"	Sft.	450		
	Unit Rate in words				
01-06C	Providing and laying **carpet tile** 50cmX50cmX6mm thick (F-CUBE or Approved) of approved quality, colour/shade, pasted with approved bonding agent including cement concrete base floor to match with the floor level (carpet+base floor) complete in all respects shown on drawings/details and or as directed by the Engineer (CEO-01, C-01 & M-01).	Sft.	920		
	Unit Rate in words				
01-7C	Providing and laying **Raised Floor** in Server Room complete in all respects shown on drawings/details and or as directed by the Engineer.	Sft.	165		

RENOVATION OF EXIM BANK OFFICE AT 5TH FLOOR BAHRIA COMPLEX, KARACHI

CIVIL WORKS **BILL OF QUANTITIES**

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT RATE (Rs)	TOTAL AMOUNT (Rs)
01-07C	Wooden Wall cabinet having laminated MDF shutters & Shelves fixed on base partal wood framing with hardwares, locks etc., complete in all respect as shown on drawings & or as directed by the Architect. (WS-08 & 09)	Sft	170		
	Unit Rate in words				
01-08C	Aluminium powder coated doors, fixed glazing of approved manufacturer using 2mm thick extruded sections, glazed with 8mm thick tempered glass including lock, handles, wooden door shutter, including all accessories, hardwares, PVC/rubber gasket and sealant etc. complete in all respects as shown on drawings/details and/or as directed by the Architect.				
	a) Aluminium Fixed glazing	Sft.	800		
	Unit Rate in words				
	b) Aluminium Glazed doors	Sft.	200		
	Unit Rate in words				
	c) Wooden flush door shutters of approved quality fixing in already fixed aluminium frame with powder coated hardwares, fittings & all others accessories and polishing etc.	Sft.	144		
	Unit Rate in words				
	RECEPTION				
01-09C	Supply & fixing Company logo & name in acrylic sheet pasted on painted MDF Dry wall complete in all respects as shown on drawings and as or directed by the Architect.	Job	1		
	Unit Rate in words				
01-10C	Supply & fixing of pattern tile on existing concrete/masonry walls with base mortar complete in all respects as shown on drawings & or as directed by the Architect	Sft	120		
	Unit Rate in words				
01-11C	Supply & fixing of dry wall partition in partal wood frame with 1/2" & 1" thick (as per pattern) MDF fixed on both sides, ply pasting in grooves and lamination complete in all respects as shown on drawings & or as directed by the Architect	Sft	120		
	Unit Rate in words				

RENOVATION OF EXIM BANK OFFICE AT 5TH FLOOR BAHRIA COMPLEX, KARACHI

CIVIL WORKS **BILL OF QUANTITIES**

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT RATE (Rs)	TOTAL AMOUNT (Rs)
01-12C	Providing and fixing in position suspended ceiling as per pattern, consisting of 12mm thick gypsum board of "ARISH" brand Pakistan or approved equivalent with G.I. suspension system including 3 coats of matt enamel paint finish of approved quality colour/shade, primer coat, making bulk head, access panel, light pelmet etc. complete in all respects and/or as directed by the Architect.	Sft.	220		
	Unit Rate in words				
01-13C	Providing & fixing egg crate ceiling on specified area with original finish & suspension system as per manufacturer's recomendation complete in all respect as shown on drawings and/or as directed by the Architect.	Sft.	120		
	Unit Rate in words				
01-14C	Providing & fixing of ply pasting with texture coating on MDF dry wall with partal wood frame complete in all respect as shown on drawings and/or as directed by the Architect.	Sft.	110		
	Unit Rate in words				
01-15C	Provide, making & fixing of wooden reception counter as shown on drawings & or as directed by the Architect.	Job	1		
	Unit Rate in words				
01-16C	Provide & fixing of Automatic glazed door with fixed glazing using 12mm tempered glass including all hardwares, fittings, accessories and related electrical works as per manufacturere's recommendations complete in all respects and/or as directed by the Architect.	No.	1		
	Unit Rate in words				
01-16C (A)	Provide and making **Planter area** comprising of partal wood frame with granite boxing in required size filled with mix pebbles of approved size & ceramic pots with plants etc. complete in all respects as shown on drawings/details and/or as directed by the Architect.				
	a) Planter - 01 (Size 5'X2')	Job	1		
	Unit Rate in words				
	b) Planter - 02 (Size 12'X2')	Job	1		
	Unit Rate in words				

RENOVATION OF EXIM BANK OFFICE AT 5TH FLOOR BAHRIA COMPLEX, KARACHI

CIVIL WORKS **BILL OF QUANTITIES**

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT RATE (Rs)	TOTAL AMOUNT (Rs)
	CONFERENCE ROOM				
01-17C	Engineered wooden wall panelling over existing wall fixed with base partal wood framing including 2mm imported laminate pasting with aluminium strips of 10mm powder quoted etc., complete in all respects as shown on drawings and/or as directed by the Architect.	Sft.	180		
	Unit Rate in words				
01-18C	Providing, making and fixing over 6" thick masonry TV Screen wall comprising 1/2" thick MDF board fixed on partal wood frame, ply pasting and polishing with grooves at top surface and fixing complete in all respects as shown on drawings and/or as directed by the Architect.	Sft.	130		
	Unit Rate in words				
01-19C	Providing, making and fixing Decoratives Niches with MDF 2mm imported laminate finish on partal wood frame as per design complete in all respects as shown on drawings and/or as directed by the Architect.	Sft.	131		
	Unit Rate in words				
	RECORD, ELECTRICAL, STORE & SERVER ROOM				
01-20C	4" thick MDF partion wall comprising 1/2" thick MDF both side, partal wood framing, stainless paint of approved quality with grooves etc. complete in all respects as shown on drawings/details and/or as directed by the Engineer.	Sft.	505		
	Unit Rate in words				
01-21C	Supply & Installation of G.I perforated Store Racks 8ft High & 18" depth accessible from both sides complete in all respects as shown on drawings & or as directed by the Architect.	Rft.	18		
	Unit Rate in words				

RENOVATION OF EXIM BANK OFFICE AT 5TH FLOOR BAHRIA COMPLEX, KARACHI

CIVIL WORKS **BILL OF QUANTITIES**

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT RATE (Rs)	TOTAL AMOUNT (Rs)
	PARTITION WALL				
	CEO ROOM				
01-22C	Proived, make and fix CEO Room (CE0-01) 4" thick MDF partition wall comprising 3/4" thick MDF board with veneer ply of approved quality, colour/texture, pasted & powder coated aluminium strips in office & out-side 1/2" thick MDF boad with painting approved quality, colour/shed including patal wood framing, fixing accessories, hardwares and polishing etc. complete in all respects as shown on drawings and/or as directed by the Engineer.	Sft.	105		
	Unit Rate in words				
	EXECUTIVE ROOM				
01-23C	Proived, make and fix **Executive** (EX-01, 02, 03) 4" thick MDF partition wall comprising 1/2" thick MDF board with 2mm imported lamination & glass panel (8mm Thick tempered) as per pattern specified in drawings, complete in all respects as shown on drawings and/or as directed by the Architect.	Sft.	210		
	Unit Rate in words				
	MEETING ROOM				
01-24C	4" Thick MDF partition wall comprising partal wood frameing including approved stainless painting/texture complete in all respects.	Sft.	100		
	Unit Rate in words				
01-25C	4" Thick MDF partition wall comprising partal wood framing and ply vaneer painted with stainless paint on one side and MDF with imported lamination on other side, complete in all respects as shown on drawings/details and/or as directed by the Engineer.	Sft.	300		
	Unit Rate in words				
01-26C	4" Thick MDF partition wall comprising partal wood framing and ply vaneer painted with stainless paint, complete in all respects as shown on drawings/details and/or as directed by the Engineer.	Sft.	100		
	Unit Rate in words				

RENOVATION OF EXIM BANK OFFICE AT 5TH FLOOR BAHRIA COMPLEX, KARACHI

CIVIL WORKS **BILL OF QUANTITIES**

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT RATE (Rs)	TOTAL AMOUNT (Rs)
01-27C	4" Thick dry wall partition with MDF laid in panels laminated and groove filled PVC strip filling, complete in all respects as shown on drawings / details and/or as directed by the Engineer.	Sft.	1,100		
	Unit Rate in words				
01-28C	MDF column cladding comprising Partal wood framing, 1/2" thick MDF board, aluminuim grooves with ply vaneer & polish etc. complete in all respects as shown on drawings and/or as directed by the Architect.	Sft.	1,010		
	Unit Rate in words				
01-29C	Providing and fixing in position suspended ceiling as per pattern, consisting of 12mm thick **gypsum board** of **"ARISH"** brand Pakistan or approved equivalent with G.I. suspension system including 3 coats of matt enamel paint finish of approved quality colour/shade, primer coat, making bulk head, access panel, light pelmet etc. complete in all respects and/or as directed by the Architect.	Sft.	3,350		
	Unit Rate in words				
01-30C	Providing and fixing 12mm thick **MDF laminated false ceiling as approved by Architect** with frame, suspension system. complete in all respects as shown drawings and/or as directed by the Architect.	Sft.	830		
	Unit Rate in words				
01-31C	Providing and fixing wooden doors comprising G.I. door frame/chowkhat, solid core laminated door shutter including cement concrete filling (1:2:4), deodar wood lipping, beading/architrave, all hardwares, accessories, painting & polishing etc. (as per schedule) complete in all respects as shown on drawings and/or as directed by the Architect.				
	a) Executive Toilet	Sft.	20		
	Unit Rate in words				
01-32C	Wooden louvers door to be fixed on Electrical Distribution Boards comprising wooden louvers shutter including all other accessories, hardwares and polishing etc. complete in all respects.	Sft.	12		
	Unit Rate in words				

A&P DIVISION Karachi

RENOVATION OF EXIM BANK OFFICE AT 5TH FLOOR BAHRIA COMPLEX, KARACHI

CIVIL WORKS **BILL OF QUANTITIES**

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT RATE (Rs)	TOTAL AMOUNT (Rs)
01-33C	Providing & fixing **roller window blinds** of approved quality & colour/shade (The Protector or approved equivalent) with all other accessories, harwares and fittings etc. complete in all respects and/or as directed by the Engineer.	Sft.	900		
01-34C	Providing and applying 3 coats of **stainless paint** of approved quality, colour/shed with primer, smooth filling to internal masonry / concrete surfaces including removal of existing/old paint and surface preparation etc. complete in all respects and/or as directed by the Architect.	Sft.	2,000		
01-35C	Providing, making & fixing seats with base cabinets with partal wood frame comprising 3/4" thick MDF laminated board, PVC lipping all around, premimium quality cushioning with fabic , hardware & handles of approved quality including 2" thick partition wall etc. complete in all respects as shown on drawings/details and/or as directed by the Architect.	No.	3		
01-36C	Refurbishment & repair of all existing windows comprising replacing of brokan glasses, rubber gaskets, silicon sealant, locks, sliding rollers and proper cleaning etc. complete in all respects and/or as directed by the Architect.	Job	1		
01-37C	Providing, making & fixing Racks with planter box comprising 3/4" thick MDF laminated board, PVC lipping all around including 2" x2" wooden frame, water proof planter box of corion and polishing etc. complete in all respects as shown on drawings/details and/or as directed by the Architect.	No.	7		

RENOVATION OF EXIM BANK OFFICE AT 5TH FLOOR BAHRIA COMPLEX, KARACHI

CIVIL WORKS **BILL OF QUANTITIES**

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT RATE (Rs)	TOTAL AMOUNT (Rs)
01-38C	**Executive Toilet Plumbing Works** comprising one piece westren style W.C, Counter type Wash basin (approved quality/make), vanity counter with 3/4" thick granite top & appron bull nosing, water supply & sewerage lines, muslim shower, basin mixer, electric water geyser (9 Gallons Capacity), stop cocks, connection pipes, looking glass mirror, soap dish, nepkin holder, hand dryer, connection with existing water supply & sewerage system, water proofing treatment of entire area of floor & wall upto 1ft. high and restoration of connection holes making good in its original condition with water proofing treatment as per manufaturer's instruction complete in all respects as shown on drawings/details and/or as directed by the Architect.	Job	1		

Total Civil Works -
(Carried over to summary)

LIST OF APPROVED MANUFACTURERS/BRANDS OF MATERIALS/EQUIPMENT

These lists of recommended manufactures/suppliers of different materials/equipment with brand names have been provided in order to establish a standard level of performance. The Contractor is bound provide and fix the materials/equipment of superior quality approved by the Engineer only from the list.

Sr. No.	Materials	Manufactures
1.	Block/Bricks, Sand, Crushed Stone Aggregate	Source as approved by the Engineer
2.	Cement	(i) Dewan, (ii) Falcon, (iii) Javedan, (iv) Lucky, (v) D.G.
3.	Bathroom Tiles	Premium quality Locally made
4.	Porcelain Tiles	Premium quality Locally made
5.	MDF	(i) Pakistan cardboard (ii) Al noor
6.	Laminated Floor	(i) First Floor (ii) Al noorLasan (iii)interwood
7.	Carpet Tiles	(i) Milliken (ii) Pak carpet
8.	Paints & Varnish	(i) ICI, (ii) Jotun. (iii)Brigto
9.	Hardware Stays, Hinges, Handles & Door Locks	(i) DORMA (ii)Yale
10.	Lamination Boards / Veneer Boards	(i) Al-Noor (ii)Formite
11.	Formica	(i) Al-Noor(ii)Formite
12.	Glass, Tinted glass / Double Glasses Tempered / Reflected / Wired Glass / Mirror Glass	(i) Gunj Glass, (ii) Ghani Glass, (iii) Pakistan Safety Glass.(iv) St. Gobin
13	Wall Coatings	(i) Al noor (ii) Rock wall or quavalent
14.	Gypsum Board False Ceiling(2' x 2') including Suspension System	(i) Boral, (ii) Gyproc (iii) United.
15.	Marble / Granite	Local Marble,Imported Granite (European)(As per Selection)
16.	Wooden Door	(i) Home pro (ii) Sterling (iii) Interwood or approved as per Specification/Drawings
17.	**Termite Proofing** For Soil For Wood	 (i) Biflex, (ii) Merage (iii) Bio Wood, (iv) Power Max, (v) Solignum (vi) Biflies
18.	Construction Chemicals	(i) CORMIX International Ltd, (ii) SIKA, (iii) Fosroc, (iv) Vandex.
19.	Aluminum for doors, windows and façade products	(i) ALCOP, (ii) Prime, (iii) Pakistan Cables
20.	Blinds	(i) Thermic (ii) Protector (iii) Marvi Interior

- All Materials to be procured according to the Material Board specified by the Architect.

LIST OF APPROVED MANUFACTURERS/BRANDS OF MATERIALS/EQUIPMENT

This list of recommended manufactures/suppliers of different materials/equipment with brand names have been provided in order to establish a standard level of performance. The Contractor is bound to provide and fix the materials/equipment of superior quality approved by the Engineer only from the list.

Sr. No.	Materials	Manufactures
1.	GI Pipe	IIL, Jamal
2.	Valves all types	Kitz, Econosto
3.	Stainless Steel Sink	Atlas, Super Asia, Master
4.	CI Pipe, Fittings & manhole covers	Alpine (Supper)
5.	uPVC Pipe (Non Pressure Pipe)	Dadex, AGM, Jeddah, Pak Arab
6.	ASTM A-53, API 5L Pipe (Seamless Pipes for Fire Fighting)	Huffaz, approved equivalent.
7.	Fire Hose Cabinets	Haseen Habib, Fire Chief
8.	Portable fire extinguishers	NAFFCO, SRI
9.	Concrete Pipe & Fittings	Pakistan Pipe, Sindh pipe
10.	Sanitary Fixtures	Porta, American Standard, Grohe
11.	Flush Tank	Master, Roca
12.	Sanitary Fittings (Local)	Master, Sonex, Grohe
13.	Pumps	KSB, Grundfos
14.	Geysers	Singer, Nasgas
15.	PPR Pipe	Palling, Hepworth
16.	Water cooler	Mecco, Sunny
17.	Pipe insulation	Iqbal Sons, Afico
18.	Electric water heater	Atlas, Nasgas
19.	Fiber Glass	Popular

EXIM BANK OF PAKISTAN
RENOVATION OF EXIM BANK OFFICE AT 5TH FLOOR BAHRIA COMPLEX, KARACHI

ELECTRICAL WORKS **BILL OF QUANTITIES**

Item No.	Description	Unit	Qty.	Unit Rate (Rs.)	Amount (Rs.)

EA ELECTRICAL WORKS

Ref Spec Sec: 8001, Approved List of Manufacturer's in Vol-I

Supply, installation, testing and commissioning of the following items of work (unless specifically stated otherwise) including all material, labour, tool, plant, accessories, related civil works etc required for proper completion of each item as per specifications. The contractor is bound to submit hard & soft copy of all relevant standard, data, information, literature, drawings, submittals etc. as per specifications & approved manufacturers list to the Engineer for necessary approvals. The contractor shall directly procure material from factory source or the authorized dealers. The Contractor shall provide in support the delivery challan or other documents as required from factory or from supplier including letter of authorization for dealership, sole agent, distributor from the principal, for ensuring the quality, warranty and guarantee of purchased equipment. Note: In case of any discrepancy found between BoQ, Specifications and drawings, then BoQ and Specifications will govern.

LT DISTRIBUTION BOARDS

Ref Spec Sec: 8133, 8212, 8240

1-1EA Following 16 SWG MS sheet, recessed or surface mounted on wall or floor LT Distribution Boards (as per single line diagram shown on drawings) including electrical & mechanical components, electrolytic tinned copper busbars, control wiring, related civil works and all accessories, complete in all respect. Make as per approved list in Vol-I.

a) EDB-2F-1.1 (Recessed Type) Job. 1

Unit Rate in words_____

b) UDB-2F-1.1 (Recessed Type) Job. 1

Unit Rate in words_____

c) UDB-2F-1.2 (Recessed Type) Job. 1

Unit Rate in words_____

d) UDB-2F-1.3 (Recessed Type) Job. 1

Unit Rate in words_____

ELECTRICAL WORKS **BILL OF QUANTITIES**

Item No.	Description	Unit	Qty.	Unit Rate (Rs.)	Amount (Rs.)

LIGHT FIXTURES
Ref. Specs Sec. 8150, 8212, 8240

1-2EA Following LED light fixtures (Flicker Free) installed on surface or wall or floor or false ceiling or columns with lamps, holders, ballasts, starters, ignitors, capacitors, drivers as applicable, including mounting accessories, complete in all respect. The contractor shall be reponsible for compatibility of light fixtures with false ceiling as proposed in architectural design. The light fixtures & components shall be certified by international accredited laboratory and complete test certificates and associated reports shall be submitted for approval. Make as per approved list in Vol-1.

a) Type – DL1 no. 9
Surface mounted LED downlight SMD fixture 150 mm or less dia, 1000 lumens light output, 13 W or less, die cast aluminium housing and heat sink, 4000K, CRI 80, LED output driver (PF 0.9), IP20

Unit Rate in words_____

b) Type – DL2 no. 10
Surface mounted LED downlight SMD fixture 150 mm or less dia, 1000 lumens light output, 13 W or less, die cast aluminium housing and heat sink, 4000K, CRI 80, LED output driver (PF 0.9), IP20

Unit Rate in words_____

c) Type – MS1 no. 22
Recessed mounted multiple LED adjustable spot light fixture, 100 mm or less dia, 2x350 lumens output, 2x5 W or less, 24 deg beam, 4000K, CRI 80, LED output driver (PF 0.9)

Unit Rate in words_____

d) Type – MS2 no. 66
Recessed mounted multiple LED adjustable spot light fixture, 100 mm or less dia, 2x500 lumens output, 2x8 W or less, 36 deg beam, 4000K, CRI 80, LED output driver (PF 0.9)

Unit Rate in words_____

e) Type – MS3 no. 35
Recessed mounted multiple LED adjustable spot light fixture (maximum 100 mm or less dia) 3x750 lumens output, 3x12 W or less, 36 deg beam, 4000K, CRI 80, LED output driver (PF 0.9)

Unit Rate in words_____

ELECTRICAL WORKS **BILL OF QUANTITIES**

Item No.	Description	Unit	Qty.	Unit Rate (Rs.)	Amount (Rs.)
	f) Type – PD1 Decorative long cylindrical pandent light fixture (maximum 100 mm or less dia) 350 lumens output, 5 W or less, aluminium body, 15 degree beam angle, 4000K, CRI 80, LED output driver (PF 0.5), IP20, suitable length of suspension system and mounting accessories including canopy & pandent holder. **Unit Rate in words**_____	no.	8		
	g) Type - PL1 Recessed mounted LED light fixture 100 mm (W) x 1200 mm (L), 4000 lumens output, UGR<19, 40 W or less, 100 deg beam, 4000K CRI 80, built-in driver (PF 0.9), recessed mounted frame from original manufacturer, IP20, Philips / Signify RC095V **Unit Rate in words**_____	no.	17		
	h) Type - PL2 Recessed mounted LED panel light fixture, 600 x 600 mm, 4000 lumens output, 40 W or less, 120 deg beam, 4000K, CRI 80, LED output driver (PF 0.9), IP20 **Unit Rate in words** _____	no.	21		
	i) Type – SP1 Recessed mounted LED adjustable spot light fixtue 100 mm or less dia, 500 lumens light output, 5 W or less, 36 deg beam, 4000K, CRI 80, LED output driver (PF 0.5), IP20 **Unit Rate in words**_____	no.	32		
	j) Type – SP2 Recessed mounted LED adjustable spot light fixture 100 mm or less, 750 lumens light output, 12 W or less, 36 deg beam, 4000K, CRI 80, LED output driver (PF 0.5), IP20. **Unit Rate in words**_____	no.	13		
	k) Type – ST1 LED flexible strip (suitable for curved or cornor surfaces) 1200 lumens light output, 15 W or less, 3000K, CRI 80, LED output driver (PF 0.9), IP65 **Unit Rate in words**_____	Rft	50		

ELECTRICAL WORKS **BILL OF QUANTITIES**

Item No.	Description	Unit	Qty.	Unit Rate (Rs.)	Amount (Rs.)

EMERGENCY LIGHTING FIXTURE
Ref. Specs Sec. 8150, 8212, 8240

1-3EA Following LED light fixtures (Flicker Free) installed on surface or wall or floor or false ceiling or columns with lamps, holders, ballasts, starters, ignitors, capacitors, drivers, battery backup unit as applicable, including mounting accessories, complete in all respect. The contractor shall be reponsible for compatibility of light fixtures with false ceiling as proposed in architectural design. The light fixtures & components shall be certified by international accredited laboratory and complete test certificates and associated reports shall be submitted for approval. Make as per approved list in Vol-I.

a) Type – EB1 no. 10
Recessed mounted, non-maintained type double head emergency light fixture, 6.5 W, with ni-cd battery backup unit for 3 hours standby operation, over charge & discharge protection, 3 no. indication light for power, charging & fault, test button, IP65 ingress protection

Unit Rate in words_____

b) Type – EB2 no. 1
Recessed mounted, non-maintained type emergency light fixture, 3.5 W with ni-cd battery backup unit for 3 hours standby operation, over charge & discharge protection, 3 no. indication light for power, charging & fault, test button, IP65 ingress protection

Unit Rate in words_____

c) Type – EX1 (Single Side Visual Indication) no. 5
Recessed mounted or Surface mounted or suspended including suspension system with base, non maintained type emergency exit light fixture with sign & direction pictograms, with ni-cd battery backup unit for 3 hours standby operation,over charge & discharge protection, 3 no. indication light for power, charging & fault, test button, IP30 ingress protection (Note: The light fixture quanity for surface mounted or suspended shall be evaluated by the contractor as per site conditions)

Unit Rate in words_____

ELECTRICAL WORKS **BILL OF QUANTITIES**

Item No.	Description	Unit	Qty.	Unit Rate (Rs.)	Amount (Rs.)
	d) Type – EX2 (Double Side Visual Indication) Recessed mounted or Surface mounted or suspended including suspension system with base, non maintained type emergency exit light fixture with sign & direction pictograms, with ni-cd battery backup unit for 3 hours standby operation,over charge & discharge protection, 3 no. indication light for power, charging & fault, test button, IP30 ingress protection (Note: The light fixture quanity for surface mounted or suspended shall be evaluated by the contractor as per site conditions)	no.	1		
	Unit Rate in words_____				
	LT CABLES Ref. Specs Sec. 8212, 8240				
1-4EA	Following sizes, 600/1000 V, Single core or multi core, copper conductor, PVC insulated, armoured / unarmoured, PVC Sheathed cable pulled in already installed surface mounted conduits or concealed conduits or cable tray or concrete ducts or underground in already excavated trenches or in already laid PVC pipes including tags, ties, lugs, termination kits, colour sleeves, cable glands, bushes etc., all related accessories, complete in all respect. Make as per approved list in Vol-I.				
	a) 4 core, 35 mm^2, Cu/PVC/PVC	Rft	500		
	Unit Rate in words_____				
	b) 4 core, 16 mm^2, Cu/PVC/PVC	Rft	250		
	Unit Rate in words_____				
	WIRING Refer Spec Sec: 8212, 8220, 8230, 8240, 8290				
1-5EA	Wiring of light circuits from distribution board (DB) to point/switch including wiring between switches on the same circuit with 3 no. (1 x 2.5 mm^2 as phase, neutral & CPC) single core Copper conductor PVC cable complete with appropriate size concealed (minimum 1" dia) / surface mounted PVC conduit and all accessories etc. complete in all respects. Make as per approved list in Vol-I.	no.	25		
	Unit Rate in words_____				

ELECTRICAL WORKS **BILL OF QUANTITIES**

Item No.	Description	Unit	Qty.	Unit Rate (Rs.)	Amount (Rs.)
1-6EA	Wiring from light/exhaust fan point to switch with 3 no. (1 x 1.5 mm^2 as phase, neutral & CPC) single core copper conductor PVC cable complete with appropriate size concealed (minimum 1" dia) / surface mounted PVC conduit, ceiling rose, 10A light control gang switch, sheet steel back box, 3 core flexible cable and all accessories etc. complete in all respects. Make as per approved list in Vol-I.	no.	124		
	Unit Rate in words_____				
1-7EA	Same as above item 01-5E but wiring from point to point.	no.	124		
	Unit Rate in words_____				
1-8EA	Wiring of 250V socket outlets with following size single core, copper conductor PVC cables complete with appropriate size concealed (minimum 1" dia)/surface mounted PVC conduit and all accessories, etc. complete in all respects. Make as per approved list in Vol-I.				
	a) From Distribution Board (DB) to outlet with 3 no. (1 x 4.0 mm^2 as as phase, neutral & CPC)	no.	28		
	Unit Rate in words_____				
	b) From outlet to outlet with (1 x 2.5 mm^2 as phase, neutral & CPC)	no.	129		
	Unit Rate in words_____				
	c) From outlet to outlet three feet loop with (1 x 2.5 mm^2 as phase, neutral & CPC)	no.	45		
	Unit Rate in words_____				
1-9EA	Wiring from distribution board to load break switch / circuit breaker box / socket outlet with 3 no. (1 x 6 mm^2 as phase, neutral & CPC) single core copper conductor PVC cable, complete with appropriate size concealed (minimum 1" dia) / surface mounted PVC conduit and all accessories, etc. complete in all respects. Make as per approved list in Vol-I.	no.	30		
	Unit Rate in words_____				

ELECTRICAL WORKS **BILL OF QUANTITIES**

Item No.	Description	Unit	Qty.	Unit Rate (Rs.)	Amount (Rs.)

WIRING ACCESSORIES
Ref. Specs Sec. 8220

Make MK, Schneider,ABB, Legrand, Signify

1-10EA Following types of socket outlets including all accessories, complete in all respect. Make as per approved list in Vol-I.

a) Ceiling rose (A1 superior quality) no. 300

Unit Rate in words_____

b) 10 A light control gang switch (Rocker Type) - decorative high end series no. 350

Unit Rate in words_____

c) Concealed sheet steel back box with earth point for switches and fan dimmer (3 inch by 3 inch) no. 570

Unit Rate in words_____

d) 13 A, 250 V, 3 pin universal type, switched socket outlet no. 157

Unit Rate in words_____

e) 13 A, 250 V, single phase shavor socket outlet no. 5

Unit Rate in words_____

f) 13 A, 250 V, single phase spur outlet with fuse no. 5

Unit Rate in words_____

g) 15 A, 250 V, 3 pin, switch socket no. 5

Unit Rate in words_____

h) 45 A, double pole, 250 V, switch with neon indication unit no. 25

Unit Rate in words_____

i) 32 A, triple pole, 250 V, 3 pin, load break switch with rotatory on/off handle with back box, IP20 ingress protection no. 8

Unit Rate in words_____

CONDUITS & PIPES

ELECTRICAL WORKS **BILL OF QUANTITIES**

Item No.	Description	Unit	Qty.	Unit Rate (Rs.)	Amount (Rs.)

Ref. Specs Sec. 8230

1-11EA Following sizes of PVC conduit / pipes installed on surface / concealed in wall, slab & floor including pull wire and all accessories as required etc., complete in all respects. Make as per approved list in Vol-I.

a) 2" dia Rft 100

Unit Rate in words_____

b) 1-1/2" dia Rft 100

Unit Rate in words_____

c) 1-1/4" dia Rft 100

Unit Rate in words_____

EARTHING
Ref. Specs Sec. 8212, 8240

1-12EA Following sizes of single core PVC insulated copper conductor cable as earth continuity conductor (ECC) installed on surface or on already installed pipes / conduits / trenchs / cable tray etc., including tags, ties, lugs, termination kits, colour sleeves, cable glands, bushes etc., all related accessories, complete in all respect. Make as per approved list in Vol-I.

a) 35 mm^2 Rft 500

Unit Rate in words_____

b) 16 mm^2 Rft 300

Unit Rate in words_____

MISCELLANEOUS ITEMS
Ref. Specs Sec. 8290

1-13EA 250 x 250 x 56 mm underfloor box with 4 no. socket outlet frame, die cast aluminium alloy trap & frame 9 mm recess, in line surface finish without collar including all accessories, complete in all respect. Make as per approved list in Vol-I no. 10

Unit Rate in words_____

1-14EA Following (2.0 mm) thick G.I sheet coated perforated cable tray with 1.5mm thick solid cover including proper manufactured flexible expansion coupler, elbows, risers, tees, crosses, internal & external bends and fittings, galvanized support structure, all accessories, compelete in all respects. (Note: Welded connection is not allowed and prohibited). Make as per approved list in Vol-I

ELECTRICAL WORKS **BILL OF QUANTITIES**

Item No.	Description	Unit	Qty.	Unit Rate (Rs.)	Amount (Rs.)
1-14EA	Following (2.0 mm) thick G.I sheet coated perforated cable tray with 1.5mm thick solid cover including proper manufactured flexible expansion coupler, elbows, risers, tees, crosses, internal & external bends and fittings, galvanized support structure, all accessories, complete in all respects. (Note: Welded connection is not allowed and prohibited). Make as per approved list in Vol-I				
	a) 300 mm x 100 mm	Rft.	300		
	Unit Rate in words _____				
	b) 150 mm x 75 mm	Rft.	300		
	Unit Rate in words _____				
1-15EA	Following online double conversion UPS (30 min backup with batteries), input/output PF=1, three phase in/three phase out), static & manual bypass switches, parallel operation capability upto 4 numbers UPS of same rating, including in/out connections through suitable rating industrial sockets or any suitable arrangement, appropriate size floor mounting racks with lockable wheels for UPS and battery bank all accessories, complete in all respect. Make as per approved list in Vol-I				
	a) 20 KVA /20 kW	Job	2		
	Unit Rate in words _____				
	EARTHING Ref. Specs Sec. 8212, 8240				
1-16EA	Following sizes of tinned copper earth connecting point, including continuous mounting base all accessories, complete in all respect.				
	a) 6 ways (300 mm x 50mm x 6mm)	no.	5		
	Unit Rate in words _____				
	b) 12 ways (300 mm x 50mm x 6mm)	no.	5		
	Unit Rate in words _____				

Total Cost of Electrical Works
(Carried over to summary) Rs. _____

EXIM BANK OF PAKISTAN
RENOVATION OF EXIM BANK OFFICE AT 5TH FLOOR BAHRIA COMPLEX, KARACHI

TELECOMMUNICATION WORKS
(CABLING, PASSIVE EQUIPMENTS & RELATED ITEMS) **BILL OF QUANTITIES**

Item No.	Description	Unit	Qty.	Unit Rate (Rs.)	Amount (Rs.)

TA **TELECOMMUNICATION WORKS**
Ref Spec Sec: 8001, Approved List of Manufacturer's in Vol-I

Supply, installation, testing, commissioning of the following telecommunication work items (unless specifically stated otherwise). The specifications section 8001 and recommended list of manufacturer applicable to all BoQ items. The work includes all material, labour, tools, plant, storage, transportation, accessories, related civil works required for proper completion of each item. The Contractor is bound to provide submittals for the Engineer's approval with relevant standards, data sheets, catalog, brochures, manuals, shop drawings etc. Note: in case of any discrepancy found between BoQ, specifications and drawings, then BoQ/specifications will govern.

VOICE CABLING

1-1TA Following sizes of 16 SWG powder coated Telephone Distribution Frame with IDC connectors, channels including all components & accessories, complete in all respect. Make as per approved list in Vol-I

a) 100 Pair Distribution Box — no. 1

Unit Rate in words_____

1-2TA One gang, one port CAT-5e UTP RJ-45 shutter faceplate with keystone jack mounted on already installed recessed / surface moutned back box or floor box plate including all mounting accessories. Make as per approved list in Vol-I — no. 41

Unit Rate in words_____

1-3TA 24 portCAT-CAT-5e UTP LSZH 10 Giga Speed modular loaded (RJ45) jack patch panels compatible with 19" rack installed in floor/wall mounted cabinet including built-in rear cable management with all mounting accessories. Make as per approved list in Vol-I — no. 3

Unit Rate in words_____

1-4TA 19" Rack mounted front cable management with all installation & mounting accessories, complete in all respect. Make as per approved list in Vol-I — no. 3

Unit Rate in words_____

1-5TA Wiring from data outlet point to relevant building or floor distributor rack with CAT-5e UTP LSZH cable in already installed conduit or cable tray or cable trunking including all accessories complete in all respect. Make as per approved list in Vol-I — Point. 41

TELECOMMUNICATION WORKS
(CABLING, PASSIVE EQUIPMENTS & RELATED ITEMS) **BILL OF QUANTITIES**

Item No.	Description	Unit	Qty.	Unit Rate (Rs.)	Amount (Rs.)

Unit Rate in words_____

DATA CABLING

1-6TA One gang, one port CAT-6A UTP LSZH RJ-45 shutter faceplate with keystone jack mounted on already installed recessed / surface moutned back box or floor box plate including all mounting accessories. Make as per approved list in Vol-I — no. 60

Unit Rate in words_____

1-7TA One gang, two port CAT-6A UTP LSZH RJ-45 shutter faceplate with keystone jack mounted on already installed recessed / surface moutned back box or floor box plate including all mounting accessories. Make as per approved list in Vol-I — no. 1

Unit Rate in words_____

1-8TA 24 portCAT-CAT-6A UTP LSZH 10 Giga Speed modular loaded (RJ45) jack patch panels compatible with 19" rack installed in floor/wall mounted cabinet including built-in rear cable management with all mounting accessories. Make as per approved list in Vol-I — no. 8

Unit Rate in words_____

1-9TA 19" Rack mounted front cable management with all installation & mounting accessories, complete in all respect. Make as per approved list in Vol-I — no. 8

Unit Rate in words_____

1-10TA Wiring from data outlet point to relevant building or floor distributor rack with CAT-6A UTP LSZH cable in already installed conduit or cable tray or cable trunking including all accessories complete in all respect. Make as per approved list in Vol-I — Point. 62

Unit Rate in words_____

1-11TA Following type CAT-6A UTP LSZH 10 Giga Speed patch cord with RJ45 connector at both ends, including all accessories, complete in all respect. Make as per approved list in Vol-I

a) 1 meter (19 inchs) long — no. 25

Unit Rate in words_____

TELECOMMUNICATION WORKS
(CABLING, PASSIVE EQUIPMENTS & RELATED ITEMS) **BILL OF QUANTITIES**

Item No.	Description	Unit	Qty.	Unit Rate (Rs.)	Amount (Rs.)
	b) 2 meter (3 ft.) long	no.	25		
	Unit Rate in words_____				
	c) 3 meter (10 ft.) long	no.	60		
	Unit Rate in words_____				
	d) RJ45 to Fax Conversion Kit (upto 10ft length)	no.	5		
	Unit Rate in words_____				
	DATA RACK				
1-12TA	42U 19" server rack (800mm x 1100mm) with perforated front single door, split rear door, side panels & roof panel, including hoops, perforated panels, side management, two number cable trays, 2/4 fans tray, castors, feet, 4 brackets, no bottom, 2 number tray, including all mounting and installation accessories complete in all respect. (2 years warranty) Make as per approved list in Vol-I	Job	3		
	Unit Rate in words_____				
1-13TA	Power cabling for data rack single or three phase (as required) including industrial socket in already installed conduit or cable tray (as per site condition) from relevant connection point upto rack including all mounting and installation accessories complete in all respect. Make A-1 quality brand as approved.	Job.	1		
	Unit Rate in words_____				
	CCTV SYSTEM				
1-14TA	4"(W)x4"(L)x3"(D) Recessed sheet steel back box with cover plate for camera installation including all components & accessories, complete in all respect. Make A-1 quality brand as approved.	no.	11		
	Unit Rate in words_____				
1-15TA	4"(W)x4"(L)x3"(D) Recessed sheet steel back box with cover plate for camera installation including all components & accessories, complete in all respect (Future Provision). Make A-1 quality brand as approved.	no.	5		
	Unit Rate in words_____				
1-16TA	24 port CAT-6A UTP LSZH 10 Giga Speed modular loaded (RJ45) jack patch panels compatible with 19" rack installed in floor/wall mounted cabinet including built-in rear cable management with all mounting accessories. Make as per approved list in Vol I	no.	1		
	Unit Rate in words_____				

TELECOMMUNICATION WORKS
(CABLING, PASSIVE EQUIPMENTS & RELATED ITEMS) **BILL OF QUANTITIES**

Item No.	Description	Unit	Qty.	Unit Rate (Rs.)	Amount (Rs.)
1-17TA	19" Rack mounted front cable management with all installation & mounting accessories, complete in all respect. Make as per approved list in Vol-I **Unit Rate in words**_____	no.	1		
1-18TA	Wiring from CCTV point to relevant building or floor distributor rack with CAT-6A UTP LSZH cable laid in already installed conduit or cable tray or cable trunking including all accessories complete in all respect. Make as per approved list in Vol-I **Unit Rate in words**_____	no.	16		
	MISC CABLING				
1-19TA	High speed HDMI to HDMI 4K (upto 15 meter length) cable with connectors on both end laid in already installed conduit or cable tray or cable trunking including all accessories complete in all respect. Make A-1 quality brand as approved. **Unit Rate in words**_____	no.	10		
	TECHNOLOGY BOXES				
1-20TA	Supply & installation of Technology Boxes for board room & conference room with configration 2 x 3 pin power sockets, 2 x Ethernet port RJ45, 1 x VGA port, 1 x HDMI port, 1 x Audio Connector, 1 x USB, including all mounting accessories, complete in all respect. Make as per approved list in Vol-I **Unit Rate in words**_____	no.	4		
	PDU Unit				
1-21TA	Supply & installation of 32A, single phase, managed PDU Vertical Type with 12 number C13 & 4 number C19 output sockets, industrial plug, indicator & junction box, including all accessories complete in all respect. **Unit Rate in words**_____	no.	6		
1-22TA	Loop Cord C13/C14, including all accessories, complete in all respect. **Unit Rate in words**_____	no.	30		
	FLUKE AND OTDR TESTING				
1-23TA	Fluke Testing and Commissioning of all above network related items, termination and connectivity at both ends, including tagging/labeling and submission of detailed report with updated cable route drawings. **Unit Rate in words**_____	Job.	1		

Total Cost of Telecommunication Works for Cabling, Passive Equipments & Related Items (Carried over to summary) Rs. _____

EXIM BANK OF PAKISTAN
RENOVATION OF EXIM BANK OFFICE AT 5TH FLOOR BAHRIA COMPLEX, KARACHI

TELECOMMUNICATION WORKS
(FIRE ALARM, ACCESS CONTROL, CATV & MISC ITEMS) **BILL OF QUANTITIES**

Item No.	Description	Unit	Qty.	Unit Rate (Rs.)	Amount (Rs.)
TB	**TELECOMMUNICATION WORKS** Ref Spec Sec: 8001, Approved List of Manufacturer's in Vol-I Supply, installation, testing, commissioning of the following telecommunication work items (unless specifically stated otherwise). The specifications section 8001 and recommended list of manufacturer applicable to all BoQ items. The work includes all material, labour, tools, plant, storage, transportation, accessories, related civil works required for proper completion of each item. The Contractor is bound to provide submittals for the Engineer's approval with relevant standards, data sheets, catalog, brochures, manuals, shop drawings etc. Note: in case of any discrepancy found between BoQ, specifications and drawings, then BoQ/specifications will govern. **FIRE ALARM SYSTEM** NOTE: The Contractor shall coordinate with the building adminstration department for the proposed fire alarm system interfacing, testing & commissioning with existing fire alarm system. **Unit Rate in words**_____				
1-1TB	Intelligent Addressable Optical Smoke & Heat Multisensor with base, built-in isolator module including all installation accessories. Make as per approved list in Vol-I **Unit Rate in words**_____	no.	23		
1-2TB	Intelligent Addressable Optical Heat Sensor with base & isolated flasher, built-in isolator module including all installation accessories. Make as per approved list in Vol-I **Unit Rate in words**_____	no.	1		
1-3TB	Intelligent Addressable Optical Smoke & Heat Multisensor with base & remote flasher, built-in isolator module including all installation accessories. Make as per approved list in Vol-I **Unit Rate in words**_____	no.	6		

TELECOMMUNICATION WORKS
(FIRE ALARM, ACCESS CONTROL, CATV & MISC ITEMS) **BILL OF QUANTITIES**

Item No.	Description	Unit	Qty.	Unit Rate (Rs.)	Amount (Rs.)
1-4TB	Addressable Manual Call Station with all installation and mounting accessories, complete in all respect. Make as per approved list in Vol-I	no.	3		
	Unit Rate in words_____				
1-5TB	Loop powered Addressable directional sounder with flasher including all installation accessories. Make as per approved list in Vol-I	no.	3		
	Unit Rate in words_____				
1-6TB	Following type modules with all installation accessories. Make as per approved list in Vol-I				
	a) Control / Relay Module with installation box enclosure	no.	2		
	Unit Rate in words_____				
	b) Monitor Module with installation box	no.	2		
	Unit Rate in words_____				
1-7TB	Fire Alarm Repeater Panel (FARP) including all installation and mounting accessories, complete in all respect. Make as per approved list in Vol-I	Job.	1		
	Unit Rate in words_____				
1-8TB	One loop (mini) Fire Alarm Control Panel (FACP) including interfacing components for FACP to link with main building FACP, public address, access control system, Integrated Building Management System etc., including power supply, maintainance free batteries, battery charger, and all installation and mounting accessories, complete in all respect. Make as per approved list in Vol-I	Job.	1		
	Unit Rate in words_____				
1-9TB	Wiring of Fire Alarm Points with 2 core 1.5 mm2 LSZH, CWZ cable complying BS5839 and EN50200 laid in already installed conduit or tray or trunking etc., including all accessories, complete in all respect. Make as per approved list in Vol-I	Points	41		
	Unit Rate in words_____				

ACCESS CONTROL SYSTEM

TELECOMMUNICATION WORKS

(FIRE ALARM, ACCESS CONTROL, CATV & MISC ITEMS) **BILL OF QUANTITIES**

Item No.	Description	Unit	Qty.	Unit Rate (Rs.)	Amount (Rs.)
1-10TB	Controller board with battery, battery charger, adapter, enclosure, reader interface for one door power supply including all interconnecting manufacturer's recommended wiring between readers, exit push buttons, magnetic door lock and release with all installation and mounting accessories. Make as per approved list in Vol-I **Unit Rate in words**_____	Job.	4		
1-11TB	Intelligent smart reader i.e. (Biometric, Pin Code (key pad), Card Swapping, Touch Memory etc.) including all installation and mounting accessories. Complete in all respect. Make as per approved list in Vol-I **Unit Rate in words**_____	No.	4		
1-12TB	Contact less smart card. **Unit Rate in words**_____	No.	10		
1-13TB	Magnetic door lock and release for single door with all installation and mounting accessories. Make as per approved list in Vol-I **Unit Rate in words**_____	No.	4		
1-14TB	Licensed Access Contral Software to be installed in CCTV workstation. Make as per approved list in Vol-I **Unit Rate in words**_____	No.	4		
1-15TB	Exit push button with back box with all installation and mounting accessories. Make as per approved list in Vol-I **Unit Rate in words**_____	No.	4		
1-16TB	Wiring from biometric controller point to relevant building or floor distributor rack with CAT-6A S/FTP LSZH cable laid in already installed conduit or cable tray or cable trunking including all accessories complete in all respect. Make as per approved list in Vol-I **Unit Rate in words**_____	No.	4		

CATV SYSTEM

TELECOMMUNICATION WORKS
(FIRE ALARM, ACCESS CONTROL, CATV & MISC ITEMS) **BILL OF QUANTITIES**

Item No.	Description	Unit	Qty.	Unit Rate (Rs.)	Amount (Rs.)
1-17TB	Co-axial TV outlet including all accessories complete in all respect. Make as per approved list in Vol-I	no.	10		
	Unit Rate in words_____				
1-18TB	Following type splitter unit including all mounting accessories, complete in all respect. Make as per approved list in Vol-I				
	a) 8-way	no.	2		
	Unit Rate in words_____				
1-19TB	6"(W)x6"(H)x4"(D) 16 SWG size cabinet recessed or surface mounted as per site condition for housing amplifier, splitters and tap-off etc., including power distribution unit all components & accessories, complete in all respect. Make as per approved list in Vol-I	no.	1		
	Unit Rate in words_____				
1-20TB	Wiring from TV outlet point to relevant building or floor distributor with RG-7 coax cable laid n already installed conduit or cable tray or cable trunking including all accessories complete in all respect. Make as per approved list in Vol-I	no.	10		
	Unit Rate in words_____				
1-21TB	RG-11 solid copper conductor, copper braid coaxial cable in already installed concealed conduit / trunking/tray, including all accessories, complete in all respect. Make as per approved list in Vol-I	Rft	500		
	Unit Rate in words_____				
	CONDUITS & PIPES				
1-22TB	Following sizes of PVC conduit / pipes installed on surface / concealed in wall, slab & floor including pull wire and all accessories as required etc., complete in all respects. Make as per approved list in Vol-I				
	a) 2 inch dia	Rft	100		
	Unit Rate in words_____				
	b) 1-1/2 inch dia	Rft	100		
	Unit Rate in words_____				

TELECOMMUNICATION WORKS
(FIRE ALARM, ACCESS CONTROL, CATV & MISC ITEMS) **BILL OF QUANTITIES**

Item No.	Description	Unit	Qty.	Unit Rate (Rs.)	Amount (Rs.)
	c) 1-1/4 inch dia	Rft	100		
	Unit Rate in words_____				
	d) 1 inch dia	Rft	6,500		
	Unit Rate in words_____				
	CABLE TRAYS				
1-23TB	Following (1.6 mm) thick G.I sheet coated perforated cable tray with 1.6mm thick solid cover including proper manufactured flexible expansion coupler, elbows, risers, tees, crosses, internal & external bends and fittings, galvanized support structure, all accessories, compelete in all respects. (Note: Welded connection is not allowed and prohibited) (Make as per approved list in Vol-I				
	a) 300 mm x 75 mm	Rft.	150		
	Unit Rate in words_____				
	b) 150 mm x 75 mm	Rft.	150		
	Unit Rate in words_____				

Total Telecommunication Works for Fire Alarm Access Control, CATV & Misc Items (Carried over to summary) Rs. _____

EXIM BANK OF PAKISTAN

RENOVATION OF EXIM BANK OFFICE AT 5TH FLOOR BAHRIA COMPLEX, KARACHI

TELECOMMUNICATION WORKS

(ACTIVE EQUIPMENTS) **BILL OF QUANTITIES**

Item No.	Description	Unit	Qty.	Unit Rate (Rs.)	Amount (Rs.)
TC	**TELECOMMUNICATION WORKS** Ref Spec Sec: 8001, Approved List of Manufacturer's in Vol-I Supply, installation, testing, commissioning of the following telecommunication work items (unless specifically stated otherwise). The specifications section 8001 and recommended list of manufacturer applicable to all BoQ items. The work includes all material, labour, tools, plant, storage, transportation, accessories, related civil works required for proper completion of each item. The Contractor is bound to provide submittals for the Engineer's approval with relevant standards, data sheets, catalog, brochures, manuals, shop drawings etc. Note: in case of any discrepancy found between BoQ, specifications and drawings, then BoQ/specifications will govern.				
	VOICE - HYBIRD-PBX EQUIPMENT				
1-1TC	Supply, installation, testing and commissioning of Hybird PBX with 8 analogue trunks and 35 extensions, digital card provision, video conferencing provision, PRI Interface provision, auto attendent, voice conferencing, inbound & outbound call recording provision for 90 days, built-in unified communication provision, configuration, testing and commissioning including all call mangament features, including all accessories, complete in all respect. Make as per approved list in Vol-I	Job	1		
	Unit Rate in words_____				
	VOICE - PHONE SET				
1-2TC	Propreitary digital operator console telephone set with LCD display and programmable keys (as required), all essential interconnecting cables as required including power adapter, installation and mounting accessories. Make as per approved list in Vol-I	Job	1		
	Unit Rate in words_____				
1-3TC	Propreitary analogue telephone set with CLI, all essential interconnecting cables as required including power adapter, installation and mounting accessories. Make as per approved list in Vol-I	Job	20		
	Unit Rate in words_____				
	CCTV - IP CAMERAS				

Item No.	Description	Unit	Qty.	Unit Rate (Rs.)	Amount (Rs.)
1-4TC	IP Dome / Bullet type colour fixed camera having 4 megapixel resolution, 1/3 inch sensor with varifocal lens, IR and day/night functions, power over ethernet (PoE), H.264/265 compression including all installation and mounting accessories. Make as per approved list in Vol-I	no.	8		
	Unit Rate in words_____				
	CCTV - NETWORK POE ACCESS SWITCHES				
1-5TC	Supply of channelized + smart support (3 years warranty) layer-2 managed ethernet access switch having 24 x 10/100/1000 Mbps BASE-T POE+ ports (AC 370 W & DC 740 W) auto sensing ports and 4 x 100/1000BASE X SFP combo ports and 4 x 1G/10G BASE X SFP plus ports, AC/DC including, console cable, power supply units and all essentail interconnecting cabling with installation and rack mounting accessories, complete in all respect. Make as per approved list in Vol-I	no.	1		
	Unit Rate in words_____				
1-6TC	SFP optical transceiver module Make as per approved list in Vol-I	no.	6		
	Unit Rate in words_____				
	CCTV - NETWORK VIDEO RECORDERS (NVR'S)				
1-7TC	Network Video Recording (16 channel) support H.264/265 compression including 30 days hard disk storage with connecting ports (RJ-45) for integration with Integrated BMS, including all components & accessories, complete in all respect. Make as per approved list in Vol-I	Job.	1		
	Unit Rate in words_____				
	CCTV – DESKTOP				
1-8TC	Latest generation Core i5 with 16GB Ram, 1TB SSD, Desktop Computer comprising one numbers 27 inch 4k 2160P LED Screen with Professional 4 GB graphics card supporting 2 x 4K display outputs, license latest operating system, casing and cooling fans, keyboard, mouse with all essential interconnecting cables as required for system operation, including all components & accessories, complete in all respect. Make as per approved list in Vol-I	no.	1		
	Unit Rate in words_____				
	CCTV - MISC WORKS				

Item No.	Description	Unit	Qty.	Unit Rate (Rs.)	Amount (Rs.)
1-9TC	Interfacing of CCTV system with Fire Alarm, Public Address, Access Control and Integrated Building Management System.	Job.	1		
	Unit Rate in words_____				
	MISC ITEMS - EMS FOR SERVER ROOM (ENVIRONMENT MONITORING SYSTEM/ ROOM MONITORING)				
1-10TC	Supply, install & configure Environment Monitoring system sensors, Temperature, Humidity, Door Contact, SNMP V1, V2, V3, HTTP, HTTPS, DNS, SMTP, DH,CP, Support Email, GSM module spport SMS query and alarm. Make as per approved list in Vol-I. Make as per approved list in Vol-I	Job	1		
	Unit Rate in words_____				

Total Cost of Telecommunication Works for Active Equipment & Related Items (Carried over to summary) Rs. _____

LIST OF APPROVED MANUFACTURERS AND BRANDS OF MATERIALS/EQUIPMENT

This list of recommended manufacturer's or brands of different materials or equipments is provided in order to establish a standard level of performance and do not indicate any preference for a particular manufacture or material or brand. The Contractor is bound to provide and fix the material or equipments of superior quality approved by the Engineer from the list or it's approved equivalent provided meeting same or superior quality and provide documented reason or justification for deviation during execuation phase of the Project. However, the material provided from the List of Recommended Manufacturer's shall meet the requirements of the BoQ, relevant specifications come under specification section 8001 of the bidding documents. The contractor shall directly procure material from factory source or the authorized dealers. The Contractor shall provide in support the delivery challan from factory or from supplier including letter of authorization for dealership, sole agent, distributor from the principal, for ensuring the quality, warranty and guarantee of purchased equipment.

SR. NO.	MATERIALS	MANUFACTURER/BRANDS OF MATERIALS/EQUIPMENT
	CABLES & ACCESSORIES	
1.	LV Wiring Cables (300 / 500 Volts)	Fast Cables, Pakistan Cables, Newage Cables
2.	LV Power Cables (600 / 1000 Volts)	Fast Cables, Pakistan Cables, Newage Cables
3.	High Voltage Cables(15 kV)	Fast Cables, Pakistan Cables, Newage Cables
4.	MV Termination/Straight Jointing kit (Hot/Cold Termination)	Raychem, 3M
5.	CAT Cables	Vivanco, Corning, Schneider Electric
6.	Fire Resistant Cables	Belden, Prismian, Cavicel
7.	Glands, Lugs, Ferrules, Connectors	Cembre, Gewiss
8.	Cable Tagging/Labelling System	Cembre, Hellermanntyton
	PVC AND STEEL CONDUIT	
9.	Electrical PVC Conduit & Accessories	Dadex, Dura Flow
10.	Steel Conduit & Accessories	IIL
	ELECTRICAL COMPONENTS	

Sign & Stamp of The Contractor

11.	LV Circuit Breakers (MCB, MCCB, ELCB, ACB) (	Schneider, ABB
12.	LV Magnetic Contactor, Starters & Thermal Overload Relay	Schneider, ABB
13.	Power Factor Capacitor	Schneider, ABB, Nokian, RTR, Shizuki
14.	LV Capacitor	Amber Capacitor, Entes, Nokian, Ducati, Schneider Electric
15.	PF Controller	Schneider, ABB, Shizuki
16.	Series Reactor	Nokian, Schneider Electric, ABB, GE, Shizuki
17.	Timer	GE, National / Panasonic, Finder, Fuji, Hanyong
18.	Push buttons and indication lights	GE, Maruyasu, Lovato, Fuji, Hanyong
19.	Current Transformer/Voltage Transformer	Entes, Revalco, Circutor, Sacci, Frer, FICO
20.	Measuring Instrument	Entes, Revalco, Circutor, Lovato, Schneider Electric, Hanyong
21.	Programmable Logic Controllers	Siemens, ABB, Schneider Electric
22.	VSS/ASS	Kraus & Naimer, Fuji, Hanyong
23.	HRC Fuses	Siba, ETI, Voltran
	TRANSFORMER	
24.	Oil Type Transformers (11/0.415 kV)	PEL
25.	Dry Type Transformers (11/0.415 kV)	PEL-IMEFY, Schneider, ABB
26.	LV Panel	Hussian & Co, A to Zee, HRA Switchgear
27.	11 kV Panels	Siemens, PEL, Schneider Electric, ABB
28.	MV Surge Arrester	Siemens, PEL Schneider Electric, ABB
	LIGHTING FIXTURE & COMPONENTS	Note: 3rd Party Test Report(s) shall be submitted from IEC accredited laboratories for verification of Quality of Light Fixtures submitted by the Contractor and minimum 3 years warranty shall be provided. This clause in applicable to items from Serial No. 28 to 36.

Sign & Stamp of The Contractor

29.	Surface/recessed office luminaries	Philips (Signify), NVC, EAE, Ledvance, Opple
30.	Battens	Philips (Signify), NVC, EAE, Ledvance, Opple
31.	Downlights	Philips (Signify), NVC, EAE, Ledvance, Opple
32.	Exit Emergency Light Fixture	Hochiki, NVC, EAE, Ledvance, Opple
33.	Lamps/LED chips	Source as approved by the "Engineer"
34.	Control gear/LED drivers	Source as approved by the "Engineer"
35.	Connectors/holders	Source as approved by the "Engineer"
36.	Solar Light Standalone/System	Leadsun, Gewiss
37.	Street Light	Philips (Signify), NVC, EAE, Ledvance
	SWITCHES & SOCKETS	
38.	Switches	MK, Clipsal, ABB, Legrand, Philips (Signify)
39.	Sockets	MK, Clipsal, ABB, Legrand, Philips (Signify)
40.	Dimmer / Fan Speed Controller	MK, Clipsal, ABB, Legrand, Philips (Signify)
41.	Connection Unit	MK, Clipsal, ABB, Legrand, Philips (Signify)
42.	Voice/TV/Data Outlets	MK, Clipsal, ABB, Legrand, Philips (Signify)
43.	Back Boxes	MK, Hussain & Co., Clipsal, Philips (Signify)
44.	High Current Switches	MK, Clipsal, ABB, Legrand, Philips (Signify)
45.	Industrial Switches, Plugs and Sockets	Walther, GARO, Schneider, Gewiss
	DIESEL GENERATOR SET	Note: The Diesel Generator Suppliers shall have minimum 10 years of proven experience in selling and providing after sales services. The supplier shall show sizable frequency of DG set sales for a period of last 10 years for approval. This Clause is applicable to Serial No. 46.

AIP DIVISION Karachi

Sign & Stamp of The Contractor

46.	Couplers	Caterpillar, CPG (Cummins), Onis Visa, SDMO, FG-Wilson, Synergy (The set shall be from above brands and is subject to approval of verification of import source and proper documentation. The engine and alternator shall not be old than 12 months from the date of purchase. Principal warranty of 3 years/3000 hours shall be provided. Load Testing shall be performed as per specifications.
47.	Engines from 10 kVA upto 500 kVA ratings	Caterpillar, Cummins, Perkins, Volvo
48.	Engines from 500 kVA upto 2500 kVA	Caterpillar, Cummins , MTU, Mitsubishi, Kohler
49.	Alternator	Caterpillar, Stamford, Leroy Somer, Mecc Alte, Kohler
50.	Generator Module	Deepsea Electronics, Caterpillar, Cummins, Kohler
51.	ATS/AMF, Generator Panels	Refer to heading Electrical Panels in the List of Approved Manufacturer's.
	ELECTRONICS/COMPUTER EQUIPMENT	
52.	UPS	APC, Eaton, Vertiv
53.	Fire Alarm/Fighting System	Esser, Notifier, Bosch
54.	Public Address System	TOA, Bosch, Honeywell
55.	Burglar Alarm System	DSC, Texicom, Bosch, Honeywell
56.	CCTV System (Ultra / Top Range Series is acceptable)	Pelco, Bosch, Axis Communication, Infinova
57.	CATV	WISI, Scientific Atlanta
58.	Lightning Protection, Earthing System & Surge Protection (European Origin)	Wallis, Furse
59.	PABX	Alcatel, Avaya, Siemens
60.	Access Control System	Cavdax Gallaghev, Virdi, Salto
	COMPUTER NETWORK SYSTEM/COMPONENTS	
61.	Structured Cabling	Vivanco, Corning, Schneider Electric
62.	Ethernet Switches (Channelized Components + Smart Support with 2 years	CISCO

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	principal warranty)	
63.	Network Firewall (Channelized Components + Smart Support with 2 years principal warranty)	Sophos, Fortigate
	MISC MATERIALS	
64.	Construction Chemicals	Vandex, FEB, SIKA, Fosroc
65.	Cable Tray with accessories	Ashraf Industries, Electroline
66.	Street Lighting Poles	Jamal Pipes
67.	Power Supplies/Convertors	Siemens, ABB, PULS GmbH
68.	Industrial Plugs & Sockets	Walther, GARO, Schneider, Gewiss
69.	Junction Boxes (Polycarbonate DB)	HENSEL, Gewiss
70.	High Mast (up to 40 m)	Petit Jean, Metelogalva
71.	Ring Main Unit, MV Panels (Fixed Type Circuit Breaker)	Lucy Electric, Schneider Electric
72.	Ceiling Fan/Bracket Fan	Pak Fan, GFC, Royal, Yunas
73.	False Ceiling Fan	Voldam

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OFFICE FOR EXIM BANK AT KARACHI

BILL OF QUANTITIES

Fire Supression System

(NON-MRS ITEMS)

Item. Each	DESCRIPTION	UNIT	QTY.	UNIT RATE (Rs.)	TOTAL AMOUNT (Rs.)
1	Supply and installaion of ceiling mounted Automatic Clean agent (HFC 227 ea/FM200) Fire extinguisher with 7% by volume concentration at 21 deg. C i) Agent weight : 35 kgs	Each	1		
			TOTAL (PKR)		

OFFICE FOR EXIM BANK AT KARACHI

HVAC WORKS

BILL OF QUANTITIES

ITEM NO.	DESCRIPTION OR CODE	UNIT	QTY	UNIT RATES IN FIGURES (PKR)	TOTAL AMOUNT (PKR) COL. 4 x COL. 5
1	2	3	4	5	6
1	**Supply and installation of Sheet Metal Ducting and insulation as per schedule specification & drawings with accessories & fitting complete in all respects.**				
	G. I. Sheet Metal Work				
	a) U.S. GAUGE 26	SFT	200		
	b) U.S. GAUGE 24	SFT	1,500		
	Insulation				
	c) Indoor Supply Air Duct Concealed to Vision	SFT	1,700		
2	**Supply and installation of Decorative Wall Mounted (Inverter) indoor units, outdoor condensing units and hanging arrangements, including electrical works complete in all respect.**				
i)	SAC-1/ OU-1 (Nominal Capacity = 24,000 BTU/HR) - Decorative Wall Mounted Unit	EACH	4		
3	**Supply and installation of refrigerant pipes, insulation, fittings including all accessories for complete system complete in all respect.(For Split Units)**				
i)	DIA 9.52 mm (3/8")	RFT	100		
ii)	DIA 15.88 mm (5/8")	RFT	100		
4	**Supply and installation of uPVC Drain Pipes, Conduits for Refrigerant Pipes, fittings including all accessories complete in all respect.**				
i)	1 inch	RFT	100		
5	**Supply and installation of Volume Damper (VD) for complete system as per specification/ drawings with accessories & fitting and complete in all respects.**	SFT	25		
6	**Supply and installation of Air devices for complete AC system as per specification & drawing with all accessories & fitting and complete in all respects as approved by consultant and engineer incharge.**				
	a) Code A : Four Way Ceiling Supply Air Diffuser Square / Rectangular Face	SFT	35		
	b) Code B : Four Way Ceiling Return Air Diffuser Square / Rectangular Face	SFT	30		
	c) Code C: 1 inch - 2 Slot Return Air Linear Diffuser	SFT	6		
	d) Code D: Return Air Rectangular Grille Double Deflection Adjustable Bars	SFT	20		
7	**Supply and installation of Hanger and Supports with all accessories except item # 2 (Complete in all respect).**	LOT	1		
8	**Testing, Commissioning and Air Balancing of the HVAC System**	LOT	1		
				TOTAL = Rs	

IN WORDS : RUPEES _____

LEGENDS

sft Square Feet

ANNEXURE-A

LIST OF RECOMMENDED MANUFACTURERS FOR ITEMS/ MATERIALS/EQUIPMENT OF HVAC WORKS

The Contractor should note that only Equipment/materials from the following approved manufacturers or approved equivalent shall be allowed to be used on this Project provided their products meet the specified requirements.

SR. NO.	EQUIPMENT/ MATERIAL	RECOMMENDED MANUFACTURER/ SUPPLIER	COUNTRY
1.	Duct insulation	KIMMCO AFICO, ODE, OWENS CORNING, KNAUF	KUWAIT / SAUDI ARABIA/ TURKEY / EUROPE / USA
2.	G.I. Sheets	PAK STEEL MILLS KARACHI, ISL, NIPPON	PAKISTAN / JAPAN
3.	Air Inlets/Outlets/ Volume Damper/ Fire Damper	MEHRAN, THERMEC, AIR CONTROL, STEELCRAFT, SA INDUSTRIES, PAK PRIEMER, EAP	PAKISTAN
4.	Paint	ICI, MASTER PAINTS, BERGER	PAKISTAN
5.	Fasteners, Hanging Rods Rawal Plugs etc.	FISHER, HILTI, SPIT, SIKLA INKA	AS PER MANUFACTURER'S FACILITY
6.	White Glue	FOSTER	USA/EUROPE
7.	Duct Sealant	DOW CORNING ZAHBIA	USA/TURKEY
8.	PVC Pipe	BETA DADEX TURKPLAST	PAKISTAN

EXIM BANK OF PAKISTAN
RENOVATION OF EXIM BANK OFFICE AT 5TH FLOOR BAHRIA COMPLEX, KARACHI

DIESEL GENERATOR INSTALLATION WORKS **BILL OF QUANTITIES**

Item No.	Description	Unit	Qty.	Unit Rate (Rs.)	Amount (Rs.)

EB ELECTRICAL WORKS

Ref Spec Sec: 8001, Approved List of Manufacturer's in Vol-I

Supply, installation, testing and commissioning of the following items of work (unless specifically stated otherwise) including all material, labour, tool, plant, accessories, related civil works etc required for proper completion of each item as per specifications. The contractor is bound to submit hard & soft copy of all relevant standard, data, information, literature, drawings, submittals etc. as per specifications & approved manufacturers list to the Engineer for necessary approvals. The contractor shall directly procure material from factory source or the authorized dealers. The Contractor shall provide in support the delivery challan or other documents as required from factory or from supplier including letter of authorization for dealership, sole agent, distributor from the principal, for ensuring the quality, warranty and guarantee of purchased equipment. Note: In case of any discrepancy found between BoQ, Specifications and drawings, then BoQ and Specifications will govern.

Diesel Generator Set

Ref Spec Sec: 8111, 8132, 8212, 8240

1-1EA Following sizes of DG set (prime rating) including sound proof canopy (IP-65), skid mounted fuel tank (including level senor control system & control wiring), AMF Controller, control / instrument panel, control wiring to GCP, LT switch boards, and ATS etc., testing of DG sets with load bank, related civil works foundation pad (including RCC, reinforcement, shuttering, excavation, backfilling, finishing, waterproofing etc.) all components and accessories, complete in all respect. Make as per approved list in Vol-I

a) 60 KVA Job. 1

Unit Rate in words_____

DIESEL GENERATOR INSTALLATION WORKS **BILL OF QUANTITIES**

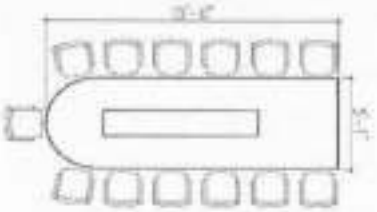
Item No.	Description	Unit	Qty.	Unit Rate (Rs.)	Amount (Rs.)
1-2EB	300 A auto transfer switch/auto main failure (ATS/AMF) with dual supply bypass mechanism suitable for 150 kVA DG set includes control wiring to DG set, GCP and LT switch board etc., all components and accessories, complete in all respect. Make as per approved list in Vol-I	Job.	1		
	Unit Rate in words_____				
1-3EB	Fuel System for one number 60 kVA DG Set comprising of underground ground fuel storage tank of 1000 liters capacity manufactured as per DIN 6608 / ASME Section VIII Div I including vent pipe, fuel piping, automatic fuel pump with manual hand pump bypass for filling and pumping process (including level sensor control system & control wiring), all related components and accessories, complete in all respect. Make as per approved list in Vol-I	Job.	1		
	Unit Rate in words_____				
1-4EB	Necessary spare parts for 3000 hours for 60 kVA DG Set in Item as per manufacturers recommendation.	Lot.	1		
	Unit Rate in words_____				

Total Diesel Generator Installation Works (Carried over to summary) Rs. _____

SUPPLY OF FURNITURE FOR
OFFICE OF EXIM BANK AT 5TH FLOOR BAHRIA COMPLEX KARACHI
BILL OF QUANTITIES

Sno.	Item Description	Item Image	Qty	Rate	amount
1	**CEO room**				
	CEO Room Desk - Lincoln Table Desk with Side rack made of particle board/MDF pressed with veneer and genuine leather writing pad on worktop and Side rack, Storage should have fingerprint biometric locks. Size: 2100 x 1050 x 750		1		
	a) Two seater: Made of oak wood frame with imported Latheride upholstery		1		
	b) One seater: Made of oak wood frame with imported Latheride upholstery		1		
	c) Center Table: Made of laminated top with imported pvc edging and MS powder coated base		1		
	d) Office chair: High Back Artificial Leather chair with auto weight sensing mechanism, chair height and locking controls on the arm rests, tilting control system.		1		
	e) Visitor chair: Low Back Executive Chair made of leatherette and fixed arms and base.		2		
	f) Executive Credenza low height, made of laminate pressed on particle board/MDF with shelves and soft closing doors. Size 11'-0" wide		1		
2	**Executive room**		3		
	Executive Desk with Side rack made of particle board/MDF pressed with veneer worktop. Side rack should include space for CPU and technology box containing 4 UK standard power sockets and concealed cable Size: 1800 x 800 x 750		3		
	d) Office chair: medium Back Artificial Leather chair with chair height and locking controls on the arm rests, tilting control system.		3		
	e) Visitor chair: Low Back Executive Chair made of leatherette and fixed arms and base.		6		
2	**Conference Room**				
	a) Table				
	Laminated Table top with latheride in centre console, wooden frame and base as per design and instruction by Architect.		1		

SUPPLY OF FURNITURE FOR
OFFICE OF EXIM BANK AT 5TH FLOOR BAHRIA COMPLEX KARACHI
BILL OF QUANTITIES

Sno.	Item Description	Item Image	Qty	Rate	amount
	For 13 Persons Size: 15'-0"X5'-2"x2'-6" b) Chairs: medium Back Mesh chair with chair height and locking controls on the arm rests.		13		
	b) Chairs: low Back Mesh revolving chair with chair height and locking controls with out arms.		12		
3	**Reception Sofas** **a) Two seater:** Made of oak wood frame with imported Latheride upholstery **c) Center Table:** Made of laminated top sides and bottom seamless joints with imported pvc edging		2 1		
	Small meeting Room a)Meeting Table: Made of high pressure laminated top with imported pvc edging and MS base Size: 3'-0"X 5'-6"X 2'-6" b) Chairs: low Back cushioned revolving chair with chair height and locking controls with out arms.	 	1 6		
	workstation a) work station Table: made of high pressure laminated top with imported pvc edging and laminated front and side partitions with fabric upholstery and technology box and MS base. b) chairs: medium back chairs with adjustable seat and lumber support, lokcing system. Cushion seat and breathable mesh back	 	20 20		

SUPPLY OF FURNITURE FOR
OFFICE OF EXIM BANK AT 5TH FLOOR BAHRIA COMPLEX KARACHI
BILL OF QUANTITIES

Sno.	Item Description	Item Image	Qty	Rate	amount
	c) drawers units: made of high pressure laminated top, sides and drawers including locks.		20		
8	**Work station chairs** a) Record room b) Server room c) Tresury		 1 1 2		
	Total				
	Total amount in words				

PROPOSED CONSTRUCTION SCHEDULE

(to be filled and signed by the Bidder)

Pursuant to Sub-Clause 43.1 of the General Conditions of Contract, the Works shall be completed on or before the date stated in Appendix-A to Bid. The Bidder shall provide as Appendix-E to his Bid Construction Schedule in the bar chart (CPM or PERT) showing the sequence of work items and the period of time during which he proposes to complete each work item in such a manner that his proposed programme for completion of the whole of the works and parts of the works may meet Employer's completion targets in days noted below and counted from the date of receipt of Engineer's Notice to Commence. (Attach sheets as required for the specified form of Construction Schedule):

Description	**Time for Completion**
Renovation of EXIM Bank Office at 5th Floor, Bahria Complex-I, M.T. Khan Road, Karachi	03 Calendar Months

A&P DIVISION Karachi.

Authorized Signature and official Seal: _____

Name: _____

Date: _____

METHOD OF PERFORMING THE WORK

(to be filled and signed by the Bidder)

The Bidder is required to submit a narrative outlining the method of performing the Work. The narrative should indicate in detail and include but not be limited to:

1. Organization Chart indicating head office and field office personnel involved in management and supervision, engineering, equipment maintenance and purchasing.

2. Mobilization, the type of facilities, office accommodation, provision for maintenance and for storage, communications, security and other services to be used.

3. The method of executing the Works, the procedures for installation of equipment and machinery and transportation of equipment and materials to the site and providing all services including but not limited to supply of power, water, maintenance of facilities, safety and security and all what is required for completion of works in accordance with the Contract.

4. Quality control / Quality assurance measures to be adopted including procedures to be followed for carrying out all tests required under specifications.

5. **The Bidder while preparing his methodology for performing and executing the works shall also consider the following:**

   a) The timely completion of the Project as per the time provided in Appendix-A to this Bid.

   b) The Contractor while filling out the list of major equipment required at site, shall ensure that the equipment requirement is in consonance with the construction requirement.

   c) The Contractor is not restricted to carry out the work in single shift. The Contractor should note that if he plans to execute the work in more than single shift than all costs related to the additional superintendence to be provided by the Engineer will be borne by the Contractor. Procedure for such additional costs will be worked out and finalized between the Contractor and Engineer with the consent of the Employer.

   d) The portions of the Site shall be made available to the Contractor in coordination with other Contractors working at site. The Contractor shall prepare the work programme accordingly.

Authorized Signature and official Seal: _____

Name: _____

Date: _____

LIST OF MAJOR EQUIPMENT – RELATED ITEMS

(to be filled and signed by the Bidder)

The Bidder will provide a list of all major equipment and related items, under separate heading for items owned, to be purchased or to be arranged on lease by him to carry out the Works. The information shall include make, type, capacity, and anticipated period of utilization for all equipment which shall be in sufficient detail to demonstrate fully that the equipment will meet all requirements of the Specifications.

The Bidder will provide on Sheet 2 of this Appendix a list of all major equipment and related items, under separate heading for items owned, to be purchased or to be arranged on lease by him to carry out the Works. The information shall include make, type, capacity, and anticipated period of utilization for all equipment which shall be in sufficient detail to demonstrate fully that the equipment will meet all requirements of the Specifications.

Minimum Mandatory Equipment Requirement to be brought/installed/erected at site.

Sr. No.	Description	Min. Quantity Required
1	Tile Cutting Machine	1 No.
2	Wood Planer	1 No.
3	Edge Banding Machine	1No.
4	Sander Machine (Portable)	1 No.
5	Network Analyzer	1 No.
6	Insulation Tester/Megger	1 No.
7	Clamp Meter	1 No.
8	Digital Multimetre	1 No.
9	Router	1 No.
10	Drill Machine	1 No.
11	Hammers Set	1 No.
12	Chisels Set	1 No.
13	File Set	1 No.
14	Hoist	1 No.
15	Generator Set	1 No.
16	Leveling Equipment	1 No.

Authorized Signature and official Seal: _____

Name: _____

Date: _____

Appendix-G to Bid

LIST OF MAJOR EQUIPMENT – RELATED ITEMS

(to be filled and signed by the Bidder)

The Bidder will provide a list of all major equipment and related items, under separate heading for items owned, to be purchased or to be arranged on lease by him to carry out the Works. The information shall include make, type, capacity, and anticipated period of utilization for all equipment which shall be in sufficient detail to demonstrate fully that the equipment will meet all requirements of the Specifications.

LIST OF MAJOR EQUIPMENT

Owned Purchased or Leased	Description of Unit (Make, Model, Year)	Capacity HP Rating	Condition	Present Location or Source	Date of Delivery at Site	Period of Work on Project
1	2	3	4	5	6	7
a Owned						
b. To be Purchased						
c. To be arranged on Lease						

Authorized Signature and official Seal: _____

Name: _____

Date: _____

CONSTRUCTION CAMP AND HOUSING FACILITIES

(to be filled and signed by the Bidder)

The Contractor in accordance with Clause 34 of the Conditions of Contract shall provide description of his construction camp's facilities and staff housing requirements.

The Contractor shall be responsible for pumps, electrical power, water and electrical distribution systems, and sewerage system including all fittings, pipes and other items necessary for servicing the Contractor's construction camp.

The Bidder shall list or explain his plans for providing these facilities for the service of the Contract as follows:

1. Site Preparation (clearing, land preparation, etc.).

2. Provision of Services.

   a) Power (expected power load, etc.)
   b) Water (required amount and system proposed).
   c) Sanitation (sewage disposal system, etc.).

3. Construction of Facilities

   a) Contractor's Office. Workshop and Work Areas (areas required and proposed layout, type of construction of buildings, etc.).
   b) Warehouses and Storage Areas (area required, type of construction and layout).
   c) Housing and Staff Facilities (Plans for housing for proposed staff, layout, type of construction, etc.)

4. Construction Equipment Assembly and Preparation (detailed plans for carrying out this activity).

5. Other Items Proposed (Security services, etc.).

National Engineering Services Pakistan (Pvt.) Ltd. A&P DIVISION Karachi.

Authorized Signature and official Seal: _____

Name: _____

Date: _____

LIST OF SUBCONTRACTORS

(to be filled and signed by the Bidder)

I/We intend to subcontract the following parts of the Work to subcontractors. In my/our opinion, the subcontractors named hereunder are reliable and competent to perform that part of the work for which each is listed.

Enclosed are documentation outlining experience of subcontractors, the curriculum vitae and experience of their key personnel who will be assigned to the Contract, equipment to be supplied by them, size, location and type of contracts carried out in the past.

Part of Works (Give Details)	Subcontractor (With Complete Address)
1	2

National Engineering Services Pakistan (Pvt.) Ltd. A&P DIVISION Karachi.

Authorized Signature and official Seal: _____

Name: _____

Date: _____

ESTIMATED PROGRESS PAYMENTS

(to be filled and signed by the Bidder)

Bidderer's estimate of the value of work which would be executed by him during each of the periods stated below, based on his Programme of the Works and the Rates in the Estimate, expressed in percentage of Bided Price (excluding Provisional Lump Sum Amount, if any):

Months	% of Bided Price (Contract Price)
(a)	(b)
1st Month	
2nd Month	
3rd Month till completion of Project	
Total	100 %

Authorized Signature and official Seal: _____

Name: _____

Date: _____

ORGANIZATIONAL CHART FOR THE SUPERVISORY STAFF AND LABOUR

(to be filled and signed by the Bidder)

MINIMUM MANDATORY STAFF REQUIREMENT:

The Contractor shall arrange all requisite resources for timely completion of project as per provisions given in the Bidding Documents.

Following is the list of Minimum Mandatory Staff Requirement to be deployed at site immediately by the Contractor upon commencement of Works:

Designation	Nos.	Minimum Qualification	Min. Relevant Working Experience
Site Engineer	01	B.Sc. Civil Engr. with valid PEC Registration	5 years or above
Site Supervisor (Electrical / Mechanical)	01	DAE (E/M)	8 years
Quantity Surveyor	01	DAE (Civil) / Certificate	5 years

Authorized Signature and official Seal: _____

Name: _____

Date: _____

(INTEGRITY PACT)

DECLARATION OF FEES, COMMISSIONS AND BROKERAGE ETC PAYABLE BY THE SUPPLIERS OF GOODS, SERVICES & WORKS

_____ [the Bidder/Contractor] hereby declares its intention not to obtain or induce the procurement of any contract, right, interest, privilege or other obligation or benefit from Government of Pakistan or any administrative subdivision or agency thereof or any other entity owned or controlled by it (Government of Pakistan) through any corrupt business practice.

Without limiting the generality of the foregoing, [the Bidder/Contractor] represents and warrants that it has fully declared the brokerage, commission, fees etc. paid or payable to anyone and not given or agreed to give and shall not give or agree to give to anyone within or outside Pakistan either directly or indirectly through any natural or juridical person, including its affiliate, agent, associate, broker, consultants, director, promoter, shareholder, sponsor or subsidiary, any commission, gratification, bribe, finder's fee or kickback, whether described as consultation fee or otherwise, with the object of obtaining or inducing the procurement of a contract, right, interest, privilege or other obligation or benefit in whatsoever form from Government of Pakistan, except that which has been expressly declared pursuant hereto.

[The Bidder/Contractor] certifies that it has made and will make full disclosure of all agreements and arrangements with all persons in respect of or related to the transaction with Government of Pakistan and has not taken any action or will not take any action to circumvent the above declaration, representation or warranty.

[The Bidder/Contractor] accepts full responsibility and strict liability for making any false declaration, not making full disclosure, misrepresenting facts or taking any action likely to defeat the purpose of this declaration, representation and warranty. It agrees that any contract, right, interest, privilege or other obligation or benefit obtained or procured as aforesaid shall, without prejudice to any other rights and remedies available to Government of Pakistan under any law, contract or other instrument, be voidable at the option of Government of Pakistan.

Notwithstanding any rights and remedies exercised by Government of Pakistan in this regard [the Bidder/Contractor] agrees to indemnify Government of Pakistan for any loss or damage incurred by it on account of its corrupt business practices and further pay compensation to Government of Pakistan in an amount equivalent to ten times the sum of any commission, gratification, bribe, finder's fee or kickback given by [the Bidder/Contractor] as aforesaid for the purpose of obtaining or inducing the procurement of any contract, right, interest, privilege or other obligation or benefit in whatsoever form from Government of Pakistan.

Authorized Signature and official Seal: _____

Name: _____

Date: _____

LIST OF DRAWINGS

(to be signed by the Bidder)

As provided in Volume – II

Authorized Signature and official Seal: _____

Name: _____

Date: _____

FORM OF CONTRACT AGREEMENT

THIS CONTRACT AGREEMENT (hereinafter called the "Agreement") made the_____ day of _____ 2023 between _____ (hereafter called the "Employer" which expression shall include the successors, legal representatives and permitted assignees) of the one part and _____ of _____ _____ (hereafter called the "Contractor" which expression shall include the successors, legal representatives and permitted assignees) of the other part.

WHEREAS the Employer is desirous that certain Works, viz _____ should be executed by the Contractor and has accepted a Tender by the Contractor for the execution and completion of such Works and the remedying of any defects therein.

NOW this Agreement witnesseth as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.

2. The following documents after incorporating addenda, if any, except those parts relating to Instructions to Bidders shall be deemed to form and be read and construed as part of this Agreement, viz:

   a. The Contract Agreement;
   b. The Letter of Acceptance;
   c. The completed Form of Bid;
   d. Addenda (if any)
   e. Special Stipulations (Appendix-A to Bid);
   f. The Particular Conditions of Contract – Part II;
   g. The General Conditions of Contract– Part I;
   h. The completed Appendices to Bid
   i. The Drawings;
   j. The Specifications
   k. Any other document forming part of the Contract by reference

3. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works in conformity and in all respects with the provisions of the Contract.

4. The Employer hereby covenants to pay the Contractor, in consideration of the execution and completion of the Works as per provisions of the Contract, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS WHEREOF the parties hereto have caused this Agreement to be executed the day and year first before written in accordance with the respective laws.

For and on behalf of
Contractor
Signature: _____
Name :- _____
Title :- _____
Signed, Sealed and Delivered in the presence of:

Witness 01
Signature: _____
Name :- _____
Title :- _____
Address :- _____
_____

Witness 02
Signature: _____
Name :- _____
Title :- _____
Address :- _____
_____

For and on behalf of
Employer
Signature: _____
Name :- _____
Title :- _____
_____

Witness 01
Signature: _____
Name :- _____
Title :- _____
Address :- _____
_____

Witness 02
Signature: _____
Name :- _____
Title :- _____
Address :- _____
_____

FORM OF PERFORMANCE SECURITY
(Bank Guarantee)

Guarantee No. _____
Executed on _____
Expiry date _____

[Letter by the Guarantor to the Employer]

Name of Guarantor (Bank) with address: _____

Name of Principal (Contractor) with address: _____

_____

Penal Sum of Security (express in words and figures) _____

_____

Letter of Acceptance No:- _____ Dated _____

KNOW ALL MEN BY THESE PRESENTS, that in pursuance of the terms of the Bidding Documents and above said Letter of Acceptance (hereinafter called the Documents) and at the request of the said Principal we, the Guarantor above named, are held and firmly bound unto the _____ _____ (hereinafter called the Employer) in the penal sum of the amount stated above for the payment of which sum well and truly to be made to the said Employer, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that whereas the Principal has accepted the Employer's above said Letter of Acceptance for _____ for the _____ (Name of Contract)
(Name of Project).

NOW THEREFORE, if the Principal (Contractor) shall well and truly perform and fulfill all the undertakings, covenants, terms and conditions of the said Documents during the original terms of the said Documents and any extensions thereof that may be granted by the Employer, with or without notice to the Guarantor, which notice is, hereby, waived and shall also well and truly perform and fulfill all the undertakings, covenants terms and conditions of the Contract and of any and all modifications of said Documents that may hereafter be made, notice of which modifications to the Guarantor being hereby waived, then, this obligation to be void; otherwise to remain in full force and virtue till all requirements of Clause 49, Defects after Taking Over, of Conditions of Contract are fulfilled.

Our total liability under this Guarantee is limited to the sum stated above and it is a condition of any liability attaching to us under this Guarantee that the claim for payment in writing shall be received by us within the validity period of this Guarantee, failing which we shall be discharged of our liability, if any, under this Guarantee.

We, _____ (the Guarantor), waiving all objections and defenses under the Contract, do hereby irrevocably and independently guarantee to pay to the Employer without delay upon the Employer's first written demand without cavil or arguments and without requiring the Employer to prove or to show grounds or reasons for such demand any sum or sums up to the amount stated above, against the Employer's written declaration that the Principal has refused or failed to perform the obligations under the Contract which payment will be effected by the Guarantor to Employer's designated Bank & Account Number.

PROVIDED ALSO THAT the Employer shall be the sole and final judge for deciding whether the Principal (Contractor) has duly performed his obligations under the Contract or has defaulted in fulfilling said obligations and the Guarantor shall pay without objection any sum or sums up to the amount stated above upon first written demand from the Employer forthwith and without any reference to the Principal or any other person.

IN WITNESS WHEREOF, the above-bounden Guarantor has executed this Instrument under its seal on the date indicated above, the name and corporate seal of the Guarantor being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

_____
Guarantor (Bank)

Witness:

1. _____

_____
Corporate Secretary (Seal)

2. _____

_____
Name, Title & Address

Signature _____

Name _____

Title _____

_____
Corporate Guarantor (Seal)

MAG-1

MOBILIZATION ADVANCE GUARANTEE

Guarantee No._____ Date _____

WHEREAS _____(hereinafter called the 'Employer') has entered into a Contract for _____
(Particulars of Contract)
with _____ (hereinafter called the "Contractor").

AND WHEREAS, the Employer has agreed to advance to the Contractor, at the Contractor's request, an amount of Rupees _____ (Rs _____) which amount shall be advanced to the Contractor as per provisions of the Contract.

AND WHEREAS, the Employer has asked the Contractor to furnish Guarantee to secure the mobilization advance for the performance of his obligations under the said Contract.

AND WHEREAS, _____
(Scheduled Bank in Pakistan acceptable to the Employer) (hereinafter called the "Guarantor") at the request of the Contractor and in consideration of the Employer agreeing to make the above advance to the Contractor, has agreed to furnish the said Guarantee.

NOW, THEREFORE, the Guarantor hereby guarantees that the Contractor shall use the advance for the purpose of above mentioned Contract and if he fails and commits default in fulfilment of any of his obligations for which the advance payment is made, the Guarantor shall be liable to the Employer for payment not exceeding the aforementioned amount.

Notice in writing of any default, of which the Employer shall be the sole and final judge, on the part of the Contractor, shall be given by the Employer to the Guarantor, and on such first written dem and, payment shall be made by the Guarantor of all sums then due under this Guarantee without any reference to the Contractor and without any objection.

This Guarantee shall remain in force until the advance is fully adjusted against payments from the Interim Payment Certificates of the Contractor or until _____whichever is earlier.
(Date)
The Guarantor's liability under this Guarantee shall not in any case exceed the sum of Rupees _____ (Rs _____).

This Guarantee shall remain valid up to the aforesaid date and shall be null and void after the aforesaid date or earlier if the advance made to the Contractor is fully adjusted against payments from Interim Payment Certificates of the Contractor provided that the Guarantor agrees that the aforesaid period of validity shall be deemed to be extended if on the above mentioned date the advance payment is not fully adjusted.

GUARANTOR

1. Signature _____
2. Name _____
3. Title _____

WITNESS

1. _____
Corporate Secretary (Seal)

2. _____ _____
(Name Title & Address) Corporate Guarantor (Seal)

PART-I

GENERAL CONDITIONS OF CONTRACT

The General Conditions of Contract (Part-I) are based on the FIDIC "Conditions of the Contract for Works of Civil Construction, Part-I General Conditions" Fourth Edition (1987) Reprinted in 1988, with editorial amendments, Reprinted in 1992 with further amendments. These Conditions of Contract are published by the "FEDERATION OF INTERNATIONALE DES INGENIEURS-CONSEILS" (FIDIC), P.O. Box 86, CH 1000 Lausanne, 12-Chailly, SWITZERLAND.

The prospective Bidders are required to obtain copy of the above mentioned Conditions of Contract directly from Head Office of FIDIC, on the address indicated above against payment of their usual charges. However, the aforesaid FIDIC Conditions of Contract are available in the PEC Standard Form of Bidding Documents (Civil Works) which may be purchased from PEC Head office, Islamabad, for ready reference.

The successful Bidder after award of work shall have to provide three (3) copies of the said FIDIC Conditions of Contract for Works of Civil Construction, all in original obtained from the publishers for incorporation of the same in the Contract Documents of the Work.

PART II
PARTICULAR CONDITIONS OF CONTRACT

These Particular Conditions Of Contract - Part II are additions, deletions and amendments to General Conditions of Contract - Part I and shall be taken into consideration in interpreting or construing such clauses. Sub-Clause numbers, if similar as of Part-I, are amendments therein otherwise these are additional Clauses or Sub-Clauses thereto.

Definitions **1.1** (a) (i) The **"Employer"** is EXIM Bank of Pakistan (EXIM), Islamabad, the legal successors and any assignee of such person.

(a) (iv) The **"Engineer"** is 'National Engineering Services Pakistan (Pvt.) Limited (**NESPAK**)' Architecture & Planning Division, 4th Floor, NICL Building, Karachi, as nominated by the Employer or any other competent person appointed by the Employer, and notified to the Contractor, to act in replacement of the Engineer. Provided always that except in cases of professional misconduct, the outgoing Engineer to formulate his certifications/recommendations in relation to all outstanding matters, disputes and claims relating to the execution of the Works during his tenure.

Add the following paragraphs:

(a) (vi) **"Employer's Representative" is:**

Manager Admin & Procurement,
EXIM Bank of Pakistan
Office No. 510-512, 5th Floor, Evacuee Trust Complex,
Agha Khan Road, F-5/1,
Islamabad.
Tel: 051 - _____, Fax: 051 – _____
Email: **info@eximbank.gov.pk**

or any other competent person appointed in writing by the Employer and shall take effect on delivery of such appointment to the Engineer and the Contractor. The Employer may from time to time delegate to the Employer's Representative any of the duties and authorities vested in the Employer and may at any time revoke such delegation.

Any communication given by the Employer's Representative to the Engineer and the Contractor in accordance with such delegation shall have the same effect as though it had been given by the Employer.

(a) (vii) "Bidder or Tenderer" means any person or persons, company, corporation or firm submitting a Bid or Tender.

(b) (iv) Add the following at the end of the paragraph:
The word "Bill of Quantities" is synonymous with "Estimate including Premium".

(v) Add the following at the end of the paragraph:

The word "Tender" is synonymous with "Bid" and the word "Tender Documents" with "Bidding Documents".

Add the following paragraph:

(b) (ix) "**Programme**" means the programme to be submitted by the Contractor in accordance with Sub-Clause 14.1 and any approved revisions thereto.

(e) (i) Delete the text and substitute with the following:

"**Contract Price**" means the sum stated in the Letter of Acceptance as payable to the Contractor for the execution and completion of the Works subject to such additions thereto or deductions therefrom as may be made and remedying of any defects therein in accordance with the provisions of the Contract.

Engineer's Duties and Authority 2.1 (b) With reference to Sub-Clause 2.1(b), the following provisions shall also apply;

The Engineer shall obtain the specific approval of the Employer before carrying out his duties in accordance with the following Clauses:

(i) Consenting to the sub-letting of any part of the Works under Sub-Clause- 4.1 "Subcontracting".

(ii) Certifying additional cost determined under Sub-Clause 12.2 "Not Foreseeable Physical Obstructions or Conditions".

(iii) Any action under Clause 10 "Performance Security" and Clauses 21,23,24 & 25 "Insurance" of sorts.

(iv) Any action under Clause 40 "Suspension".

(v) Any action under Clause 44 "Extension of Time for Completion."

(vi) Any action under Clause 47 "Liquidated Damages for Delay".

(vii) Issuance of "Taking Over Certificate" under Clause 48.

(viii) Issuing a Variation Order under Clause 51,except:

a) in an emergency" situation, as stated here below, or

b) if such variation would increase the Contract Price by an amount equal to or less than the amount stated in the Appendix-A to bid.

(ix) Fixing rates or prices under Clause 52.

(x) Extra payment as a result of Contractor's claims under Clause 53.

(xi) Release of Retention Money to the Contractor under Sub-Clause 60.3 "Payment of Retention Money".

(xii) Issuance of "Final Payment Certificate" under Sub-Clause 60.8.

(xiii) Issuance of "Defect Liability Certificate" under Sub-Clause 62.1.

(xiv) Any change in the ratios of Contract currency proportions and payments thereof under Clause 72 "Currency and Rate of Exchange".

* (If in the opinion of the Engineer an emergency occurs affecting the safety of life or of the Works or of adjoining property, the Engineer may, without relieving the Contractor of any of his duties and responsibilities under the Contract, instruct the Contractor to execute all such work or to do all such things as may, in the opinion of the Engineer, be necessary to abate or reduce the risk. The Contractor shall forthwith comply with any such instruction of the Engineer. The Engineer shall determine an addition to the Contract Price, in respect of such instruction, in accordance with Clause 52 and shall notify the Contractor accordingly, with a copy to the Employer.

Engineer's Representative 2.2 Following paragraph is added:

The Employer shall ensure that the Engineer's Representative is a professional engineer as defined in the Pakistan Engineering Council Act 1975 (V of 1976)

Add the following Sub-Clauses:

Engineer not Liable 2.7 Approval, reviews and inspection by the Engineer of any part of the Works does not relieve the Contractor from his sole responsibility and liability for the supply of materials, plant and equipment for construction of the Works and their parts in accordance with the Contract and neither the Engineer's authority to act nor any decision made by him in good faith as provided for under the Contract whether to exercise or not to exercise such authority shall give rise to any duty or responsibility of the Engineer to the Contractor, any Subcontractor, any of their representatives or employees or any other person performing any portion of the Works.

Replacement of the Engineer 2.8 "If the Employer intends to replace the Engineer, the Employer shall, not less than 14 days before the intended date of replacement, give notice to the Contractor, of the name, address and relevant experience of the intended replacement Engineer. The Employer shall not replace the Engineer with a person against whom the Contractor raises reasonable and logically convincing objection by notice to the Employer, with supporting particulars and verifiable documentary evidence."

Language(s) and Law 5.1
(a) The Contract Documents shall be drawn up in the English language.
(b) The Contract shall be subject to and construed according to the Laws of Islamic Republic of Pakistan.

Priority of Contract Documents 5.2 Delete the documents listed at (1) to (6) of the Sub-Clause and substitute with the following:

(a) The Contract Agreement;
(b) The Letter of Acceptance;
(c) The completed Form of Bid;
(d) Addenda (if any);
(e) Special Stipulations (Appendix-A to Bid);
(f) The Particular Conditions of Contract – Part II;
(g) The General Conditions of Contract – Part I;
(h) The completed Appendices to Bid
(i) The Drawings;
(j) The Specifications;

(x) Any other document forming part of the Contract by reference.

In case of discrepancies between drawings, those of larger scale shall govern unless they are superseded by a drawing of later date regardless of scale. All Drawings and Specifications shall be interpreted in conformity with the Contract and these Conditions. Addendum, if any, shall be deemed to have been incorporated at the appropriate places in the documents forming the Contract.

Add the following Sub-Clauses:

Shop Drawings **6.6**

For Civil, E&M and HVAC Works, The Contractor shall submit to the Engineer for review 3 copies of all shop and erection drawings applicable to this Contract as per provision of relevant Sub-Clause of the Contract.

Review and approval by the Engineer shall not be construed as a complete check but will indicate only that the general method of construction and detailing is satisfactory and that the Engineer's review or approval shall not relieve the Contractor of any of his responsibilities under the Contract.

As-Built Drawings **6.7**

At the completion of the Works under the Contract, the Contractor shall furnish to the Engineer 6 copies and one reproducible of all drawings amended to comply with the Works as built. The price of such Drawings shall be deemed to be included in the Contract Price.

Contract Agreement **9.1**

Delete the text of Sub-Clause 9.1 in its entirety and substitute with the following:

The Contractor shall enter into and execute the Contract Agreement in the form annexed to the Bidding / Contract Documents. The Contract Agreement, Performance Security, Insurance Policies / Bonds and other Bond/Guarantees/Sureties shall be prepared and completed at the cost of the Contractor. The Contractor shall prepare six (6) copies of the Contract Document (including all the volumes / documents listed in the Contract Agreement) along-with copies of all the bonds/Guarantees/Sureties, at his cost and shall submit the same to the Employer.

Performance Security **10.1**

Delete the text and substitute with the following:

The Contractor shall obtain and provide to the Employer a Performance Security in the prescribed Form annexed to these Bidding / Contract Documents. The said security shall be furnished to the Employer by the Contractor within fourteen (14) days from the date of Letter of Acceptance. The Performance Security shall be of an amount equal to ten percent (10%) of the Contract Price in the currency (PKR) of the Contract at the option of the bidder, in the form of Bank Guarantee from any Scheduled Bank in Pakistan.

The cost of complying with requirements of this Sub-Clause shall be borne by the Contractor.

Add the following Sub-Clause:

Performance Security Binding on Variations and Changes

10.4 The Performance Security shall be binding irrespective of changes in the quantities or variations in the Works or extensions in Time for Completion of the Works which are granted or agreed upon under the provisions of the Contract.

Programme to be Submitted

14.1 Delete the text and substitute with the following:

The Contractor shall prepare and submit the programme of the work acceptable to the Engineers within seven (7) days from the date of Letter of Acceptance for agreement of the Engineer and approval of the Employer. This programme shall identify and highlight those activities which are on the critical path.

The time schedule may be adjusted from time to time but the contractual completion date (Time for Completion) shall remain un-changed in accordance with the Bidding documents unless extensions of time for completion of the Works are approved in accordance with the provisions of the Contract.

The programme should be computerized and drawn-up on the critical path method (CPM) or any other programme approved by the Engineer. Progress reporting by the Contractor should be supported, on a monthly basis with an updated analysis of the progress including a statement on items, which are or are going to become critical to the progress of the Work, along with the proposal on how the Contractor intends to alleviate the situation. Programme should include complete sequence of activities. Programme to be MS Project / MS Office / any other programme approved by the Engineer based and updated with actual progress continually.

Cash Flow Estimate to be Submitted

14.3 Delete the text of Sub-Clause 14.3 and substitute with the following:

The detailed Cash Flow Estimate shall be submitted by the Contractor to the Engineer within fourteen (14) days from the date of Letter of Acceptance. The Cash Flow Estimate shall be provided, in monthly periods, of all payments to which the Contractor will be entitled under the Contract and the Contractor shall subsequently supply revised cash flow estimates at monthly intervals, if required to do so by the Engineer.

Add the following Sub-Clause:

Detailed Programme and Monthly Progress Report

14.5 a) For purposes of Sub-Clause 14.1, the Contractor shall submit to the Engineer detailed programme for the following:

(1) Execution of Works;
(2) Labour Employment;
(3) Material Procurement;
(4) Schedule for submittals of shop drawings/bar-bending schedule, samples of material/literature for approval; and
(5) Other details as required by the Engineer.

(b) During the period of the Contract, the Contractor shall submit to the Engineer not later than the 3rd day of the following week, 6 copies each of Monthly Progress Reports covering:

(1) A Construction Schedule indicating the fortnightly progress in percentage;

(2) Description of all work carried out since the last report;
(3) Description of the work planned for the next fourteen days sufficiently detailed to enable the Engineer to determine his programme of inspection and testing;
(4) Fortnightly summary of daily job record;
(5) Photographs to illustrate progress; and
(6) Information about problems and difficulties encountered, if any, and proposals to overcome the same.

(c) During the period of the Contract, the Contractor shall keep a daily record of the work progress, which shall be made available to the Engineer as and when requested. The daily record shall include particulars of weather conditions, number of men working, deliveries of materials, quantity, location and assignment of Contractor's equipment.

Add the following Sub-Clauses:

Language Ability of Contractor's Representative **15.2** The Contractor's authorised representative shall be fluent in the English language. Alternately an interpreter with ability of English language shall be provided by the Contractor on full time basis.

Contractor's Representative **15.3** The Contractor's authorized representative and his other professional engineers working at Site shall register themselves with the Pakistan Engineering Council.

The Contractor's authorized representative at Site shall be authorized to exercise adequate administrative and financial powers on behalf of the Contractor so as to achieve completion of the Works as per the Contract.

Add the following Sub-Clauses:

Language Ability of Superintending Staff of Contractor **16.3** A reasonable proportion of the Contractor's superintending staff shall have a working knowledge of the English language. If the Contractor's superintending staffs is not fluent in English language, the Contractor shall make competent interpreters available during all working hours in a number deemed sufficient by the Engineer.

Employment of Local Personnel **16.4** The Contractor is encouraged, to the extent practicable and reasonable, to employ staff and labour from sources within Pakistan.

Add the following Sub-Clauses:

Safety Precautions **19.3** In order to provide for the safety, health and welfare of persons, and for prevention of damage of any kind, all operations for the purposes of or in connection with the Contract shall be carried out in compliance with the Safety Requirements of the Government of Pakistan with such modifications thereto as the Engineer may authorise or direct and the Contractor shall take or cause to be taken such further measures and comply with such further requirements as the Engineer may determine to be reasonably necessary for such purpose.

The Contractor shall make, maintain and submit reports to the Engineer concerning safety, health and welfare of persons and damage to property, as the Engineer may from time to time prescribe.

Lighting Work at Night **19.4** In the event of work being carried out at night, the Contractor shall at his own cost, provide and maintain such good and sufficient light as will enable the work to proceed satisfactorily and without danger. The approaches to the Site and the Works where the night-work is being carried out shall be sufficiently lighted. All arrangement adopted for such lighting shall be to the satisfaction of the Engineer's Representative.

Employer's Risks **20.4** Delete the text and substitute with the following:

The Employer's risks are:

(a) insofar as they directly affect the execution of the Works in Pakistan:

(i) war and hostilities (whether war be declared or not), invasion, act of foreign enemies,
(ii) rebellion, revolution, insurrection, or military or usurped power, or civil war,
(iii) ionizing radiations, or contamination by radioactivity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuel, radioactive toxic explosive or other hazardous properties of any explosive nuclear assembly or nuclear component thereof,
(iv) pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds,
(v) riot, commotion or disorder, unless solely restricted to the employees of the Contractor or of his Subcontractors and arising from the conduct of the Works;

(b) loss or damage due to the use or occupation by the Employer of any Section or part of the Permanent Works, except as may be provided for in the Contract;

(c) loss or damage to the extent that it is due to the design of the Works, other than any part of the design provided by the Contractor or for which the Contractor is responsible; and

(d) any operation of the forces of nature (insofar as it occurs on the Site) which an experienced contractor:-

(i) could not have reasonably foreseen, or
(ii) could reasonably have foreseen, but against which he could not reasonably have taken at least one of the following measures:-
(a) prevent loss or damage to physical property from occurring by taking appropriate measures, or
(b) insure against.

Insurance of Works and Contractor's Equipment **21.1** The Contractor is bound to provide all the below mentioned insurance policies, as mentioned below, for the persons, works and equipment, etc. on the Contract.

(a) General Requirements

The Engineer/Engineer's Representative and their designate staff for supervision of work shall be included as an insured party against all risks and liabilities. The Contractor shall insure with any one of the Insurance Companies approved for this purpose by the Employer in the joint names of the Employer, the Engineer, and the Contractor against all loss or damages as stated in the General Conditions and as stated herein.

Notwithstanding the responsibilities of the Contractor for indemnities and insurance as described above, the Contractor before commencing work on the Site, must discuss fully with the Engineer and the Employer the insurance coverage provided by

each under any general policies which are to be applied to this Contract to ensure that there are no contingencies left uncovered and to reduce, as far as practicable, duplication of coverage. Should any areas of possible damage or loss be discovered that are not covered by definition of responsibilities set out in these conditions, the addition or reduction in premiums required to give such insurance coverage will be paid by the Contractor and the policies obtained by the mutual agreement of the Employer and the Contractor.

All payments will be in Pakistan Rupees required to replace the damaged items.

The Contractor shall be responsible for deductibles and losses not covered by insurance.

An insurance loss shall not affect the Employer's or Contractor's rights and obligations under the Contract.

All policies shall state that:

i. the Employer shall receive at least fourteen (14) days written notice of intended cancellation or change affecting coverage.

ii. the Contractor is fully protected so as to provide full indemnity to Employer in respect of liability against loss or damage assumed by the Contractor under the Contract.

iii. the inclusion of more than one Insured shall not affect the rights of any other insured.

The Contractor shall be responsible for observance by his Sub Contractor(s) of insurances noted herein. Before each Sub Contractor starts work the Contractor shall give the Employer proof that the Sub contractor(s) are covered by insurance equivalent to that specified herein for the Contractor.

(b) The Contractor shall include the following insurances:

i. Third Party Liability Insurance

Risks insured: bodily injury, death and property damage.

Scope of coverage: contractual liability, tortuous liability, premises and operations liability, Contractor's contingent liability with respect to Sub Contractor's operations.

Minimum limit: as indicated in Appendix 'A' to Bid inclusive, each occurrence.

ii. All Risk Property Insurance.

All risks including fire, flood, storm and earthquake.

Scope of coverage: the Works, during the entire duration of the Contract including the Period of Maintenance / Defects Liability Period, and all permanent, temporary and consumable materials related to the Works which are in storage, in transit or at site of the Works.

Minimum limit: the sum of the Contract Price plus fifteen percent (15%). This policy shall state that :

(a) if a loss occurs the Contractor, the Employer and the Engineer shall be paid in relation of their share of the loss.

(b) (Waiver of subrogation) the Insurer has no subrogation rights against any person, corporation or organization (including directors, officers, employees, servants and agents thereof) which: is an Insured under the policy, or is controlled by, owned by, or associated with an Insured, or is a Sub Contractor on the Works, or has, before a loss occurs, been released from liability by an Insured.

"Hold harmless" provisions: The Employer and the Contractor shall be indemnified against all losses.

Employer use or occupancy: If the Employer uses or occupies all or part of the Works during the life of the Policy the Contractor shall ensure that the policy continues in full force and the Employer shall pay any resulting extra cost of insurance.

Loss Procedure: If a loss occurs the Contractor shall, on behalf of the Employer and himself negotiate the value of the loss with the insurer. Unless directed otherwise by the Engineer, when agreement is reached the Contractor shall repair all damage and the Employer shall pay him, in accordance with the Engineer's certificates, for that part of the repairs which is the Employers responsibility.
If directed by the Engineer, instead of carrying out repairs, the Contractor shall pay to the party suffering the loss that part of the agreed value of the loss which is the Contractor's responsibility.

iii. All Risk Contractor's Plant Insurance

Scope of coverage: all construction machinery plant used by the Contractor for the Works.

iv. Automobile Liability Insurance.

Risks insured: Bodily injury, death, property damage and theft.

Scope of coverage: all licensed vehicles owned, hired operated or licensed by the Contractor.

Minimum limit: as indicated in Appendix 'A' to the form of Bid inclusive each occurrence.

Cost of compliance with the requirements of this sub-clause and providing all insurance policies shall be borne by the Contractor.

Scope of Cover **21.2** Para. (a) of Sub-Clause 21.2 is amended by deletion of the words "from the start of work at the Site." and by the substitution therefor of the words "from the first working day after the Commencement Date.".

In Part I, the following is added as sub-para (c) under Sub-Clause 21.2,

c) It shall be the responsibility of the Contractor to notify the insurer of any change in the nature and extent of the Works and to ensure the adequacy of the insurance coverage at all times during the currency of the Contract.

Exclusions **21.4** Delete the text and substitute with the following:

There shall be no obligation for the insurances in Sub-Clause 21.1 to include loss or damage caused by the risks listed under Sub-Clause 20.4 paras (a) (i) to (iv).

Evidence and Terms of Insurances **25.1** Sub-Clause 25.1 of the General Conditions of Contract Part-I, the first sentence "The Contractor shall ..... policies to the Employer" is deleted and substituted with the following sentence.

"The Contractor shall provide evidence to the Employer as soon as practical but in any case prior to the start of the work at site that the insurances required under the Contract have been affected and shall provide the insurance policies to the Employer."

Following new paragraph is added at the end.

The Contractor shall also submit in original the receipts of all the premiums paid by the Contractor in connection with the above insurances.

Add the following Sub-Clause:

Insurance Companies **25.5** The Contractor shall be obliged to place all insurances relating to the Contract including, but not limited to, the insurances referred to in Clauses 21, 23 and 24 with either National Insurance Company of Pakistan or any other insurance company operating in Pakistan and acceptable to the Employer.

Costs of such insurances shall be borne by the Contractor.

Add the following Sub-Clause:

Co-operation with other Contractors **31.3** During the execution of the Works, the Contractor shall co-operate fully with other contractors working for the Employer at and in the vicinity of the Site and also shall provide adequate precautionary facilities not to make himself a nuisance to local residents and other Contractors.

Add the following Sub-Clauses:

Rates of Wages and Conditions of Labour **34.2** The Contractor shall pay rates of wages and observe conditions of labour not less favourable than those established for the trade or industry where the work is carried out. In the absence of any rates of wages or conditions of labour so established, the Contractor shall pay rates of wages and observe conditions of labour which are not less favourable than the general level of wages and conditions observed by other employers whose general circumstances in the trade or in industry in which the Contractor is engaged are similar.

Employment of Persons in the Service of Others **34.3** The Contractor shall not recruit his staff and labour from amongst the persons in the services of the Employer or the Engineer; except with the prior written consent of the Employer or the Engineer, as the case may be.

Housing for Labour **34.4** Save insofar as the Contract otherwise provides, the Contractor shall provide and maintain such housing accommodation and amenities as he may consider necessary for all his supervisory staff and labour, employed for the purposes of or in connection with the Contract including all fencing, electricity supply, sanitation, cookhouses, fire prevention, water supply and other requirements in connection with such housing accommodation or amenities. On completion of the Contract, unless agreed with the Employer, the temporary camps or housing provided by the Contractor shall be removed and the Site reinstated to its original condition, all to the approval of the Engineer.

Health and Safety	**34.5**	Due precautions shall be taken by the Contractor, and at his own cost, to ensure the safety of his staff and labour at all times throughout the period of the Contract. The Contractor shall further ensure that suitable arrangements are made for the prevention of epidemics and for all necessary welfare and hygiene requirements.
Epidemics	**34.6**	In event of any outbreak of illness of an epidemic nature, Contractor shall comply with and carry out such regulations, orders and requirements as may be made by Government, or local medical or sanitary authorities, for purpose of dealing with and overcoming same.
Supply of Water	**34.7**	The Contractor shall, so far as is reasonably practicable, having regard to local conditions, provide on the Site, to the satisfaction of the Engineer or his representative, adequate supply of drinking and other water for the use of his staff and labour.
Alcoholic Liquor or Drugs	**34.8**	The Contractor shall not, otherwise than in accordance with the Statutes, Ordinances and Government Regulations or Orders for the time being in force, import, sell, give, barter or otherwise dispose of any alcoholic liquor or drugs, or permit or suffer any such importation, sale, gift, barter or disposal by his Subcontractors, agents, staff or labour.
Arms and Ammunition	**34.9**	The Contractor shall not give, or otherwise dispose of to any person or persons, any arms or ammunition of any kind or permit or suffer the same as aforesaid.
Festivals and Religious Customs	**34.10**	Contractor shall in all dealings with his staff and labour have due regard to all recognised festivals, days of rest and religious and other customs.
Disorderly Conduct	**34.11**	The Contractor shall at all times take all reasonable precautions to prevent any unlawful, riotous or disorderly conduct by or amongst staff and labour and for the preservation of peace and protection of persons and property in the neighbourhood of the Works against the same.
Compliance by Subcontractors	**34.12**	The Contractor shall be responsible for compliance by his Subcontractors of the provisions of this Clause.
		Add the following Sub-Clauses:
Records of Safety and Health	**35.2**	The Contractor shall maintain such records and make such reports concerning safety, health and welfare of persons and damage to property as the Engineer may from time to time prescribe.
Reporting of Accidents	**35.3**	The Contractor shall report to the Engineer details of any accident as soon as possible after its occurrence. In the case of any fatality or serious accident, the Contractor shall, in addition, notify the Engineer immediately by the quickest available means.
		Add the following Sub-Clause:
Use of Pakistani Materials and Services	**36.6**	The Contractor shall, so far as may be consistent with the Contract, make the maximum use of materials, supplies, plant and equipment indigenous to or produced or fabricated in Pakistan and services, available in Pakistan provided such materials, supplies, plant, equipment and services shall be of required standard and conform to the prescribed specifications.
Commencement of Works	**41.1**	Delete the text and substitute with the following: The Contractor shall commence the Works on the Site within the period named in Appendix – A to Bid from the date of receipt by him from the Engineer of a written Notice to Commence. Thereafter, the Contractor shall proceed with the Works with due expedition and without delay.

Reduction of Liquidated Damages	**47.2**	Delete the Sub-Clause in its entirety.
		Add the following Sub-Clause:
Bonus for Early Completion of Works	**47.3**	Delete the Sub-Clause in its entirety.
Taking Over of Sections or Parts	**48.2**	Delete the Sub-Clause in its entirety.
Instructions for Variations	**51.2**	At the end of the first sentence, after the word "Engineer", add the words "in writing"
Valuation of Variations	**52.1**	Delete the words "after due consultation.....Engineer and the Contractor" in seventh to ninth line and replace with following: "the valuation will be carried out by the Engineer on the basis of similar items covered in the Bill of Quantities, insofar as such rates or prices apply and where such rates or prices do not directly apply, the value shall be based on the rates or prices deduced therefrom so far as it is practicable to do so. If the same is not provided in the Bill of Quantities then the valuation will be carried out on the basis of actual with the application of current market rates for labour, material etc. No escalation on account of material, labour, POL etc. shall be allowed on such items if the valuation is carried out on the basis of current market rates and the percentage of overheads, taxes & profit, etc. to be allowed in such cases for Civil , Plumbing, Electrical & HVAC Works shall be twenty five percent (25%) and 17.5% for Furniture Works." In the tenth line, after the words "Engineer shall" add the following - Within a period not exceeding one-eighth of the completion time subject to a minimum of 28 days from the date of disagreement whichever is later. Add the following Para at the end of Sub-Clause 52.1 of Part-I: The approval / finalization of rates of all variations shall not relieve the Contractor of his obligations under the Contract. The Contractor shall neither stop the work nor slow down the progress of the Works in awaiting the approval of rates of all variations.
Variations Exceeding 15 per cent	**52.3**	Delete the words "15 per cent" and replace with "20 per cent".
Failure to Comply	**53.4**	Delete this Sub-Clause in its entirety.
Conditions of Hire of Contractor's Equipment	**54.5**	Add the following paragraph: The Contractor shall, upon request by the Engineer at any time in relation to any item of hired Contractor's Equipment, forthwith notify the Engineer in writing the name and address of the Owner of the equipment and shall certify that the agreement for the hire thereof contains a provision in accordance with the requirements set forth above.

Breakdown of Lump Sum Items 57.2 Delete the words "28 days" in second line and replace with "14 days".

Payments to Nominated Subcontractors 59.4 The Contractor shall pay to the nominated Subcontractor the amounts which the Engineer certifies to be due in accordance with the subcontract. These amounts plus other charges shall be included in the Contract Price in accordance with Clause 58 [Provisional Sums], except as stated in Sub-Clause 59.5 [Certification of Payments].

Certification of Payments & Nominated Subcontractors 59.5 Before issuing a Payment Certificate which includes an amount payable to a nominated Subcontractor, the Engineer shall be entitled to demand from the Contractor reasonable evidence that the nominated Subcontractor has received all amounts due in accordance with previous Payment Certificates, less applicable deductions for retention or otherwise. Unless the Contractor

a) submits reasonable evidence to the Engineer, or

b) i) satisfies the Engineer in writing that the Contractor is reasonably entitled to withhold or refuse to pay those amounts, and

ii) submits to the Engineer reasonable evidence that the nominated Subcontractor has been notified in writing of the Contractor's entitlement,

then the Employer may (at his sole discretion) pay direct to the nominated Subcontractor, part or all of such amounts previously certified (less applicable deductions) as are due to the nominated Subcontractor and for which the Contractor has failed to submit the evidence described in sub-paragraphs (a) or (b) above. The Contractor shall then repay, to the Employer, the amount which the nominated Subcontractor was directly paid by the Employer.

Monthly Statements 60.1 Delete the text and substitute with the following

The Contractor shall on the basis of the joint measurement of work done under Clause 56.1submit to the Engineer after the end of each month six copies, each signed by the Contractor's representative approved by the Engineer in accordance with the Sub-Clause 15.1, of a statement, in such form as the Engineer may from time to time prescribe, showing the amounts to which the Contractor considers himself to be entitled up to the end of the month in respect of

(a) the value of the Permanent Works executed,

(b) any other items in the Bill of Quantities including those for Contractor's Equipment, Temporary Works, day works and the like,

(c) the percentage of the invoice value of listed materials, all as stated in the Appendix to Tender, and Plant delivered by the Contractor on the Site for incorporation in the Permanent Works but not incorporated in such Works,

(d) adjustments under Clause 70 (if applicable), and

(e) any other sum to which the Contractor may be entitled under the Contract or otherwise.

An amount equal to five percent (5%) of the Interim Payment

Certificate shall be retained from interim payments against work done as retention money.

The Contractor should have to remain on Active Tax Payer's list throughout the currency of the Contract.

Final Payment Certificate 60.8 Delete the words "28 days" in first line and replace with "14 days".

Time for Payment 60.10 Delete the text and substitute with the following:

The amount due to the Contractor under any Interim Payment Certificate issued by the Engineer pursuant to this Clause, or to any other terms of the Contract, shall, subject to Clause 47, be paid by the Employer to the Contractor within fourteen (14) days after such Interim Payment Certificate has been delivered to the Employer, or, in the case of the Final Certificate referred to in Sub Clause 60.8, within 28 days after such Final Payment Certificate has been delivered to the Employer. In the event of failure of the Employer to make payment within the times stated due to circumstances beyond his control, the Employer shall not pay to the Contractor any interest or compensation of any sort.

Add the following Sub-Clauses:

Financial Assistance to Contractor 60.11 Financial assistance shall be made available to the Contractor by the Employer by adopting the following method.

Mobilization Advance

Mobilization Advance @ ten percent (10%) of the Contract Price stated in the Letter of Acceptance shall be paid by the Employer to the Contractor upon submission by the Contractor of a Mobilization Advance Guarantee for the full amount of the Advance in the specified form from a Scheduled Bank in Pakistan. Mobilization Advance Guarantee shall remain valid till full recovery of the Mobilization Advance. The Mobilization Advance Guarantee shall be progressively reduced to the balance amount of Mobilization Advance indicated in the IPCs certified by the Engineer.

a) Mobilization Advance shall be paid within 10 days after signing of the Agreement or the date of receipt of Engineer's Notice to Commence, whichever is earlier.

b) This Advance shall be recovered in two (02) equal installments from first two (02) Interim Payment Certificates (IPC) and shall be fully recovered before completion of the project.

Recovery of Retention Money 60.12 An amount equal to five percent (5%) of the contract price shall be retained from interim payments against work done as retention money. The maximum amount of retention money shall be five (5%) percent of the Contract Price.

Withholding of Payment 60.13 a) The Employer at his own or on the recommendations of the Engineer may withhold the whole or part of any payment requested by the Contractor if it is necessary in his opinion to protect himself against losses on account of the following reasons:

i) Defective work not rectified.

ii) Non-fulfilment of any due demand and guarantee or renewal of any guarantee or surety.

iii) Claims if third parties raised against the Employer caused through the fault of the Contractor in connection with the works.

iv) Damage caused by the Contractor or his personnel or any sub contractor, to the Employer, or to a third party on the site.

v) Non-fulfilment of the Contract by the Contractor.

vi) Non-fulfilment of the Contractual Obligation towards submittal of Shop Drawings, Bar Bending Schedules, Samples, erection of Mock-Up samples, As-built drawings, etc.

b) After the reasons of withholding of payments have been eliminated to the satisfaction of the Employer and the Engineer, payments to the Contractor will be undertaken by the Employer without delay.

Default of Contractor **63.1** Add the following para at the end of the Sub-Clause:

Provided further that in addition to the action taken by the Employer against the Contractor under this Clause, the Employer may also refer the case of default of the Contractor to Pakistan Engineering Council for punitive action under the Construction and Operation of Engineering Works Bye-Laws 1987, as amended from time to time.

Special Risks **65.2** Delete the text and substitute with the following:

The Special Risks are the risks defined under Sub-Clause 20.4 paragraph a (i) to (v).

Out Break of War **65.6** In sub-clause 65.6, delete "in any part of the World" from the second line of the paragraph.

Arbitration **67. 3** In the sixth to eight lines, delete the words "shall be finally settled ..... appointed under such Rules" and substitute with the following:

"shall be finally settled under the provisions of the Arbitration Act, 1940 as amended or any statutory modification or re-enactment thereof for the time being in force".

Add the following paragraph:

The place of arbitration shall be at **Islamabad**, Pakistan.

Notices to Contractor **68.1** Add the following paragraph:

For the purposes of this Sub-Clause, the Contractor shall, immediately after receipt of Letter of Acceptance, intimate in writing to the Employer and the Engineer by registered post, the address of his principal place of business or any change in such address during the period of the Contract.

Notice to **68.2** For the purposes of this Sub-Clause, the respective addresses are:

Employer and Engineer

a) **The Employer:**

Manager Admin & Procurement,
EXIM Bank of Pakistan
Office No. 510-512, 5th Floor, Evacuee Trust Complex,
Agha Khan Road, F-5/1,
Islamabad.
Tel: 051 - _____, Fax: 051 – _____
Email: info@eximbank.gov.pk

b) **The Engineer:**

National Engineering Services Pakistan (Pvt.) Ltd
Architecture & Planning Division,
4th Floor, NICL Building, Abbasi Shaheed Road, off Shahrah-e-Faisal, Karachi
Ph 021-99225430-34, Fax : 021-99225424

Increase or Decrease of Cost **70.1** Delete Sub-Clause 70.1 in its entirety.

Currency And Rates Of Exchange **71 & 72** Delete the Clauses in their entirety.

Add the following Sub-Clauses:

Payment of Income Tax **73.1** The Contractor, Subcontractors and their employees shall be responsible for payment of all their income tax, super tax and other taxes on income arising out of the Contract and the rates and prices stated in the Contract shall be deemed to cover all such taxes.

Customs, duties and taxes **73.2** The rates and prices stated in the priced Bill of Quantities shall be deemed to include every element of duty or tax leviable on or in relation to the production, import, purchase, sale, delivery and transportation of materials and to the bringing thereof to the Site and no such duty or tax shall be separately reimbursable.

Integrity Pact **74.1** If the Contractor or any of his Subcontractors, agents or servants is found to have violated or involved in violation of the Integrity Pact signed by the Contractor as Appendix-L to his Bid, then the Employer shall be entitled to:

(a) recover from the Contractor an amount equivalent to ten times the sum of any commission, gratification, bribe, finder's fee or kickback given by the Contractor or any of his Subcontractors, agents or servants;

(b) terminate the Contract; and

(c) recover from the Contractor any loss or damage to the Employer as a result of such termination or of any other corrupt business practices of the Contractor or any of his Subcontractors, agents or servants.

The termination under Sub-Para (b) of this Sub-Clause shall proceed in the manner prescribed under Sub-Clauses 63.1 to 63.4 and the payment under Sub-Clause 63.3 shall be made after having deducted the amounts due to the Employer under Sub-Para (a) and (c) of this Sub-Clause

Termination of Contract for Employer's Convenience 75.1 The Employer shall be entitled to terminate the Contract at any time for the Employer's convenience after giving 28 days prior notice to the Contractor, with a copy to the Engineer. In the event of such termination, the Contractor:

(a) shall proceed as provided in Sub-Clause 65.7 hereof, and

(b) shall be paid by the Employer as provided in Sub-Clause 65.8 hereof.

Liability of Contractor 76.1 The Contractor or his Subcontractors or assigns shall follow strictly, all relevant labour laws including the Workmen's Compensation Act and the Employer shall be fully indemnified for all claims, damages etc. arising out of any dispute between the Contractor, his Subcontractors or assigns and the labour employed by them.

Joint and Several Liability 77.1 If the Contractor is a joint venture of two or more persons, all such persons shall be jointly and severally bound to the Employer for the fulfilment of the terms of the Contract and shall designate one of such persons to act as leader with authority to bind the joint venture. The composition or the constitution of the joint venture shall not be altered without the prior consent of the Employer.

Details to be Confidential 78.1 The Contractor shall treat the details of the Contract as private and confidential, save in so far as may be necessary for the purposes thereof, and shall not publish or disclose the same or any particulars thereof in any trade or technical paper or elsewhere without the prior consent in writing of the Employer or the Engineer. If any dispute arises as to the necessity of any publication or disclosure for the purpose of the Contract, the same shall be referred to the decision of the Engineer whose award shall be final.

Precaution for Pollution 79.1 Precautionary measures and facilities shall be provided by the Contractor at his own cost in carrying out the Works including dumping and disposal of spoils, in the manner approved by the Engineer to prevent environmental pollution.

SPECIFICATIONS

(to be signed by the Bidder)

SPECIFICATIONS – SPECIAL PROVISIONS

1. GENERAL

1.1 Specifications – Special Provisions shall form an integral part of Bid and the Contract documents.

1.2 The Contractor shall notify all sub-contractors of the provisions of these Special Provisions.

2. DESCRIPTION OF PROJECT, WORKS INVOLVED AND SITE

The scope of works mainly comprises furnishing, renovation works including civil, plumbing, electrical HVAC and networking works, etc. lying within the boundaries and limits shown on the Drawings and any such additional areas adjacent thereto as may be designated by the Engineer from time to time for the construction to be performed under the Contract, and all such areas and additional areas shall comprise the Site.

3. CODES, STANDARDS AND CERTIFICATES

A. Applicable Standards

Except as otherwise provided by these Specifications or the Drawings, all materials, equipment and fabrication and testing thereof shall conform to the latest applicable standards and codes referred in the Specifications by use of the abbreviations explained below:

ASCE		American Society of Civil Engineers
ASA		American Standard Association
ACI	-	American Concrete Institute (USA)
AISI	-	American Iron and Steel Institute (USA)
AISC	-	American Institute of Steel Construction (USA)
ANSI	-	American National Standard Institute (USA)
ASTM	-	American Society for Testing and Materials (USA)
AASHTO	-	American Association of State Highway & Transportation Officials.
AWS	-	American Welding Society (USA)
BS	-	British Standards (UK)
CP	-	Codes of Practice (UK)
ICAO		International Civil Aviation Organisation
BSICP		British Standard Institute Code of Practice
PS	-	Pakistan Standards (Pak)
PCA		Portland Cement Association
PSI		Pakistan Standard Institute
SSPC	-	Steel Structures Painting Council (USA)
UBC	-	Uniform Building Code (USA)
USBR	-	United States Bureau of Reclamation (USA)

If the Contractor, at any time and for any reason, wishes to deviate from the above standards or desires to use material or equipment not covered by the above standards, he shall state the exact nature of the changes, the reason for making the change and shall submit complete specifications of the materials and equipment to the Engineer for approval.

B. Standards other than those Specified

Where requirements for materials or equipment are specified by reference to a standard which has its origin in one country, it is not the intention to restrict the requirements solely to that standard and that country. Other standards, including standards of other countries, will be accepted provided the requirements thereof, in the sole opinion of the Engineer, are at least equal to the requirements of the standard specified. The Contractor may propose to the Engineer an equivalent standard other than that specified, in which case he shall submit the proposed

standard and all other information required and shall submit written proof that his proposed standard is equivalent in all significant respects to the standard specified. All submissions must be made in the English language.

C. Codes and Standards at Site

The Contractor shall supply and have at his site office:-

a) Copies of all latest editions of codes and standards referred to in these Specifications or equivalent codes and standards as approved by the Engineer.

b) Catalogues and published recommendations from manufacturers supplying products and materials for the project.

c) The Contractor shall provide manufacturer's or supplier's materials which must meet the requirements of a specific code or standard as stated in these Specifications.

4. MANUFACTURER'S RECOMMENDATIONS

Installation of manufactured items shall be in accordance with procedures recommended by the manufacturer or as approved by the Engineer.

5. UNITS OF MEASUREMENTS

The FPS System of Units shall be used throughout the Project.

6. EXISTING CONDITION AT SITE

Drawings and information pertaining to existing project conditions are furnished for reference. Neither the Employer nor the Engineer warrants the adequacy or correctness of these. The Contractor's are encouraged to visit the project site to assess the existing site conditions.

7. PROTECTION AND PRECAUTIONS

The Contractor and his sub-contractors shall afford all necessary protection to existing structures and will be required to make good at his own expense any damage done to such structures through his own or his representatives or subcontractors' fault and negligence.

The Contractor and his sub-contractors shall afford all necessary protection to existing roads in the area . He will clear and make good at his own expense any damage to or debris on these roads through his own fault and negligence. He must at all time ensure the free and normal flow of traffic and shall not cause obstruction to the traffic system. The Contractor and his sub-contractors shall provide and maintain necessary protection an precautionary measures such as warning signs, warning lamps and barricades etc. to prevent accidents.

The Contractor shall promptly correct all such damage to original condition at no additional expense to the Employer.

The Contractor shall cooperate with trades performing work under other Contracts as necessary for completion.

8. SEQUENCE OF CONSTRUCTION

The Contractor shall submit his proposal for approval of the Engineer the sequence of Construction, prior to starting the works. The works shall be executed as per approved sequence of construction.

9. LINES AND LEVELS

Survey control points will be established by the Engineer. The Contractor shall be responsible for verifying these and shall be responsible for all requirements necessary for

the execution of any work to the locations, lines, and levels specified or shown on the drawings, subject to such modifications as the Engineer may require as work progresses.

10. PLANT, EQUIPMENT AND TOOLS

The Contractor shall provide at his cost modern plant, equipment and tools, adequate and befitting to the nature, magnitude and size of this Contract, in strict compliance with the requirements of the General Conditions of Contract, Conditions of Particular Applications and Technical Specifications.

11. PARTIAL POSSESSION

Whenever, as determined by the Employer any portion of work performed by the Contractor is in a condition suitable for use, the Employer may take possession of or use such portion.

Such use by the Employer shall in no instance be construed as constituting final acceptance, and shall neither relieve the Contractor of any of his responsibilities under the Contract, nor acts a waiver by the Employer of any of the conditions thereof, provided that the Contractor shall not be liable for the cost of repairs, re-work, or renewals which may be required due to ordinary wear and tear resulting from such use. However, if such use increase the cost or delays to the completion of remaining portions of work, the Contractor will be entitled to an equitable adjustment.

If, as a result of the Contractor's failure to comply with the provision of the Contract, such use proves to be unsatisfactory, the Employer will have the right to continue such use until such portion of the work can, without injury to the Employer, be taken out of service for correction of defects, errors, omissions, or replacement of unsatisfactory materials or equipment, as necessary for such work to comply with the Contract; provided that the period of such operation or use pending completion of appropriate remedial action shall not exceed twelve months unless otherwise mutually agreed upon in writing between the parties.

12. EXISTING SERVICES

The Contractor shall search for, find, locate and protect any wiring, cable, duct, pipework, etc., within or immediately adjoining the site area.

The Contractor shall take full responsibly for safety of existing service lines, utilities and utility structures uncovered or encountered during excavation and construction operations.

The Contractor shall take full responsibility for damaging any such service lines, utility/utility structure and any cost and/or expense that arises or issues from any such damage shall be borne directly by himself. Should any damage to any such service occur the Contractor shall forthwith take remedial action, initiate safety precautions, install temporary services and carryout repair all at his own cost and expense and inform the Engineer and notify all relevant authorities.

Existing utilities which are to remain in service for or after the works are to be determined by the Contractor. If any existing service lines, utilities and utility structures which are to remain in service are uncovered or encountered during these operations, they shall be safeguarded, protected from damage, and supported. The Contractor shall preserve, maintain and keep in perfect working conditions, any existing facilities required to be preserved by the Employer/the Engineer.

13. CONSTRUCTION AREA AND ACCESS

The Employer will provide the Contractor possible space within or nearby the area of site of works for the storage of plant, equipment and materials and for Contractor's temporary office, during the currency of the Contract. In case the adjacent area as required by the Contractor is not available within the Project boundary for storage of plant, equipment and machines then the Contractor shall arrange at his own expense possible space for storage of plant, equipment and machines at his own cost and expense. On no account shall such temporary installations conflict/interfere with any of the permanent installations, services and any operational function of Employer. The handling and storage of all plants, equipment and

materials at site shall be the sole responsibility of the Contractor and at no risk and cost to the Employer.

The Contractor shall protect all material against corrosion, mechanical damage or deterioration during storage and erection on site. The protection methods shall be to the approval of the Engineer

14. CONSTRUCTION AND CHECKING AT SITE

The Contractor shall submit to the Engineer in due time for approval and discussion, his proposals and plans as to the method and procedure to be adopted for the temporary and permanent works involved.

The submitting to these suggestions and arrangements, and the approval thereof by the Engineer shall not relieve the Contractor of his responsibilities and duties under the Contract.

The carrying out of all work included in the Contract is to be supervised by a sufficient number of qualified representatives of the Contractor and full facilities and assistance are to be afforded by the Contractor for the Engineer or his Representative to check and examine the execution of the work.

The Engineer reserves the right to inspect all parts of the works but may at his discretion waive inspection on certain items. This shall in no way absolve the Contractor from his responsibilities. This particularly applies to the checking of materials, the accurate setting out of foundations, and to the leveling, setting and aligning of the various parts, and to the proper fitting and adjustment of manufactured and finished materials and fixtures in position.

If the Engineer or his Representative find that the work progress is slow in such a way that the works or parts thereof will not be completed in the time specified, then he shall order the Contractor to work overtime or in shifts and the Contractor shall comply. These arrangements will be free of all financial encumbrances and at no additional costs to the Employer.

In the event of night work, the Contractor shall provide sufficient and adequate lighting to the satisfaction of the Engineer or his Representative and shall supply the necessary manpower for satisfactory continuation of the work after normal hours.

15. STORAGE & HANDLING FACILITIES

The Contractor shall make his own arrangements for providing the necessary space for the storage of plant, equipment and materials and for Contractor's temporary office, in and around the site of works, during the currency of the Contract.

16. PRODUCT DATA

Manufacture's standard schematic drawings shall be modified or deleted to indicate only information which is applicable to the project. Such standard information shall be supplemented to provide all additional applicable information.

Manufacturer's catalogue sheets, brochures, diagrams, schedules, performance charts, illustrations and other standard descriptive literature shall be clearly marked to identify pertinent materials products or models. Dimensions and required clearances shall be indicated. Shop performance characteristics and capacities shall be noted.

17. PRODUCT QUALITY AND HANDLING

Suppliers of local and foreign products and installations specified shall have been regularly engaged in the business of manufacturing, fabricating, installing and / or servicing work required for a period not less than 5 years. In addition, the Engineer may request as appropriate a:

- list of similar installations that describes project, scope and date of completion.
- complete literature, performance data, and technical data.
- list of services record within Pakistan.
- location of service office from which this installation could be maintained.

For the actual fabrication, installation and testing of the specified work use only thoroughly trained and experienced workmen completely familiar with the items required and with the manufacturers recommended methods of installation. In acceptance or rejection, no allowance will be made for the lack of skill on the part of workmen.

Use all means necessary to protect materials before, during and after installation and to protect the installed work and materials of all other trades. In the event of damage, immediately make all repairs and replacement necessary for approval and at no additional cost to the Employer.

18. INSPECTION & TESTS REPORTS

For Civil, E&M and HVAC Works, all equipment and materials furnished under these specifications and all work performed in connection therewith will be subject to rigid inspection by the Engineer or the Engineer's Representative. The Contractor shall furnish the Engineer with certified true copies of test reports of all materials used in the manufacture and fabrication of all equipment and material including metal work, steel pipes, fire bricks etc. The result of these test shall be in such form as to show compliance with the applicable Specifications, standards and codes for the material used.

For Furniture Works, the Contractor shall at its own expense and at no cost to the Employer carry out all such tests and / or inspections of the Goods as specified in the documents or as instructed by the Engineer. The inspections and tests may be conducted at point of delivery, and / or at the final destination of the Goods in the presence of representatives of Employer and Engineer. The Employer / Engineer may reject any Goods or any part thereof that fail to pass any test and/or inspection or do not conform to the specifications. The Contractor shall replace such rejected Goods or parts thereof of make alterations necessary to meet the specifications at no cost to the Employer, and shall repeat the test and/or inspection, at no cost to the Employer, upon giving a notice.

Acceptance of equipment and material or the waiving off inspection thereof shall in no way relieve the Contractor of his responsibility for meeting the requirements of the Contract.

19. FIELD LABORATORY AND TESTING

19.1 General

The Contractor shall arrange all the tests required by the Engineer from any approved laboratory indicated by the Engineer.

All quality control and tests shall be carried out in accordance with applicable standards and codes.

19.2. Field Laboratory Equipment Requirements

Not used

19.3. Testing Laboratory Certificates

The Engineer may accept a certificate from a commercial testing laboratory, satisfactory to him, certifying that the product has been tested within a period acceptable to the Engineer and that it conforms to the requirements of these specifications.

19.4. Method of Payment

All cost incurred for arrangements of sample, equipment, materials and staff, and any other testing charges incurred shall be deemed to be included in the price quoted by the Contractor and no separate claim for payment on this account shall be entertained by the Engineer. Furthermore, the cost of any additional laboratory, field and shop tests required through the resubmission of samples because of failure of compliance with Specifications shall be borne by the Contractor.

In case the Contractor does not provide the specified equipment and testing facility, cost of testing plus 100 percent overheads shall be recovered from his bills.

20. SURVEYING INSTRUMENTS

20.1 General

The minimum quantity of survey equipment is stated below which shall be available with the Contractor at site of Works along with qualified Surveyors and Survey Helpers. The equipment shall be maintained throughout the Contract Period and replaced by the Contractor in case of damage or loss. The survey equipment shall be made available to the Engineer when requested. All surveying equipment shall be in good working condition.

20.2 Surveying Equipment Required

The Contractor shall provide and maintain the following surveying equipment at site.

a) Total Station with staff 01 No.
b) Automatic Levels with tripods & staff 02 No.
c) All other miscellaneous tools, equipment and materials required in surveying.

21. APPROVAL OF MATERIALS AND PLANT

21.1 Quality of Materials

All materials, fixtures, fittings, supplies and plant furnished under the Contract shall be new and unused, standard first grade quality and of the best workmanship and design. No inferior or low-grade materials, supplies or articles will be either approved or accepted, and all work of assembly and construction shall be done in a first-class and workmanlike manner. In asking for prices for materials intended for delivery to the Site and incorporation in the Works under any portion of these Specifications, the Contractor shall provide the manufacturer or supplier with complete information as may be necessary to secure compliance to this Clause and, in every case, he shall quote this Clause in full to each such manufacturer or supplier.

21.2 Submission of Samples and Data

Civil, E&M and HVAC Works

21.2.1 The Contractor shall furnish for approval of the Engineer with reasonable promptness all samples as directed by the Engineer or specifically called for in the Specifications and in accordance with the time schedule provided in the schedule of submittals. The Engineer shall check and approve such samples with reasonable promptness only for conformance with the design concept of the Works and for compliance with the information given in the Contract Documents. All work shall be in accordance with approved samples.

21.2.2 Samples shall be furnished so as not to delay fabrication, allowing the Engineer reasonable time for consideration of the sample submitted.

21.2.3 Each sample shall be properly labeled with the name and quality of the material, manufacturer's name, name of the project, the Contractor's name and the date of submission, and the Specifications Article number to which the sample refers.

21.2.4 The manufacturer's installation directions shall be provided with each sample. The Contractor shall pay all transportation costs and deliver samples to the Engineer's office, Site or testing laboratory as directed by the Engineer.

21.2.5 Samples shall be of adequate size to permit proper evaluation of the material by the Engineer. Where variations in colour, texture, dimensions or other characteristics are to be expected, the Contractor shall submit samples showing the maximum range of variation. Materials exceeding the range of variation of the approved samples shall not be used on the Work.

21.2.6 In order to permit coordinated selection of colours and finishes, the Contractor shall deliver samples of all related items to the Engineer at one time. Samples of such materials will not be approved until all related samples have been submitted.

21.2.7 If both Shop Drawings and samples are required for the same item, the Engineer may require both to be submitted before approving either.

21.2.8 The Contractor shall erect Mock-up samples of finished items where specifically called for in the documents or as directed by the Engineer.

The Mock-up samples shall be preserved/protected by the Contractor till the end of the project or as directed by the Engineer.

21.2.9 No acceptance or approval of any Shop Drawings or sample, or any indication or request by the Engineer on any Shop Drawings shall constitute an authorization for any increase in the Contract Sum.

Furniture Works

21.2.10 The photographs of different items of furniture given in the Details attached in these Bidding Documents are indicative of requirements of Client. The Contractor is required to prepare detailed design of each proposed item to be manufactured by him, nearest to and matching with those indicated in the aforementioned photographs/ details of furniture and interior items without change in characteristics and specifications. The design shall also include but not limited to the class/ type of wood being used, upholstery such as internal details of sofas, chair cushions and foam etc.

21.2.11 The Contractor shall provide catalogues, brochures, literature, relevant technical data and detailed specifications for the offered furniture/ interior items to ascertain compliance of the offered goods with prescribed technical requirements, for review and approval of the Engineer. The approved technical specifications/ catalogues/ brochures and relevant technical data shall be deemed considered as part of the Contract Documents for execution of the Works.

21.2.12 The Contractor shall furnish detailed shop drawings of each furniture/ interior item along with photographs prior to execution of Works for approval of the Engineer.

21.2.13 The Works shall be executed as per technical parameters and requirements given in the Price Schedules and Drawings provided in the Bid Documents and Sample of each furniture/ interior item duly approved by the Engineer. The Contractor shall remedy any defects therein in conformity with the Conditions of Contract.

21.2.14 The approval of the Engineer shall not relieve the Contractor of his obligations with respect to the quality to meet with the standard specifications. The Contractor will ensure seasoning of wood used in furniture and interior items fit for manufacturing of high class furniture.

21.3 Inspection

All material and Plant furnished and all work performed under this Contract will be subject to inspection by the Employer and the Engineer at all times and in all states of completion both off-Site and on-Site. The Contractor shall furnish promptly without additional charge, all facilities, labour and materials reasonably needed for performing such inspection and testing as may be required by the Engineer.

21.4 Approved Sample At Site

The Contractor shall, at all times, keep on the Site approved samples. All such samples shall be made available to the Engineer as and when required.

22. BAR BENDING SCHEDULE

Bar bending (reinforcement bars) schedule of all structural drawings shall be prepared by the Contractor and submitted in triplicate to the Engineer for approval.

23. DRAWINGS

23.1 Bid Drawings

Bid Drawings issued with the Bid Documents, called the Bid Drawings, show scope of the work to be performed by the Contractor. The Drawings are generally in sufficient detail so as to be used as a basis for construction, fabrication and for placing orders for materials subject to corrections based on the future issue of supplementary Drawings as provided under Sub-Clause 23.2 hereof.

23.2 Construction Drawings, Supplementary Drawings

Upon commencement of the works and furnishing by the Contractor stake out survey plan and natural ground levels, the Engineer shall issue Construction Drawings to the Contractor. The Construction drawings may be issued in stages, where necessary.

The Engineer shall have authority to issue to the Contractor, from time to time, such supplementary Drawings and instructions as shall be necessary for the purpose of the proper and adequate execution and completion of the Works and the remedying of any defects therein. The Contractor shall follow these drawings.

When additional information regarding the geological formations or other conditions becomes available, the Engineer may find it desirable to change dimensions or design of one or more of the features of the Works to conform to the newly disclosed conditions. The Engineer reserves the right to make such reasonable changes, and the Contractor's operations shall be conducted so as to accommodate any such reasonable changes in the Works.

23.3 Definition of Term Drawings

The term Drawings as used in the Specifications means the Drawings referred in Clauses 23.1 and 23.2 above.

23.4 Checking of Drawings

The Contractor shall check all Drawings carefully as soon as practicable after receipt thereof, and shall promptly notify the Engineer of any errors discovered.

23.5 Copies of Drawings

Drawings will be issued to the Contractor as described below:

23.5.1 Construction Drawings

Two (2) sets of the Construction Drawings will be issued to the Contractor as stated above, free of charge. Additional sets will be provided at cost of reproduction upon written request of the Contractor.

23.5.2 Supplementary Drawings

Two (2) prints of each supplementary Drawing will be issued to the Contractor free of charge. Additional sets will be provided at cost of reproduction upon written request of the Contractor.

23.6 Drawings to Be Furnished By the Contractor

The Contractor shall submit to the Engineer for review, such drawings as are required under the Contract, sufficiently in advance of the work intended to be executed.

23.6.1 Reinforcement Drawings

Reinforcement placement drawings and bar bending schedules (to be provided by the Contractor as per clause 22 above) of all RCC work shall be prepared by the Contractor and submitted in triplicate to the Engineer for approval, sufficiently in advance of the works in which they are intended to be used.

23.6.2 Shop Drawings

(a) The Contractor shall submit to the Engineer for review three (3) copies of all drawings to be issued for setting out, fabrication, supply order and construction; based on data, requirements, dimensions, details, codes, standards and design provided in the drawings issued by the Engineer. The Contractor shall also furnish detailed shop drawings of each furniture/ interior item along with photographs prior to execution of Works for approval of the Engineer. Such drawings shall be submitted at least seven (7) days before they are required for use. If within a period of seven (7) days after submission, the Engineer notifies the Contractor that a drawing fails to comply with the relevant requirement of the Contract, it shall be rectified and resubmitted for approval at the Contractor's cost. Fabrication or construction shall not commence on any part of the Works until the shop drawings or construction drawings for that part of the Works have been approved by the Engineer.

The Works shall be executed in accordance with the technical parameters and drawings as approved by the Engineer. If the Contractor wishes to modify any approved drawings, he shall immediately notify the Engineer and submit revised drawings for approval. If the Engineer instructs that further drawings are necessary for executing the Works, the Contractor shall prepare such drawings and submit them for approval.

The Contractor at his cost shall rectify errors, omission, ambiguities, inadequacies and other defects.

Approval by the Engineer, in accordance with this paragraph, shall not relieve the Contractor of any of his responsibilities under the Contract.

(b) The shop drawings shall be properly identified indicating the part of the Works, the name of the contractor / supplier etc., the date of preparation and the dates of all revisions. The Shop Drawings shall be complete and shall show the design dimensions, proposed materials to be used, finishes, type of shop paint and all other details in connection thereto.

(c) Where adjoining work requires shop drawings, the Contractor shall prepare and submit composite shop drawings, which shall show and define the work under all affected trades. If the Contractor executes work before coordinating with other trades so as to cause interference with work of those trades, he shall make changes necessary to correct the conditions without extra cost to the Employer.

(d) No changes shall be made by the Contractor in the resubmitted shop drawings in excess of the corrections spelled out by the Engineer and in a separate note on the shop drawings.

(e) No work in the shop shall be started and no material or plant ordered until the Engineer has approved the shop drawings. It shall be the responsibility of the Contractor to submit the shop drawings on a schedule that allows reasonable time for checking and approval and subsequent fabrication. Failure to submit shop drawings in ample time for checking, correcting, and rechecking will not justify extension of time for completion of the Works.

(f) The Contractor shall also check and verify all site measurements whenever requested by other Specialist Contractors or by other Sub-Contractors to enable them to prepare their own shop drawings and pass on the information with sufficient promptness, so as not to delay the work in any way. A copy of all such information passed on shall be given to the Engineer.

(h) The Works shall be executed as per technical parameters and requirements given in the Price Schedules and Drawings provided in the Bid Documents and Sample of each furniture/ interior item duly approved by the Engineer. The Contractor shall remedy any defects therein in conformity with the Conditions of Contract.

(i) The Contractor will ensure seasoning of wood used in furniture and interior items fit for manufacturing of high class furniture.

23.6.3 As-Built Drawings

The Contractor shall, at all times, keep on Site a separate set of prints of all drawings on which all significant changes between the work shown on the Drawings and that which is actually constructed, shall be noted neatly, accurately and promptly as the work progresses. The Subcontractor(s) for plumbing, mechanical and electrical shall, at all times, keep on Site, a separate set of prints of the drawings (showing their parts of the Works) on which all significant changes between the work shown on the Drawings and that which is actually constructed, shall be noted neatly, accurately and promptly as the work progresses. Such drawings shall show the exact physical location and configuration of the works as actually installed.

The Contractor shall, within fourteen (14) days of issuance of Taking-Over Certificate for whole of the Works, furnish to the Engineer for his approval two (2) copies of such marked up drawings. One (1) copy of each of the marked up drawings approved by the Engineer shall be returned to the Contractor by the Engineer and these shall be used for the preparation of the As - Built Drawings.

The Contractor shall furnish to the Engineer six (6) complete sets and one reproducible copy of all As -Built Drawings within twenty eight (28) days of receipt of drawings stated above, from the Engineer.

24. PROTECTION OF THE WORKS

The Contractor shall whenever necessary cover up and protect the works from weather and damage by his own or other workmen performing subsequent operation. The Contractor shall provide all necessary dustsheets, barriers and guard rails and clear away same at completion.

25. RESTORATION AND CLEANING

Upon completion of the works the Contractor shall restore all items covered by the Contract to the satisfaction of the Engineer.

The Contractor shall do regular cleaning and clear away all rubbish and excess materials that may accumulate from time to time on completion and before handing over. Upon completion of the works he shall obliterate all signs of temporary construction facilities such as work areas, structures, foundations of temporary structures, stock piles of excess or waste materials, or any other vestiges of construction, as directed by the Engineer. All buildings shall be cleaned; floors and paving scrubbed and the works and site shall be left in a clean and satisfactory state for immediate use and occupation. Care shall be taken not to use any cleaning materials, which may cause damage to the surface to be cleaned.

The Contractor shall also take all necessary precautions to keep the works and site free from vermin during construction and he shall leave the works vermin free on completion. Application of pest control agents shall not commence until the specific product, name, method and extent of application have been submitted to and approved of by the Engineer.

26. SITE OFFICE AND TEMPORARY FACILITIES TO BE PROVIDED BY THE CONTRACTOR

26.1 Contractor's Office, Facilities Etc.

The Contractor shall establish and maintain a Site office. The Contractor shall provide all facilities in connection with the execution, completion, of the Works, remedying defects therein and maintenance of the utilities services. The facilities shall not be limited to the Contractor's Site Office, labour camps, work yard and storage areas, temporary water supply, waste water disposal, temporary electricity, medical unit, temporary roads, fire protection and fire fighting equipment etc. The Contractor shall be solely responsible for arranging all utilities and the Contractor shall setup, maintain and operate an architectural and engineering facility at site with adequate number of technical and support staff as well as equipment required for particular nature of job covered under the Contract to prepare drawings/shop drawings for approval of the Engineer.

The Contractor shall arrange his labour camp, work yard, storage area and site office.

26.2 Temporary Roads

The Contractor shall prepare and maintain such temporary roads as may be necessary, from the site to the nearest road and also within the plot. Such roads shall be positioned strictly in accordance with the Engineer's instructions and the Contractor shall reduce or control any dust nuisance by regularly spraying water and compaction as directed.

26.3 Temporary Services

26.3.1 Temporary Water Supply

The Contractor shall supply in sufficient quantity all necessary potable and other water for construction purposes for all trades at points within a reasonable distance of any building being constructed. The Contractor shall make arrangements and pay charges for water service installation, maintenance and removal thereof, and pay the costs of water for all trades.

At completion of the work, the temporary water services equipment and piping shall be removed by the Contractor at his own expense.

26.3.2 Temporary Electricity

The Contractor shall make all the necessary arrangements for a temporary electricity service, pay all expense in connection with the installation, operation and removal thereof and pay the costs of electricity consumed by all trades. The Contractor shall arrange and furnish an Electric Power Generating set at site and maintain the generating set in perfect working condition through-out the duration of Contract. The generating power of the set shall be sufficient to operate all plant and equipment as well as the camps and offices of the Contractor and the offices of the Engineer/Employer, during construction at site. Should the set fail to meet the required demand at site or fail to function or operate, the Contractor shall immediately replace the same with other generating set/sets to the satisfaction of the Employer as well as the Engineer.

A temporary lighting system shall be furnished, installed and maintained by the Contractor as required to satisfy the minimum requirements for safety and security and to the satisfaction of the Engineer.

When the permanent electrical power and lighting systems are in an operating condition, they may be used for temporary power and lighting for construction purposes provided that the Contractor obtains the written approval of the Engineer and the Employer and assumes full responsibility for the entire power and lighting system and pays all costs for operation and maintenance of the system.

At completion of construction work, or at such time as the Contractor makes use of permanent electrical equipment and devices, temporary electricity services shall be removed by the Contractor at his own expense.

26.3.3 Waste Disposal

The Contractor shall make such temporary provisions as may be required in order to dispose of any chemicals, fuels, oils, grease, bituminous materials, waste and soil waste and the like without causing pollution to either the site or the environment. Disposal of any materials, wastes, effluent, garbage, oil, grease, chemicals and the like shall be in areas specified by the concerned local authority proposed by the Contractor and subject to the approval of the Engineer. If any waste material is dumped in unauthorized areas the Contractor shall remove the material and restore the area to the condition of the adjacent undisturbed area. If necessary, contaminated ground shall be excavated, disposed off as directed by the Engineer and replaced with suitable fill material compacted and finished with topsoil all at the expense of the Contractor.

26.3.4 Fire Protection

The Contractor shall provide and maintain adequate fire protection in the form of barrels of water with buckets, fire bucket tanks, fire extinguisher, or other effective means ready for instant use, distributed around the project and in and about temporary inflammable structures during construction of the works.

Gasoline and other flammable liquids shall be stored in and dispensed from safety containers approved by the Engineer and storage shall not be within building.

Torch-cutting and welding operations performed by the Contractor shall have the approval of the Engineer before such work is started and a chemical extinguisher is to be available at the location where such work is in progress.

The Contractor shall follow the instructions and specifications of the Civil Defense Department or any other local department concerned with such activities.

27 CONSTRUCTION SCHEDULE

A Construction schedule shall be maintained in accordance with the provisions of the General Conditions of Contract.

The schedule shall be accompanied with sufficient data and information including all necessary particulars of constructional plant, equipment machinery, temporary Works, arrival of plant, equipment at site and their installation, method of operation, work forces employed, etc., for an activities of the Works.

Should the Engineer consider any alteration or addition in the programme and time schedule, the Contractor shall conform thereto without any cost to the Employer.

Whenever necessary and wherever the progress of the actual work shows departure, the programme and time schedule shall be undated and submitted to the Engineer for his approval.

28 SUBMISSION REQUIREMENTS

28.1 Schedule submission at least sixty days before the dates when reviewed submittals will be needed.

28.2 Submit Shop Drawings as per provision given in Sub-Clause 23.6.2 and number of copies of Product Data which the Contractor requires for distribution plus four copies which will be retained by the Engineer.

28.3 Submit three samples unless otherwise specified.

28.4 Accompany submittals with transmittal letter, in duplicate, containing:

- Date
- Project title and number
- Contractor's name and address
- The number of each Shop Drawing, Product Data and the Sample submitted.
- Notification of deviations from Contract Documents.
- Other pertinent data.

29 RESUBMISSION REQUIREMENTS

Shop Drawings:

- Revise initial drawings as required and resubmit as specified for initial submittal.
- Indicate on drawings any changes which have been made by the Engineer.
- Product Data and Samples: Submit new data and samples as required for initial submittal.

30 MONTHLY PROGRESS REPORT AND PHTOGRAPHS

30.1 During the continuance of the Contract, the Contractor shall submit monthly progress on forms as approved by the Engineer. Such monthly reports shall show the actual progress completed as of date of the report plotted against the schedule as given by the Contractor at the start of work and shall be broken down so as to indicate status of all activities associated with mobilization, design, material procurement, manufacture, surveys works, tests with regard to the agreed contract programme.

30.2 The Employer and the Engineer reserve the right to coordinate the schedules of this Contractor and other Contractors working at the Site, and to adjust and/or change any and all such schedules as required during the course of construction in order to achieve a coordinated project in harmony with the Employer's completion date.

30.3 Commencing after the first week of construction, and continuing every week until completion, the Contractor shall take and submit photographs to the Engineer's Representative, to show progress of his work and completion of each structure or major feature.

31 CONTRACTOR TO NOTIFY DELAYS ETC.

Any delay which will affect the completion of Works shall be detailed by the Contractor who shall state the action he is taking for effective completion of the Contract programme.

The Contractor shall submit a report in respect of the various sections of the Works, the equipment in use or held in readiness, a return of labour and supervisory staff, and details of any matters arising which may generally affect the progress of the work.

The Contractor shall give a summary of the detailed progress report giving the position with regard to the agreed Contract programme.

The progress reports shall be set out in a format to the approval of the Engineer, and forwarded promptly so that on receipt the information contained therein is not more than 07 days out of date.

If during execution of the Contract, the Employer considers the progress position of any section of the work to be unsatisfactory, or for any other reason relating to the Contract, he will be at liberty to convene a meeting and the Contractor's Representatives are to attend such meeting.

The Contractor's Site Office shall prepare and submit 6 copies of a monthly progress report to the Employer and Engineer's Site Office. This report shall summarize site activities and record and details where difficulties in maintaining the agreed programme are being experienced or are likely to cause subsequent delay.

The Contractor's Site Office shall also prepare and submit to the Engineer's Site Office 2 copies of Daily Activity Report summarizing the main activities to be undertaken each day, noting special activities such a tests, alignment checks, etc. The Contractor shall be responsible for expediting the delivery of all material and equipment to be provided by him and his subcontractors.

32 PHOTOGRAPHS

As soon as work commences on Site, the Contractor shall provide at least 10 to 12 photographs (alongwith soft copy) of the works from positions to be selected by the Engineer. Each photographic print shall not be less than 297mm x 210mm and shall bear a printed description, a serial number and the date when taken.

The negatives/soft copy of all photographs shall be held at the Contractor's Site Office, numbered and handed over to the Employer at the completion of the Contract.

33 Sign Board

Not used

34 Site Office for Engineer/Engineer's Staff

The Contractor shall provide, furnish, and maintain a temporary site office for Engineer/Engineer's Staff at site immediately after signing of agreement. The site office shall

be connected to the electrical systems, portable water supply system and sewage disposal system.

The Contractor shall provide a laptop (Core i7), a flash drive of minimum 8 GB capacity, UPS, internet connection, an A-4 size color printer and stationery etc.

The site office shall be maintained by Contractor during execution period only. After substantial completion of Project.

The accessories of the site office shall be returned to the Contractor after the completion of the project and shall be removed from the site. The area in case of removal shall be developed in accordance with the drawings and as per the directions of the Engineer.

No payment shall be made to the Contractor for the works involved under this sub clause. The cost thereof shall be deemed to have been included in the total price quoted by the Contractor.

35 Transport for the Employer and The Engineer

The Contractor shall be responsible for the Engineer's Site Supervision team to meet his transportation needs for the entire duration of actual construction period as well as for the duration of one month after substantial completion of project.

In case of failure of provision of conveyance by the Contractor, the cost of alternate arrangements made by the Engineer at his own cost shall be recovered from the Contractor's IPC as per actual.

36 Coordination of Work at Site

The Contractor shall take cognizance that during the execution of the project, other Contractor will be working concurrently on this Site.

All works of his responsibility shall be coordinated by the Contractor so as to give the necessary facilities to other Contractor or their workman or any other employ, who execute or supervise any work on the Site.

The Contractor shall ensure that the necessary safety precaution will be observed and interferences shall be avoided specially for the works executed side by side by different Contractors.

Due consideration must be given to permit access to sections of the work as required by other Contractors for the extension of their works. With a view to coordinate the works, the Engineer may from time to time direct the order of the works to be carried out.

No payment shall be made to the Contractor for the works involved under this sub clause.

37 Site Facilities to Be Provided By The Contractor

37.6.1 General

Without prejudice to the generality of the various clauses of the Contract, particular attention is drawn to the obligation of the Contractor to make his own arrangement at his own expense for the following.

37.6.2 Labour Camps and Staff Residences

The Contractor shall provide, operate and maintain labour camps and staff residences and are required for the proper and efficient progress of the work to house his own employees. For the purposes of operation and maintenance of the Camps and Residences, the Contractor shall comply with the rules of Pakistan Labour Camp Rules 1960 and all other applicable provisions of the Pakistan Labour Laws.

37.6.3 Administrative and Field Office

The Contractor shall provide, operate and maintain administrative and field offices required for his staff and would be responsible for Operation and Maintenance, furniture, equipment, appliances, janitor services and security of the same.

37.6.4 Work yards and Storage Areas

The Contractor shall provide, operate and maintain all sheds, fencing, foundations and all above ground structures required to store material or equipment brought on to the site by him. The Contractor shall be responsible for the security of his entire camps, residence, site and field offices work yard and storage area.

37.6.5 Water Supply, Sewerage System and Electricity

The Contractor shall make his own arrangement, at his own expense for provision, operation and maintenance of electric supply, reasonable supplies of raw and potable water and sewerage system at the site of works and his labour camps, staff residences and offices. The Contractor shall pay all fees, and charges (including bills) of whatsoever nature to the concerned departments (if any) in order to procure connections of the above facilities and thereafter using these facilities.

37.6.6 Medical Care

The Contractor shall arrange provision of adequate medical facilities for his employees.

Adequately equipped and properly staffed first aid stations or dispensaries shall be provided by the Contractor at camps and other strategic locations, to administer first aid treatment at all times free of charge to all persons on the Site, including personnel of the Engineer and the Employer. The nature, number and location of facilities furnished and the Contractor's staff for administering first-aid treatment shall meet the requirements of the Health Services of the Government of Pakistan and of Section III of the Manual "Safety Requirements for Construction by Contract", published by the Employer, and shall be subject to approval by the Engineer.

37.6.7 Other Facilities

The Contractor shall also be responsible for providing at his own cost other facilities for his own staff and labour such as educational, recreational, transport, telephone and catering if required.

38. CONSTRUCTION PROCEDURES

The Contractor shall advise the Engineer of proposed construction procedures in accordance with the General Conditions of Contract.

If the Engineer shall see that the work progress is slow in such a way that the work will not be completed in the time specified, then he shall order the Contractor to work overtime or in more shifts and the Contractor shall obey these orders without any additional payments and without any objections or request for compensation.

39. NOTIFICATION TO ENGINEER

The Engineer shall be notified daily in writing of the nature and location of the Works the Contractor intends to perform the next day so as to enable necessary inspection and measurement to be carried out. The Engineer may, if necessary, direct that longer notice be given of certain operations.

40. NIGHT WORK

When work is done at night the Contractor shall maintain from sunset to sunrise such lights on or about his work and plant as the Engineer may deem necessary for the proper observations of the work and the efficient execution thereof.

41. WEATHER

No work is to be undertaken when, in the opinion of the Engineer, the weather is so unsuitable that proper protection of the work cannot be ensured.

42. CO-ORDINATION WITH OTHER CONTRACTORS

It shall be the responsibility of the Contractor to keep-up good relations with other Contractors employed on site by the Employer. The Contractor shall cooperate and coordinate his work with that of the other Contractors working at the Site, to whatever extent may be necessary to complete the Project in accordance with the approved programme of the Works and in accordance with the Engineer's instructions. Should a disagreement or dispute arise between the Contractor and other contractors, the same shall be referred without delay to the Engineer for his decision. Upon such decision, the Contractor shall proceed with the work in accordance therewith. In case the access to the works of other contractors is through the Site area of the Contractor, the Contractor shall coordinate with and permit all reasonable access to other Contractors.

43. ACCIDENT PREVENTION, SAFETY MEASURES AND PROTECTIVE EQUIPMENT

The Contractor shall comply and enforce compliance by all his sub- contractors with the highest standards of safety and accident prevention in accordance with international standards and in compliance with all applicable laws, ordinances and statutory provisions.

All requisite barriers, fences, warning signs, lights and other safety precautions as required for the protection of persons and property on or adjacent to the site shall be provided at the Contractor's cost.

All false work, scaffolding and handrails shall be well constructed and secured at all times. Where overhead work is being carried out, warning signs shall be installed at ground level clearly warning of the overhead work.

All warning signs shall be in two languages, English and Urdu, and shall at all times be maintained in a clean and legible condition, to the satisfaction of the Engineer.

Trash shall be removed at frequent intervals to the satisfaction of the Engineer.

Netting shall be provided at all levels where work is in progress, all around the building.

44. SETTING OUT OF WORK AND SURVEY

44.1 Reference Points, Lines

The Contractor shall establish benchmarks and / or reference line at the Site in accordance with the instructions of the Engineer. The Contractor shall set out its work from these benchmarks and lines. The Contractor shall supply plant, equipment, materials and labour for checking if required of the survey control by the Engineer. Slope stakes will be set by the Contractor before commencement of excavation and will be re-established as required during progress of work using established bench-marks and reference points.

44.2 Verification

The Engineer may make checks as the work progress to verify lines and grades established by the Contractor and to determine the conformance of the work as it progresses with the requirements of the Drawings and Specifications. Such checking by the Engineer shall not relieve the Contractor of his responsibility to perform all

work in accordance with the Drawings and Specifications and the lines and grades given therein.

The Contractor shall provide experienced construction surveyors with adequate experience in the construction surveys similar in nature as required by this Contract.

The Contractor shall provide all materials, equipment and labour required for surveying work, including, but not limited to, instruments, stakes, spikes, steel pins, templates, platforms, and tools, and except as required to be incorporated in the work or left in place, all such materials and equipment, shall remain the property of the Contractor. Surveying instruments shall be in perfect working condition and shall be subject to rigid inspection for proper operation at least after every two weeks of use. Defective instruments shall be promptly replaced or repaired and adjusted to the satisfaction of the Engineer.

Survey data shall be recorded in accordance with recognized professional surveying standards. Original field notes, computations, and other surveying data shall be recorded in the Contractor furnished field books. Notes or data not in accordance with standard formats will be rejected. Illegible notes or data, or use of erasures on any page of a field book will be considered sufficient cause for rejection of part or the entire field book. Copied notes or data will not be permitted; therefore, rejection of part or all of a field book may necessitate re-surveying. Corrections by ruling or lining out errors will be satisfactory.

The cost of all materials, equipment, surveyors and labour required for surveys for the Works and quantity surveys required by this clause shall be deemed to be included in the rates and prices of the various items in the Bill of Quantities and no separate measurement and payment in their respect shall be made.

44.3 Survey Instruments

The Contractor shall maintain at the Site the requisite surveying instruments in perfect working conditions to enable the Engineer's Representative to check levels and lines of the work at all times.

45. PAYMENT OF WORK

No payment shall be made for the works involved within the scope of this section of specification unless otherwise specifically stated in the Bills of Quantities or herein.

The cost thereof shall be deemed to have been included in the total price quoted by the Contractor.

46. ENVIRONMENTAL PROTECTION

The Contractor shall exercise care to protect the natural landscape and shall conduct his construction operations so as to prevent any unnecessary destruction, scarring or defacing of the natural surroundings in the vicinity of works. Except where clearing is required for the Permanent works, approved construction roads and the Temporary Works, and for excavation operations, all trees and native vegetation shall be preserved and shall be protected from damage which may be caused by the Contractor's construction operations and equipment. On completion of the works, all work areas shall be smoothed and graded in a manner to confirm to the natural appearance of the landscape. Where unnecessary destruction, scarring, damage or defacing may occur as a result of the Contractor's operations, it shall be repaired, replanted, or otherwise corrected as directed by the Engineer at no additional cost to the Employer.

SECTION - 8001

GENERAL SPECIFICATIONS FOR ELECTRICAL WORKS

1.0 SCOPE OF WORK

The works related to the electrical system are included in the Scope of this Contract as shown on the Drawings, stated in the Specifications and Bill of Quantities and explained in these Specifications. The works shall broadly include but not limited to the following:

- General Specifications for Electrical Works
- LT Distribution Boards
- Light Fixtures
- Low Tension Cables
- Wiring Accessories
- Conduits and Pipes
- Earthing
- Miscellaneous Items
- Structured Cabling Network
- Intelligent Addressable Fire Alarm System
- Closed Circuit Television System
- Cable Antenna TV System

The Contractor shall also be responsible to supply any other equipment not specifically mentioned in these Documents but which is necessary for proper operation of the works/system included in the scope of this Contract. The Contractor shall solely be responsible for ensuring proper functional requirements of different equipment. He shall also be responsible for furnishing any additional piece of equipment and for making modification in the equipment as desired and/or approved by the Engineer to achieve proper co-ordination with various equipment offered in the bid and also with those installed by others.

2.0 RULES & REGULATIONS

The entire electrical installation/work shall be carried out by licensed Contractor, authorised to undertake such work under the provisions of the Electricity Act 1910 and The Electricity Rules 1937 as adopted and modified upto date by the Government of Pakistan.

All works shall be carried out in accordance with the latest edition of the Regulations of the Electrical Equipment of Buildings issued by the Institute of Electrical Engineers-London, the Contract Documents, The Electricity Rules 1937 and bye-laws that are in force from time to time. Any discrepancy between these Specifications and any other rules and regulations shall be brought to the notice of Engineer for his instructions and the discussion of the accepting/controlling shall be final and conclusive.

The Contractor shall be responsible for completing all formalities and submitting the test certificates as per prevailing rules and regulations, and shall have the installation passed by the Government Electric Inspector of that region. All requirements of the Electric Inspector and the KE (Karachi Electric) shall be complied with.

3.0 AMBIENT CONDITIONS

All material and equipment supplied and installed shall be designed, manufactured and tested to meet the following ambient conditions unless specifically stated otherwise for any material/ equipment.

Location	:	Karahi
Maximum indoors ambient temperature	:	45-Degree Celsius
Minimum indoors ambient temperature	:	Zero Degrees Celsius
Maximum outdoors-ambient temperature	:	45-Degree Celsius
Minimum outdoors-ambient temperature	:	Zero Degrees Celsius
Maximum Relative humidity	:	100 Percent
Maximum Altitude of project	:	520 meters above the mean sea level.

The atmospheric conditions are tropical and highly humid.

4.0 STANDARDS

The latest standards and codes of reputable organisations shall be applicable for the material and equipment specified herein and for installation work. Such organisations to be BSS, IEC, VDE, NFPA 99, NEC Article 517 etc. In case the Specifications laid down herein differ from those given in the standards, then the equivalent or better specifications shall govern. Wherever applicable the equipment shall also conform to the requirements of Pakistan Standard Institution (PSI).

Contractor shall maintain at the site office one copy of the standards / codes applicable to the works.

5.0 SYSTEM DATA

Unless otherwise specified elsewhere, all equipment and material shall be designed to operate satisfactorily with the following minimum requirements without any de-rating.

a) Voltage rating of equipment : HT : 11 kV, 3 phase, +/- 10%
LT : 415 V, 3 phase, +/- 10%
240 V, 1 phase, +/- 10%

b) Frequency : 50Hz $\pm$ 2Hz

In general, the electrical colour coding of switchgear cubicles, control panels, desks etc., shall be in accordance with the respective IEC Recommendations. Live parts of electrical connections shall be colour coded according to IEC 446 as follows:

	Conductor Designation	Coding Alphanumeric	Colour
A.C. Network	Phase 1	L 1	red
	Phase 2	L 2	yellow
	Phase 3	L 3	blue

	Neutral	N	black
D.C. Network	Positive	L+	white
	Negative	L-	black
Earthing	Protective Earth	PE	green/yellow
	Earth	E	green/yellow

The colour coding for the secondary circuits of isolated power panel board is as follows:

Orange-Isolated Phase Conductor
Brown- Isolated Neutral Conductor
Green-Isolated Ground Conductor

Conductor insulation of secondary circuits of isolated power panel board shall be XLPE and PVC sheathed.

Control Cables

The Control Cables shall be manufactured according to specifications for L.T. Cables. The Control Cables shall be of multi-core, PVC insulated type withstanding without deterioration the conditions prevailing at the place of installation. The cross section of cable shall be as per the requirement of the system.

All the cores should be numbered and/or colour coded or otherwise properly identified. At-least 20% spare cores shall be provided in all Control Cables.

No separate payment is admissible for supplying, installing, testing and commissioning of control cables and is deemed to have been included in the BOQ rates of the respective equipment.

Distance in between power, communication and control cables shall be kept as per requirements laid down by EN50174-2, NEC800 and NFPA 70.

6.0 EQUIPMENT

6.1 IP Degree of Protection

The equipment shall have IP degree of protection as follows, unless mentioned other wise:

- IP 42 for indoor areas
- IP 54 for indoor damp areas
- IP 65 for outdoor areas

If properly rated equipment is not available, the Contractor shall provide field enclosures to attain the required IP degree of protection. If necessary cooling/exhaust fans and / or anti condensate heaters shall also be provided. No separate payment shall be made to attain the required IP degree of protection.

6.2 Identification & Labelling

All devices, meters, cabling, wiring and auxiliaries shall be properly labeled for identification. Labeling of equipment shall be done by means of flameproof material using indelible ink/marking. The labeling shall be such as to ensure uniformity and shall facilitate study of control diagrams/ drawings during operation and maintenance.

All labeling shall be of suitable size to be visible from the operating conditions/positions at site.

6.3 Lamp Test Facility

All equipment / switchboards, etc. shall be provided with common lamp test facility.

7.0 DRAWINGS AND DATA TO BE FURNISHED BY THE CONTRACTOR

For each electrical equipment shop drawings, as-built drawings and/or technical data are to be furnished by the Contractor. LT cable distribution layouts & shall include, but not limited to the following:

(a) Structural drawings showing foundations, RCC details dimensional plans, elevation and sections on a suitable scale.

(b) Electrical drawings showing:

- Line diagrams of Switchboards, Motor Control Centres, distribution boards and isolated power panels with detailed wiring diagrams, elevations/internal component layout and other standard details.
- LT Cabling, Grounding/Earthing including all cable routing and support details.
- Necessary execution details such as no. of cable/wires, size of conduits, cable routes, cable trays and cable trenches, etc.
- Substation and Generator Room Equipment installation details.
- Manhole/Duct works.

(c) Layouts of all LT cable routes with coordinates and levels.

(d) Technical literature and manufacturer's characteristic data with the description of materials and weights of all equipment as instructed by the Engineer.

At least three (3) copies of the shop drawings and/or technical data of the equipment shall be submitted to the Engineer for checking and approval.

8.0 MANUFACTURER'S INSTRUCTIONS

The Contractor shall supply to the Engineer in properly bound form six (6) copies of manufacturer's instruction manuals for installation, testing, commissioning, operation and maintenance of the specified equipment including manuals of spare parts and tools of the equipment. At least two copies of the documents shall be submitted in original. The installation instructions shall be submitted 2

weeks prior to commencement of installation of each equipment, and operation and maintenance instruction at the time of commissioning. If the Contractor fails to provide the documents the Engineer shall withhold issuance of requisite certificates and deduct suitable amount from the payments to the Contractor.

9.0 GUARANTEE

The Contractor shall furnish written guarantee of the manufacturer or supplier with respect to satisfactory performance of each equipment. Guarantee shall be given for replacement and repair of part or whole of the equipment, which may be found defective in material or workmanship. The guarantee shall cover the duration of Maintenance Period as defined in the Conditions of Contract. This guarantee shall not relieve the Contractor of his obligations and he will be fully responsible for the repair or replacement of any defective material in time, so as not to cause any undue delay in carrying out the repairs and/or replacements.

10.0 DANGER BOARDS WITH SIGNS, DESIGNATION AND SHOCK / FIRST AID CHARTS AND FIRE FIGHTING EQUIPMENT

Danger Boards having signs and designation of the room shall be installed on the external door of HT, LT, Power transformer, Low Voltage DG Set Rooms. Shock/First Aid Charts shall be installed in H.T, L.T and Low Voltage DG Set Rooms.

Potable fire fighting extinguisher suitable to control electrical fire shall be provided in H.T, L.T, Power Transformer and Low Voltage DG Set Rooms.

All the above items shall also be provided, wherever required to comply the requirements of the Pakistan Electricity Rules/Electric Inspector.

Laminated single line and adequate detail drawings on proper boards highlighting the main system features shall be displayed/ fixed in respective electrical and communication rooms.

11.0 ASSOCIATED CIVIL WORKS

Except where separately stated in the Bill of Quantities the cost of all civil works associated with any BOQ item of electrical works, such as excavation and back filling of earth, compaction of the earth, foundation pads, chiselling, making openings, etc. shall be included in the price quoted against respective items. No separate payment for such works will be made. Such works will also include repair of any damage to civil works caused by the Contractor during electrical installation.

12.0 INSTALLATION INSTRUCTIONS - GENERAL

The Contractor shall furnish all labour, materials, tools and equipment required to install, connect, test and commission all electrical equipment specified herein, whether or not such equipment is furnished by him or by others.

For all equipment to be installed by the Contractor, the Contractor shall supply and install all erection materials such as foundation bolts, washers, nuts, etc. as required and without any additional costs.

The Contractor shall set out the works himself as per Specifications and Drawings and shall properly position the equipment on specified

foundation/location. In general, the manufacturer's instructions for installation shall be followed. Any defect or faulty operation of equipment due to the Contractor not following the manufacturer's instructions shall be corrected and repaired by the Contractor at his own cost.

For any deviation from the working drawings or specification that are deemed necessary by the Contractor due to site conditions, he shall submit the details and obtain the Engineer approval before starting such works.

13.0 FACTORY TESTS

All type and routine tests on Low Voltage D.G Set, Power Transformer, H.T Switchboards, LT Switchboards, Motor Control Centre, H.T Cables, LT Cables, and all other equipment shall be performed at the manufacturer's works in the presence of the Engineer or his Representative. Type tests may be waived off in case test certificates are submitted as certified by an Engineer approved standard laboratory of international repute; but merely producing the test type certificates will not relieve the manufacturer to carry out the required standard/routine tests.

The Contractor shall inform the Engineer about the date and time of test of each equipment at least two weeks in advance. This shall, however, be done after the Contractor has got the test procedures duly approved by the Engineer. The witnessing of test by the Engineer and the Employer shall not absolve the Contractor from his responsibility for the proper functioning of the equipment, and for furnishing the guarantees referred to in clause 9.0. All test results shall be supplied in quadruplicate. All expenses for carrying out the tests as incurred by the Engineer and the Employer to witness it shall be borne by the Contractor and deemed to have been included in the bid. Provision for at least two person's visit for Factory Acceptance Tests shall be made to include one representative each from the Employer and the Consultant/Engineer. The contractor shall undertake all formalities as may be required for the Engineer or his representative to enable him make the visit.

14.0 TESTING

14.1 Scope

Upon completion of the installation, the Contractor shall perform field tests on all equipment, materials and systems. All tests shall be conducted in the presence of the Engineer for the purpose of demonstrating equipment or system compliance with Specifications. The Contractor shall submit for Engineer's approval complete details of tests to be performed describing the procedure, test observations and expected results.

The Contractor shall furnish all tools, instruments, test equipment, materials, etc., and all qualified personnel required for the testing, setting and adjustment of all electrical equipment and material including putting the same into operation.

All tests shall be made with proper regard for the protection of the personnel and equipment and the Contractor shall be responsible for adequate protection of all personnel and equipment during such tests. The cost of any damages or rectification work due to any accident during the tests shall be the sole responsibility of Contractor.

The Contractor shall record all test values of the tests made by him on all equipment. Four (4) copies of all test data and results certified by the Engineer shall be given to the Engineer for record purposes. These shall also include details of testing method, testing equipment, diagrams, etc.

The witnessing of any tests by the Engineer does not relieve the Contractor of his guarantees for materials, equipment and workmanship, or as any other obligations of Contract.

14.2 **Low Voltage D.G. Set**

Prior to the tests, the contractor shall submit manufacturer's recommended detailed description of the test procedures to be conducted for Engineer's approval.

The Contractor shall carry out full site load and no load tests in accordance with IEC, ISO or BS Specifications for site commissioning. The inspection and tests shall include but not be limited to:

Basic Tests:	Insulation Resistance	
	Earth Continuity	
	Earth Loop Impedance	
	Polarity	
	Phase Rotation	
	Voltage and Frequency	
	Starting System	
	Protection Equipment	
Battery:	Nominal Voltage	
	Discharge Voltage	
	Specific Gravity of Electrolyte	
	Level of Electrolyte	
	Charging System	
Lubrication:	Check as required by manufacturer	
Operational Check at Start-up	Oil Pressure	
	Fuel Oil Leaks	
	Operation of Safety Devices	
	Operational Speed	
	Automatic Control	
	Instrument Check	
	Exhaust Check	
	Undue Vibration	
Operational Check After one hour's run:	Oil Pressure	
	Oil Leaks	
	Cooling System	
	Oil Temperature	
Commissioning Test:	25% of full load	0.5 hrs.
	50% of full load	0.5 hrs.
	75% of full load	1 hrs.
	100% of full load	1 hrs.
	110% of full load	1 hr.

All commissioning and test results shall be recorded and compared with design data. A retest/commissioning shall take place if results are not satisfactory. All the tools, labour, POL, required for the testing and commissioning shall be provided by the Contractor at no extra cost. If required load is not available at site for testing the generators, the Contractor shall provide dummy load at site at no extra cost to the Employer. The correct functioning of the control equipment shall also be proved.

Battery Charger

Battery charger shall be static type and shall provide for both trickle and boost charging of the batteries when the engine is not in operation. The charger shall be of suitable capacity to fully recharge the completely discharged batteries within four hours at boost charge.

Control Panel

The Control Panel shall provide all the necessary control and monitoring devices of the Diesel Generating Sets. All the control and monitoring of the safety devices, alarms, protections, meters, lamps, etc. as mentioned in this Specifications and required as per good engineering practices for such an installation shall be provided in the Control Panel.

14.3 Transformer Tests

In addition to the insulation resistance test of the transformer, a polarity and phase rotation test shall also be made. Buchholz relay shall be tested for proper operation. Di-electric test shall be carried out on transformer oil prior to putting the same in operation.

14.4 HT / LT Switchboards

Each circuit breaker shall be operated electrically and mechanically. All interlocks and control circuits shall be checked for proper connections in accordance with the wiring diagrams given by the manufacturer.

The Contractor shall properly identify the phases of all switchgear and cables for connections to give proper phase sequence.

Trip circuits shall be checked for correct operation and rating of equipment served. The correct size and function of fuses, disconnect switches, number of interlocks, indicating lights, alarms and remote control devices shall be in accordance with approved manufacturer drawings. Nameplates shall be checked for proper designation of equipment served. Protective relays shall be tested and set at site prior to commissioning of the equipment.

14.6 Insulation Resistance Test

Insulation resistance test shall be made on all electrical equipment by using a meggar of 500 volts for circuits upto 250 volts and 1000 volt for circuits between 250 and 500 volts. For testing of 11 kV circuits, upto 5

kV meggar shall be used; the exact voltage shall be as advised by the equipment manufacturer unless otherwise advised by the Engineer.

The insulation resistance values of cables, transformer, switchgears, etc., shall be as per BSS, IEEE, NEC, ICEA and Pakistan Electricity Rules.

Before making connections at the ends of each cable run or joint between cables, the insulation resistance test of each cable section shall be made. H.T. cables shall be subjected to high voltage test as per recommendations of standard to which the cable is manufactured. Each conductor of a multi-core cable shall be tested individually with each of the other conductor of the group and also with earth. If insulation resistance test readings are found to be less than the specified minimum in any conductor, the entire cable shall be replaced and tests repeated on new cable. If cable joint is provided, then each cable section shall be tested, and joint made only after the tests have been made satisfactorily. Finally the completed cable length including the joints shall be tested.

The transformer and switchgears shall be given an insulation resistance measurement test after installation, but before any wiring is connected. Insulation tests shall be made between open contacts of circuit breakers, switches and between each phase and earth.

If the insulation resistance of the circuit under test is less than the specified value, the cause of the low reading shall be determined and removed. Corrective measures shall include dry-out procedure by means of heaters, if equipment is found to contain moisture. Where corrective measures are carried out, the insulation resistance readings shall be taken after the correction has been made and repeated twice at 12 hours interval. The maximum range for each reading in the three successive tests shall not exceed 20% of the average value. After all tests have been made, the equipment shall be reconnected as required. Polarity test shall be made on single pole switching devices.

14.7 Earth Resistance Test

The Contractor shall make Earth resistance tests on the Earthing system, separating and reconnecting each earth connection.

If it is indicated that soil treatment or other corrective measures are required to lower the ground resistance values, the Engineer will determine the extent of such corrective measures.

The electrical resistance of the ECC together with the resistance of the Earthing leads measured from the connection with earth electrode to any other position in the complete installation shall not exceed one ohm.

Earth resistance test shall be performed as per Electrical Inspector's requirements. Where more than one earth electrodes are installed, the earth resistance test of each electrode shall be measured by means of resistance bridge instrument.

The complete lightning protection system shall be tested for continuity and earth resistance. The combined earth resistance at any point in the lightning protection system shall not exceed 10 ohms.

14.8 Completed Tests

After any equipment has been tested, checked for operation, etc., and is accepted by the Engineer the Contractor shall be responsible for the proper protection of that equipment so that subsequent testing of other equipment do not cause any damage to the already tested equipment.

14.9 Expenses

All expenses, i.e., daily allowance (as per NESPAK rules & policy), travelling, boarding and lodging for carrying out the tests and witnessing by the Engineer shall be borne by the Contractor and are deemed to have been included in the BOQ rates of the respective equipment(s) by the Contractor.

14.10 Spare Parts

Contractor shall provide necessary spare parts as per manufacturer's recommendation. The cost of each spare parts shall be carried over to relevant BOQ item and no extra payment shall be admissible in this regard.

14.11 Special Tools

Contractor shall provide special tools and instruments as may be deemed essential for assembly, adjustment, dismantling, installation and maintenance reasons. No separate payment shall be made for any special tools and instruments, and cost shall be deemed to be included in the cost of the Contract.

15.0 APPENDICES TO BE FILLED IN BY THE BIDDER

The details regarding equipment manufacturers, deviations, etc., are to be furnished in the attached form of Bids.

16.0 PAYMENT

No separate payment shall be made for work involved within the scope of this section unless specifically stated in the Bill of Quantities or herein.

*** End of Section 8001 ***

SECTION - 8133

LT DISTRIBUTION BOARDS

1.0 SCOPE OF WORK

The work under this section consists of supplying, installing, testing, and commissioning of all material and services of the complete Low Tension (LT) Distribution Boards as specified herein, shown on the Tender Drawings and stated in the Bill of Quantities.

The Contractor shall discuss the electrical layout with the Engineer and co-ordinate at site with other services for exact location and position of the each L.T. Distribution Board.

The Low Tension Distribution Board with accessories shall also comply with the General specifications for Electrical Works, section - 8001 and with other relevant provisions of the Tender Document.

2.0 GENERAL

The Low Tension Distribution Board (DB) shall be sheet steel fabricated suitable for surface/recessed mounting on wall or floor standing totally enclosed, dust tight and vermin proof. It shall be complete in all respect with material and accessories, factory assembled, tested and finished according to the Specifications and to the normal requirements.

The Low Tension Distribution Board shall be front operation type and shall:

- have a rated service short circuit breaking capacity, (Ics), conforming to IEC 947-2 as shown on the drawings.
- be provided with adequate clearance from live parts so that the flashovers can not be caused by switching, vermin, pests etc.
- be suitable for 415 Volts, 3 phase 4 wire, 50 Hz system.
- be designed for flush mounting of all instruments on the front side.
- have incoming and outgoing cable termination arrangement, terminal block/line up terminals.
- be provided with stainless steel name plate on the front side of door.
- have all incoming and outgoing connections from top or bottom as per requirement of site conditions.
- have door grounded by flexible copper strip/cable.
- have wiring diagram in the pocket inside the door of Distribution Board

3.0 APPLICABLE STANDARDS/CODES

The latest editions of the following standards and codes shall be applicable for the materials specified within the scope for this section:

IEC 51	-	Direct setting electrical measuring instruments
IEC 73	-	Colours for indicator lights and push buttons
IEC 947-2	-	Low voltage switchgear and control gear
IEC 439	-	Low Voltage Switchgear and Control gear Assemblies.
BS 4752	-	Circuit Breaker
BS 3871	-	Miniature & Moulded Case Circuit Breakers
BS 88	-	HRC fuses
BS 89/90	-	Ammeters and Voltmeters
BS 3938	-	Low voltage current transformers
BS 1432	-	Bus Bars

4.0 MATERIAL

4.1 Sheet Metal Work

The Low Tension Distribution Board (DB) shall be fabricated with 16 SWG sheet steel recess / surface mounting as approved by the Engineer. All the components shall be installed on a common component mounting plate inside the enclosure and protected from the front with screwed sheet steel front plate. The enclosure shall be provided with rubber gasketting and a lockable hinged door with cam fastener.

The distribution board shall be supplied complete with all installation materials as recommended by the manufacturer. The incoming and outgoing cable connections shall be according to the wiring requirements. If required, an adapter box for accommodating the cables and conduits may be provided. The box shall be of the same material and finish as the DB. All holes, cutout etc. shall be tool or jib manufactured and free from burrs and rough edges.

The cabling inside the DB shall be suitably harnessed by means of straps or cords. Colour sleeves shall be provided on each cable lugs connected to the bus bars, circuit breakers or terminals for phase identification. An earth bar shall be provided for connection of incoming and outgoing earth conductors. The earth bar shall be permanently connected to the body of DB at two points. Flexible copper strip shall be provided for earthing of the door of DB.

Circuit numbers/ designation on all circuits shall be conspicuously marked to facilitate connection and maintenance.

All metal work of the DB shall be cleaned down to bare shining metal phosphated and the surfaces chemically prepared for powder coating. Then these shall be coated with powder of colour RAL 7032 and then baked in oven. The thickness of powder coating shall not be less than 120 microns.

4.2 Components

The Low Tension Distribution Boards (DB) shall be provided with components as specified, as shown on the Tender Drawings and required for the satisfactory operation of the distribution board and of the electrical system.

Typical component specifications are given below:

4.2.1 Bus Bars

The Bus bars shall be made of 99.9% pure high conductivity electrolytic copper and shall be completely isolated and mechanically braced for the specified fault level. The identification of bus bars shall be by providing colours sleeves on bus bar ends and these shall be red, yellow and blue for phases and black for neutral. The earth bus bar shall be green.

The bus bars shall be for three phase, neutral and earth and shall be of appropriate size to meet the electrical and mechanical requirements of the system. The temperature rise shall not exceed 30°C at rated current.

4.2.2 Moulded Case Circuit Breaker (MCCB)

The MCCBs shall be moulded case triple pole 440 Volts or single/double pole 250 Volts of current ratings as shown on the drawings. These shall have fixed magnetic short circuit and adjustable/fixed thermal overload protection.

The MCCBs shall be installed such that their switching levers are accessible through the front plate for operation.

The single and triple pole MCCBs shall have short circuit rupturing capacity suitable for the distribution system as approved by the Engineer or as shown on the drawings. The MCCBs shall be suitable for working on lighting and power circuits.

4.2.3 Ammeters and Voltmeters

All meters shall be flush mounting, moving iron, spring controlled. The front dimensions shall be 96 x 96 mm for meters.

The meters shall be of accuracy class 1.5 according to BS-89 and 90. The ammeter shall be suitable for connection to 5 Amps secondary of current transformers or directly through shunt as shown on drawings. The ammeters and voltmeters shall have measuring range as indicated on the drawings.

4.2.4 Current Transformers

Air cooled, ring type current transformers shall be provided having transformation ratio as indicated on the drawings. The current transformers shall be of suitable burden having accuracy class 1.0 according to BS 3938. The current transformers shall have 5 amps secondary.

4.2.5 Selector Switch

The ammeter and voltmeter selector switch shall be complete with front plate, grip handle R-Y-B and OFF position for ammeters, and RY-YB-BR-RN-YN-BN and OFF position. For voltmeters shall be marked on the respective selector switches.

4.2.6 Air Break Contactors

The contactor shall be air break, triple pole, 400 Volts. Each contactor shall be provided with a 230 Volt operating coil, one 6 Watt, 230 Volt red coloured signalling lamp, control fuse and two normally open and two normally closed type auxiliary contacts wired upto terminals for electrical interlocking.

4.2.7 Push Buttons

Push Button shall be momentary contact type and suitable for flush mounting on the door of panel and on remote area. The push button for ON and OFF witching shall be spring loaded.

4.2.8 Indicating Lamps

Indicating lamps shall be suitable for flush mounting, complete with base and 230 Volts incandescent lamp. It shall have rosettes of suitable colours as approved by the Engineer and shall be provided on each distribution boards.

5.0 INSTALLATION

The location of low tension distribution boards (DB) are shown diagramatically on the drawings. The actual location shall be determined at site, keeping in view the site conditions and in co-ordination with other equipment, as approved by the Engineer.

Low tension distribution board for recessed mounting in wall shall be installed such that the door shall finish flush with the surface of wall. The recess mounted distribution board shall be installed before the plastering of walls. The DB shall be protected to avoid any damage due to the civil work. Any cuttings, dismantling of the existing wall required for fixing the DB shall be coordinated at site with the approval of Engineer. Any damage done to civil structure shall be made good by the Contractor.

All loose parts dispatched separately with the DB shall be installed as per manufacturer instructions and all adjustments or setting shall be made as required. All screws, nuts and bolts used for fixing the distribution board shall be galvanized.

The distribution boards installation shall include connecting all incoming and outgoing cables. The cable entry in the boards shall be provided from top or bottom as required.

The distribution boards shall be tested as per instructions contained in article "Testing" of General Specifications for Electrical Works, Section-8001 of these Specifications.

6.0 MEASUREMENT AND PAYMENT

6.1 General

The Contractor's bid amount against each item of Bill of Quantities as given below shall include design, fabrication, supply, installation, testing, commissioning and completion for all works specified herein and/or as shown on the Tender Drawings related to the item.

6.2 LT Distribution Board

6.2.1 **Measurement:** Measurement shall be made for the number of each LT distribution board acceptably supplied and installed by the Contractor as a complete job.

6.2.2 **Payment**: Payment shall be made for the number of jobs measured, as provided above, at the Contract unit price each and shall constitute full compensation for design, fabricating, supplying, installing, connecting, testing and commissioning of the LT distribution boards, including fixing arrangement, adapter box and other accessories for complete installation.

SECTION - 8150

LIGHT FIXTURES

1.0 SCOPE OF WORK

The work under this section consists of supplying, installing, testing and commissioning of all material and accessories of the complete Light fixtures as specified herein and/or shown on the drawings and given in the Bill of Quantities.

The Contractor shall discuss the electrical layout with the Engineer and co-ordinate at Site with other services for exact locations and positions of the light fixtures.

The lighting fixtures with accessories shall also comply with the General Specifications for Electrical Works, Section-8001 and with other relevant provisions of the Tender Document.

2.0 GENERAL

The description of light fixtures is given in the bill of quantities, and stated on the drawings, and all relevant material is described in this Section. The determination of quality is based on certified photometric data covering the coefficient of utilization, light distribution curves, construction material, shape, finish, operation, etc.

The Contractor shall submit the samples of each and every light fixture specified and obtain approval of the Engineer before purchasing. The quality and finishes of the local make light fixtures (if mentioned in BOQ) shall be same as that of standard manufacturer. The accessories such as ballast, lamp/starter holders, starters, lamps, ignitors, etc. for all type of light fixtures shall be of Philips make or approved equivalent. Approved equivalent against those specified will be accepted if the specified one is/will not be available. For any substitution the Engineer's approval is necessary.

All fixtures shall be finished in standard color schemes as mentioned in the manufacturer's catalogue for respective fixtures, unless specifically stated in the Specifications, Drawings or Bill of Quantities or directed by the Engineer.

3.0 APPLICABLE STANDARDS/CODES

The latest editions of the following standards/codes shall be applicable to the material specified within the scope of this section:

IEC 81 & BS 1853	-	Tubular fluorescent lamps
IEC 82 & BS 2818	-	Ballast for tubular fluorescent lamps
IEC 155 & BS 3772	-	Starters for fluorescent lamps
IEC 400	-	Lamp holders and starter holders for fluorescent lamps
IEC 1048, 566, 1049	-	Capacitors for use in TL, HP Mercury and LP Sodium Vapour Lamps.

BS 3677/3767/4017	-	Discharge Lamp Circuits
IEC 598 IEC 922/923	-	Luminaires
BS 5266	-	Emergency Lighting
BS 2560	-	Exit Signs

4.0 MATERIAL

4.1 Fluorescent Light Fixtures

The fluorescent light fixtures shall have lamps and ballasts of proper rating as shown on the drawings. Each 36 W lamp shall be provided with independent ballast.

The fluorescent lamps shall be tubular, 1214/604mm long, 28-mm. dia. for 36/18 watts respectively as specified. The fluorescent shall be cool white, with colour rendering and light colour of 840 characteristics with an average output of 3350 lumens (+ 5%) for 36 watts and 1350 lumens (+5%) for 18 watts after 100 burning hours. The ballast shall be 'Low Loss' polyester filled type, totally enclosed and suitable to operate upto 250 VAC. The power loss shall not be more than 6 watts for 36/18 watts ballast. A wiring diagram, wattage, voltage and current figures shall be printed on the body of the ballast.

The lamp holders shall be rotary lock-in type. The starters shall be glow type with radio interference suppressor/by-pass capacitor. The internal wiring of the fluorescent light fixtures shall be done with heat resistant wires at the manufacturer's factory. The internal wiring shall be clipped properly and heat resistant sleeves be provided on cables passing near ballasts. All light fixtures shall be provided with power factor improvement capacitor to give a minimum power factor of 0.90. Connectors suitable for connecting 2.5 sq.mm cable conductors shall be provided for supply connections. An earth terminal for connection to 2.5-sq.mm cable conductor shall be provided.

The body of the fluorescent light fixtures shall be minimum 24 SWG sheet steel, derusted, degreased, finished in heat resistant paint, stove enameled. Appropriate size bushed wire entry holes, fixing holes, and earth terminal shall be provided.

The light fixtures shall be furnished with Perspex diffusing panels "040 opal acrylic" (minimum sheet thickness 3mm), polystrene louvers or metal grid louvers or mirror optic reflectors, etc. as specified on the drawings or in BOQ. The louvers shall be secured firmly and in level. The louvers shall be in one section and not in pieces.

The design of light fixture for recess mounting shall be coordinated with the design of false ceiling prior to commencement of manufacture. Shop drawings shall be submitted for approval of Engineer.

IP degree of protection shall comply with the requirements laid down in section 8001. Standard luminaires with manufacturer's recommended modifications, such as, additional gasket, etc. shall be provided to attain required protection level.

4.2 Incandescent / Incandescent reflector/ compact fluorescent Light Fixtures

The incandescent/incandescent reflector/compact fluorescent light fixtures shall be as stated on drawings and bill of quantities. The light fixture shall be finished in standard colours unless otherwise stated on drawings or directed by Engineer. All incandescent/incandescent reflector/compact fluorescent light fixtures shall be of international standard and quality. The types of fixtures with manufacturer's catalogue reference are given on the fixture schedule and in bill of quantities. Equivalent fixture may be acceptable provided that the contractor submits for review all necessary data indicating photometric curves to show that the fixture proposed are of the same type, construction and quality.

The lamps for incandescent/incandescent reflector/compact fluorescent light fixtures shall be GLS lamps or incandescent reflector (PAR) or compact fluorescent lamp with normal or electronic control gear and shall be supplied and installed according to the wattage/type as indicated on drawings.

Weatherproof bulkhead incandescent/compact fluorescent light fixture shall comprise of plastic body and gasketted clear glass cover secured to the body by means of wing nuts/screws to give a weatherproof and watertight fit. The gasket shall be weather resistance type. The lamp holder shall be of bi-pin brass having porcelain outer ring or 2/4-pin base for compact fluorescent lamps with normal control gear as per requirements.

The glass shade of the light fixtures shall be opal white or clear as furnished by the manufacturer with the light fixture unless specified and free from any air bubbles or voids. The shade may be spherical, cylindrical, flattened bottom or any other shape as specified in the drawings or BOQ.

4.3 High / Low Bay Light Fixture

The industrial type mercury light fixture shall consist of circular reflector of anodized aluminum providing bare lamp cut-off at an angle of 62° to the vertical, glass cover and gasket. The reflector shall have aluminium canopy having ¾" (19mm) threaded hole for fixing on the bracket. The lamp holder shall be of porcelain and wired to the mains terminals with heat resistant wires. The fixture shall be provided with mercury vapour lamp of 400 or 250 watts, with appropriately rated ballast, power factor correction capacitor and have terminals provided for connecting to minimum size of 4 sq.mm single core wires. The ballast to be housed in the choke box provided integral with the fixture.

4.4 Road Light Fixtures

The road light fixture shall be high performance lantern for high pressure sodium lamp. It shall be suitable for low threshold increment distribution to BS 5489-2. The fixture shall have white glass reinforced polyester canopy with seamless polyurethane gasket, high purity anodized aluminium reflector and toughened glass lens with stainless steel hinges and toggles. The integral control gear shall be mounted on pressure die cast aluminium alloy end support. The fixture shall have side entry with suitable fixing arrangement for G.I. pipe bracket. The fixture shall conform to IP 66 protection Class.

The lamp for road light fixture shall be increased output high pressure sodium lamp (SON-T). The lamp wattage shall be as shown on the drawing.

The control gear hall have ballast, igniter and power factor correction capacitor. The ballast power loss shall not be more 32 watts for 400 W SON-T lamp.

4.5 Under Water Flood Lights for Fountains

The under water flood lights shall have lamps of ratings specified in BOQ/ Drawings and shall be equipped with proper rating control gears, etc., complete with internal wiring and suitable cable tail (5 m or as required) up to transformer.

The transformers for underwater lights shall be compatible with light fixture, and shall be of same make as that of light fixtures.

The fixtures and accessories shall be manufactured to comply with EN 60598. Floodlights shall be dusted jet proof to IP 68 and suitable for installation at a depth of at least 5 m under meter. The transformers shall be rated to IP 54.

The body of the fixture shall be of copper alloy construction employing PAR 38 120w/24 V or PAR 56 300 W/12V lamps, as required.

5 Nos. of spare gland seal and lamp O-ring shall be supplied with each light fixture.

4.6 Decorative Bollards

The decorative bollards shall have lamps of ratings specified in BOQ/drawings and shall be fully equipped with proper rating control gears, capacitor etc. complete with all internal wiring.

The bollards shall have UV-stabilized polycarbonate optical unit, polycarbonate diffuser, aluminium internal louvers (painted white) and appropriate gear tray, extruded PVC column/aluminium, cast aluminium bollard base and vandal resistant arrangements. The housing shall be dustproof and jet proof to IP54, such that no internal cleaning shall be required.

The colour of the bollards shall be as approved by the Engineer.

5.0 LIGHT FIXTURE INSTALLATION

5.1 General

The mounting heights of light fixtures are indicated on the drawings, and positions of fixtures are according to the mentioned scale.

The Contractor must ensure that the light fixtures are installed uniformly with respect to the dimensions of the area. Any modifications due to site conditions may be made with the approval of Engineer. All fixtures shall be carefully aligned before fixing in position.

The wiring between ceiling rose or terminal box and the fixture shall be carried out with 3-core 1.0 sq.mm and 1.5-sq.mm flexible copper conductor PVC/PVC cable respectively for circuits protected by 10 amps and 15/20 amps mcbs. The wiring inside light fixture body shall be done with heat resistant cables or PVC insulated cable in heat resistant sleeves as approved by the Engineer.

Glasses, shades, reflectors, diffusers, etc., must be in a clear condition after installation. All light fixtures shall be earthed by an earth wire connected to the earth terminal in the fixture.

5.2 Fluorescent Light Fixtures

The fluorescent light fixtures on the surface of ceiling shall be installed with the back of the body flush with the ceiling surface, and in a manner so as to facilitate wiring. Nylon plugs and galvanized steel bolts or screws shall be used for fixing the light fixture to the ceiling. For light fixtures installation on false ceiling the installation method/detail shall be coordinated with ceiling design and submitted for approval of Engineer. Care shall be taken to prevent the weight of the fixture from being transferred to the false ceiling.

Pendant light fixtures shall have two holes in the top of each casing for supporting to the ceiling by a 3/4" dia. galvanized pipe or any other standard method as approved by the Engineer. Wiring from ceiling rose to the fixture shall be done through the pipe. Proper arrangements such as long threads with check nuts, etc. for minor adjustment in the mounting heights of the fixtures shall also be provided.

5.3 Incandescent/Incandescent reflector/ compact fluorescent Light Fixtures

The incandescent/incandescent reflector / compact fluorescent light fixture shall be installed on the surface of ceiling or wall by means of nylon plugs and galvanized steel screws, such that their back finish flush with the surface for exposed conduits and flush with outlet box for concealed conduit system. Wherever convenient, screws for fixing light fixtures shall be screwed into the holes of the outlet box. The lights on false ceiling shall be installed in a manner as described for fluorescent light fixture.

5.4 High / Low Bay Light Fixture

The high/low bay mercury vapour light fixture shall be installed in the roof surface/ trusses. Appropriate size and shape of steel clamps shall be fixing to the truss member for supporting the light fixture, and the light fixture shall be suspended to the required level with a steel rod. Rod length shall vary to keep the fixtures at a uniform level. The wiring between ceiling rose and fixture shall be with three core 1.5 sq.mm. PVC insulated PVC sheathed flexible cable.

5.5 Road Light Fixtures

The Road Light Fixtures shall be installed on G.I. bracket as per details shown on the drawing. Manufacturer'/s installation instructions shall be followed. The G.I. bracket shall be installed on column as shown on drawing.

5.6 Under Water Flood Lights for Fountain

The under water floodlights shall be installed as per finalized architectural layouts.

All mounting and fixing accessories shall be rust proof and suitable for installation under water.

The remote transformer shall be installed in purpose made UV protected transformer housing at a suitable place near fountain. The transformers shall be fixed with four lugs.

The conduiting inside fountain shall be done with rigid and flexible conduit. The installation shall ensure that water can not drip into transformer box (from conduit or out side).

5.7 Decorative Bollards

The bollards shall be three Allen Screws to a mounting flange with anchored bolt, cast in concrete base. Cable entry and exit through concrete foundation shall be done in suitable size class 'D' PVC pipe. Cable terminations shall be done with proper rating connectors suitable for connecting 6.0 sq.mm cables, looping in and out to other bollards. Cable armour and earth wire shall be connected/looped to all conductive parts of the bollard body.

6.0 MEASUREMENT AND PAYMENT

6.1 General

The Contractor's bid amount against each Bill of Quantities item as given below shall include supply, installation, testing, commissioning and completion for all work specified herein and/or shown on the Tender Drawings related to the item.

6.2 **Fluorescent / Incandescent / Incandescent Reflector/ Compact Fluorescent / High/Low Bay & Road Light Fixtures**

6.2.1 **Measurement**: Measurement shall be made for each type of light fixture including all accessories acceptably supplied and installed by the Contractor as complete unit.

6.2.2 **Payment**: Payment shall be made for the number of units measured as provided above at the contract unit price each and constitute full compensation for supplying, installing, connecting, testing and completion of fluorescent/incandescent/incandescent reflector/compact fluorescent light fixture including all accessories such as ballasts, capacitors, igniters, lamps, lamp starter, holders, suspension rods, GI pipe bracket, ceiling supports, internal wiring, nuts, bolts, screws, etc., as required and complete in all respects.

6.3 **Under Water Flood Lights for Fountain**

6.3.1 **Measurement:** Measurement shall be made for each type of underwater flood light for fountain including transformer, transformer housing including all accessories, foundation works etc., acceptably supplied and installed by the Contractor as a complete unit.

6.3.2 **Payment:** Payment shall be made for the number of units measured as provided above at the Contract Unit Price each and shall constitute full compensation for supplying, installing, connecting, testing and commissioning of under water flood light, transformer, transformer pit, all accessories such as internal wiring, nuts, bolts, screws, etc. including PVC conduit, foundation etc., as required and complete in all respect.

6.4 **Decorative Bollards**

6.3.1 **Measurement:** Measurement shall be made for each type of bollard including accessories, concrete foundation etc. acceptably supplied and installed by the Contractor as complete unit.

6.3.2 **Payment:** Payment shall be made for the number of units measured as provided above at the contract unit price each and constitute full compensation for supplying, installing, connecting, testing and completion of bollards fixture, all accessories, such as internal wiring, nuts, bolts, screws, etc., including PVC pipe, foundation etc., as required and complete in all respects.

SECTION - 8212

LOW TENSION CABLES

1.0 SCOPE OF WORK

The work under this section consists of supplying, installing, testing and commissioning of all material and services of low tension (LT) cables and the accessories as specified herein or as shown on the Tender Drawings and in the Bill of Quantities.

The Contractor shall discuss the electrical layout with the Engineer and coordinate at site with other services for exact route, location and position of the L.T. cables.

The LT cables with accessories shall also comply with the General Specifications for Electrical Works, Section-8001 and with other relevant provisions of the Tender Document.

2.0 GENERAL

All multi-core and single core PVC insulated and sheathed cables for light circuits, socket outlets and circuits operating upto 250 volts shall be 300/500 volts grade. All single core PVC insulated, non-sheathed cables shall be of 450/750-volt grade. Power cables for main feeders, main to sub main feeders, power equipment, etc., armoured or unarmoured shall be of 600/1000-volt grade. Armouring of multi-core/ single core cables shall be done with appropriate size galvanized steel/aluminium wire as per relevant codes.

The conductors shall be stranded high conductivity, soft annealed copper/aluminum . Conductors of single core cables shall be circular, whereas of multi-core cables may be circular or shaped according to standard practices and codes. LT power distribution cables having Aluminum Conductor XLPE Insulated PVC Sheathed Rated Voltage of 0.6/1 kV shall be used. The PVC insulation, bedding and overall sheath shall be of extruded PVC compound having good flexibility, resistance to ageing and ability to withstand deformation at high temperatures. Non-hygroscopic filler shall be provided in multicore cable to fill empty gaps between the cores to make the cable a smooth round finish. In all shaped cables a non-hygroscopic high strength binding tape shall be provided on the core assembly. All cables shall be treated for vermin proofing and be protected against rodents during storage, laying and all protective pipe/sleeves shall be plugged to attain the same after installation.

Embossed marking on the oversheath at 3 meters intervals shall give the following information :

- name of Manufacturer
- year of Manufacture
- No. of cores and size of cable in sq.mm.
- voltage grade
- type of cable i.e. Cu./PVC/SWA/PVC or Al./XLPE/PVC

3.0 APPLICABLE STANDARDS/CODES

The latest editions of the following standards and codes shall be applicable for the materials specified within the scope of this section:

IEC 60502	-	XLPE Insulated PVC Sheathed cables
BS 6004/6346	-	PVC insulated cables for lighting & power
BS 6746	-	PVC insulation for electrical cables
BS 6360	-	Copper conductors
BS 6500	-	Insulated flexible cords

4.0 MATERIAL

4.1 General

The power, lighting and control cables shall be furnished and installed in accordance with the routes and requirements shown on the drawings.

All cables shall have phase identification colours on insulation of each core. The colour code for three phase circuits shall be red, yellow and blue for phase conductors and black for neutral conductor. Where insulated earth conductor is installed, it shall have green or green-yellow colour insulation.

Single-phase circuits shall have insulation of red colour for phase/line, black colour for neutral and green or green-yellow colour for earth conductor.

All DC circuits shall have insulation of white colour for positive, black colour for negative and green or green-yellow colour for earth conductor.

The ends of each length of multi-core armoured or unarmoured cables shall be properly marked for clock-wise and anti clock-wise sequence of core colours.

4.2 Cables for Conduit or Channel Wiring

All cables/wiring in concealed or surface mounted PVC conduits or in covered channel shall be single core PVC insulated of specified grade and size, unless specifically shown on the drawings or given in BOQ.

4.3 Cables on surface/concrete trenches

Cables for distribution system to be installed on surface, in cable ducts, in concrete trenches or on trays shall be single or multi-core PVC/XLPE insulated and PVC sheathed of specified voltage grade and size, unless specifically shown on the drawings or given in BOQ.

4.4 Cable/Wiring Inside Lighting Column

All cables/wiring in side lighting column from cable connection box to light fixtures / lanterns shall be 3 core PVC insulated PVC sheathed, high temperature resistant of specified grade and size, unless specifically shown on the drawing or given in the BOQ.

4.5 Underground Cables

Cables for laying directly underground shall be XLPE insulated, PVC sheathed and armoured with galvanized steel/ aluminium wire. Cables fully installed in underground ducts/pipes and mechanically protected from end to end shall be XLPE insulated and PVC sheathed unless specifically shown on the drawings or given in BOQ.

4.6 Cable Markers

Above ground cable markers made of Grade-25 reinforced concrete shall be erected at a maximum interval of 200 metres along the straight trench, at each bend and joint box for indicating the presence of underground cables. Where the trench changes its direction two number of markers shall be installed one in each direction to indicate the two directions of the trench. At the joint box, additionally a symbol shall be engraved just beneath the letters MV or LV to indicate the presence of the joint box. The cable markers shall be finished in grey paint. The letters and symbols for indication shall be engraved in concrete on both sides. Letters shall be MV or LV for medium voltage or low voltage cable. The colour of the engraved letters and symbol shall be black. The dimensions of the markers shall be as shown on the drawing and shall be installed in the ground as shown.

4.7 Cable Accessories

All cable accessories shall be provided for the complete cabling and wiring system without any additional cost unless specifically mentioned in BOQ. These shall include but not limited to the items such as saddles, clamps, fixing channels, connectors, cable joints (where necessary and as approved by the Engineer), clips, lugs, colour sleeves, identification tags, bushes, glands, etc.

5.0 INSTALLATION

5.1 General

All installation material, labour, tools, cable rollers and accessories for cable installation shall be furnished by the Contractor. The cable and accessories shall be installed as described in accordance with these Specifications, drawings and manufacturer's instructions.

The Contractor shall confirm the exact cut lengths for cable by actual measurements at site prior to the ordering. The cable lengths where shown on the drawings or in BOQ are tentative and only for general

guidance. The Contractor shall be solely responsible for furnishing correct lengths of cable to avoid joints in cable length except where necessary, after obtaining approval of the Engineer.

No separate payment for such joints is admissible.

Necessary precautions for safety of cables shall be taken during the laying of cables to avoid scratches/ cuts to the cable surface. Pulling force on cable at all times shall remain well within the manufacturer's recommended limits.

Prior to installation of jointing and termination kits, the cable lengths shall be checked and tested to ensure that the cables are in sound condition, and no damage has been done during handling and installation. After installation, these shall again be tested prior to commissioning as per recommendations of the standards according to which the cable is manufactured.

5.2 Conduit or Channel Wiring

The wiring through conduit shall be started only after the conduit and channel system is completely installed and all outlet boxes, junction boxes, etc., are fixed in position.

The wires shall be pulled in conduit or channel with care, preferably without the use of any lubricant. Where necessary and if approved by the Engineer, the cable manufacturer's recommended lubricant may be used. Where several wires are to be installed in the same conduit, they shall be pulled together along with the earth conductor. All wires of same circuit shall be run in one conduit.

The wires shall not be bent to a radius less than ten times the overall diameter of the wire, or more if otherwise recommended by the manufacturer.

The wiring shall be continuous between terminations and looping-in system shall be followed throughout. Any joint in wires shall not be allowed. The use of connectors shall only be allowed at locations where looping-in is rendered difficult. The consent of the Engineer shall be required for using connectors. The connector shall be of suitable rating having porcelain body with sunk-in screw terminals. The connector shall be wrapped with PVC insulation tape after its installation. A minimum of 150 mm extra length of cable/wire shall be provided at each termination to facilitate repairs in future.

5.3 Cables on Surface/Trenches

All cables for installation on surface of wall, column, ceiling, trenches, etc., shall be fixed to the surface by means of galvanized steel clips secured to a steel channel using suitable stud plate, nuts and washers. The distance between each cable clip shall be such so as to support the entire weight of the cable and that distance between the cable & surface and also the vertical clearance between two adjacent cables at any point is 50mm minimum. Common mounting channels are to be furnished for cable along the same route. The Contractor can offer alternate cable

fixing arrangement, which shall be approved by the Engineer before commencement of installation.

5.4 Cable / Wiring Inside Lighting Column

All cables for installation inside lighting, column shall be fixed at the ends by means of galvanized steel clips secured to a steel channel using suitable stud plate, nuts and washers ensuring no tension on cable terminations. The Contractor can offer alternate cable fixing arrangement, which shall be approved by the Engineer before commencement of installation.

5.5 Underground cables

The cables to be installed directly underground shall be laid in trenches in single tiers. Unless shown specifically on the drawing the depth of cable below finished ground level shall be 900 mm minimum measured from the top of the largest cable to the general ground level. The burial depth may be increased as required due to site conditions or when crossing other service pipes and roads. Burial depth less than 900 mm and more than 1500 mm shall require Engineer's approval.

When cables cross road, paved area, other services or other cables, they shall be laid in protective pipes of required size. Cables entering the buildings shall also be laid in protective pipes. The protective pipe ends, after installation of cables, shall be plugged watertight be means of bituminised hesian or equivalent method as approved by the Engineer. A minimum clearance of 250 mm vertically and 500 mm horizontally shall be maintained between cables and other services.

The cable trench shall be excavated as per route and location shown on the drawings. Before laying of cables in the trench, the bed of the trench shall be leveled and filled with a 100 mm thick layer of fine sand (1.3 mm diameter maximum particles size). The sand layer shall be leveled and the cables placed thereon. The cables shall be covered with a layer of fine sand 100 mm thick measured above the top of the cable. Cable protective bricks shall be placed over the sand cover which shall be of class-C cement concrete, minimum 50 mm thick and 300 mm square. The bricks shall be placed over the sand layer and end-to-end to cover the entire length and breadth of the cable trench. After the concrete bricks are placed, the remainder of the trench shall be backfilled with earth in layer 300 mm thick. Each layer shall be thoroughly tamped and compacted.

A PVC warning tape shall be provided 300 mm below normal ground level covering the entire length and breadth of the trench. The warning tape shall be yellow in colour with marking of danger and voltage of the cable printed in black and as approved by the Engineer.

Cable identification tags of corrosion resistant material shall be tied to cables with PVC cable tie at a maximum of 20 metre interval along the

cable length for identification of cable and circuit. The earth continuity conductor shall be laid in the trench with the cables.

Sufficient slack shall be left in cables for this purpose the cut lengths of cables shall allow about 3% more in the measured lengths between terminations. At underground joint box, ample slack shall be left to prevent straining of cable joints due to settlement of earth. Payment shall be done as per actual lengths measured at site after installation.

The cut lengths of cables wherever stated are only as a guide. The Contractor shall measure lengths between terminations of each circuit and if the discrepancy between measured lengths at site and the one given on the drawing differ, the Contractor shall report to Engineer and act as directed. Cables, whether installed underground or in concrete trenches, shall not be bent to a radius less than 12 times the diameter of the cable or as recommended by the cable manufacturer, whichever is higher.

5.6 Cable Marker

Above ground, cable markers shall be erected at a 200 metre interval along the straight trench, and at each bend and joint box for indication of presence of underground cable. For more than one metre wide trenches, cable markers shall be provided at both edges of the trench. The cable marker shall bear the necessary instructions indicated in approved colours.

The Contractor shall submit to the Engineer for approval, schedule of cable markers showing location of marker and instructions on each marker.

6.0 MEASUREMENT AND PAYMENT

6.1 General

The Contractor's bid amount against each Bill of Quantities item as given below shall include supply, installation, testing, commissioning and completion for all work specified herein and/or as shown on the Tender Drawing related to the item.

6.2 Light Circuit Wiring

6.2.1 **Measurement:** Measurement shall be made for the total number of light circuit wiring from LT distribution board to point/switch including wiring between switches on the same circuit, acceptably carried out by the Contractor as a complete unit.

6.2.2 **Payment:** Payment shall be made for the total number of units measured, as provided above, at the Contract unit price each and shall constitute full compensation for supplying, installing, connecting, testing, commissioning and completion of the circuit wiring from the LT distribution board to point/switch including wiring between switches on the same circuit complete with specified type of surface mounted/concealed conduit, (PVC or

steel) required No. specified size single core PVC insulated cable, earth continuity conductor, accessories, etc.

6.3 **Wiring of Light/Fan Point (Point to Switch, Point to Point, Two Way or Group Controlled Light Points)**

6.3.1 **Measurement:** Measurement shall be made for the total no. of wiring of light/fan points (point to switch, point to point, two way or group controlled light point), acceptably carried out by the Contractor as a complete unit.

6.3.2 **Payment:** Payment shall be made for the total number of units measured, as provided above, at the Contract unit price each, and shall constitute full compensation for supplying, installing, connecting, testing, commissioning and completion of the wiring between light point to switch, point to point and two way light points, including required no. of specified size single core PVC insulated cable, specified type of surface mounted/concealed conduit (PVC or Steel), earth continuity conductor, flexible cable, ceiling rose, one way or two way 10A light control switch, sheet steel box and other accessories, etc.

6.4 **Wiring of Socket Outlets**

6.4.1 **Measurement:** Measurement shall be made for the total number of socket outlets wiring (from DB to socket outlets or between the socket) acceptably carried out by the Contractor as a complete unit.

6.4.2 **Payment:** Payment shall be made for the total number of units measured, as provided above, at the Contract unit price each and shall constitute full compensation for supplying, installing, connecting, testing, commissioning and completion of wiring of socket outlets from LT switchboard/distribution board to sockets or between sockets with specified size and number of single core PVC cables including specified type of surface mounted/ concealed conduit, ECC and all other accessories etc.

6.5 **Wiring Inside Lighting Column**

6.5.1 **Measurement:** Measurement shall be made for the total number of wiring points from cable connection box to light fixtures/lanterns, acceptably carried out by the Contractor as a complete unit.

6.5.2 **Payment:** Payment shall be made for the total number of units measured, as provided above, at the Contract unit price each and shall constitute full compensation for supplying, installing, connecting, testing, commissioning and completion of the wiring from the cable connection box to light fixtures including all accessories etc. complete in all respects.

6.6 **LT Cables**

6.6.1 **Measurement:** Measurement shall be made for the total running feet for each size and type of LT cable acceptably supplied and installed by the Contractor.

6.6.2 **Payment:** Payment shall be made for the total running feet of each size and type of LT cable measured, as provided above, at the Contract unit price each and shall constitute full compensation for supplying, installing, connecting, testing and commissioning of the LT cables including all accessories such as cable joints, lugs, colour sleeves, glands, bush, etc. complete with plugging of protective pipe/ sleeve ends for water tightening.

6.7 Cable Trenches

6.7.1 **Measurement:** Measurement shall be made for the total cubic feet of cable trenches acceptably completed by the contractor according to the specification and as shown on drawings.

6.7.2 **Payment:** Payment shall be made for the total cubic feet of excavation / backfilling of cable trench measured as carried out above at the contract unit price and shall constitute full completion for cable trenches and all the works related to the item.

No separate payment shall be made for the under mentioned specified work related to the B.O.Q. item cable trenches. The cost thereof shall be deemed to have been included in the quoted rates of above work.

- Dewatering during excavation and backfilling.
- Providing and filling of fine sand in trenches.
- Compacted backfilling of trenches with specified material and disposal of surplus and rejected material.
- Providing and laying of 300 mm x 300 mm x 50 mm thick concrete (gade-20) protective tiles in trenches.
- Providing and laying of PVC warning tape.

6.8 Cable Marker

6.8.1 **Measurement :** Measurement shall be made for the total number of cable marker acceptably supplied and installed by the Contractor as a complete unit.

6.8.2 **Payment :** Payment shall be made for the total number of cable marker as provided above at the contract unit price and shall constitute full compensation for supplying & installing reinforced concrete cable markers, excavation, backfilling, concrete curing, and painting etc.

SECTION - 8220

WIRING ACCESSORIES

1.0 SCOPE OF WORK

The work under this Section consists of supplying, installing, and commissioning of all material and services of the complete switches, switch sockets, etc., as specified herein, as shown on the Tender Drawings and explained in the Bill of Quantities.

The Contractor shall discuss the electrical layout with the Engineer and coordinate at Site with other services for exact location and position of all wiring accessories.

The wiring accessories shall also comply with the General Specifications for electrical works Sec. 8001 and with other relevant provisions of the Tender Documents.

2.0 GENERAL

The locations of the wiring accessories such as sockets, switches etc. are tentatively shown on the drawings. The Contractor shall ensure the exact positions and locations of wiring accessories in coordination with other services drawings, as per site requirements and as directed by the Engineer. The Contractor shall be responsible for proper functioning of wiring accessories after installation and commissioning.

3.0 APPLICABLE STANDARDS/CODES

The latest edition of following standards & codes shall be applicable for the materials specified within the scope of this section :

BS 3676/BS 1363		Switches for domestic and similar purposes.
BS 2135	-	Capacitors for radio interference suppression.
BS 67	-	Ceiling roses.
BS 115	-	3 pin plugs, socket outlets and socket outlet adapter.
PS 116	-	Two and three terminal ceiling roses.

4.0 MATERIAL

4.1 Switches - Indoor type

Switches for controlling light and fan points shall be single pole, rated for 10 Amps, 250 volts AC. The body of the switches shall be of thermoplastic with white face plate suitable for flush mounting on a sheet steel outlet box. The switches shall be piano type having silver tipped contacts and shall operate with snap action.

Unless otherwise specified wherever switches control only the light points, these shall be plate type gang switches installed on common outlet boxes.

Where specified metal front plates shall be used with single grid type switches. The plate shall be finished in specified colour or as otherwise directed by the Engineer. The bell push switches shall be spring loaded type with the identification symbol embossed on it. Two way switches shall be used to control lights from two different locations as shown on the drawings.

The switches & socket outlets shall be of 'Clipsal' - Australia make or MK-UK or approved equivalent.

4.2 **13-Amp Switch-Socket Outlets**

Switch socket units shall be 2 pin + earth, 13 Amp Switch socket outlets on white face plate conforming to the standards requirements of BS 1363 and stated above for switches - Indoor type. The outlets shall be heavy duty type suitable for mounting on sheet steel outlet box. The 13 Amps Switch sockets outlets shall have sheltered live contacts and designed such that the earth pin of plug is engaged to socket earth before making of live contacts.

Where metal plate switches are installed, the switch socket units shall also be provided with front plate of similar design.

4.3 **16 Amp Socket Outlets**

16 Amp Socket Outlets shall be 2 pin + earth German type (Schuko) socket outlets on white face plate conforming to the standards and requirements of relevant IEC codes and stated above for switches - Indoor type. The outlets shall be heavy duty type suitable for mounting on sheet steel outlet box. The 16 Amp Schuko Socket Outlet shall be designed such that the earth pin of plug is engaged to socket earth prior to making contact to the live contacts.

4.4 **Multiple Socket Outlets Box**

Pedestal type Multiple Socket Outlet Box shall be made of 16 SWG sheet steel, powder coated and suitable for installation of 2 Nos. 13A switch socket unit and 1 No. 16A socket outlet as specified 4.2 and 4.3 above. The 3 socket units shall be housed in pedestal mounted multiple outlet box. Internal wiring between various sockets inside the multiple box shall be done by required number of 2.5 sq.mm PVC cables.

4.5 **Sheet Steel / Wooden Box**

The sheet steel boxes for installation of switches, fan regulators, dimmers and socket outlets shall be made of 16 SWG sheet steel or wooden box in dry partitions having appropriate dimensions. The box shall have suitable arrangement for receiving the conduit(s). The wooden box shall be teak wood having a polished front face in coordination with the dry partitions. An earth terminal shall be provided for connecting atleast three earth wires of 4 sq.mm size. The outlet box shall be finished in powder coated paint. The sheet steel/wooden box shall be as approved by the Engineer.

4.6 Ceiling Rose

The ceiling rose shall be suitable for 5 amps 250 volts single phase ac. It shall have white plastic moulded base plate, copper or brass terminals for connecting atleast two wires of 2.5 sq.mm size. The ceiling rose shall have a cover with cable inlet hole suitable for multicore PVC insulated and PVC sheathed cable.

5.0 INSTALLATION

5.1 General

The mounting heights of all wiring accessories fixtures are stated on the drawings. In case the mounting height is not mentioned, the instructions of the Engineer shall be obtained before fixing.

5.2 Switches, and Socket Outlets

All wiring accessories shall be installed on 1.63 mm (16 SWG) thick sheet steel box recessed in wall. sheet on sheet steel box shall be by means of flat head galvanized screws sunk in the plastic plate so as to finish flush with the surface. The edges of the plastic plate shall be champhered. Where switches and fan regulators are required to be installed to gather, these shall be grouped and suitably installed on common plastic sheet fixed on appropriate size sheet steel box, wooden polished box.

6.0 MEASUREMENT AND PAYMENT

6.1 General

The Contractor's bid amount against each Bill of Quantities item as given below shall include supply, installation, testing, commissioning and completion for all work specified herein and/or as shown on the Tender Drawing related to the item.

6.2 13A/16A Socket Outlets

6.2.1 **Measurement:** Measurement shall be made for the total number of each type of socket outlet with all accessories acceptably supplied and installed by the Contractor as a complete unit.

6.2.2 **Payment:** Payment shall be made for the total number of units measured, as provided above, at the Contract unit price each and shall constitute full compensation for supplying, installing, connecting, testing and completion of each type of 13A/16A socket outlet including screws, sheet steel box, nuts, bolts and other accessories as required.

6.3 Multiple Socket Outlets Box

6.3.1 **Measurement:** Measurement shall be made for the total number of each type of multiple socket outlet with all accessories acceptably supplied and installed by the Contractor as a complete unit.

6.3.2 **Payment:** Payment shall be made for the total number of units measured, as provided above, at the Contract unit price each and shall constitute full compensation for supply, installing, connecting, testing and completion of multiple socket outlets box, as specified including internal wiring between various socket outlets inside the box, screws, sheet steel or wooden box, nuts, bolts, and other accessories as required.

SECTION - 8230

CONDUITS AND PIPES

1.0 SCOPE

The work under this section consists of supplying, installing and commissioning of all material and services of the complete Conduits and Pipes as specified herein and/or shown on Tender Drawings and stated in the Bill of Quantities.

The Contractor shall discuss the electrical layout with the Engineer and co-ordinate at Site with other services for exact route, location and position of the conduits and pipes.

The conduits and pipes with accessories shall also comply with the General Specifications for Electrical Works, Section-8001 and with other relevant provisions of the Tender Document.

2.0 GENERAL

The extent of works shown on the drawing does not indicate the exact position of conduits and pipes. The Contractor shall ensure exact location and route of conduit and pipes in coordination with other services drawings, as per site requirements and as directed by the Engineer.

The quality and material for the accessories of conduits and pipes such as sockets, end cap, elbows, bushings, bends, inspection/pull boxes, round boxes, etc., necessary for the complete installation shall be similar to that of conduits or pipes. All the accessories shall be supplied by the Contractor without any extra cost and deemed to have been included in the price of conduits/pipes.

3.0 APPLICABLE STANDARD/CODES

The latest edition of the following standards and codes shall be applicable for the materials specified within the scope of this section:

BS 4607 - Rigid PVC conduits and fittings.

BS 1387 - Galvanized Iron (GI) pipes and fittings.

BS 3505 - uPVC pressure pipe and fittings.

4.0 MATERIAL

4.1 Galvanized Iron (G.I) Conduits and Accessories

G.I. conduits shall be used on surface for lighting and power circuits wherever specified and required, as shown on drawings or given in BOQ.

The G.I. conduit shall be made of heavy gauge mild steel, galvanized inside and outside by hot dip galvanized process. The conduit shall be free from stains, burrs or any other defects. The accessories for G.I. conduit such as sockets, bends etc. shall also be galvanized inside and outside and of the same quality and specification as the conduit. Each length of conduit shall be furnished with threaded ends.

The round junction boxes for ceiling light points shall have minimum dimensions of 64mm diameter and 64mm depth. The junction boxes for wall light points shall have minimum mansions of 64mm diameter and 40mm deep. Round junction boxes shall be provided with one piece cover plate fixed to the box by means of brass screws.

4.2 PVC Conduit and Accessories

The PVC conduits and accessories for lighting and power circuits shall be furnished by the Contractor as shown on the drawings or given in BOQ. The PVC bends shall have enlarged ends to receive conduit without any reduction in the internal diameter at joint. Manufactured smooth bends shall be used where conduit changes direction. Bending of conduits by heating or otherwise will be allowed in special situations only for which the consent of the Engineer shall be required. The use of sharp 90 degree bends and tees will not be allowed for concealed wiring.

The round PVC junction boxes for ceiling light or fan points shall have minimum dimensions of 63 mm diameter and depth. The junction boxes for wall light points shall have minimum dimensions of 63 mm diameter and 38 mm deep. Round junction boxes shall be provided with one piece PVC cover plate fixed to the box by means of brass screws.

4.3 Inspection/Pull and Adaptable Boxes

Inspection/Pull boxes and adaptable boxes shall be provided in conduit runs wherever required to facilitate pulling operation. The drawings are diagrammatic and do not indicate the position and spacing of inspection/pull boxes or adaptable boxes. However, these shall be as per Engineer's approval.

4.4 Galvanized Iron (G.I) Pipes and Accessories

Galvanized iron pipes shall be used for underground installation wherever specified and required at entry into manholes and as shown on drawings. The Specifications for G.I. pipes and accessories shall be same as given in Section 4.1, G.I. Conduits and Accessories.

The underground G.I. pipes and accessories shall be provided with one thick coat of bituminous paints on the outer surface prior to installation.

4.5 uPVC Pipes and fittings

Unplasticised PVC pressure pipes and fittings shall conform to BS 3505:1968 and shall be of class-D (working pressure - 12 bars). The buried uPVC pipes should be able to withstand the external load acting upon it by continuous movements of heavy duty vehicles such as truck, crane, forklift etc. where pipe changes direction manufacturer smooth bends shall be used.

Fittings and accessories for use with uPVC pressure pipes shall be of the same class as the pipe and shall have the required shapes and dimensions of turned ends to fit the uPVC pressure pipes. uPVC pipes and accessories shall be suitable for jointing with rubber rings or solvent.

Bending of pipes by heating or otherwise will not be allowed. The use of sharp 90 degree bends and tees will not be allowed. The bends shall conform to same specifications as given for PVC conduits. For jointing of pipe all precautions and procedures recommended by manufacturer shall be followed.

Hard PVC or reinforced concrete pipe range spacers shall be used if there is more than one pipe running in parallel. The distance between range spacers shall be maximum 2 meters. Range spacers shall be prefabricated/precast and decay resistant.

Flexible pipes shall be used as deemed essential or as directed by the Engineer.

4.6 Pipe End Markers

Wherever the underground pipe ends do not terminate into any light fixture, transformer housing or a concrete pit, pipe end markers shall be installed to indicate the location of the pipe ends underground. The pipe end markers shall be a concrete slab marker in the vicinity of Runway, Taxiway and Apron. The size, thickness and concrete grade of the flat pipe end markers shall be as shown on the drawing. Each marker shall have following information impressed upon its top surface.

a) the word 'PIPE'

b) Number of layers X number of pipes in each layer (diameter of pipes)

5.0 INSTALLATION

5.1 Galvanized Iron (G.I) Conduits

The surface conduits shall be installed where shown on drawings only. The conduits shall be installed parallel or perpendicular to the surface of wall, structural members, ceiling, etc., by means of C.I. saddles and clamps of approved design. The conduits shall be kept at least 150 mm away from any other services pipes.

The saddles shall be installed on surface by means of nylon or wooden plugs and galvanized screws. Appropriate size of holes in structure shall be made by drilling, the thickness of saddles shall not be less than 6mm and clamps shall be of 16 SWG G.I. The surface conduits shall be supported at a maximum of one metre spacing along horizontal and vertical runs. All accessories for complete installation of conduit system shall be provided by the Contractor. The pull boxes, etc. if required shall be used for surface conduit system. The entire conduit system alongwith the accessories shall be galvanized.

5.2 Galvanized Iron Pipes

The galvanized iron pipes shall be installed at a minimum depth of 900 mm measured from the top of pipes to finished ground level. The pipe shall be laid and checked for soundness before completion of civil works. The pipes at the entrance of the buildings and in concrete shall be installed at locations as shown on the drawings.

At all joints the pipes shall be firmly screwed and cotton yarn with waterproof compound shall be used to make the joint waterproof.

At each termination, the pipe end shall have threads and socket screwed on thread for installing soft metal bush. The soft metal bush shall be of approved quality and shall be male type.

The installation of pipes shall be completed in all respects including its fixing at terminations before the work is started. All sharp edges and burrs shall be removed by using reamer or any approved device.

The pipe shall be checked before installation of cable for any obstruction. If found, it shall be cleared without damaging the installation. All pipe ends shall be plugged to prevent entry of water, rodents etc.

5.3 PVC Conduits

5.3.1 Concealed Conduits

Where concealed conduit system is stated on drawings, the conduit shall be installed concealed in roof, wall, column, etc. Conduits shall be laid under floor only where specifically stated. The entire conduit system shall be installed and checked before wiring is carried out. Any obstruction found shall be cleared before the installation of cable.

When concealed, the conduit shall have a minimum of 32 mm cover of concrete measured from the top of conduit to finished surface. In the reinforced cement concrete (RCC) work the conduit shall be laid before pouring of concrete. Under no circumstances shall chases be made in the RCC structure for concealing conduit and accessories after pouring of concrete. The conduit shall be supported on top of bottom reinforcement of slab. All outlet boxes to be firmly supported and installed such that they finish flush with the soffit of slab or beam.

Where conduits have to be concealed in cement concrete (CC) work after concreting or in block masonry, chase shall be made with appropriate tools and shall not be made deeper than required. The conduit shall then be fixed firmly in the recess and covered with cement concrete mixture. The work of cutting in the cement concrete work or block masonry work shall be co-ordinated with the civil work. The Contractor shall obtain approval from the Engineer before starting chasing and cutting.

The termination of conduits at or near the equipment/ switchboard is shown diagrammatically on the drawings. The exact locations of the termination shall be co-ordinated with the equipment/ switchboard to be installed. Any extension of conduit to suit the site condition shall be made without any extra cost. Conduit ends pointing upwards or downwards shall be properly plugged in order to prevent the entry of foreign materials. All openings through which concrete may leak shall be carefully plugged in order to prevent the entry of foreign materials. All openings through which concrete may leak shall be carefully plugged and boxes shall be suitably protected against filling with concrete. At all terminations of conduit, sharp edges of conduit ends shall be prevented to avoid the cutting or damaging of wires or cables during pulling through the conduits.

Under floor conduit shall be installed at a minimum depth of 2 inch from the finished floor level or as shown on the drawings. The conduits shall be installed empty, before finishing of floor or in RCC work, with an 18 SWG steel wire drawn through the conduit for pulling cable. No conduits shall be laid under floor in bathroom.

Wherever the conduit lengths cross the expansion joint either along the columns or slab, suitable arrangement shall be provided so that when the conduit lengths in the expansion joint are stressed, the conduit shall not crack or break.

5.3.2 Surface Conduits

The surface conduits shall be installed where shown on drawings only. The conduits shall be installed parallel or perpendicular to the surface of wall, structural members, ceiling, etc., by means of PVC saddles and clamps of approved design. the conduits shall be kept at least 150 mm away from parallel runs of flues, steam pipes and hot water pipes.

The saddles shall be installed on surface by means of nylon or wooden plugs and galvanized screws. Appropriate size of holes in structure shall be made by drilling. the thickness of saddles and clamps shall be at appropriate thickness and prime quality. The surface conduits shall be supported at a maximum of one metre spacing along horizontal and vertical runs. All accessories for complete installation of conduit system shall be provided by the Contractor. The pull boxes, etc. as stated for concealed conduits shall also be applicable for surface conduit system.

5.4 uPVC Pipe

uPVC pipes shall be installed as shown in the drawings. The depth of the pipe shall vary according to the conditions at site, and approval of Engineer shall be obtained prior to installation. In general the pipes shall be installed underground at the following depths measured from the top of the pipe:

- Under roads/pavement : 900mm below finished surface.
- When crossing other services : 250/500mm vertical/horizontal

The trench of required dimensions shall be excavated and the bottom of trench cleaned and levelled. A 100mm bed of fine sand shall be provided over which the PVC pipes installed after proper alignment. Where two or more pipes are installed in the same trench the clearance between pipes shall not less than 50mm. This shall be done by the provision of pipe range spacers as per Engineers approval. After laying of pipe the trench shall be backfilled with clean screened sand at least 100mm above the top most pipes. The remaining portion of trench shall be backfilled with selected earth in layers well compacted other than runway/taxiway/apron. However remaining trench under runway/taxiway/apron should be backfilled with sand in layers.

After installation, the ends of the pipe shall be plugged with manufactured end cap impervious to water and chemicals. All joints shall be sealed adequately not only to prevent entry of foreign elements but water tightness shall be ensured.

The installation of pipes shall be completed in all respects including its fixing at terminations, before cabling work is started. All sharp edges and burrs shall be removed by using reamer or any approved device. The pipe shall be through cleaned of dirt and dust from inside, the pipes shall be installed in proper co- ordination with other works.

The protective PVC pipe for cable entering building shall be installed so as to lead cable into the cable trench. The required number of pipes shall be fixed before completing the work in the plinth. If an opening is provided to the cable trench from outside, the required number of pipes shall be installed and part of the opening remained unutilized shall be properly packed and sealed using suitable packing material impervious to water and chemical to make it completely water-tight.

Spare pipes shall be provided with 5 mm dia rope pulled from end to end and plugged with manufactured end cap.

Flexible pipes of compatible material and size shall be used wherever deemed essential.

5.5 Pipe End Markers

The pipe end markers shall be installed flat in the ground with top approximately 2.5 cm. above the finished grade. After the concrete marker has set a minimum of 24 hours, the top surface shall be painted bright orange with paint suitable for uncured exterior concrete.

Markers shall be installed after the laying of cables through the pipes is completed in all respects and cable trenches are finally covered and compacted.

6.0 MEASUREMENT AND PAYMENT

6.1 General

The Contractors bid amount against each item of Bill of Quantities as given below shall include supply, installation, testing, commissioning and completion for all work specified herein and/or as shown on the Tender Drawings related to the item.

6.2 Conduits and Pipes (G.I. and PVC)

6.2.1 Measurement

Measurement shall be made for the total running feet of each type and size of conduits and pipes acceptably supplied and installed by the Contractor according to specification and as shown on drawings.

6.2.2 Payment

Payment shall be made for the total running feet of each type and size of conduits or pipes measured as provided above at the contract unit price each and shall constitute full compensation for supplying, installing and completion of the laying of the conduits and pipes including all accessories related to the item.

No separate payments shall be made for the under mentioned specified work related to the supply and installation of conduit and pipe. The cost thereof shall be deemed to have been included in the quoted rates of above work.

- Excavation and backfilling.
- Dewatering during excavation and backfilling.
- Providing and filling of fine sand in trenches.
- Providing pipe range spacers.
- Providing flexible pipes and accessories, jointing material/ compound, saddles, sockets, elbows, bend junction boxes reducers, 16SWG GI pull wire for empty conduit and 5 mm rope for empty pipe, soft metal bush, making threads and plugging of pipe with manufactured end cap etc. whether used or left spare
- Compacted backfilling of trenches with specified material and disposal of surplus and rejected material.
- Watertight sealing of any unutilized opening to the buildings after installing the protective pipes entering the buildings.

6.3 Pipe End Markers

6.3.1 Measurement

Measurement shall be made for the total number of markers acceptably supplied and installed by the Contractor as a complete unit.

6.3.2 Payment

Payment shall be made for the total number of units measured, as provided above, at the Contract unit price each and shall constitute full compensation for supplying, installing, reinforced concrete pipe end markers, excavation, backfilling, concrete curing and painting etc.

SECTION - 8240

EARTHING

1.0 SCOPE OF WORK

The work under this section consists of supplying, installing, testing and commissioning of all material and services of the complete Earthing system as specified herein, as shown on the Tender Drawings and given in the Bill of Quantities.

The Contractor shall discuss the electrical layout with the Engineer and co-ordinate at Site with other services for exact route, location and position of the earth electrode and ECC etc.

The Earthing system shall also comply with the General Specifications for Electrical Works Section - 8001 and with other relevant provisions of the Tender Documents.

2.0 GENERAL

The earthing system consists of earth electrodes, earthing leads, earth connecting points, earth continuity conductors and all accessories necessary for the satisfactory operation of the associated electrical system.

3.0 APPLICABLE STANDARDS/CODES

The latest editions of following standards / codes shall be applicable for the materials specified within the scope of this section:

BS 951 - Earthing clamps

CP 1013 - Earthing

BS 2874 - Nuts, bolts, washers, screws and rivets fixing for use on copper

BS 1433 - Hard drawn bare copper conductor for earthing

BS 6346 - PVC insulated cables

4.0 MATERIAL

4.1 Earth Electrode

4.1.1 Plate Type

The plate type earth electrode shall comprise a 600 x 600 x 3mm electrolytic copper plate. The surface of the plate shall be tinned for protection. The plate shall have four terminals for connecting the earthing leads. Nuts bolts and washers, shall be either of brass or tinned copper. A 50mm dia. G.I. pipe shall be provided from inspection chamber to earth plate for watering purpose. This pipe shall have 10mm dia. holes at 500mm centre to centre all along the length.

At the ground level an inspection chamber with cast iron cover shall be constructed having dimensions as shown on the drawings. The inspection chamber shall have a cover supported on angle iron frame. The cover shall be hinged type, as approved by the Engineer and shall finish flush with the ground level.

4.1.2 **Copper Clad Steel Rod Type**

This type of earth electrode shall comprise a 3 metre long, 20 mm dia. copper clad steel rod having flat head at drive end and pointed conical tip at the driven end. The tip shall be hardened to facilitate driving. At the top of the rod, a brass clamp for bolted connections shall be provided suitable for connection to the down conductor or earthing lead as required.

The inspection chamber with C.I. cover shall be provided as instructed by the Engineer.

4.2 **Earthing Lead**

The earthing lead shall connect the earth electrode to earth connecting point or equipment in the building. It shall be of round hard drawn bare electrolytic copper of size shown on the drawings. The cost of earthing leads deemed to have been included in the price of earth electrode and no separate payment shall be made for it.

4.3 **Earth Continuity Conductor**

Earth continuity conductor (ECC) shall be hard drawn bare copper wire or single core PVC insulated copper conductor cable of sizes indicated on the drawings. All thimbles, lugs, sockets, nuts, washers & other accessories necessary for the complete installation of ECC shall be provided by the Contractor without any extra cost.

The specifications for single core PVC insulated cables used as ECC shall be same as those given in section "LT Cables" of the technical specifications. PVC insulated cables when used as ECC shall be green or green/yellow.

4.4 **Earth Connecting Point**

Earth connecting points shall comprise tinned copper bar, rectangular in shape, having dimensions of 300 x 50 x 6 mm. At least six terminals for connection shall be arranged on the bar, which can be increased or decreased as required by the Engineer.

The terminals shall have brass or tinned copper bolts, nuts and washers for protection against corrosion. Two holes shall be provided off centre of the copper bar for fixing to the wall by means of 10 mm dia. nut and bolt and shall be insulated by means of rubber gaskets/washers.

5.0 INSTALLATION

5.1 General

Complete earthing systems as shown on the drawing shall be installed by the Contractor. The earthing system shall give earth resistance, including the resistance of soil, earth leads and ECC equal to or less than one ohm.

At all connections of earth continuity conductor to LT Distribution Board or flood light mast or any other metallic body, proper size copper or brass sockets, thimbles or lugs shall be used to which the copper wire shall be connected by copper brazing. The soldering of copper wire at joints or terminations shall not be allowed. All tee-off connections shall be by copper brazing using suitable socket and clamps. After brazing, the jointed surface shall be protected by oxide inhibiting compound of low electrical resistance. For connections to metallic body, the surface shall be thoroughly cleaned before bolting the lug or socket.

The earth continuity conductor shall in general run in cable trench or in conduits/pipes as shown on the drawings. For under floor runs, these shall be installed in pipe/conduit of appropriate sizes. Where laid along underground cables, these shall be laid directly underground in unpaved areas and in pipes under paved areas.

5.2 Earth Electrode

5.2.1 Plate Type

The electrode plate shall be installed at a minimum depth of 5 metres from finished ground level or 1 metre below permanent water level whichever is less. The minimum horizontal distance between earth electrodes shall be 3 metres. Proper mixture of lime and charcoal shall be made and buried alongwith the copper plate in the ground to increase the soil conductivity. The electrode shall be installed as per details shown on the drawings. The inspection chambers shall be constructed at locations approved by the Engineer.

5.2.2 Copper Clad Steel Rod Type

In case the soil conditions at site permit and approved by the Engineer this type of earth electrode may be installed by hammering the electrode in soil, until the top of the rod is about 300 mm below the proposed finished ground level. If hammering down of rod is not possible due to site conditions, a pit shall be first excavated in bare ground upto the required depth and electrode shall be installed upright in the pit. The excavated pit shall be backfilled in layers of 500 mm, each layer tamped and compacted.

5.3 Earth Continuity Conductor

The earth continuity conductor of sizes shown on the drawing shall be installed all along the cable runs and connected to the earthing bar/terminals provided in equipment. The body of all switchboards shall also be connected to earth by specified size of ECC. All other metal work shall also be connected to earth by specified size of ECC.

At any joint or terminations, the ECC shall be connected using proper accessories. No connection shall be made by twisting of earth conductors.

5.4 Earth Connecting Point

The earth connecting point shall be installed at locations shown on the drawings. It shall be fixed on wall surface by means of brass screws with nuts, washers and other insulating material as instructed by the Engineer.

6.0 MEASUREMENT AND PAYMENT

6.1 General

The Contractor's bid amount against each Bill of Quantities item as given below shall include supplying, installation, testing, and commissioning of all work specified herein, as shown on the Tender drawing related to the item.

6.2 Earth Electrode

6.2.1 **Measurement:** Measurement shall be made for the total no. of each type of earth electrode acceptably supplied and installed by the Contractor as a complete unit.

6.2.2 **Payment:** Payment shall be made for the number of units measured, as provided above, at the Contract unit price each, and shall constitute full compensation for supplying, installing, testing, commissioning and completion of earth electrodes including copper plate or copper clad steel rod, earthing leads, excavation, backfilling, lime and charcoal, inspection chamber with cast iron cover, GI pipes for earthing leads/watering, nuts, bolts, washers, lugs, brazing and all related civil works.

6.3 Earth Continuity Conductor

6.3.1 **Measurement:** Measurement shall be made for the total running feet of each size and type of earth continuity conductor (ECC) acceptably supplied and installed by the Contractor.

6.3.2 **Payment:** Payment shall be made for the total running feet of each size and type of ECC measured, as provided above, at the Contract unit price and shall constitute full compensation for supplying, installing, connecting, testing and completing of ECC including all accessories such as sockets, thimbles, lugs, bolts, nuts, washers, brazing, etc.

6.4 Earth Connecting Point

6.4.1 **Measurement:** Measurement shall be made for the total no. of earth connecting points acceptably supplied and installed by the Contractor as a complete unit.

6.4.2 **Payment:** Payment shall be made for the total number of units measured, as provided above, at the Contract unit price each and shall constitute full compensation for supplying, installing and completion of earth connecting point and all other associated accessories such as nuts, bolts, washers, lugs, etc.

SECTION - 8290

MISCELLANEOUS ITEMS

1.0 SCOPE OF WORK

The work under this section consists of supplying, installing, testing and commissioning of all material and accessories for Miscellaneous Items as specified herein and/or shown on the drawings and given in the Bill of Quantities.

The Contractor shall discuss the electrical layout with the Engineer and coordinate at site with other services for exact locations and positions of the Miscellaneous Items.

The Miscellaneous Items with accessories shall also comply with the General Specifications for Electrical Works Section - 8001 and with other relevant provisions of the Tender Document.

2.0 GENERAL

The Miscellaneous Items as described in this section shall comply with other sections of these specifications as applicable. The Contractor shall ensure that all the miscellaneous items be supplied/fabricated from the reputable manufacturers, who have already supplied/fabricated similar items.

3.0 APPLICABLE STANDARDS/CODES

The latest editions of the following standards/codes shall be applicable to the material specified within the scope of this section:

BS 3871	-	Miniature & Moulded Case Circuit Breakers.
IEC 947-2	-	Low Voltage Switch Gear and Control Gear.
BS 4934	-	Safety requirements for electric fans and regulators.
BS 5060	-	Performance of circulating fans and their regulators.
BS 729	-	Hot dip galvanization
BS 5649	-	Lighting Columns

4.0 MATERIAL

4.1 MCCB / MCB Enclosed in Sheet Steel Box

The single / double pole 250 volts miniature circuit breaker (MCB) and triple pole 500 volts moulded case circuit breakers (MCCB) are used for supplying single phase and three phase power respectively to the equipment shown on the drawings and given in the Bill of Quantities.

The MCCB/MCB shall conform to the same specifications as given in section LT switchboards and LT distribution boards of these specifications. It shall be installed in a 16 SWG sheet steel box of such a size, which can easily accommodate the MCCB/MCB and incoming/

outgoing wires or cables. Sufficient numbers of PVC connectors shall also be provided inside the sheet steel box for terminating the earth continuity conductors and neutral wires. The front plate fixed on the sheet steel box shall be of white plastic fixed with G.I. screws having an opening for operating the ON-OFF lever of MCCB / MCB.

4.2 Load Break Switch Enclosed in Sheet Steel Box

Single pole 250 volts and triple pole 500 volts load break switch are used for supplying single phase and three phase power respectively to the equipment shown on the drawings and given in the Bill of Quantities.

The load break switch shall conform to the same Specifications as given in section LT switchboard and LT distribution boards of these Specifications. It shall be housed in a, manufacturer's standard and in such a size of box which an easily accommodate the load break switch and incoming / outgoing wires alongwith the earth continuity conductor and neutral wires terminals.

4.3 Ceiling Fan

Ceiling fan shall be capacitor type, suitable for 250V AC. The air displacement shall be 12,000 cfm for 56" (1422 mm) sweep and 10,000 cfm for 48" (1219) sweep at maximum speed. The fan motor shall be capacitor type and bearing shall be groove type to give noiseless operation. The fan regulator / dimmer shall be made of low voltage electronic components, and shall be suitable for the speed control of fans. The body of the regulators shall be matching with the switching accessories, suitable for flush mounting on a sheet steel outlet box. Where the regulators are to be mounted with switches they shall match with the dimensions of switches and shall be fixed on plastic outlet by means of flat headcounter sunk galvanized screws, with the head of the screws finish flush with the surface of the plate. The complete fan with blades and canopy shall be finished in white colour, or as approved by the Engineer.

The fan hook shall be made of 16 mm diameter mild steel rod. It should be in the form of a loop about 75 mm long and about 50 mm wide. The rod should be bent to have atleast 200 mm extension on both sides for tying to reinforcement steel of slab.

4.4 Wall Bracket Fan

Wall bracket fan shall be capacitor type, suitable for 250V AC. The fan shall be of size as mentioned in the BOQ. The fan motor shall be capacitor type and bearing shall be groove type to give noiseless operation. The fan regulator shall be made of low voltage electronic components, and shall be suitable for the speed control of fans. The regulator shall be located in the fixed portion of the fan. The complete fan with blades and cover shall be finished in white colour or as approved by the Engineer. The fan shall be provided with a rotating mechanism for swinging the fan on its vertical axis.

4.5 Exhaust Fans

Exhaust fans shall be three blade or multi blade type of metal / PVC construction as approved by the Engineer.

Fans shall be direct driven and supplied complete with electric motor, back draft dampers and anti-vermin screen.

The bearings shall be ball roller or sleeves type of permanently lubricated and sealed type.

Wheels shall be heavily and rigidly constructed and accurately balanced both statically and dynamically and be free from objectionable vibration or noises.

4.6 Cable Trays / Trunking

Where specified, the cables shall run on cable trays/trunking supported to the wall and/or ceiling. The tray shall be of appropriate dimensions to ensure minimum clearance of 50mm between the cables. Tray and trunking shall be provided with complete accessories such as straight through joint, tee, cross, internal and external bend, cover etc. complete with proper support and fixing accessories, GI nuts, bolts washer etc.

The cable tray/ trunking length shall be fabricated in sections not exceeding 3.0 metres.

4.6.1 M.S. (Mild Steel) Cable Trunking

The M.S. cable trunking (with cover) shall be made of 16 SWG M.S. sheets. Suitable trunking design shall be provided for bends, crossings, etc., keeping in view allowable bending radius of cables.

Arrangement shall be provided to secure the cables in position on the trunking. After fabrication of each trunking and cover section, the metalwork shall be cleaned down to bare shining metal phosphated and the surface chemically prepared for powder coating. Then these shall be coated with powder of RAL colour as approved by the Engineer and then baked in oven. The thickness of powder coating shall not be less than 120 microns.

4.6.2 G.I. (Galvanized Iron) Trays

The G.I. trays shall comprise of 16 SWG perforated G.I. Sheets bend to shape and having required dimensions and all accessories shall be compatible with the tray to make a smooth medium.

Cables laid on tray or trunking shall be properly fixed or clamped, with smooth finished split pieces with bore diameter to suit the cable. Supports shall be arranged as far as practicable for easy removal of any cable without disturbing other cables.

Copper braid connections shall be provided at every joint, fixing accessories of cable tray to ensure continuity.

4.7 Manholes with CI Cover & Frame

Manholes for electric power cables or telephone cables shall be constructed in accordance with the standard Specifications of Civil works. The work shall also include making of concrete chambers and concrete benching in manholes, complete as shown on the drawings. Top of the cover shall be roughened in an approved pattern. The cover shall tightly fit in the frame and shall be water tight. The manhole shall have appropriate identification code as instructed by Engineer.

CI covers complete with frame shall be of the size and duty specified on the drawings. The specified size means the clear opening. The duty, weight, test and working load for circular or square C.I. covers shall comply with specification section 5233 of Cast Iron covers with frames & ladder rungs. Suitable locking and lifting arrangement shall also be provided. The frame shall be set in place at the time of pouring of concrete so that the cover shall tightly fit in the frame.

5.0 INSTALLATION

5.1 General

The mounting heights, depths and other dimensions of all the Miscellaneous Items are stated on the drawings or in general notes. In case of any discrepancy, the instructions of the Engineer shall be obtained before fixing the item.

5.2 MCCB / MCB Enclosed in Sheet Steel Box

The triple pole moulded case circuit breakers (MCCB) single/double pole miniature circuit breakers (MCB) shall be installed on 1.63 mm (16 SWG) thick sheet steel box with screws or some suitable arrangements as approved by Engineer. White faceplate for sheet steel box shall be fixed by means of flat head galvanized screws sunk in the plastic plate so as to finish flush with the wall surface. The edges of the plate shall be champhered.

5.3 Load Break Switch enclosed in Sheet Steel Box

The load break switch shall be installed as per manufacturer's recommendation and site conditions following good engineering practice.

5.4 Ceiling Fan

Fan hook shall be installed in the RCC ceiling and to the reinforcement before pouring of concrete.

The installation of fan shall include fixing of blades, down rod, clamp, canopy, including testing and commissioning. The down rod shall be of required length having long threads and shall be provided with check nuts to secure it firmly with the clamp and with the body of the fan. A split pin shall be provided both at the fan body end and at the clamp for safety. Any scratches on the body of the fan or fan rod appearing during installation shall be cleaned and painted properly with the same quality paint as provided by the manufacturer.

Wiring between the ceiling rose and the fan terminals shall be carried out with three core 1.0 sq.mm PVC insulated PVC sheathed flexible cables.

5.5 Wall Bracket Fan

The wall bracket fan shall be installed on the wall and shall be firmly fixed by means of flat head galvanized screws.

Wiring between the ceiling rose and the fan terminals shall be three core 1.0 sq.mm PVC insulated PVC sheathed flexible cables.

5.6 Exhaust Fan

The propeller exhaust fan shall be installed in the opening already made in the wall and shall be firmly fixed by means of flat and head galvanized screws.

Wiring between the ceiling rose and the fan terminals shall be three core 1.0 sq.mm PVC insulated PVC sheathed flexible cables.

5.7 Cable Trays / Trunking

The cable trays / trunking shall be installed on supports fixed to the wall and/or ceilings. The supports shall be fixed to civil works by means of Rawl bolts. The additional hangers and other metalwork required for the installation of the trays / trunking shall be painted and finished by method as specified for the cable tray / trunking.

The distance between alternate supports (span) in straight runs shall be finalized as per loading and in no case shall exceed 1.2 metres. In addition to these, supports shall be provided near each bend or change in direction, end of trunking/ tray.

The straight jointing, bends and other accessories shall be fixed with cable tray/ trunking in such a manner that they are in one line with no sharp edges/ protruded surfaces. Rivet head nuts shall be installed on inner side of tray/ trunking.

5.8 Manholes with CI Cover & Frame

The manholes shall be constructed according to the Specifications of the Civil works and standard practice. Proper curing of the concrete shall be done for at least 15 days. Before constructing, the Contractor shall submit shop drawing of manhole showing steel reinforcement, embedded pipes, clearances, etc. for approval of the Engineer. Quality of cement used in the manhole shall be sulphate resistant.

6.0 MEASUREMENT AND PAYMENT

6.1 General

The Contractor's bid amount against each Bill of Quantities item as given below shall include supply, installation, testing, commissioning and completion for all work specified herein, as shown on the Tender Drawings and given in the Bill of Quantities related to the item.

6.2 MCCB / MCB Load Break Switch Enclosed in Sheet Steel Box

6.2.1 **Measurement:** Measurement shall be made for the number of each item acceptably supplied and installed by the Contractor as a complete unit.

6.2.2 **Payment:** Payment shall be made for the number of units measured as provided above at the Contract unit price each and shall constitute full compensation for supplying, installing, connecting, testing and completion of each item including sheet steel outlet box, plate and accessories as required.

6.3 Wall Bracket Fan/Ceiling Fan/Exhaust Fan

6.3.1 **Measurement:** Measurement shall be made for each type of fan & Accessories acceptably supplied and installed by the Contractor as a complete unit.

6.3.2 **Payment:** Payment shall be made for the number of units measured as provided above at the Contract unit price each and shall constitute full compensation for supplying, installing, connecting, testing and commissioning of each type of fans including mounting, accessories such as down rod, clamp, canopy, dimmer, nuts, bolts, etc. and wiring between ceiling rose and fan terminals complete in all respects.

6.4 Cable Trays / M.S. Cable Trunking

6.4.1 **Measurement:** Measurement shall be made of the total running feet of each size of cable tray / powder coated M.S. cable trunking with all accessories acceptably supplied and installed by the contractor.

6.4.2 **Payment:** Payment shall be made for the total running feet as provided above at the contract unit price and shall constitute full compensation for supplying, installing, and completion of each size of cable tray / powder coated M.S. cable trunking for cables complete with all installation material and accessories such as mounting brackets, bend, elbow, nuts and bolts etc.

6.5 Manholes With CI Cover & Frame

6.5.1 **Measurement:** Measurement shall be made for the complete manholes with CI cover & frame acceptably constructed and installed in position as shown on the Drawings or as directed by the Engineer as a complete job.

6.5.2 **Payment:** Payment shall be made for the number of jobs as measured above at the contract unit price and shall constitute full compensation for constructing, installing of manhole in position including CI cover with frame, excavation/ backfilling, disposal of surplus material, reinforcement, concreting, curing, embedded parts and all associated civil works, etc.

Supply, Installation, Testing and Commissioning of Fire Suppression System for Exim Bank at Karachi

TECHNICAL SPECIFICATIONS

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SECTION II- FM 200 SYSTEM

SPECIAL PROVISIONS

1.1 GENERAL

This specification is intended to set out general outline and the minimum requirements and standards of installation for the various units of equipment and works it covers.

This Specification shall be read in conjunction with the Bidding Drawings (as per Schedule of Drawings) and are intended to be mutually explanatory and complementary to one another. All works and specification called for by one, i.e. Specification or Drawings even if not by the other shall be fully executed and complied.

Whenever international standards are specified, the Contractor may use the better local standard subject to Engineer's approval. In the event that different standards are specified, the most applicable standard shall apply.

The contractor shall carry out detailed design and localize to suit requirements of the local Competent Authority. The contractor shall engage approved professional engineer to endorse the design and make submission to Competent Authorities for approval.

All necessary works to comply with requirements of the local Competent Authority are deemed to be included in the tender sum.

The Contractor shall be deemed to have inspected and examined the site and its surroundings and acquainted himself as to the nature of the existing works, buildings and the site, the extent and nature of works and materials or equipment required for the necessary completion of the Contract works, the means of communication and access to the site and in general obtain for himself all Bid. No claim whatsoever made by the Contractor on the grounds of want of knowledge of any of the aforesaid will be entertained.

1.2 Scope of Work

The works to be performed consists of design, supply, delivery, installation, painting, testing, commissioning, Maintenance and Warranty of the following entire fire protection system and equipment comprising:

a) Gas Suppression System (FM 200)

b) The entire Electrical power supply and control system to the whole fire protection system equipment including Distribution Boards, Sub-distribution Boards, isolators, power points, control panels, wiring, conduits, turnings and other necessary accessories. The Contractor's approved electrical professional engineer shall endorse on certificate of supervision, electrical single-lines (shop drawings and as-built drawings), testing and commissioning of the electrical related works.

c) The construction of flat 4" to 6" thick Grade 30 concrete plinths to all floor-mounted equipment (electrical supply distribution boards and control panels, etc) and concrete stumps for all piping, etc running on roof/floor.

d) Hoisting of equipment, coring/forming of openings, pipe sleeve, sealing of all openings including existing openings already provided, and fire stops, etc necessary for the successful completion of the Contract.

e) All other works necessary for the successful completion of the Contract for the full functioning of the Fire Protection systems.

f) Monthly maintenance and servicing including labor and parts replacement for the twelve (12) months defects liability period.

g) Making good all works disturbed to match existing and cleaning up on completion including patching of openings, painting, etc. to the satisfaction of the Engineer.

1.3 Minimum Qualification Requirement Of Main Contractor/Firefighting Sub Contractor

i. Registered with Pakistan Engineering Council in relevant category.

ii. Minimum experience as Contractor in the execution of at least five (05) projects of similar nature and complexity within last ten years; this experience should include supply, installation, testing and commissioning and operation & maintenance of firefighting system.

iii. Minimum experience as Contractor in execution of at least three (03) multi storey's/ hospitals/ apartments building Firefighting system of same type and capacity.

1.4 Statutory Regulations and Bye-Laws

The works and all plants, equipment materials forming part of this contract shall comply in all respect with any relevant Local Statution Regulation, Bye-Laws and other Regulation currently in force.

The contractor shall obtain and complete all notices required by the above Authorities as necessary and shall obtain all consents necessary for the various works to be executed and shall' pay all fees in connections herewith.

All codes, acts, standards and regulations shall be the latest published edition unless otherwise stated. In addition, current Rules and Requirements of the following bodies as applicable shall be complied with:

a) Building Code of Pakistan-Fire Safety Provisions 2016
b) Standard for Clean Agent Fire Extinguishing Systems (NFPA 2001 :2000)
c) Electrical Installation as per local authority requirements.
d) All other Authorities having jurisdiction over the installation of equipment and carrying out this contract works in the locality.

The work shall also be carried out strictly in accordance with the current editions of all applicable British Standards or other National Standard acceptable to the Engineer. All electrical installations and materials supplied shall comply with IEEE and Local Codes and to be approved by the Local Electricity Department or Authority.

Where discrepancy arises, the most stringent Standard shall take precedence on all matters relating to the works.

The Contractor shall bear the cost for all necessary arrangement to obtain approval for fittings, valves expansion joints, equipment and materials from the relevant authority, if required.

1.5 Noise Level, Sound and Vibration Control

All installed plants are to be reasonably quiet in operation. Preference will be given to equipment operating at low noise level.

Vibration isolators shall be installed where necessary so as to eliminate the transmission of vibration.

During initial testing operation of the installation, the Contractor is to correct for any undue noise and to make any adjustment and modifications necessary for this purpose.

Unless otherwise specified, the noise/sound level in the various areas due to operation of equipment shall not exceed the recommended standard by local Authority or ASHRAE whichever is the lowest.

Special care is to be exercised in the manufacture of equipment and installation of pipe work and outlets to keep air borne noise down to a practical minimum.

1.6 Permits and Fees

The Contractor shall procure all permits and pay all fees and charges incurred in connection with this Contract.

1.7 Shop Drawings

The Contractor shall prepare and submit to the Engineer for approval all plant and equipment layout drawings showing full details within fourteen (14) days upon award of the Contract. Detailed calculations shall be submitted where applicable. All equipment and materials proposed shall be submitted for approval.

Shop drawings shall cover complete details for the following but not limited to.

a) Operating load of all items of plant, equipment and accessories.
b) Dimensions of all plant,-equipment and accessories.
c) Equipment room layout, showing all clearances for operating and servicing, etc.

d) Control equipment and system, wiring and control diagrams and power requirements.
e) Vibration Isolation Equipment.
f) Hangers and supports
g) Foundations
h) Chases, drains with channels, openings in walls, floors, roof slab and beams.
i) Piping and electrical cable runs.
j) All other items as is reasonably required by the Engineer.

Three (03) copies of each drawing shall be submitted for approval. Drawings with inadequate details and not conforming to the requirements as stated above will not be considered.

Upon approval of the drawings, the Contractor shall deliver three (3) copies of each approved drawing to the Engineer for the purpose of Contract administration.

The drawings shall be submitted in ample time for review and approval by the Engineer and no work shall be carried out until such drawings are approved, The Contractor shall allow a period of not less than three (3) weeks for the Engineer to study the drawings for approval.

It is the obligation of the Contractor to ensure that his drawings conform to the requirements of the Specification and that they are approved by the Engineer early.

Review of shop and working drawings is not to be considered as a guarantee of measurements or building conditions. Where drawings are reviewed and approved by the Engineer, such approval does not in any way relieve the Contractor neither from his responsibility nor from the necessity of furnishing material or performing work required by the Drawings and Specification which shall in the event of a dispute, take precedence over shop drawings.

1.8 As-Installed Drawings and Manuals

Prior to the completion of the works, and not later than the date of Practical Completion, the Contractor shall submit to the satisfaction of. the Engineer six (6) hard cover bound sets of Comprehensive Operation and Maintenance Manuals and Data Sheets published by the equipment manufacturers, six (6) hard cover bound sets of "As-Installed" drawings and two (2) sets of "As-Installed" drawings (in AutoCAD -latest release) in CD-Rom subject to Engineer's approval.

These instruction manuals shall be typed in good quality paper and neatly bound into a manual having rigid covers. A draft shall be approved before final submission.

The operation manual and As-Built drawings shall be bound with hard covers.

All "As-Installed" electrical single line drawings and control diagram shall be endorsed and signed by the Contractor's Approved Mechanical Engineer.

The manuals shall contain and be set out as follows:

a) Description of System servicing, etc.

This section shall simply but clearly describe the operation of the system and the equipment.

b) Summary of Equipment List
This section shall include all major equipment complete with makes, models, serial number with technical catalogues (at least one set to be original and others in legible print).

c) Spare Parts, Special Tools and Equipment List
Include manufacturer's list of all recommended spare parts for replacement and special tools and equipment for maintenance used.

d) Operational Procedure
This section shall fully described start and stop sequence of operation; programmed for alternate planning of plant to even out wear and testing procedures for all section of the plant including emergency procedures and breakdown trouble shooting.

e) Manufacturer's Handbook
Include Manufacturer's technical literature on all components of the installation, particularly as applying to operation and maintenance. The technical literature shall include all major equipment, control instruments and equipment used and other related materials

f) Maintenance and Trouble Shooting Instruction
   i) Equipment operation instruction
   ii) Hang-up instructions
   iii) Equipment suppliers

This section shall comprise a full list of names, addresses and telephone numbers (including after office hours numbers) of all Sub-Contractors and Suppliers of equipment (local and overseas) incorporated in the installation.

   iv) Maintenance & Breakdown Service
This section shall comprise a list of the names and telephone numbers of Company's Maintenance 'and Servicing Section personnel for normal maintenance and breakdown request.

In the event of the Contractor failing to fulfill the aforesaid requirements, the Engineer shall reserve the right to obtain-all of the required operating and maintenance manuals by other means shall deduct all cost incurred thereof from monies due to the Contractor. In addition the Engineer shall forfeit the rights of the Contractor in relation to further payment and the issue of the Certificate Taking Over will also be withheld until he has so complied accordingly.

1.9 Spare Parts

All necessary spare parts required for two (02) years beyond defects liability period shall be included in the main bid.

1.10 Shop Inspection, Damages and Material Order

1.10.1 Shop Inspection and Damages

1.10.1.1 Inspection at Factory Premises

All major equipment to be supplied under this Contract which has been manufactured or shop-assembled in or outside Pakistan shall be subject to inspection (if the Employer so desires) by Employer or its authorized representative at its point of original manufacture or final shop assembly before its dispatch to SITE. The Contractor shall make necessary arrangements and provide all the facilities required for such inspection. The cost of travel, boarding and lodging of Employer, his authorized representative or the Engineer shall be the responsibility of the Contractor.

The following equipment shall be inspected and tested at the manufacturer's works:

a) Fire Suppression System

For local items inspection, Contractor will pay Rs. 2000/Day (Daily Allowance) in addition to cost of traveling, boarding or lodging for one Employers representative and one Engineer's representative for the subject inspection.

1.10.1.2 Special Requirements for Fire Suppression System

The pre shipment inspection of fire suppression system is required. The detail requirements are as below:

a) The Contractor shall import the equipment, preferably on proforma invoice issued by the local distributor. Trans-shipment will not be allowed. The Contractor may import the equipment without involvement of local distributor provided he fulfills following conditions:

A certificate from the manufacturer, on original stationery be furnished along with equipment submittal for approval, certifying that the manufacturer will be responsible to provide after-sale service through his authorized local representative. The certificate should carry the name and location of the project as well as the name and address of the authorized local distributor.

b) The Contractor shall arrange at his own cost factory visit(s) for pre-shipment inspection separately for Fire Suppression system. One

Engineer's representative and one Employer's representative accompany with Contractor's representative will visit manufacturer's premises. Business Class Air-fare to and from inspector's home town, boarding and lodging, and transport for two persons shall be Contractor's responsibility. The Contractor shall arrange visa for the inspectors and all formalities and costs in this respect shall also be the Contractor's responsibilities.

In addition, the Contractor shall provide (for two persons) daily allowance in US$ for out of pocket expenses at 200 US $ / day/person. The number of days shall be actual days spent in travel calculated from the dates of travel from and to the home town of the concerned inspector, but not less than five (5) days. The US$ in cash shall be provided before start of travel from hometown.

c) Technical submittal furnished in accordance with Contract provisions shall include:

Manufacturer's computer selection sheet, in original on Manufacturer's stationery stating, besides other information project name and location, make, country of origin and source of supply.

Manufacturer's Warrantee Statement on Manufacturer's stationery in original shall be submitted.

Manufacturer's confirmation on his stationery in original, acknowledging the condition that no trans-shipment would be allowed, Warrantee Statement will be part of shipping documents, and shipment will be subject to pre-shipment inspection and witnessing of performance test by two (2) representatives of the Owner at Manufacturer's factory. The Acceptance Certificate by Owner's Representatives will be part of shipping documents.

After approval of Technical Submittal for all equipment, following documentation shall be furnished.

- Attested copy of Letter of Credit (price portion may be blanked off).
- Manufacturer's confirmation on his original stationery, that the order has been entered for production. Project name, location and expected shipment date be stated.

d) In case of absence of pre-shipment inspection for any reason, Engineer may advise 3rd party inspection/testing or will deduct suitable amount of pre-shipment inspection or direct the Contractor to change the make/country of origin of the equipment if so required.

e) The Contractor is required to fill the rates of pre shipment inspection of Fire Suppression system.

1.10.1.3 Inspection at Karachi Port

All major imported equipment (Fire Suppression System) will be inspected at Karachi port. The Contractor shall make necessary arrangements and provide all the facilities required for such inspection. The cost of travel, boarding and lodging of Employer, his authorized representative or the Engineer shall be the responsibility of the Contractor. In case of unavailability of such inspection, Engineer reserves the right to deduct suitable amount from Contractor's payment and subsequent inspection at dry port will be additional responsibility of the Contractor up to Engineer's satisfaction.

1.10.2 Material Orders

Triplicate copies of material or equipment orders required in this Contract shall be furnished to the Engineer. All orders shall state the specification designation under which the material is to be furnished and shall bear reference to the drawing number, if any, pertinent thereto. Orders shall also state that material is subject to inspection and testing and shall show the required date of delivery of the material to destination.

1.10.2.1 Acceptance of Materials

The acceptance of any material or equipment prior to shipment shall in no way relieve the Contractor of any of his responsibilities for meeting all of the requirements of the specifications and shall not prevent subsequent rejection if such material or equipment is later found to be defective.

1.10.2.2 Damages, During Transportation, Storage and Installation

The Contractor shall be responsible for any damage of the Equipment/ material during transportation to site, storage and until satisfactory handling over the works. The Contractor shall replace any damaged equipment/ materials at his own cost.

1.11 Addition/Omission Works

The Engineer reserves the right to add/omit any part, item, or scope of work to the Contract. Any variation will be according to the Schedule of Rates.

1.12 Building Works and Making Good of Damages

All sealing up of holes, erection of brick walls, surface finishing etc. necessary for the carrying out the installation, including making good to match surrounding finishes, shall be deemed to be included in the Lump Sum Tender Price.

All damages caused during the installation work shall be, making good by the Contractor to match the existing and surrounding finishes. All costs in connection with such work shall deem to be included in the Lump Sum Tender Price.

1.13 Training Course

The Contractor shall conduct minimum one (01) full complete comprehensive operating and maintenance training program on the operation and maintenance of the systems installed. The training programs shall include but not limited to overall systems, the familiarization of the equipment, trouble-shooting techniques for fault rectification and servicing of the systems/equipment installed. The training shall consist of all notes and materials, etc. including hands-on training as a major portion of the whole training program.

1.14 Certification Endorsement by Contractor

The Contractor shall submit software based clean agent calculations and relevant documents for the clean agent fire suppression systems to the Engineer for approval. All calculations and submission-materials shall be endorsed by the Contractor's approve Mechanical Professional Engineer. After submissions, technical data sheets, friction loss calculations and control panel shall be endorsement by the Contractor's approved Mechanical Professional Engineer.

The Contractor shall submit structural calculations and relevant documents for all water tanks installed under this Contract to the Engineer for approval. All calculations and submission materials shall be endorsed by the Contractor's approved Structural Professional Engineer.

All shop drawing and as-installed drawings on electrical single-line diagrams shall be endorsed by the Contractor's approved- Electrical Professional Engineer.

On completion of all performance testing as required in the Specification, the Contractor is required to submit all test reports to the Engineer for approval prior to acceptance of installation. The Contractor shall also be required to certify in writing to the Engineer that Installation is in full compliance with the requirements of the Specification and the Codes to which are designed by an approved Professional Engineer/Licensed Electrical Worker.

All drawings, calculations, test certificates', Certificate of Supervision, data and analysis submitted in this Contract shall be endorsed by the Contractor's approved Professional Engineer tests and inspections required by the relevant authorities for his installation works for obtaining occupation permit of the building shall be carried out by the Contractor.

This Contract shall be deemed to include for all testing requirement.

The Certification of Taking Over will not be issued unless the clauses as stated above a complied with to the satisfaction of the Engineer.

1.15 Contractor Assistance during DLP Period

The Contractor shall operate, service and maintain complete firefighting System for a period of three hundred and sixty five (365) days after date of issuance of Certificate of Completion. The system shall be operated as specified and shall

include supply of operating staff, consumables, all necessary adjustments, greasing, oiling and cleaning and the furnishing of necessary tools, instruments supplies and parts to keep the system in perfect operation, except such parts made necessary by misuse or neglect not caused by the Contractor. All costs incidental to the above specified Servicing and Maintenance shall be deemed to be included in other items of the Schedule of prices and no separate payment shall be made to the Contractor for fulfillment of his obligations under this clause with respect to Servicing and Maintenance. The Contractor may withdraw maintenance tools and instruments at the completion of Defects Liability Period.

The cost of operating the plant during Defects Liability Period shall be paid by the Employer to the Contractor under BOQ item named "Firefighting System Operation during Defects Liability Period As specified"

TECHNICAL PROVISIONS

SECTION I - GENERAL REQUIREMENTS

1.1 MATERIAL

All materials shall be of the highest grade, free from defects and imperfections, of recent manufacture and unused, and of the classification and grades designated, conforming to the requirements of the latest issue of the appropriate specifications cited herein. All materials, supplies, and articles forming part of major equipment and not fabricated by the manufacturer of the equipment shall be the products of the recognized reputable manufacturers.

1.2 WORKMANSHIP

Workmanship and general finish shall be of the highest grade, in accordance with the requirements specified herein, and the best modern standard practice.

1.3 EQUIPMENT

a) For ratings and characteristics of manufactured equipment, Equipment Schedule as appended to Technical Provisions shall be followed.

b) All equipment shall be manufactured by companies, which have had at least ten years previous experience in the design and manufacture of equipment of comparable type, capacity and operating conditions. Unless otherwise approved by the Engineer.

c) Where the requirement of this Clause make any equipment proprietary or non-obtainable, the Engineer reserves the right to waive any portion or portions of it as required to obtain the intent of the technical specifications (s).

d) When a manufacturer's product is specified by name, or equivalent, it shall be in the sole judgment of the Engineer as to acceptability of any product, which is offered as equal to that specified.

e) Where two or more units of the same class of equipment are furnished, product of the same manufacturers shall be used: component parts of entire system need not be product of same manufacturer.

1.4 CHASSES AND OPENINGS

The Contractor shall provide shop drawings, templates or details for chases and openings to be left in concrete walls, concrete partitions, and floor or roof slabs to accommodate work under Firefighting scope of works.

1.5 PROTECTION

The Contractor shall keep pipe, duct and other openings closed to prevent entry of foreign matter. All fixtures, equipment and apparatus shall be covered and protected against dirt, water, chemical or mechanical damage, before and during the construction period. All fixtures, apparatus, or equipment damaged including damaged shop coats of paint shall be restored to original conditions prior to Commissioning and also again prior to Final Acceptance. All bright finished shafts bearing housings and similar items shall be protected until in service: no rust will be permitted.

1.6 CUTTING, PATCHING AND REPAIRING

Required for proper installation and completion of Firefighting works, including masonry work, concrete work, carpentry work, painting and re-painting shall be performed by skilled craftsmen in respective trades, at expense of the Contractor. Construction shall be cut only after obtaining written permission from the Engineer.

1.7 LINES, LEVELS AND SPACES

The Contractor shall check dimensions at the building site and establish lines and levels for work specified in Specifications. The Contractor shall check with work of other trades to ensure proper clearance of piping, ductwork, conduit and other items. Any deviations observed between drawings and actual construction shall be brought to the notice of the Engineer. The erection supervisor shall regularly inspect, during progress of civil works, the areas allocated for installation of Firefighting equipment and any conflict observed shall immediately be reported to the Engineer.

1.8 MACHINERY GUARDS

All moving parts of machinery are to be protected by strong guards to adequately protect all personnel working on or in the vicinity of equipment.

Wherever possible, moving parts should be protected by guards supplied by the equipment manufacturer. All guards must be strongly attached to equipment and should be designed for easy removal for access, servicing, adjustment and maintenance.

1.9 TOOLS

The Contractor shall supply in a toolbox, full sets of tools suitable for maintenance of all components of the plant furnished by him including the electrical equipment, for use by the Employer after completion of Maintenance Period. List of Tools shall be subject to approval by the Engineer.

1.10 OIL AND GREASES

The oils and greases shall be supplied in sealed containers. These shall be of suitable quality sufficient for the initial charge plus hundred percent (100%) extra. The quantity, grade of oil and greases and their manufacturer shall be approved by the Engineer the extra oils and greases shall be reserved for use by the Employer after completion of Defects Liability Period.

1.11 SPARE PARTS

The spare parts for Firefighting System shall be duplicates of the original parts with same country of origin furnished and interchangeable therewith.

1.12 ACOUSTIC TREATMENT

The noise criteria for different areas stated in Special Provisions is to be obtained.

Sound measurements will be made at approximately five (5) feet above floor level in the occupied area served and not more than five (5) feet from the grills, diffusers or other air devices being tested. Instruments for sound measurement shall be provided by the Contractor.

Provision is to be made to minimize noise and vibration. However, different manufacturers equipment have varying sound and vibration characteristics and it is, therefore, the responsibility of the Contractor to ensure that the requirements in these specifications are fully met by the equipment he is offering. If the Contractor has any requirements for additional vibration or sound isolation, these must be incorporated into the price quoted.

All equipment installed should not be audible inside the occupied areas and the Contractor must ensure that all equipment he is offering is quiet and have satisfactory sound levels. Where silencers are required, these must be incorporated into the price quoted.

1.13 ACCESS PANELS

The Contractor shall mark locations of, and give sizes of, access panels required in false ceiling and wall paneling for adjustment and maintenance of Firefighting Equipment, such as Dampers, Fire Dampers, valves, ceiling-hung equipment, etc. This information shall be provided to the Engineer before commencement of false ceiling work by the concerned persons.

1.14 SEALING OF OPENINGS

The contractor shall seal all openings in external walls and roof where Firefighting pipes penetrate in external membrane. The sealing shall be air tight to prevent penetration of outside air and water into building. The method and materials for sealing shall be subject to Engineer's approval.

SECTION II- FM 200 SYSTEM

1.0 General

Provision of fire detection and firefighting system complete in all respects as per applicable NFPA standards including but not limited to Automatic gas Flooding System (Clean Agent). The total firefighting water demand shall be considered while designing of water storage tank.

1.1 Automatic Gas Flooding System

1.1.1 General

The design and installation shall fully comply with NFPA 2001. The Contractor shall submit complete design and layout for automatic gas flooding system as per layout of the rooms.

The clean agent is discharged after a time delay upon detection of fire to warn any occupant to evacuate the room. Thus, this system can be installed in manned areas or semi-manned areas, that is, areas that are occasionally or periodically occupied.

A complete clean agent suppression system provided shall consist of charged FM-200 gas storage cylinder(s), manifold(s), flexible hose(s), pressure gauge(s), pneumatic actuator(s), solenoid actuator, piping, nozzle(s) and all other equipment required for a complete operational system including gas control panel, self-contained breathing apparatus, detector(s), flashing light(s), key switch(s), alarm bell(s) etc.

Unless otherwise specified, automatic gas flooding systems shall be of the total flooding type with a high pressure open-ended piping installation on the distribution side. The automatic gas release mechanism shall be operated by means of fire detection units at the protected compartment or manually by a pull handle or push button.

HFC-227ae as specified shall be used as extinguishing agent.

1.1.2 Design Requirements

The FM-200 suppression system installation shall be made in strict accordance with the, drawings, specifications and applicable NFPA and FM/UL standards.

The design and installation of the FM-200 system shall be based on manual/automatic release total flooding principle of approved/listed systems.

The system shall provide an FM-200 agent minimum design concentration of 6.25% by volume for protected spaces, at the minimum anticipated temperature within the protected area.

System design shall not exceed 9% for normally occupied spaces, adjusted for maximum space temperature anticipated, with provisions for room evacuation prior to agent release.

The Contractor's approved Professional Engineer shall ensure that the design of the system be such that a uniform design concentration is achieved throughout the protected area as stated by calculation using an approved listed software program for engineered system.

The quantity of the clean gas shall be carefully pre-determined to ensure fastest extinction of any fire in the protected areas as well as to ensure an adequate margin of safety to cater for leakage and environmental conditions. The Contractor shall submit the complete catalogue, technical information, samples and complete with full technical clean agent calculations for Engineers approval before installation. All layout drawings, design calculations shall be endorsed by the Contractor's approved Mechanical Professional Engineer. '

The following design data shall be submitted at tender stage as the minimum requirement:

Number and size of cylinder(s)

Total agent and designed concentration (kg/%)

Pipe schedule

Automatic control system

The design, supply and installation shall be made in strict accordance with the approved working drawings, specifications and applicable standards. The room shall be divided into 3 zones, namely, above false ceiling space, room space and under floor space.

The capacity and quantity of clean agent, cylinders, nozzles piping etc. is tentative. Prior to installation, Contractor shall submit complete set of calculations on manufacturer's software for Automatic flooding system and all other equipment/material with accessories for all rooms as per site condition for approval of Engineer.

1.1.3 Extinguishing Agent

The extinguishing agent shall be HFC227ea with physical properties conforming to NFPA2001 or ISO 14520 standard.

1.1.4 HFC 227ea

HFC227ea Fire Suppression agent is a chemical agent and was the first environmentally acceptable replacement for Halon 1301. HFC227ea has zero ozone depleting potential, a low global warming potential and a short atmospheric lifetime. It is particularly useful where an environmentally acceptable agent is essential, where cleanup of other media presents a problem, where weight versus suppression potential is a factor, where an electrically non-conductive medium is needed, and people compatibility an overriding factor.

HFC227ea is a colorless, liquefied compressed gas. It is stored as a liquid and dispensed into the hazard as a colorless, eclectically non-conductive vapor that is clear and does not obscure vision. It leaves no residue and has acceptable toxicity for use in occupied spaces at design concentration.

HFC227ea does not displace oxygen and therefore is safer for use in occupied spaces without fear of oxygen deprivation. HFC227 total flooding systems shall be, unless otherwise specified, designed to achieve a minimum concentration of 7 % at 5°C and a maximum of 9 % by volume at 38°C.

Discharge of gas shall be substantially completed within ten seconds and following discharge the concentration of extinguishing agent shall develop throughout the protected compartment to achieve final extinguishment of fire within 60 seconds.

The system pressure shall not be higher than 25 bar.

1.2 Hazard to Environment

The agent to be used shall not be made obsolete in the near future and with atmospheric life time not more than 42 years'. The agent shall be non-global warming and non-ozone depleting.

1.3 Hazard to Personnel

The areas to be protected are occupied by personnel(s) and there is a possibility that the personnel might be trapped inside the protected areas. The agent to be proposed shall not pose any hazard to personnel(s) or force them to breathe faster artificially by introducing carbon dioxide gas in the extinguishing agent. A medical report shall be submitted to certify that the agent is safe for use in human occupied areas at tender stage. The agent shall also be a homogeneous gas and not cause

1.4 Gas Storage Cylinders

The cylinders shall be supported securely in frames bolted to the wall. The mounting of the cylinders shall be such that all external parts can be readily inspected.

Each cylinder shall be fitted with an automatic pressure release device which shall function when the pressure of the liquid within the cylinder exceeds a predetermined value, which shall be less than the test pressure defined in BS 5045 or equivalent.

Carbon dioxide cylinders shall be of seamless steel construction to BS 5045: Parts 1 or equivalent.

Each cylinder shall complete with gas valve/actuator, pressure gauge, flexible hose, check valve and all other necessary accessories.

A reliable means of indication, other than weighing the cylinder, shall be provided for measuring the amount of liquid in the cylinder at any time. This shall be done by a method which does not require the cylinder to be detached from the remainder of plant.

The liquid shall be discharged from the cylinder through a siphon tube. The pressure of the liquid stored in the cylinder shall be such that freezing cannot take place at the lowest possible ambient temperature.

Means shall be provided to prevent gas discharging into empty containers and to prevent loss if the gas is released when any of the cylinders is disconnected.

Safety latches shall be provided in each bank of gas cylinders to prevent accidental discharge of gas during maintenance. Safety latches shall incorporate a set of contacts to initiate a warning at the control panel that the system has been locked off.

Gas cylinders shall be painted signal red as specified in BS 381C. The type of extinguishing agent, tare weight, gross weight, liquid level at 25°C for CO2 (21°C for HFC227) shall be clearly painted on each cylinder with white paint.

In case of minor leak of a cylinder, which mostly occurs at the top of the cylinder in areas such as valve threads, pressure safety device, valve stem and valve outlet, the following information may apply to the remediation of these minor leak:

- For flammable or inert gases, move the cylinder to an isolated and well ventilated area away from combustible material.

- For corrosive and toxic gas, move the cylinder to an isolated well-ventilated area and use suitable means to direct the gas into an appropriate chemical neutralizer.

- If it is necessary to move a leaking cylinder trough populated area, place a plastic bag, rubber shroud or similar device over the top and tape it (duct tape preferred) to the cylinder to confine the leaking gas.

In case of major leak, such as a large gas release or if an accident takes place, the best is to alert emergencies authority, evacuate the area, securing entrances and providing assistance to the others on the way out.

Alarms system exists for pressure loss of extinguisher gas cylinder. There operate when a leakage in any gas cylinder is detected. An alarm sounds when a leak is detected and may close the valve of the gas cylinder.

1.5 Evacuation of Extinguishing Gas

Rooms that have gas-extinguishing systems will be connected to a purge ventilation system, with an extract fan in the plant room. Following a release of extinguishing agent, the extract fan will be operated manually to purge the room of gas. Ventilation systems serving these areas will also be fitted with motorized dampers, which automatically close and shut down the associated system on an alarm within the area, prior to gas being released. A local control panel will be provided, mounted outside of the protected room, adjacent to the gas system control panel.

1.6 Cylinder Bracket

Each cylinder assembly shall be furnished with wooden spacer(s) and a bracket made of hot-dipped galvanized steel. The bracket shall hold the cylinders in a saddle with a front wooden piece that secures the cylinders well. The brackets shall be modular in design to allow added

bracketing or stacking of cylinders depending on installation requirements.

1.7 Selector Valves

For system utilizing selector valves, it shall be opened pneumatically before gas discharged from any cylinder, manual activation of each selector shall be possible.

1.8 Valve Actuator

Solenoid valve shall be of brass construction and stackable design with swivel connections to allow removal of actuators for maintenance or testing. Operation of actuators shall not require replacement of components. No electro explosive device shall be used to actuate the valve assembly. Electric actuator shall be the magnetic latch, continuous duty type for 24VDC operation.

All actuators shall be able to be manually reset and capable of being functionally tested at the quarterly service intervals without the need to replace consumable parts. Actuation devices to be used shall be listed by an internationally recognized approval bod for use with the FM-200 gas fire suppression system.

1.9 Discharge Hose

When manifold(s) is employed, all cylinder assemblies shall include flexible discharge hoses, which connects cylinder discharge valve to manifold inlet.

All hose shall be approved for use.

1.10 Discharge Nozzles

Engineered discharged nozzles shall be provided within the manufacturer's guidelines to distribute the FM-200 agent throughout the protected spaces. Material of discharge nozzle shall be brass or bronze.

The nozzle body shall have discharge outlets designed to provide a multi-directional and even-distribution discharge pattern. Orifice(s) opening diameter shall be determined by an approved computer software programmer in order to deliver the required amount of agent within the designed discharge time.

Nozzles shall be permanently marked with the manufacturer's part number and also the orifice diameter accordingly. Nozzle spacing shall be in accordance with the UL listing and/or FM approval.

1.11 System Descriptions And Operation

1.11.1 General

The system shall be a total flooding – FM 200 gas fire suppression system designed to provide a uniform concentration gas throughout the protected area.

The amount of FM-200 gas supplied shall be the amount required to provide a uniform concentration as required by the 'manufacturer's recommendation and NFPA 2001. The design concentration shall be by volume at 21°C. The discharge time shall be within 10 seconds in - accordance with NFPA 2001 standards.

The FM-200 gas fire suppression system shall be left in automatic mode at all times if the design concentration is below the NOAEL (Non-Observable Adverse Effect Level) concentration.

System shall be able to perform independently via interlocking with the automatic detection system as well as manual actuation under emergency situation.

As a special requirement, a group of extra gas cylinders and same amount of as will be provided. In case of agent discharge to the primary cylinder bank, back up cylinder group shall take over the duty. Contractor shall provide necessary protection and accessories for spare cylinder group to be in operational at any time and all the costs shall be borne by contractor.

The automatic detection system shall comprise cross-zone detection to activate before activation of the FM-200 gas fire suppression system. A single detector activation shall cause an alarm signal to be generated; a second detector activation shall generate a pre-discharge signal and start the pre-discharge condition.

Upon activation of the FM-200 gas fire suppression system, operation of the computer air- conditioning units, which are installed by others, shall be shut off. The Contractor shall provide and connect all the necessary controls, relay, cable, conduit, etc. to effect this interlocking operation.

Discharge of the FM-200 gas may be prevented by pressing the 'Abort, switch' pushbutton at the control panel. However, alarm status must remain.

If the 'Abort switch' pushbutton is being pressed before the LED timer reaches '0', timer shall re-start countdown immediately upon release of the pushbutton.

The clean agent extinguishing system installed to be data center/rooms as specified shall be completed but not limited with the followings:

a. Detectors
b. Alarm bell with complete accessories
c. Strobe and Horn
d. Evacuate Area Immediately" warning sign and Flashing Strobe Light

e. Gas Discharged" Flashing warning sign and Strobe Light
f. Caution Sign
g. Manual Release Sign
h. Abort Switch
i. Clean Agent Control Panel
j. Clean Agent Gas
k. Container c/w standard accessories
l. A4 Size Zone Chart
m. A4 Size Instruction Sign
n. Discharge Nozzle
o. Electrical & Control Wiring
p. Pipe work
q. Self-contained breathing apparatus

Alarm actuation devices shall be installed one at each door to the room where necessary or required additional equipment shall be provided at all egress and ingress point to room.

FM-200 system will have capability to integrate with Building's main Fire Alarm Control panel (FACP). FM 200 system shall also be integrated with HVAC duct motorized dampers to ensure the closure of dampers before release of gas in the room.

1.12 Inspection Testing & Commissioning

1.12.1 General

All defects and deficiencies in performance, reliability, safety and efficiency shall be rectified and tested to the entire satisfaction of the Engineer before acceptance.

Before hand over of the system to the Employer, all gaseous containers shall be fully charged.

1.12.2 Inspection

The completed installation shall be inspected by authorized agent and trained personnel.

The inspection shall include a full operational test of all components as per the equipment manufacturer's recommendations during warranty period.

All mechanical and electrical components shall be tested according to the manufacturers recommended procedure to verify system integrity.

Inspection shall include a complete checkout of. The detection I control system and certification of cylinder pressure.

The quantity of agent shall reflect the actual design quantity of the FM-200 gas.

1.12.3 Test Mode

The system shall be tested according to the design mode of operation in the presence of an engineer that is certified by the Principal Supplier of the FM-200 gas fire suppression system.

1.13 Steel Pipes & Pipe Fittings

1.13.1 Applicable Codes And Standards

All works and materials under this section shall conform to the latest edition of the following applicable codes and standards. When the requirements of these specifications or the drawings exceed the code requirements, the Contractor shall be bound by the specifications and/or drawings for that requirement.

B.S. 4504:	Flanges and Bolting for Pipes, Valves and Fittings." (Part 1)
B.S. 534:	"Steel Pipes, Fittings and Specials for Water, Gas and Sewage."
B.S. 1387:	"Galvanized/Black steel pipes and fitting."
B.S. 1965:	"Butt Welding Pipe Fittings for Pressure purposes, Part 1 Carbon Steel."
B.S. 3601:	"Steel Pipes and Tubes for pressure purposes, Carbon steel: Ordinary Duties."
B.S. 3063:	"Dimensions of Gaskets for Pipe flanges"
B.S. 4147:	"Hot Applied bitumen, based coatings for ferrous products."
B.S. 4161:	"Coal tar based hot applied coating materials for protecting Iron & Steel products"
B.S. 4515:	"Field welding of carbon steel pipe lines"
B.S. 21	"For threaded pipes and fittings."
ISO 898:	"Mechanical Properties of Fasteners, Bolts, Screws and Studs."
C.P.2010:	"Pipelines Part 2: Design and Construction of Steel Pipelines in Land."

Other authoritative codes and standards which ensure equal or higher quality than those references may also be acceptable subject to satisfaction and approval of the Engineer.

Any conflict between the requirements of this specification and those on the figures herein or in the codes, standards and specifications referred to herein shall be brought to the attention of the Engineer for resolution whose decision will be final and binding.

1.13.2 General Requirements

a) Pipes and fittings shall be new and unused.

b) Where manufacturers of pipes and fittings are specified, they shall be of the same manufacturers unless otherwise approved by the Engineer.

c) Where more than one similar item of pipes and fittings are specified, they shall be of the same manufacturer.

d) The Contractor shall submit to the Engineer for approval of the following information regarding the specified/proposed items of pipes and fittings.

i. Name and address of the manufacturers

ii. Country of origin, make and model

iii. Dimensions and wall thicknesses of pipes and fittings

iv. Material and thicknesses of coating and lining

v. Factory test certificate from the manufacturers (MTC)

vi. Warranty if so provided by the manufacturers

vii. Method of jointing, testing and commissioning

e) Approval by the Engineer shall not be construed as authorizing any deviation(s) from the specifications unless they are specifically brought to notice of the Engineer.

f) Approval by the Engineer shall not relieve the Contractor from any of his contractual responsibility regarding satisfactory performance and other requirements of pipes and fittings.

1.13.3 Special Requirements

a) Pipes and fittings shall be suitable for the intended use.

b) Every pipe shall be tested at the manufacturer's works to specified air leakage test pressure. The test pressure shall be maintained for sufficiently long time for proof and inspection.

c) Each pipe and fitting shall be permanently marked or engraved giving the following information:

(i) Make and Nominal diameter

(ii) Class, Duty or Service (Pressure) Rating

(iii) Standards according to which the pipes and fittings have been manufactured.

d) Unless otherwise specified diameters of pipes and fittings shall be nominal. Actual inside and outside diameters and tolerances in diameters of pipes and fittings shall be according to the specified standards.

e) Pipes and fittings shall be seamless or welded as specified herein or in bill of quantities, as shown on the drawings and/or as directed by the Engineer. If the

Contractor so desires, seamless pipes and fittings may be substituted for welded pipes and fittings at no risk or cost to the owner. Where neither seamless nor welded pipes and fittings are specified, pipes and fittings shall be seamless unless otherwise approved by the Engineer.

f) Unless otherwise specified, service ratings of pipes and fittings shall not be less than the maximum pressure to which they will be subjected to.

g) Unless otherwise specified, wall thicknesses of the pipes shall be according to the class, schedule or duty of the pipes. The wall thicknesses shall be measured at locations excluding the jointing ends. The tolerances in wall thicknesses shall be according to the specified standards. Wall thicknesses of fittings shall not be less than those of corresponding pipes to which they are joined together.

h) Pipes and fittings ends shall be matching and compatible with each other and with the ends of valves and appurtenances to which they are joined.

i) Unless otherwise approved by the Engineer, pipes and fittings, jointing materials such as rubber rings, gaskets, nuts & bolts and jointing compound etc. shall be of the same manufacturers as those of the pipes and fittings.

1.13.4 Material

a) Pipe

Black steel pipes shall conform to API Standard 5L. The material of the pipes shall be having minimum yield strength of 42,000 psi and minimum ultimate tensile strength of 60000 psi for fire protection pipe.

b) Fittings

Dimensions of black steel fittings shall conform B.S. 534/1965.

c) Joints

Black steel pipes and fittings shall be joined by welding except for joining of valves and appurtenances and at locations as shown on the drawings and/or as directed by the Engineer. Welded joint shall conform to B.S. 4515. Black steel pipe flanges shall conform to specified or appropriate Table of B.S. 10. Nuts and bolts for flanges shall be of hexagon shape and shall conform to ISO 898. Gaskets shall be of flat shape and shall conform to B.S. 3063.

1.13.5 Installation

a) Transportation, Handling and Storage

The Contractor shall be responsible for proper transportation, handling (loading and unloading) and storage of pipes and fittings as per the manufacturer's recommendations and direction of the Engineer.

Crane, rope or nylon slings, lifting beams with flattened hook scissor-dog shall be used for loading and unloading of pipes fittings. Hooks and dogs shaft be well padded to prevent the pipe being damaged and shall be fitted-with locking device. Steadying ropes essential.

Pipes and fittings damaged during transportation, handling or storage of lowering shall be rejected and replaced at the Contractor's expense storage of gaskets and jointing compound shall be under shade to prevent damage by sunlight and extreme heat.

b) Inspection

Pipes and fittings shall be visually inspected for any evidence damage or hair cracks. The turned ends of pipes and fittings shall be inspected for any local irregularities, which could affect the water tightness of the joint. Damaged pipes and fittings shall be rejected and replaced at the Contractor's expense.

c) Laying and Jointing

Before installation, the interior of pipes and fittings shall be thoroughly cleaned of all rust, dirt and foreign materials. Pipe and fittings shall be installed to lines and grades as shown on the drawings and/or as directed by the Engineer.

Pipe joints shall be welded unless otherwise specified and/or directed by the Engineer except for jointing valves and appurtenances and where welding is not possible. Welding shall be done by qualified and licensed welders using electric arc welding process. The welding shall develop full strength of the adjoining steel. Defective joints and joints not developing full strength shall be rejected at the risk and cost of the Contractor.

Pipes and fittings shall be properly supported by galvanized steel clamps, brackets and hangers, etc. Supports shall permit unrestrained expansion and contraction. Clamps, brackets and hangers etc. shall be designed to take the weight of pipe, weight of water, seismic and wind loads.

Thrust anchors shall be provided at all changes in the pipe diameters and directions and at all branches and dead ends.

Thrust anchors shall be designed to resist maximum thrust forces resulting from the worst possible combination of working/static/test pressures, transient/water hammer pressure, and thermal expansion/contraction, seismic and wind loads.

The Contractor shall submit to the Engineer for approval shop drawings of the pipes supports and thrust anchors. The supports and anchors shall be used only after approval by the Engineer.

Approval by the Engineer shall however, not relieve the Contactor from any of his contractual responsibility regarding safety requirements of the supports and anchors.

Pipes passing through floors, ceilings, roof, walls and columns in non-water retaining structures above ground or water table shall be encased in black steel pipe sleeve. The

annular space between the pipes and the pipe sleeves shall not be less than one inch. The annular space shall be filled with approved packing material and sealed at both ends with approved fire rated sealant.

Pipes passing through water retaining structures above or below ground and non-water retaining structures below water table shall be provided with leak proof puddle flange. The flange diameter shall be larger than the outside diameter of the pipe by at least 4" for pipe diameters 6" and smaller and by at least 6" for pipe diameters larger than 6".

After installation, pipes, fittings, pipe supports and thrust anchors shall be painted with two coats of red oxide or zinc chromate primer and two coat of synthetic enamel paint of approved quality.

1.13.6 FLUSHING

After installation and testing pipelines shall be flushed with water until all dust, dirt, scales and extraneous matters are removed from the inside of the pipeline. During flushing all valves and appurtenances shall be closed and open several times.

1.13.7 COMMISSIONING

After successful completion of testing and flushing duly approved by the Engineer, pipelines shall be commissioned. All valves and appurtenances shall be set at proper openings and all parameters shall be set at specified or manufacturers' recommended values.

1.13.8 PIPEWORK SUPPORTS

All pipe work supports shall be of mild steel rolled sections and shall be painted with two coats of approved rich metallic zinc primer. Straps, rods and hangers shall be of mild steel when used for galvanized steel pipes.

Straps shall be provided on all pipe supports. Straps shall have a pair of nut and washers on each leg with the supporting steel flange clamped tight between the pair of nuts to form a rigid guide allowing the pipe to slide axially.

Horizontal pipe work along 'walls shall be supported on channel frames securely fixed to the column. All pipes shall be arranged to slide on the pipe supports and straps shall be provided to form a rigid guide.

Vertical pipe work shall be supported at the base or at anchor point to withstand the total weight of the riser. Brackets from risers shall not be used as a means of support for the riser.

Pipe work supports shall be so designed and installed as to allow free movement due to expansion and contraction. Supports shall be anchor to steel or reinforced concrete column, wall, beam or slab.

Each support shall be able to carry independently its all the operational loads of pipe work and water.

All pipes shall be individually supported. Pipes shall not hang from other pipes. Points at which pipes pass through walls, floors, connections to plan equipment and heat emitters, etc. do not constitute points of supports for the pipes.

HVAC WORKS

SECTION 1 - GENERAL REQUIREMENTS

1-01 GENERAL

The Contractor will design & execute all works related to the HVAC system to ensure functional ease and serviceability. The provision of these works will be made in accordance with International Codes for design and execution. The Contractor will submit technical data sheets and shop drawings to fully elaborate offered equipment.

The work to be done under the section of these Specifications includes furnishing all labor, equipment, appliances, and materials and performing all operations required in connection with the installation of equipment including all accessories, testing, and commissioning.

The scope works include the supply and installation of the items mentioned in the Schedule of Prices and any other for completion of the system.

1-02 MATERIALS

All materials shall be of the highest grade, free from defects and imperfections, of recent manufacture and unused, and of the classification and grades designated, conforming to the requirements of the latest issue of the appropriate specifications cited herein. All materials, supplies, and articles forming part of major equipment and not fabricated by the manufacturer of the equipment shall be the products of the recognized reputable manufacturers.

1-03 SHOP DRAWINGS

The Contractor shall make detailed analysis of the requirements of the works by visiting the site. Based upon such analysis he shall prepare detailed Shop Drawings at his own cost for HVAC System in the scope of this contract and Equipment. The Contractor shall submit 3 copies each of all such Shop Drawings for obtaining approval of the Engineer. After obtaining approval and after having in possession these approved Shop Drawings, the Contractor shall use these Shop Drawings for fabrication, construction and installation.

The work described on any shop drawing submitted shall carefully be checked by the Contractor for all clearances, field conditions, maintenance of architectural conditions and proper coordination with all trades on the job. To this end, the Contractor during the shop drawing stage, shall ensure that he receives drawings of all other trades that might interfere with the proper installation of his work. No payment shall be made for any variations or alterations on site due to lack of knowledge of other trades. Any unresolved conflict between trades shall be referred to the Engineer for decision.

Equipment layout is to be detailed on shop drawings, showing the exact method of installing and clearly illustrating components to be used in making all connections.

The Position of hangers and supports with type and method of installation of each hanger, detailing the type of hanger fixing with a reference number for each type.

All general layout drawings shall be drawn to 1:50 (1":1/4") scale. Details of

hangers, methods of fixing of ducts, detailed cross section of ducts and risers, details of control shall be drawn to 1:10 (1":1") scale.

The Contractor shall prepare Drawings and Schedules showing precise details of holes in concrete, masonry, etc. and necessary sleeves required for passage of ducts and supports etc. Drawings and Schedules, approved by the Engineer must be available before any structural work requiring holes or other modifications, is constructed.

Signed and approved drawings shall not be departed from unless a signed variation order or site instruction is issued in writing by the Engineer. Drawings returned to the Contractor for alteration or amendments are to be resubmitted for approval.

Amended or altered drawings shall show the nature of the amendment or alteration in a revision block on the drawing, together with revision number or letter and the date of the revision.

The Contractor shall be responsible for any discrepancies, errors or omissions in the drawings and other particulars supplied by him whether such drawings and particulars have been approved by the Engineer or not, provided that such discrepancies, errors, or omissions are not due to inaccurate information or particulars furnished in writing to the Contractor by the Engineer.

1-04 AS-BUILT DRAWINGS

The Contractor shall supply to the Engineer a set of "As-Built" drawings showing the Contract works as installed, together with any other information necessary for operation and maintenance. Three copies of each drawing (scale as per shop drawing) and other information shall be supplied, along with a soft copy.

1-05 MANUFACTURER'S DATA

Manufacturer's performance data, certified factory drawings and/or curves of apparatus giving full information as to capacity, performance at different operating and ambient conditions, dimensions, materials, electrical data and all information pertinent to the adequacy of the submitted equipment shall be submitted for approval. One original and 2 copy of catalogues and other information shall be submitted.

Manufacturer's names, sizes, catalogue numbers and/ or samples of all materials shall also be submitted for approval.

Orders for equipment submitted for approval must be accompanied by relevant drawings, curves, technical data, catalogues and samples. Where data, certified drawings or other required information is not available until after orders have been placed, the Engineer shall give provisional approval until all requested drawings and information have been supplied to the Engineer and approved by him. It is the Contractor's responsibility to ensure that all necessary information is supplied to the Engineer in accordance with the progress of works.

Should the Engineer give provisional approval only for an order due to lack of

complete information and should the missing information not eventually meet with the approval, the Engineer shall not be held responsible for any delay incurred. For equipment where information from the manufacturers is likely to be delayed, it is essential that the Contractor places provisionally approved orders at the earliest possible date so as to ensure approval of orders in complete conformity with the progress of the works.

Submittals and shop drawings should, as far as possible, be complementary so that drawings and submittals can be cross-checked.

1-06 SAMPLES

Contractor shall provide at his cost, samples of materials, instruments, gauges and electrical items, for approval by the Engineer before order is placed for the same. Engineer may waive this requirement, if detailed published catalogues submitted by the Contractor provide sufficient information for approval. These samples shall include, but not limited to:

i) G.I. Sheet
ii) Duct and insulation
iii) Insulation adhesive, Duct Sealant and tapes
iv) AI/AO Diffusers, Linear Diffusers and Grills
v) Duct hangers support arrangement.
vi) Paints
vii) Anchor bolts, studs, etc. for hanging arrangements
viii) Any other item required by the Engineer

1-07 WORKMANSHIP

Workmanship and general finish shall be of the highest grade, in accordance with the requirements specified herein, and the best modern standard practice.

1-08 PROTECTION

The Contractor shall keep duct and other openings closed to prevent entry of foreign matter. All fixtures, equipment and apparatus shall be covered and protected against dirt, water, chemical or mechanical damage, before and during the construction period. All fixtures, apparatus, or equipment damaged including damaged shop coats of paint shall be restored to original conditions prior to Commissioning and also again prior to Final Acceptance. All bright finished shafts bearing housings and similar items shall be protected until in service: no rust will be permitted.

1-09 CUTTING, PATCHING AND REPAIRING

Required for proper installation and completion of HVAC works, including masonry work, concrete work, and carpentry work, painting and re-painting shall be performed by skilled persons in respective trades, at expense of the Contractor. Construction shall be cut only after obtaining written permission from the Engineer.

1-10 LINES, LEVELS AND SPACES

The Contractor shall check dimensions at the building site and establish lines and levels for work specified in Specifications. The Contractor shall check

with the work of other trades to ensure proper clearance of ductwork, conduit and other items. Any deviations observed between drawings and actual construction shall be brought into the notice of the Engineer. The erection supervisor shall regularly inspect, during the progress of civil works, the areas allocated for installation of HVAC works, and any conflict observed shall immediately be reported to the Engineer.

1-11 SEALING OF OPENINGS

The contractor shall seal all openings in external walls where HVAC ducts penetrate in an external membrane. The sealing shall be air-tight to prevent penetration of outside air and water into the building. The method and materials for sealing shall be subject to Engineer's approval.

1-12 ACCESS PANELS

The Contractor shall mark locations of, and give sizes of, access panels required in false ceiling and wall paneling for adjustment and maintenance of HVAC equipment, such as Dampers, ceiling-hung equipment, etc. This information shall be provided to the Engineer before the commencement of false ceiling work by the concerned persons.

1-13 SUPPORTS AND CEILING HUNG EQUIPMENT

All ductwork where used shall be mounted on or suspended from supports, all as specified and as required.

Flexible duct connections, as specified elsewhere, shall be fitted wherever ducts cross building expansion joints, at suction and discharge end of each air handling unit wherever ducts are connected to such unit, and/or wherever shown on the drawings.

SECTION 2 – DUCTING AND SHEET METAL WORK

2-01 GENERAL

All equipment shall be of such overall dimensions, operating weights, service area requirements and configuration that it can be located where required without any adverse effect on its performance and clearance requirements. Any change in other trades work, anticipated by offering alternate equipment, shall be estimated by the Contractor and its cost shall be included in the quoted price for HVAC Works.

All equipment/material supplied under this section shall be brand-new, factory manufactured and complete in all respects. The type, characteristics, capacity ratings of all equipment/material shall be as Scheduled.

2-01.1 Ducting Material

All duct work shall be of galvanized steel sheet unless otherwise indicated on Drawings. Galvanized steel shall be of lock forming quality (LFQ) and shall have a galvanized coating of 8 oz total for both sides of one square meter of a sheet. The GI sheet shall conform to ASTM A-525 and ASTM-90.

Galvanized steel sheet shall be Cut Lengths coated by the Hot-Dip Method and manufactured per ISO Standard 3575-76 zinc coating designation Z-275.

2-01.2 Structural Steel

Structural Steel shall be M.S. members rolled from Pakistan Steel billets or equivalent conforming to ASTM designation A-36 standard specifications for structural steel.

2-01.3 Canvas Cloth

Canvas Cloth shall have specified weight with flame retardant quality.

2-01.4 Painting

All steel work in connection with supports for ductwork etc. exposed to the elements is to be painted with two coats of an approved rust preventive paint.

All exposed metal surface of hangers, brackets, etc. must be painted with two under-coats and two finishing coats of enamel paint of approved color. G.I. sheet is not to be painted. However, all uninsulated pipe work and valves are to be painted as stated above.

Identification bands shall be painted on uninsulated ducting, or on insulation at frequent intervals. Lettering shall be agreed with the Engineer.

All duct hangers in concealed locations shall be given one coat of black asphalt paint before being concealed.

2-02 DUCT CONSTRUCTION

All sheet metal duct work shall be of a standard construction and erected in a first class workmanlike manner. The duct work shall be constructed as per SMACNA Low Velocity Duct Construction Standards.

Ducts shall be straight and smooth on the side, with joints neatly finished. Where ducts are lined with interior insulation, the dimensions required shall be for the net free area after insulation is applied. Ducts shall be anchored securely to the structure in an approved manner and shall be installed so as to be completely free from vibration under all conditions of operation.

Sheet metal ducts shall be properly braced and reinforced with steel angles, or other structural members approved by the Engineer unless otherwise required, the internal ends of all slip joints shall be installed in the direction of flow.

Finished work shall show no flaking or peeling within 6 mm (1/4 inch) of a cut edge. The construction and gauge of material, size and spacing of stiffeners for duct work shall be as follows:

Larger Dim. of Duct (mm)	Gauge (US)	Traverse Joint Type/Size (mm)	Interm Bracing, Angle Size (mm)	Max. Spacing between Traverse Joint &/or Interm Reinforcement (m)
Thru 300	26	Drive slip/-	-	-
325 thru 450	24	Drive slip/-	-	
475 thru 750	24	Pocket lock/25	25x25x3	1.5
775 thru 1050	22	Pocket lock/25	25x25x3	1.5
1075 thru 1350	22	Pocket lock/40	40x40x3	1.5
1375 thru 1500	20	Pocket lock/40	40x40x3	1.5
1525 thru 2100	20	Angled reinforced standing seam	40x40x3	0.75
2125 thru 2400	18	Angled reinforced standing seam	40x40x6	0.75
Over 2400	18	Angled reinforced standing seam	40x40x6	0.75

Other types of Traverse joints allowed as per ASHRAE/ SMACNA Standards shall be acceptable, subject to Approval of Engineer, in places where pocket lock is not possible due to tight space.

All angles for bracing shall be painted with one coat of approved rust-inhibitive paint before fixing to duct.

All duct work in the finished areas shall be run parallel to the beams wherever possible. All outlet opening and open ends shall be kept closed with sheet metal caps during construction. Rectangular duct shall be constructed by

breaking the corners and grooving the longitudinal seams. Elbows and transformation sections may be formed with Pittsburgh corner seams but complicated fittings shall be constructed with double seams. Angle bracing shall be of steel and shall be carried out on all four sides of the ducts. All bracing is to be in accordance with the current addition of the ASHRAE Hand Book/ SMACNA Standards.

2-03 ELBOWS

Ducts shall be built with curves and bends, where required, to affect an easy flow of air. Curved elbows shall have a center line radius at least equal to 150% of the width of the duct unless otherwise indicated. All duct curves having an inside radius smaller than the width of the curve shall be equipped with approved single thickness vanes.

Vertical ducts shall have full size bends where horizontal branches are taken off unless otherwise indicated, and/or approved.

Where square elbows are used in changing directions, approved and aerodynamically correct vanes as per latest SMACNA Duct Construction Standards shall be used.

These turning vanes must be free from vibration when the system is in operation.

2-04 HANGERS

Hangers and supports shall be fastened to the structure in a manner approved by the Engineer All fastening shall be such as to ensure permanent stability and to be capable of supporting at least three times the applied load.

Galvanized sheet metal ducts less than 500 mm in width (larger dimension) may be suspended by means of galvanized iron straps extended along the bottom of the duct to form a trapeze, only if hanger length above the duct is not more than 300 mm.

All other ducts shall be suspended by means of iron bars securely fastened to the angle iron bracing or angle iron placed under the duct. Bars shall be fastened to bracing only on un-insulated ducts.

Bars shall be welded to angles at ceiling, attached therein by anchor screws and heavy iron washers. Where horizontal ducting is fixed to walls, columns, supported from floor slabs, etc. angle iron frames are to be fabricated and fitted to support rectangular ductwork and associated equipment.

Vertical ducts are to be supported by steel angles bolted to at least two sides of the duct and on the complete circumference of the ducts where the larger duct dimension is greater than 600 mm (24 inch).

Angle iron extensions shall be either grouted or bolted to the structure.

Hangers spacing and sizes shall be as follows:

Larger Duct Dim. (mm)	Strap Size (mm)	Bar Dia (mm)	Bottom Angle Size (mm)	Maximum Spacing (m)
Thru 300	25 x 22 ga.	10	25x25x3	2.5
325 thru 450	25 x 22 ga.	10	32x32x3	2.5
475 thru 750	25 x 18 ga.	10	40x40x3	2.5
775 thru 1050	25 x 18 ga.	10	40x40x3	2.5
1075 thru 1350	25 x 16 ga	10	40x40x3	2
1350 over	25 x 16 ga	12.5	50x50x6	2

Hanger rods shall be cross-braced whenever the length of rod above duct work is more than 1 m (3 feet) to prevent swing of ducts.

All structural steel including hanger rods and angle iron shall be painted with one coat of approved rust- inhibitive paint before installing.

2-05 QUADRANTS FOR VOLUME DAMPERS

All dampers other than dampers behind registers and diffusers shall be fitted with substantial locking quadrants, mounted outside the duct in an accessible position. On insulated ducts the quadrants shall be fastened to bearing plates flush with the outside finish of the insulation.

2-06 DAMPERS

2-06.1 Volume Dampers (V.D)

A substantially constructed manual volume damper of the butterfly or multiple blade type as per latest SMACNA Duct Construction Standards shall be fitted where shown on the Drawings and at all branch entries or exits with main ducts for balancing purposes. Dampers shall have galvanized or painted steel interlocking blades of 200 mm (8") maximum blade width. Blades shall be fabricated from 16 gauge steel with seamed edges and a maximum length of 1.2 m (4 ft.) It should be noted that these dampers, shall be separate and independent from the dampers, hereinafter specified. Volume Dampers are not required where splitters Dampers, as specified hereinafter, are installed.

2-06.2 Splitter Dampers (S.D)

At each point of division in a supply trunk duct where a branch is taken off a trunk duct, an adjustable splitter or deflecting damper, one gauge heavier than the duct with operating rod and locking quadrant as above, shall be installed. These deflecting dampers shall be permanently set and locked in position after completion of the installation and adjustment with fans running.

Operating rods are to be full blade length extending through the duct to

externally mounted bearing plates. Construction shall be as per latest SMACNA Duct Construction Standards.

2-06.3 Fire Dampers (F.D)

Fire dampers shall be installed as shown on the drawings. Frame shall be 100 mm x 25 mm x 3 mm (4"x1"x1/8") galvanized steel channel with 16 gauge thick blades. Blades shall have an overlap of 25 mm (1") and shall be fixed on self-lubricating bronze type bearings.

Dampers shall be complete with linkage rod and fusible link rated at 71°C (160 deg. F.) Fusible Link shall be from US/UK. Damper construction shall meet NFPA 90-A requirements, and shall have the "hour" fire-rating not less than the fire rating of the plane where installed. Fire dampers shall be airtight when in a close position.

2-07 FLEXIBLE DUCT CONNECTIONS

Flame proof flexible connections shall be furnished and installed on all suction and discharge connections of fans and air-conditioning units for prevention of transmission of vibration through the ducts to occupied spaces.

Flexible connections also be provided wherever ducts cross building expansion joints.

Flexible connections shall be factory fabricated of imported origin, made from chemically impregnated canvas or other material approved by the Engineer. Connections shall fit closely and are to be secured in an airtight fashion at connections to ductwork, fans and apparatus. The unclamped section of the flexible connection between apparatus and ductwork shall not be less than 6" in length. Flexible connections shall not be painted or insulated. Samples of the material shall be presented to the Engineer for approval before installation.

2-08 ACCESS DOORS AND PANELS

Wherever necessary, suitable access openings, doors and frames to permit inspection, operation and maintenance of all filters, controls, dampers, bearings or other apparatus shall be provided in ducting. Doors shall be of double construction, of not lighter than 20 gauge metal sheet and shall have sponge rubber gaskets around their entire perimeter. On insulated duct work the space between the inner and outer door sheets shall be insulated as specified for the ductwork. All access doors in sheet metal shall have air tight seal, shall be hung on heavy flat hinges and shall be secured in the closed position by means of wing type nuts and screws or coin operated catches.

2-09 SLEEVES

Where ducts pass through walls, partitions, or floors, wooden sleeves shall be provided by the Contractor and these sleeves shall remain in place permanently. Sleeves shall be packed with non-combustible glass- fiber insulation, minimum of 24 kg/m^3 (1.5 lb/ft^3). Density and sealed with sealant.

2-10 TEST WELLS

The Contractor shall provide test wells for measurement of air velocity and static pressure for balancing purpose. These wells made up of a brass nipple with screwed caps are to be fixed into the duct or casing on the downstream sides of branch volume damper in each branch supply duct, and on upstream side of branch volume damper in each branch return. The design of test well shall be subject to Engineer's approval.

SECTION 3 – INSULATION

3-01 GENERAL

3-01.1 The Contractor shall provide insulation for the services and equipment specified hereafter. Insulation shall be as per the following Insulation Schedule.

3-01.2 Insulation material shall be complete with vapor barrier protection covering and jacketing (where specified), adhesives, insulation tape, duct sealer and/or sealing tape, fastening material, and jacketing for outdoor ducting and piping.

3-01.3 Identification bands shall be painted on insulation at frequent intervals. Lettering shall be agreed upon with the Engineer.

3-02 Insulation Schedule

Sr. No.	Services	Thick-ness mm (Inch)	Insulation Type	Vapour Barrier	Protection
a)	Indoor supply/return duct				
i)	Concealed to vision duct passing through conditioned space	25 (1)	Glass fiber blanket	Reinforced aluminum foil	226 gm (8-Oz) canvas

3-03 INSULATION MATERIALS

3-03.1 Duct Insulation

Insulation material for ducts and sheet metal air plenums shall be flexible glass fiber, 16 kg/m³ (1.0 lbs/cu.ft) density and maximum conductivity of 0.039 W/m/°C at 24°C (75°F). or closed cell foam/EPDM/NBR type 56 kg/m³ (3.5 lbs/cu.ft) Density and maximum conductivity of 0.035 W/m/°C at 24°C (75 °F).

3-03.2 Vapour Barrier for Duct Insulation

Vapour barrier when specified shall be factory applied flame retardant reinforced aluminum foil, 0.02 mils thick.

3-03.4 Insulation Protection Material and Accessories

3-03.4.1 Canvas

226 gms per Sq.m (8 Oz per square yard) as specified in Insulation Schedule.

3-03.4.2 Water & Rat Proof Paint

As approved by the Engineer.

3-03.4.3 Banding

13 mm x 0.5 mm (1/2" x 1/48") galvanized steel or aluminum bands.

3-03.4.4 Insulation Tape

Insulation tape for joints shall be of aluminum foil type, 50 mm (2 inch) wide, equivalent to Scotch No.473.

3-03.4.5 Adhesive

Adhesive for thermal insulation shall comply with ASTM Standard C 916-79 or equivalent. Adhesive for acoustic liner shall comply TIMA Standard AHC-101-1975 or equivalent.

3-03.4.6 Duct Sealer

Sealer for duct joints shall be butyl rubber caulking, weather proof and water resistant, conforming to U.S. Federal Specification TT-S-001657 Type 1, as manufactured by Woodmont Products, INC, USA, or approved equal.

3-03.4.7 Duct Sealing Tape

Duct sealing tape shall be 75 mm (3 inch) wide self-adhesive vinyl cloth tape.

3-04 INSULATION APPLICATION

3-04.1 General

All Thermal and acoustic insulating materials shall be installed as specified hereinafter.

Insulation shall be installed in a smooth, clean, workmanlike manner and joints shall be tight and finished smooth.

All surfaces to be insulated shall be dry and free from loose scale, dirt, oil or water when insulation is applied. Insulation shall be applied in such a manner that there will be no air circulation within the insulation or between the insulation and the surface to which it is applied.

Surface imperfections in the insulation such as clipped edges, small joints or cracks and small voids, or holes not over 645 mm^2 (1 sq. inch) shall be filled with like insulating material.

Where a vapour barrier is fixed on site it shall be fixed in such a manner as to obviate the possibility of moisture penetration. It shall be fixed where required by means of an approved type bituminous compound or approved equal for tightness.

Insulation for all services shall only be applied until after testing and approval for tightness obtained from the Engineer, unless otherwise instructed in writing by the Engineer.

Insulation is to be applied where indicated on the drawings or called for in these specifications.

3-04.2 Duct Insulation

Before applying insulation, either sealing tape or duct sealer shall be applied on all corners of traverse joints for air tightness.

The insulation shall be fixed on ducts with a suitable adhesive as specified. Adhesive shall be applied on at least 75% surface area. In addition to the fixing by adhesives, insulation on the underside of ducts exceeding 450 mm (18 inch) width must have mechanical fasteners of an approved pattern to prevent insulation sagging, or alternatively bands as specified above shall be used at intervals not exceeding 1.2 m (4 feet).

All joints on the insulation shall be sealed with 50 mm (2 inch) aluminum foil tape. The tape shall only be fixed to the vapour seal and not to the bare insulation and, therefore, joints in the insulation shall not occur longitudinally at corners of ducts. If it is unavoidable to have joints at longitudinal corners then the insulation must be cut back and the vapour seal folded over the bare edge of the insulation so that the tape adheres only to the vapour seal.

SECTION 4 - AIR INLETS AND OUTLETS

4-01 GENERAL

Before placing orders for these items, the Contractor shall check that all items to be supplied by the manufacturer comply for spread, throw, drop and noise, with capacities and characteristics as indicated on the drawings and schedules. All outlets shall be specifically selected for their particular application and designed for quite operation. All items are to be approved by the Engineer.

All air inlets/outlets shall be of material as indicated on the Drawings and Schedules, and/or as specified.

Color and finish shall be subject to Engineer's approval. Ceiling diffuser face and margin sizes and styles shall be coordinated with false ceiling/boxing type. All devices shall have substantial approved gaskets to completely prevent streaking on walls or ceilings due to leakage.

Where ceiling panels and ceiling diffusers are of different size, ceiling diffuser shall be centered in ceiling panel. Duct routing may slightly be adjusted, if necessary, for this purpose or duct drops for diffuser necks may be offset upto a max. of 30 degrees. or diffuser locations having requirement of greater than 30 degrees offset, flexible round insulated duct connection shall be used.

All wooden frames for wall inlets/outlets (where not mounted directly on the duct) shall be 19 mm (3/4") thick set permanently in the walls. These frames shall be provided by the Contractor. The Contractor shall be responsible for all cuttings of walls, fixing of wooden frames in walls and repair of masonry/plaster required for fixing side-wall inlets/outlets. The Contractor shall furnish wooden frames for wall inlets/outlets to those responsible for civil construction for installation at locations indicated on shop drawings prepared by the Contractor for this purpose.

Ceiling inlets/outlets shall not be supplied on false-ceiling. Cutting of false ceiling (tiles) shall be the responsibility of the HVAC Contractor.

Manufacturer's certified free area for each type and size of grille, register, linear/square diffuser and louver shall also be provided for the purpose of air balancing.

All air inlets/outlets shall be manufactured as per Tuttle & Bailey standards of air inlets/outlets.

4-02 GRILLES

All side wall outlets and inlets shall be of sizes and characteristics as scheduled and shown on the Drawings.

Double deflection type grilles shall have vertical front bars and horizontal back bars.

All supply outlets shall have opposed blade dampers, finished in black paint, fixed to the outlet and shall be operatable with a removable key inserted from

front of the grille.

All return and/or exhaust inlets shall have similar dampers if scheduled.

4-03 CEILING DIFFUSERS

Ceiling diffusers shall be of the sizes and characteristics as scheduled and shown on the Drawings.

Ceiling diffusers shall be furnished with volume dampers as furnished by the diffuser manufacturer, finished in black paint.

Volume control for these diffusers shall be accessible through the diffuser from below the ceiling and shall maintain their setting when adjusted. Each diffuser shall be provided with sponge rubber or felt gasket. Return diffusers shall be similar to supply diffusers unless otherwise indicated. Inner core shall be removable and shall be mounted on outer frame. (Throw pattern for supply diffusers shall be as shown on Drawings by arrows or as shown in schedule).

Ceiling diffusers intended for use with flexible round insulated duct shall have suitable inlet box.

4-04 LINEAR DIFFUSERS

Linear diffusers shall be of characteristics and capacity as scheduled. Sizes and throw patterns shall be as shown on the drawings. Each diffuser shall include externally insulated lined plenum box with duct connection collar of size shown on drawings as "blanked off", a sheet metal plate shall blank off the diffusers/grilles behind the core. Dampers, pattern controller and plenum box shall not be required with blanked-off diffusers/grilles.

Plenum boxes shall have inlet connection collar spaced as shown on drawings, but not more than 1.2 m (4 ft) c/c.

SECTION 5- INSPECTION TESTING AND COMMISSIONING

5-01 GENERAL

5-01.1 The whole of the works supplied under this Contract shall be subject to inspection and tests by the Employer and/or Engineer should he so require, during manufacturing erection and after completion. The inspection and tests shall include, but not be limited to, the requirements of this Section of the Specifications.

5-01.2 For this purpose the Engineer shall, at all reasonable times, be allowed free and ready access to the Contractor's shop and the shops of his suppliers for the purpose of inspecting the specified equipment components, or any other parts, and obtaining information as to the progress of the work.

5-01.3 Specific tests required by the various items of the materials shall be treated in accordance with the specifications of the corresponding clauses of the Specifications.

5-01.4 The Contractor shall submit to the Engineer, fifteen (15) days prior to the date of commencement of the balancing and performance tests, three (03) copies of the complete test procedure. The procedure, method and points of measurement as well as the method of calculation shall be approved by the Engineer before any test is carried. Three (03) copies of the test results shall be furnished to the Engineer for his approval.

5-01.5 The Contractor shall supply all necessary testing and balancing instruments, which shall include the instruments to carry out any test of any kind on a piece of equipment, apparatus part of system or on a complete system if the Engineer requests such a test for determining specified or guaranteed data, as given in the Specifications or in the Schedule of Equipment. Necessary skilled staff shall be provided by Contractor.

5-01.6 Any damage resulting from the test shall be repaired and/or damaged material replaced with intimation to the Engineer, all to the satisfaction of the Engineer, and at no extra cost to the Employer. Skilled staff shall again be provided by the Contractor.

5-01.7 In the event of any repair or any adjustment having to be made, other than normal running adjustment, the tests shall be void and shall be recommenced after the adjustment or repairs have been completed.

5-01.8 All testing, balancing and final adjustment shall be in accordance with the provision of the applicable ASHRAE Standards, or other approved relevant standards.

5-01.9 The Contractor shall test a piece of equipment, apparatus, parts of system or a complete system in accordance with method and Schedule of Tests provided by the Engineer to determine Specified or Guaranteed data, given in the Specifications, Schedule of Equipment and Contractor's Data Sheets.

5-01.10 The contractor shall be responsible for carrying out tests on the material/equipment/installation furnished by him.

5-02 PRELIMINARY INSPECTION & TESTS

5-02.1 General

All equipment/material shall be inspected and tested to determine the completeness and general conformance to specified requirements, when operated independent of overall HVAC System, for noise, vibration, and electrical data.

5-02.2 Ductwork

Inspection on ductwork shall be carried out by Contractor's supervisor in the presence of Engineer's representative to the satisfaction of the Engineer.

All joints in ducts and at outlets shall be physically inspected for air leakage prior to wrapping of insulation. All dampers shall be tested on site for proper operation prior to installation.

Ducts, plenums and casing shall be inspected and made substantially air tight before covering with insulation or concealing in the masonry. The terms substantially airtight shall be construed to mean that no air leakage will be noticeable through the senses of feeling or hearing.

5-03 BALANCING AND COMMISSIONING

5-03.1 Balancing

All, ductwork air inlet and outlets and air volume control dampers shall be adjusted and balanced to deliver within 10% of the specified quantities indicated on the Drawings. Where the equipment or systems depend upon controls for proper operation, functioning and performance, the Engineer may ask the Contractor that the later shall be operated simultaneously with the equipment or system during tests.

If the air quantities cannot be delivered without exceeding the speed range of the sheaves or the available horsepower, the Engineer shall be notified before proceeding with the balancing of air distribution system.

Any addition/replacements required to meet the specified flow rates shall be the responsibility of the Contractor at his own cost.

The balancing and commissioning work will be done by a specialized firm/approved by the Engineer, having working experience of more than five (05) years along with working experience of at least five (05) projects of similar nature.

5-03.2 Commissioning

Upon completion of whole or part of HVAC System is substantially complete and ready for operation as specified, the Contractor shall carry out Commissioning. Appropriate Seasons are not necessary and the purpose of the commissioning is to start-up the whole or part of HVAC System with manual and/or automatic controls and to put the whole or part of HVAC system in operation to make it ready to provide cooling and/or heating.

SECTION 6 - MEASUREMENTS AND PAYMENTS

6-01 GENERAL

Unless expressly excluded, the cost of all materials, equipment and works required by Specifications, acceptably furnished, installed and tested as Specified, shall be considered to be included in the amounts tendered against the item listed in the Schedule of Prices.

6-03 SOP ITEM NO. 5 & 6

6-03.1 Measurement

No measurement will be made of the items mentioned above.

6-03.2 Payment

Payment will be made at a Contract Lump sum Price entered for the respective item in Schedule of Prices.

6-04 SOP ITEM NO. 1 (a & b)

6-04.1 Measurement

Measurement will be made for surface area of installed sheet metal ducting and plenums for different gauges. No measurement will be made for wastage, bracing flanges, hangers and supports, fasteners, anchor bolts air-turning vanes, splitter dampers, and duct protection.

6-04.2 Payment

Payment will be made for the number of units measured as provided above at the Contract Unit Rates as entered in SOP.

6-06 SOP ITEM NO. 1 (c)

6-06.1 Measurement

Measurement will be made of the area of sheet metal to which the insulation is applied. No measurement will be made for accessories and adhesive.

6-06.2 Payment

Payment or deduction will be made for the number of units measured as above at the Contract Unit Rates entered in SOP.

6-07 SOP ITEM NO. 3 & 4

6-07.1 Measurement

Measurement will be made of the core area of the respective item acceptably furnished, installed and tested. No measurement will be made of accessories and attachments.

6-07.2 Payment

Payment will be made for the number of units measured as provided above at the Contract Unit Rates as entered in SOP.

EXIM OFFICE

INTERIOR DESIGNING & CONSTRUCTION SUPERVISION OF EXIM BANK OFFICE AT KARACHI

TENDER DRAWINGS
JANUARY , 2023

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT) LTD.
ARCHITECTURE & PLANNING DIVISION, KARACHI

EXIM OFFICE AT KARACHI

LIST OF DRAWINGS

ARCHITECTURE DRAWINGS

S/NO	DRAWING NO.	DESCRIPTION
1.	41156/08/TD/B001	WORKING LAYOUT PLAN
2.	41156/08/TD/B002	FLOOR PATTERN LAYOUT PLAN
3.	41156/08/TD/B003	REFLECTED CEILING LAYOUT PLAN
4.	41156/08/TD/B004	MEETING ROOM PLAN & ELEVATIONS
5.	41156/08/TD/B005	EXECUTIVE ROOM PLAN & ELEVATIONS
6.	41156/08/TD/B006	C.E.O ROOM PLAN & ELEVATIONS
7.	41156/08/TD/B007	CONFERENCE ROOM PLAN & ELEVATIONS (SHEET-1 OF 2)
8.	41156/08/TD/B008	CONFERENCE ROOM PLAN & ELEVATIONS (SHEET-2 OF 2)
9.	41156/08/TD/B009	ENTRANCE LOBBY PLAN & ELEVATIONS (SHEET-1 OF 2)
10.	41156/08/TD/B010	ENTRANCE LOBBY PLAN & ELEVATIONS (SHEET-2 OF 2)
11.	41156/08/TD/B011	RECEPTION & PLANTER/CABINATE DETAILS
12.	41156/08/TD/B012	SCHEDULE OF DOORS & FILE RACK DETAIL
13.	41156/08/TD/B013	DETAIL OF PARTITION WALLS

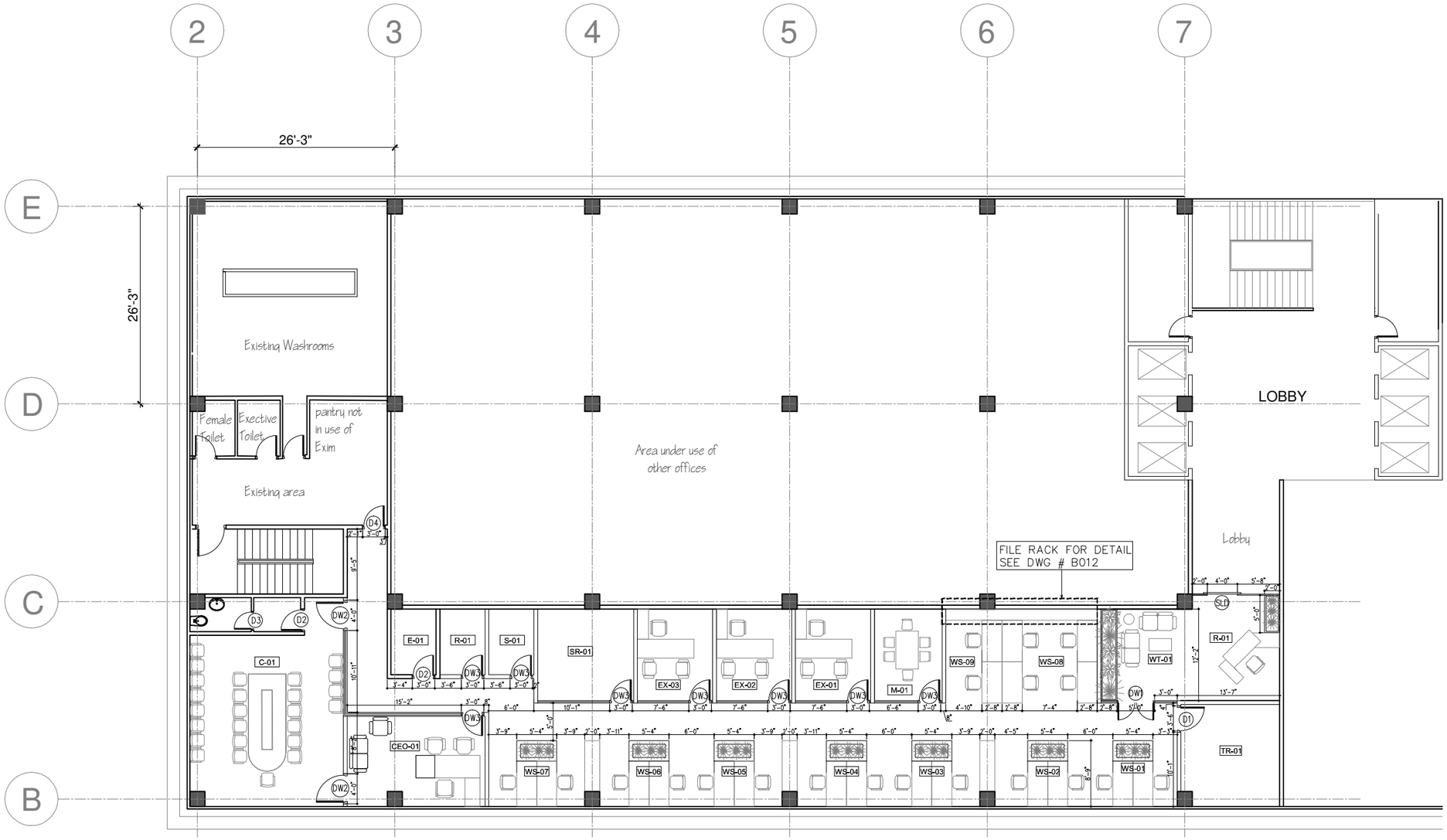
ELECTRICAL & COMMUNICATION DRAWINGS

S/NO	DRAWING NO.	DESCRIPTION
1.	41156/08/TD/E001	ELECTRICAL LEGEND AND GENERAL NOTES
2.	41156/08/TD/E002	LIGHTING LAYOUT
3.	41156/08/TD/E003	POWER LAYOUT
4.	41156/08/TD/E004	MAIN SINGLE LINE DIAGRAM & DB DETAILS
5.	41156/08/TD/T001	COMMUNICATION LEGEND AND GENERAL NOTES
6.	41156/08/TD/T002	DATA &TELEPHONE LAYOUT
7.	41156/08/TD/T003	CCTV LAYOUT

HVAC DRAWINGS

S/NO	DRAWING NO.	DESCRIPTION
1.	41156/04/TD/K001	GENERAL NOTES, ABBREVIATIONS, LEGENDS & STANDARD DETAILS
2.	41156/04/TD/K002	LAYOUT PLAN

R. NO.	ROOM NAME	DIMENSION
R-01	RECEPTION	13'-8"X14'-0"
WT-01	WAITING	8'-0"X12'-0"
TR-01	TREASURY	13'-0"X10'-0"
EX-01	EXECUTIVE	10'-0"X12'-0"
EX-02	EXECUTIVE	10'-0"X12'-0"
EX-03	EXECUTIVE	10'-0"X12'-0"
CEO-01	C.E.O	18'-0"X12'-0"
C-01	CONFERENCE	26'-0"X18'-0"
M-01	MEETING	9'-0"X12'-0"
SR-01	SERVER	12'-9"X12'-0"
S-01	STORE	6'-0"X9'-0"
E-01	ELECTRICAL	6'-0"X9'-0"
R-01	RECORD	6'-0"X9'-0"
WS-01	WORKSTATION	11'-6"X8'-9"
WS-02	WORKSTATION	12'-9"X8'-9"
WS-03	WORKSTATION	12'-0"X8'-9"
WS-04	WORKSTATION	12'-3"X8'-9"
WS-05	WORKSTATION	12'-0"X8'-9"
WS-06	WORKSTATION	12'-3"X8'-9"
WS-07	WORKSTATION	12'-9"X8'-9"
WS-08	WORKSTATION	11'-8"X12'-0"
WS-09	WORKSTATION	8'-6"X12'-0"



CLIENT: EXIM BANK OF PAKISTAN	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. ARCHITECTURE & PLANNING DIVISION KARACHI. 4th Floor, N.I.C. Building, Abbasi Shaheed Road, Karachi, Tel: 99225430-34	04			DRAWN	IMRAN
		03			SUBMITTED	
		02			RECOMMENDED	
		01			CHD./VER.	
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED

PROJECT: **OFFICE FOR EXIM BANK AT KARACHI**

EXIM OFFICE
WORKING LAYOUT

SCALE: 1/16"=1'-0"

DATE: JANUARY, 2023

DRAWING No.: **41156/08/TD/ B 001**

REV.: 0

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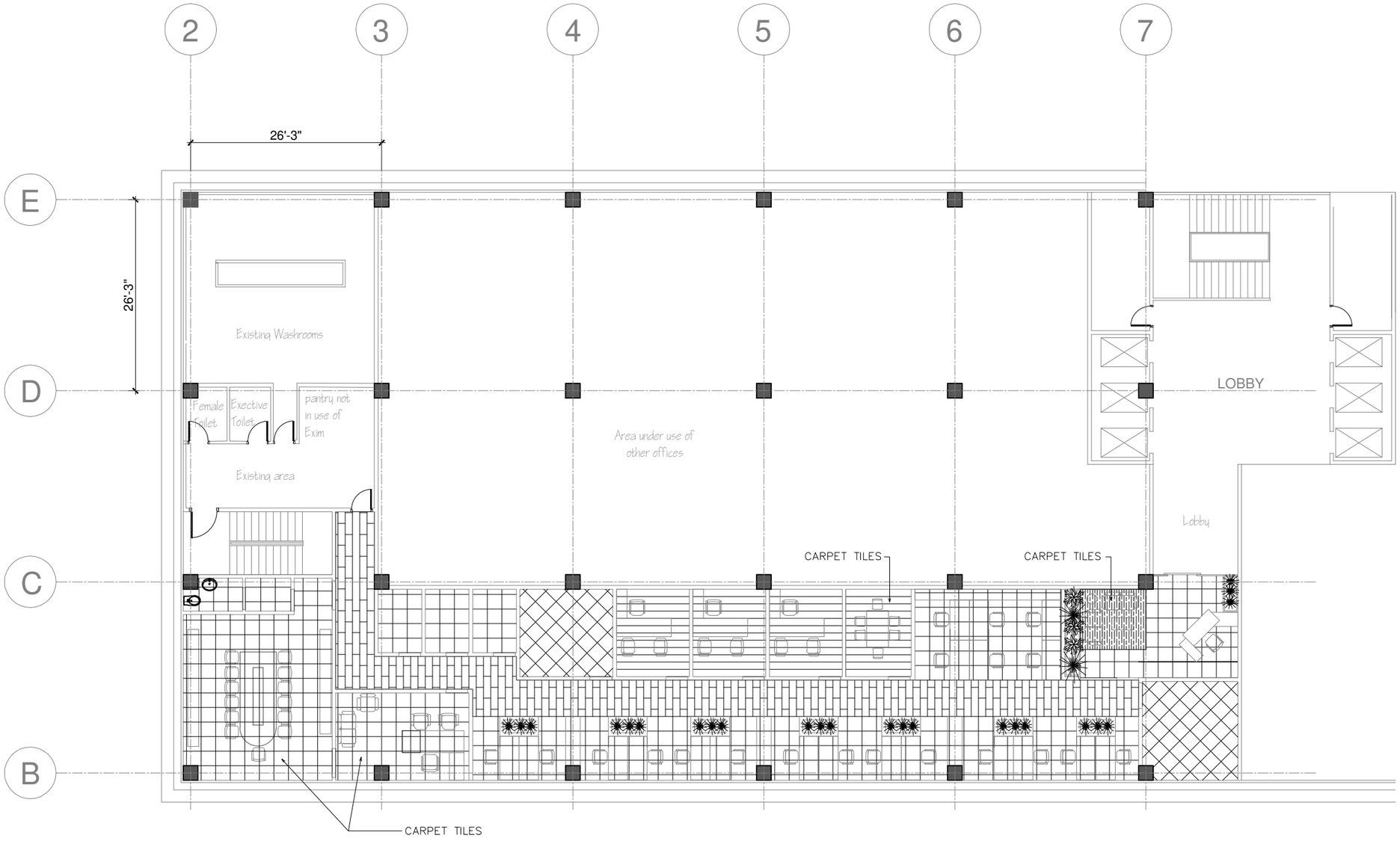

FLOOR PATTERN

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			DATE: JANUARY, 2023	DRAWING No.: 41156/08/TD/ B 002	REV.: 0

REV.	DATE	DESCRIPTION	APPROVED		
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				APPROVED	

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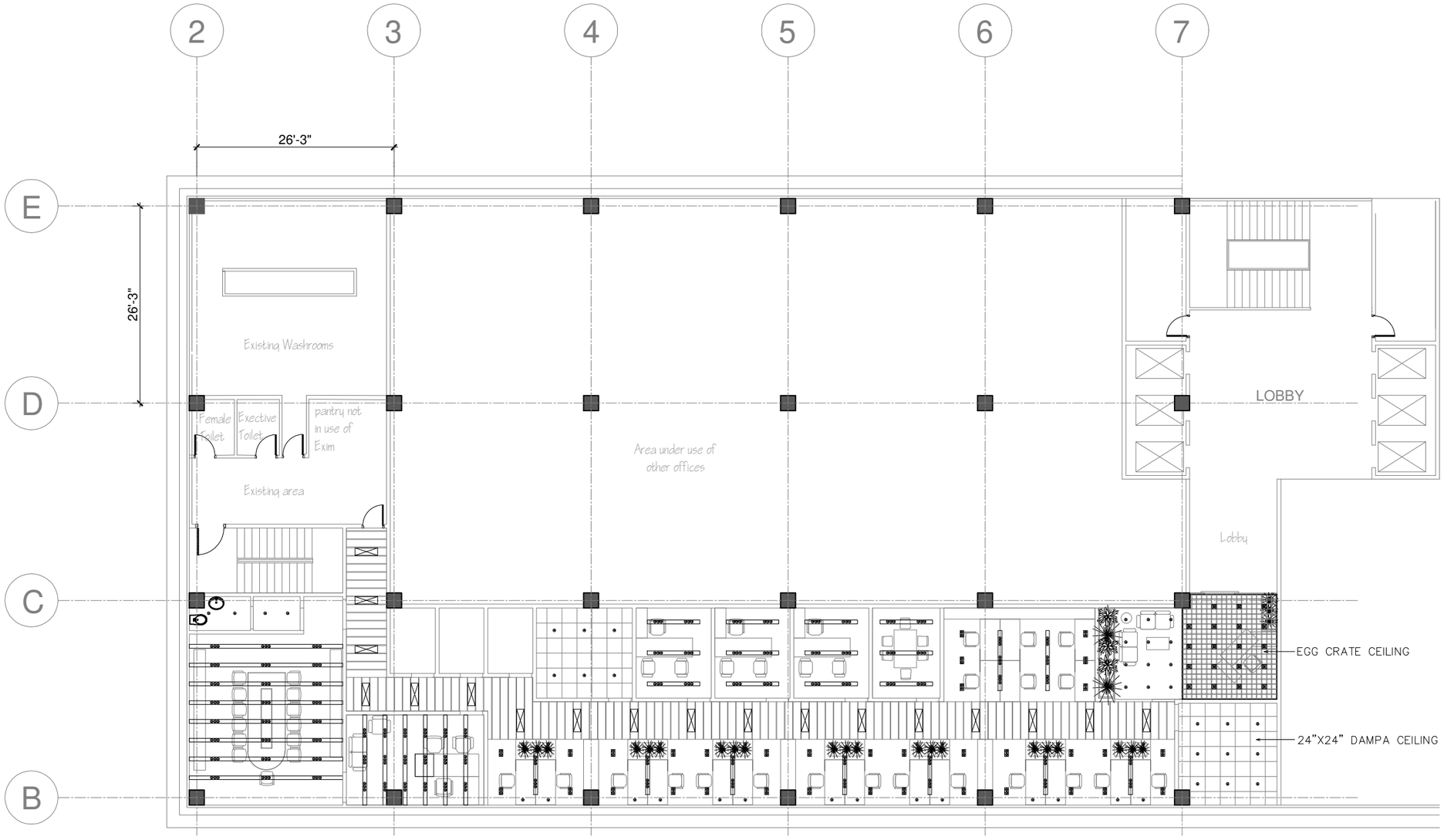

CEILING LAYOUT

CLIENT: EXIM BANK OF PAKISTAN	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. ARCHITECTURE & PLANNING DIVISION KARACHI. 4th Floor, N.I.C. Building, Abbasi Shaheed Road, Karachi, Tel: 99225430-34	PROJECT: OFFICE FOR EXIM BANK AT KARACHI	EXIM OFFICE REFLECTED CEILING PLAN	SCALE: 1/16"=1'-0"	
			DATE: JANUARY, 2023	DRAWING No.: 41156/08/TD/ B 003	REV.: 0

REV.	DATE	DESCRIPTION	APPROVED		
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02				RECOMMENDED	
01				CHD./VER.	
				APPROVED	

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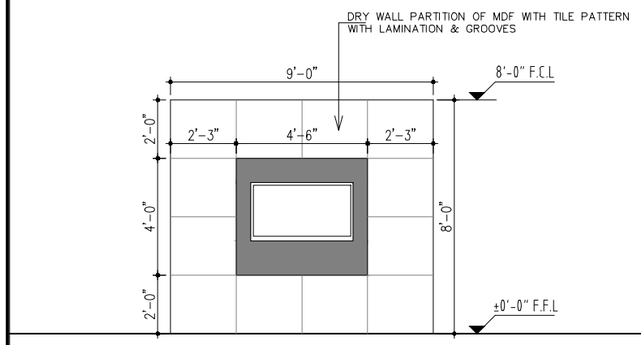
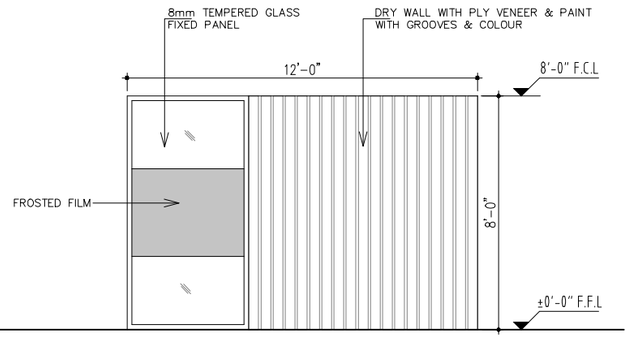


ELEVATION-1



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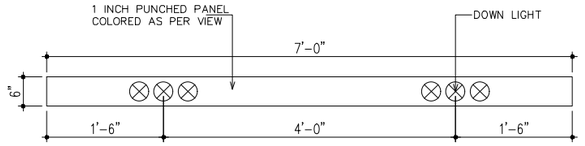
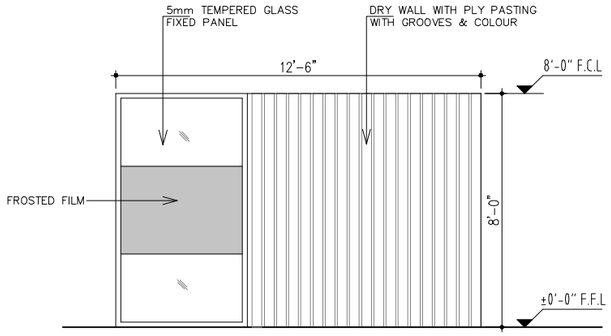
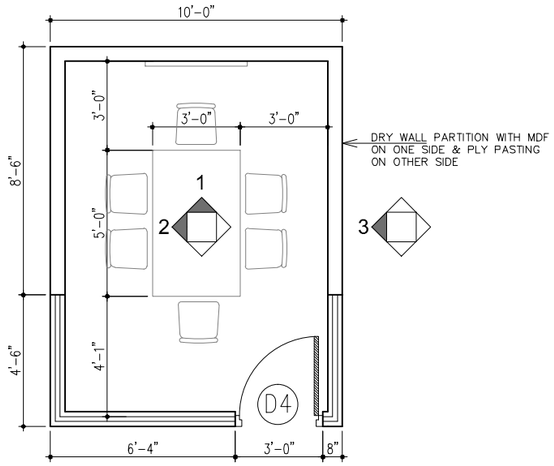


DETAIL-A

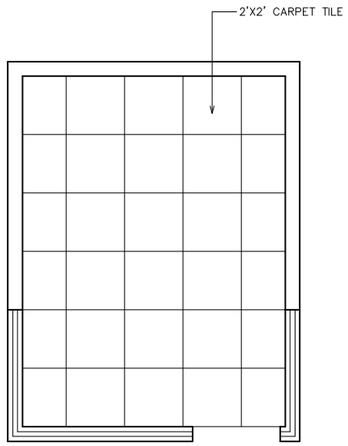


ELEVATION-3

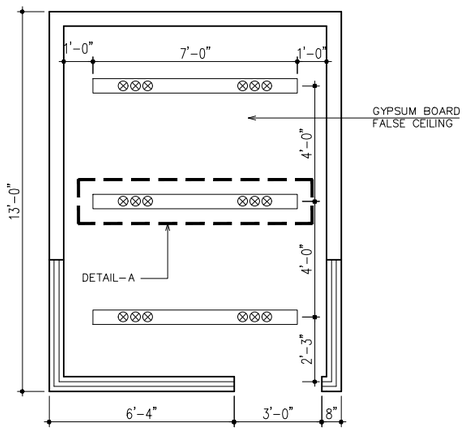
3D VIEW



MEETING ROOM
PLAN



MEETING ROOM
FLOOR PATTERN



MEETING ROOM
CEILING LAYOUT

CLIENT: EXIM BANK OF PAKISTAN	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. ARCHITECTURE & PLANNING DIVISION KARACHI. 4th Floor, N.I.C. Building, Abbasi Shaheed Road, Karachi, Tel: 99225430-34	04			DRAWN: IMRAN
		03			SUBMITTED:
		02			RECOMMENDED:
		01			CHD./VER.:
		REV.	DATE	DESCRIPTION	APPROVED / APPROVED:

PROJECT: **OFFICE FOR EXIM BANK AT KARACHI**

EXIM OFFICE
MEETING ROOM

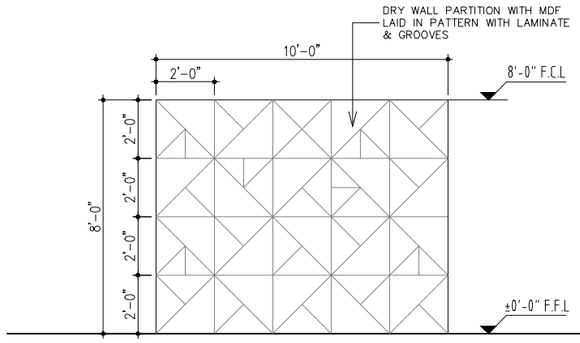
SCALE: 3/16"=1'-0"

DATE: JANUARY, 2023

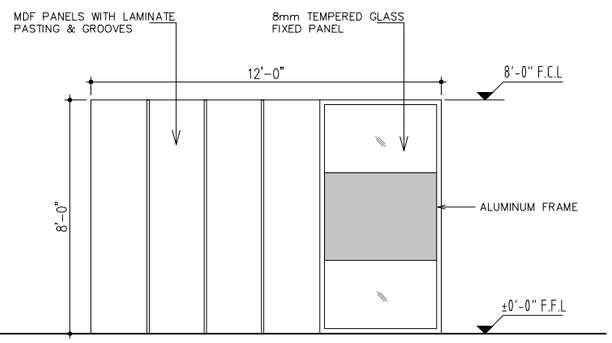
DRAWING No.: **41156/08/TD/ B 004**

REV.: 0

E:\NESPAK PROJECTS (IMRAN)\KIRAN\EXIM OFFICE\FLOOR PLAN.DWG

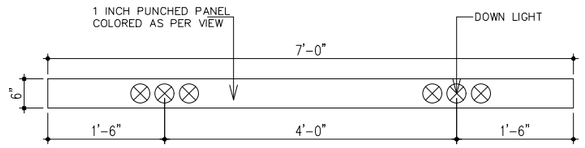


ELEVATION-1

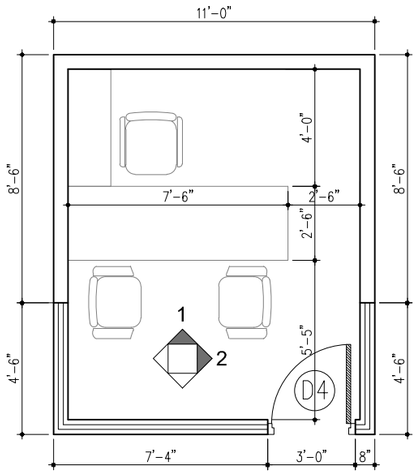


ELEVATION-2

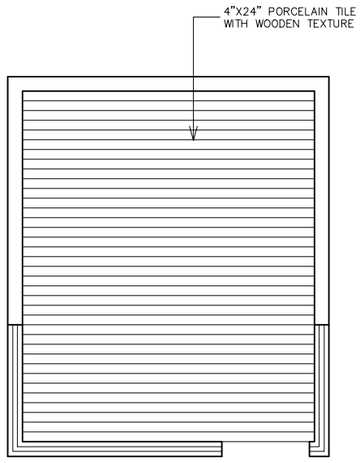
3D VIEW



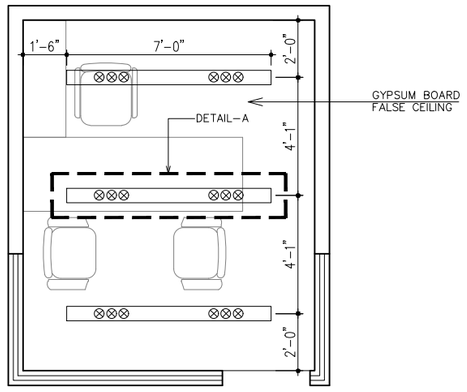
DETAIL-A



EXECUTIVE ROOM
PLAN



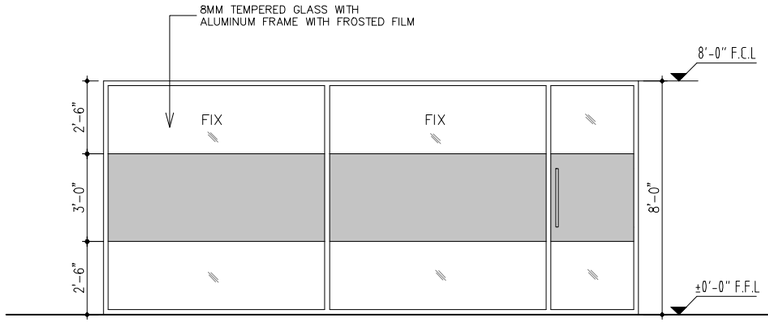
EXECUTIVE ROOM
FLOOR PATTERN



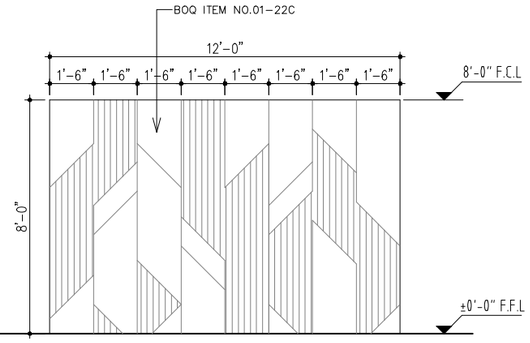
EXECUTIVE ROOM
CEILING LAYOUT

CLIENT: EXIM BANK OF PAKISTAN	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. ARCHITECTURE & PLANNING DIVISION KARACHI. 4th Floor, N.I.C. Building, Abbasi Shaheed Road, Karachi, Tel: 99225430-34	04		DRAWN	IMRAN
		03		SUBMITTED	
		02		RECOMMENDED	
		01		CHD./VER.	
		REV. / DATE / DESCRIPTION		APPROVED	
PROJECT: OFFICE FOR EXIM BANK AT KARACHI					
EXIM OFFICE — EXECUTIVE ROOM					
DATE: JANUARY, 2023	DRAWING No.: 41156/08/TD/ B 005			REV.: 0	SCALE: 3/16"=1'-0"

E:\NESPAK PROJECTS (IMRAN)\KIRAN\EXIM OFFICE\FLOOR PLAN.DWG

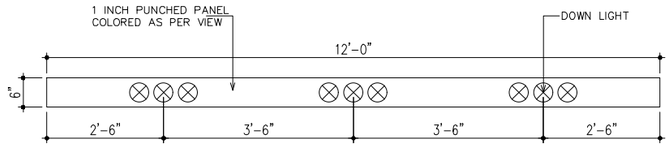


ELEVATION-1

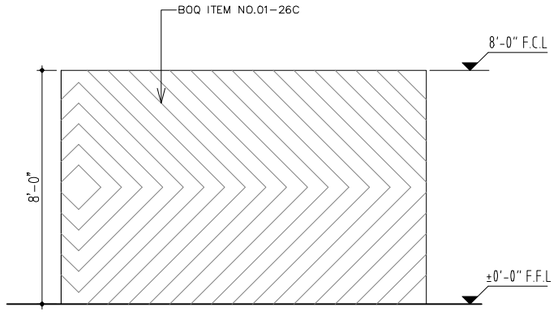


ELEVATION-2

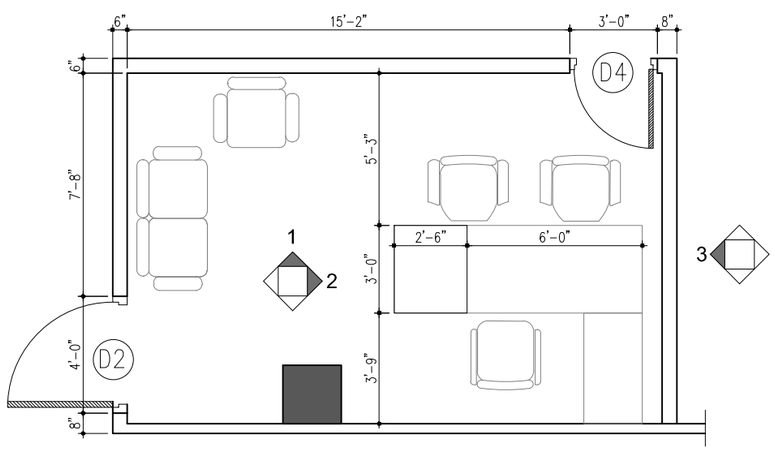
3D VIEW



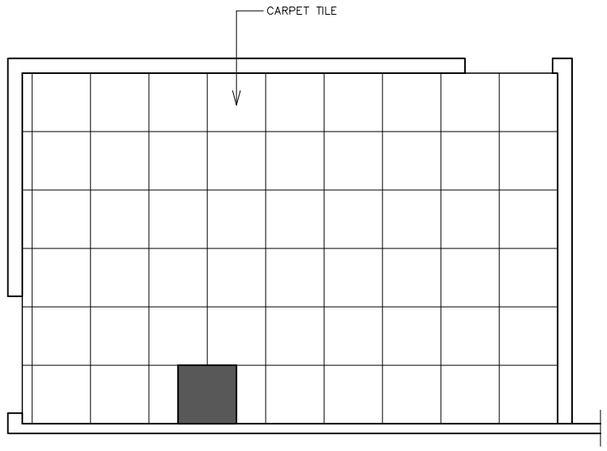
DETAIL-A



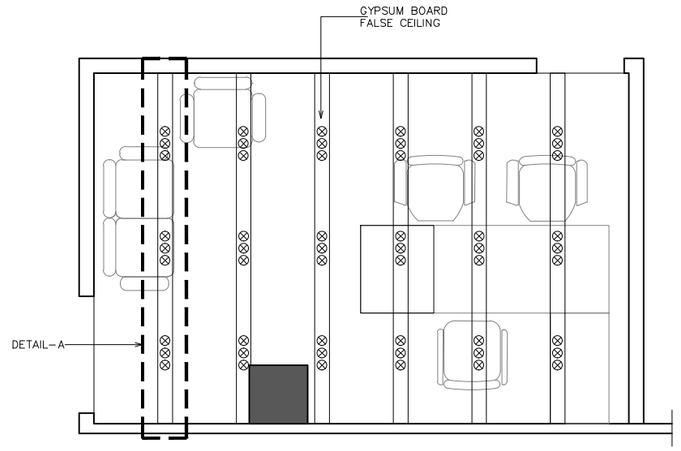
ELEVATION-3



CEO ROOM
PLAN



CEO ROOM
FLOOR PATTERN

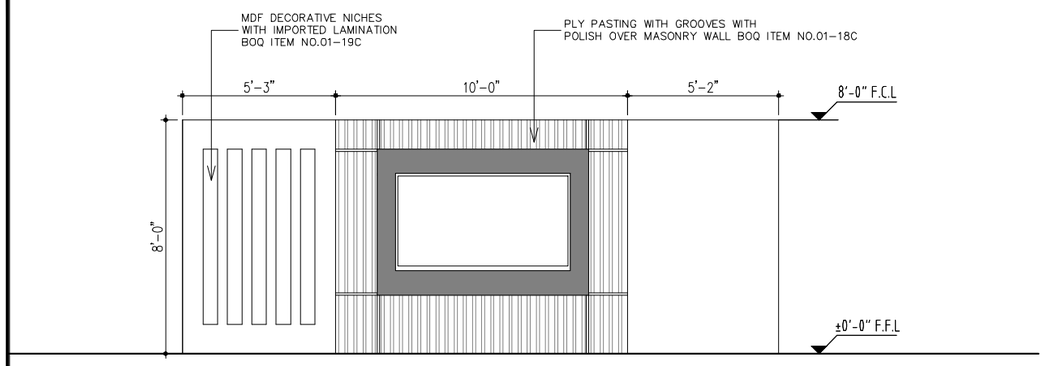


CEO ROOM
CEILING LAYOUT

CLIENT: EXIM BANK OF PAKISTAN	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. ARCHITECTURE & PLANNING DIVISION KARACHI. 4th Floor, N.I.C. Building, Abbasi Shaheed Road, Karachi, Tel: 99225430-34	PROJECT: OFFICE FOR EXIM BANK AT KARACHI	EXIM OFFICE CEO ROOM	SCALE: 3/16"=1'-0"	
			DATE: JANUARY, 2023	DRAWING No.: 41156/08/TD/ B 006	REV.: 0

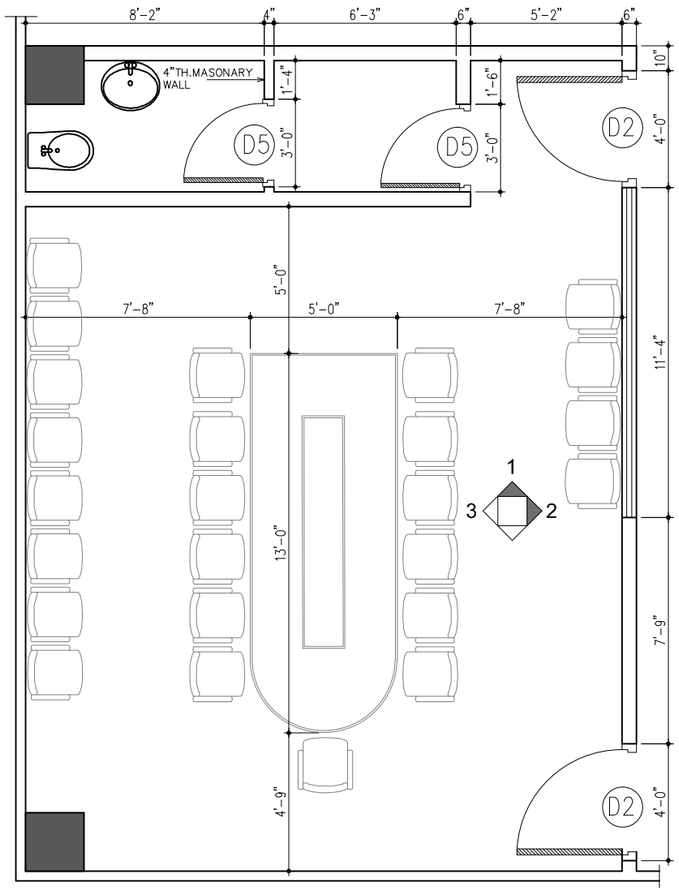
REV.	DATE	DESCRIPTION	APPROVED		
04				DRAWN	IMRAN
03				SUBMITTED	
02				RECOMMENDED	
01				CHD./VER.	
				APPROVED	

E:\NESPAK PROJECTS (IMRAN)\KIRAN\EXIM OFFICE\FLOOR PLAN.DWG

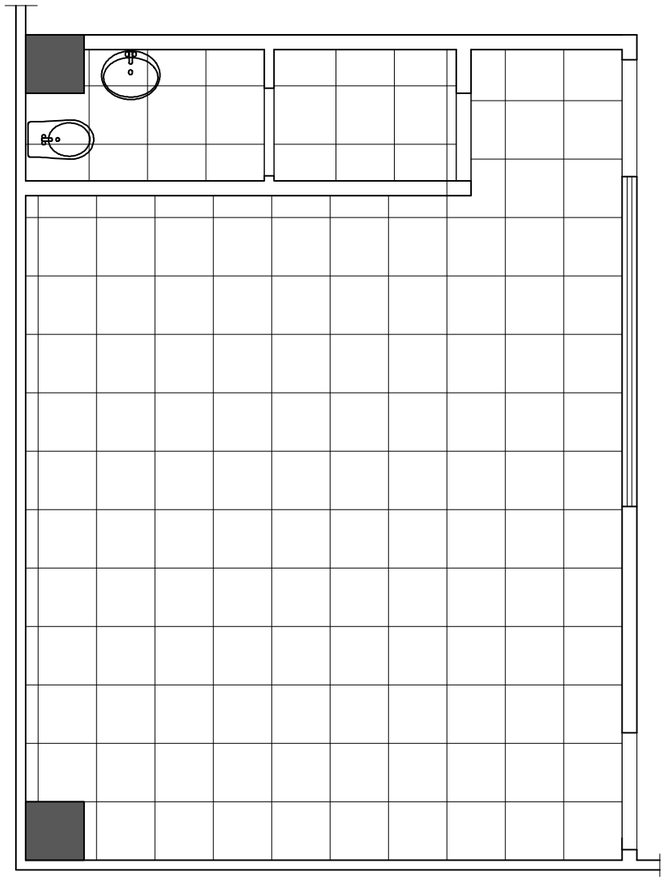


ELEVATION-1

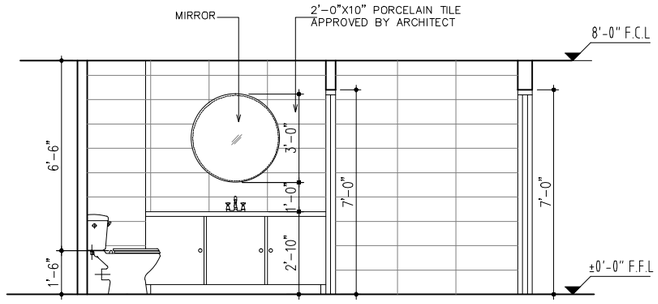
3D VIEW



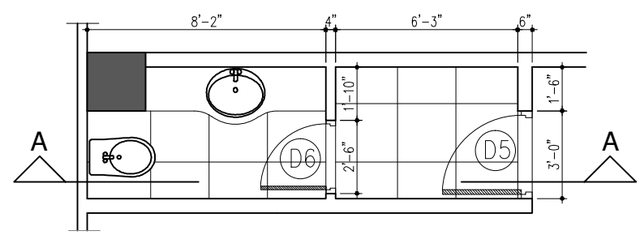
CONFERENCE
PLAN



CONFERENCE
FLOOR PATTERN



SECTION-AA



TOILET PLAN

CLIENT: EXIM BANK OF PAKISTAN	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. ARCHITECTURE & PLANNING DIVISION KARACHI. 4th Floor, N.I.C. Building, Abbasi Shaheed Road, Karachi, Tel: 99225430-34	04		DRAWN	IMRAN
		03		SUBMITTED	
		02		RECOMMENDED	
		01		CHD./VER.	
		REV.	DATE / DESCRIPTION / APPROVED	APPROVED	

PROJECT: OFFICE FOR EXIM BANK AT KARACHI

EXIM OFFICE
CONFERENCE ROOM

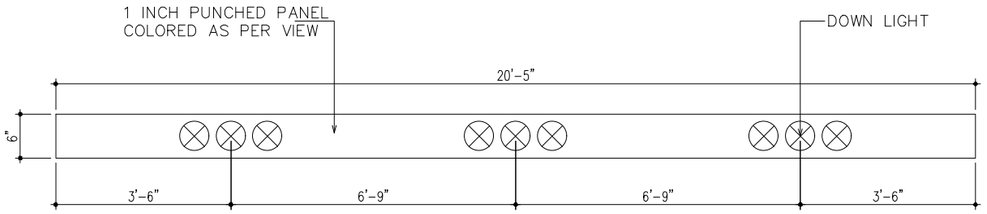
SCALE: 3/16"=1'-0"

DATE: JANUARY, 2023

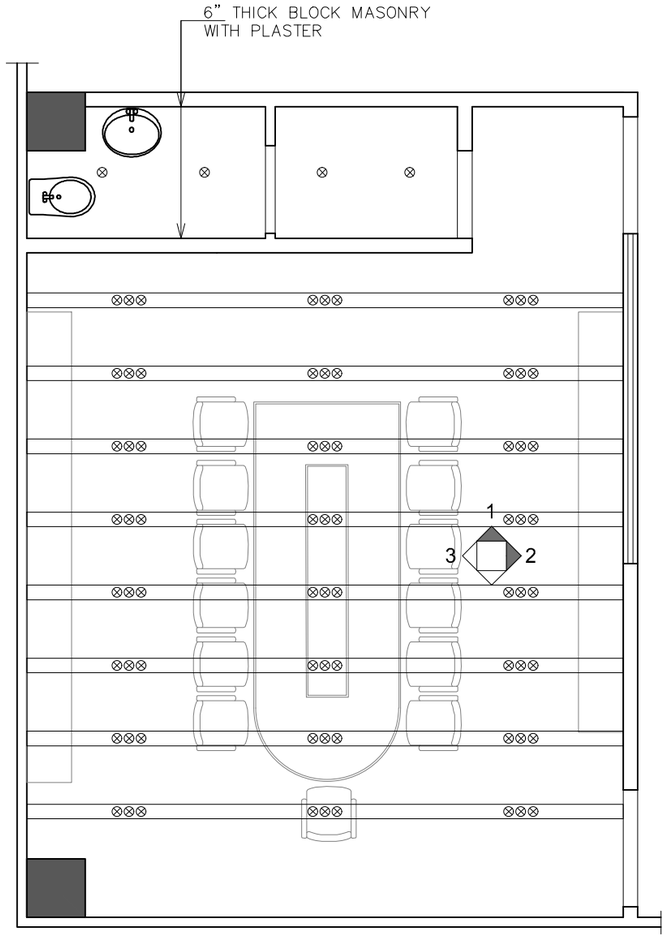
DRAWING No.: 41156/08/TD/ B 007

REV.: 0

E:\NESPAK PROJECTS (IMRAN)\KIRAN\EXIM OFFICE\FLOOR PLAN.DWG

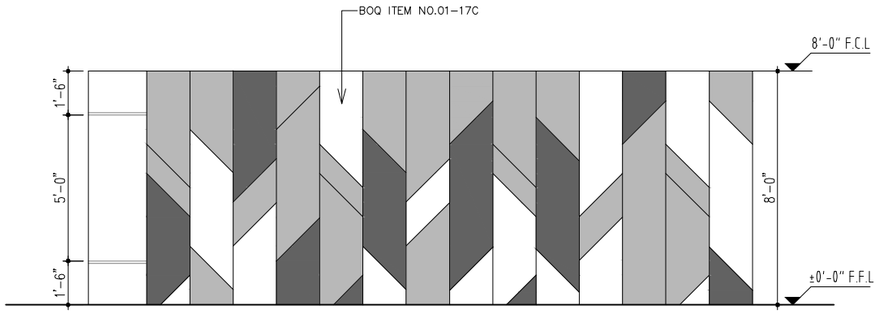


DETAIL-A

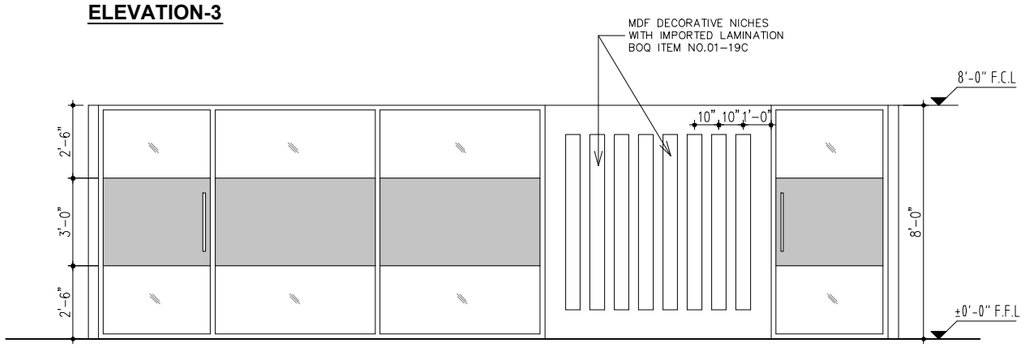


CONFERENCE
CEILING LAYOUT

3D VIEW



ELEVATION-3



ELEVATION-2

CLIENT
EXIM BANK OF PAKISTAN

CONSULTANT
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD.
ARCHITECTURE & PLANNING DIVISION KARACHI.
4th Floor, N.I.C. Building, Abbasi Shaheed Road, Karachi, Tel: 99225430-34

REV.	DATE	DESCRIPTION	APPROVED
04			
03			
02			
01			

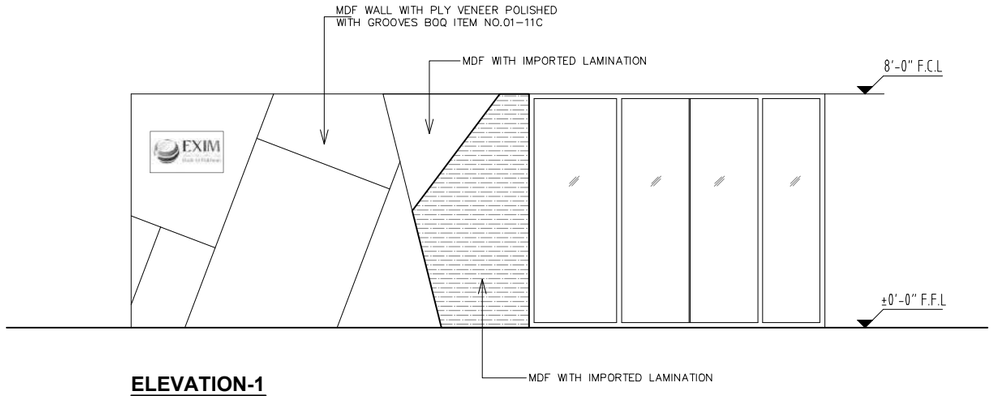
DRAWN	IMRAN
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT
OFFICE FOR EXIM BANK AT KARACHI

EXIM OFFICE
CONFERENCE ROOM

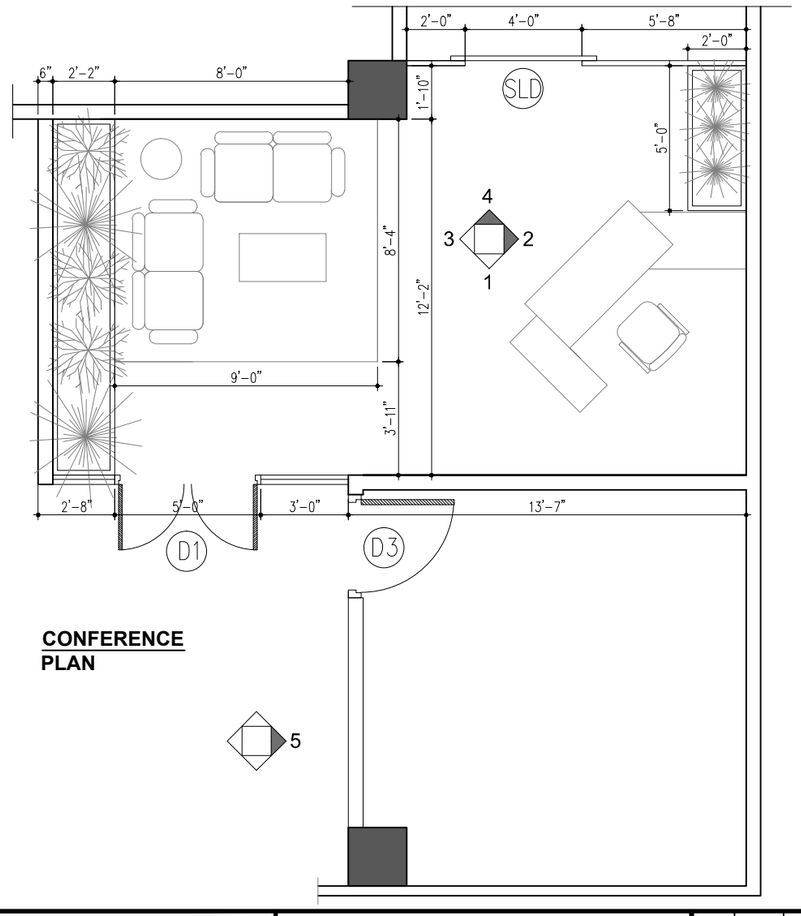
SCALE: 3/16"=1'-0"
DATE: JANUARY, 2023
DRAWING No.: **41156/08/TD/ B 008**
REV.: 0

E:\NESPAK PROJECTS (IMRAN)\KIRAN\EXIM OFFICE\FLOOR PLAN.DWG

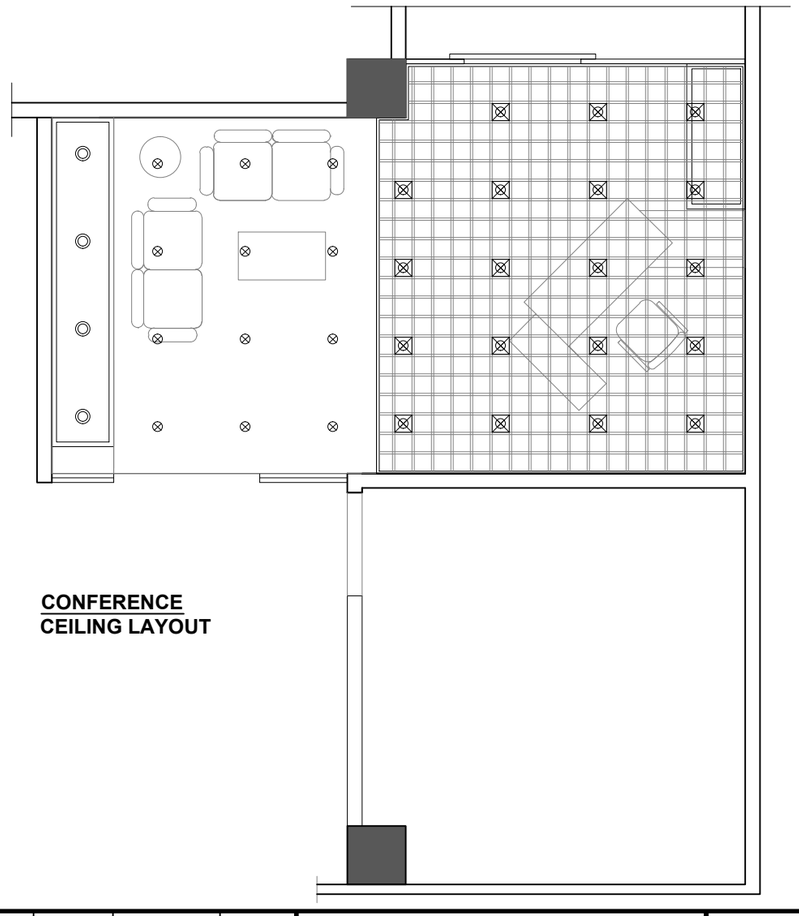


ELEVATION-1

3D VIEW



CONFERENCE
PLAN



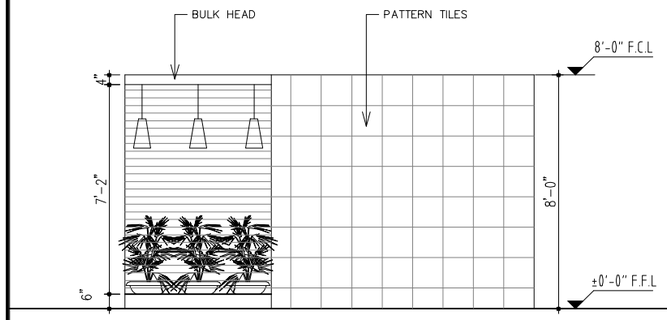
CONFERENCE
CEILING LAYOUT

CLIENT: EXIM BANK OF PAKISTAN	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. ARCHITECTURE & PLANNING DIVISION KARACHI. 4th Floor, N.I.C. Building, Abbasi Shaheed Road, Karachi, Tel: 99225430-34	PROJECT: OFFICE FOR EXIM BANK AT KARACHI	EXIM OFFICE ENTRANCE LOBBY	SCALE: 3/16"=1'-0"	
			DATE: JANUARY, 2023	DRAWING No.: 41156/08/TD/ B 009	REV.: 0

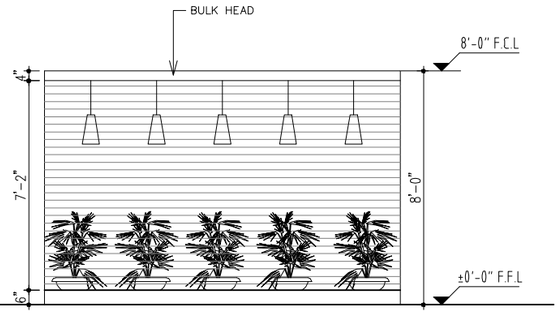
REV.	DATE	DESCRIPTION	APPROVED
04			
03			
02			
01			

DRAWN	IMRAN
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

E:\NESPAK PROJECTS (IMRAN)\KIRAN\EXIM OFFICE\FLOOR PLAN.DWG

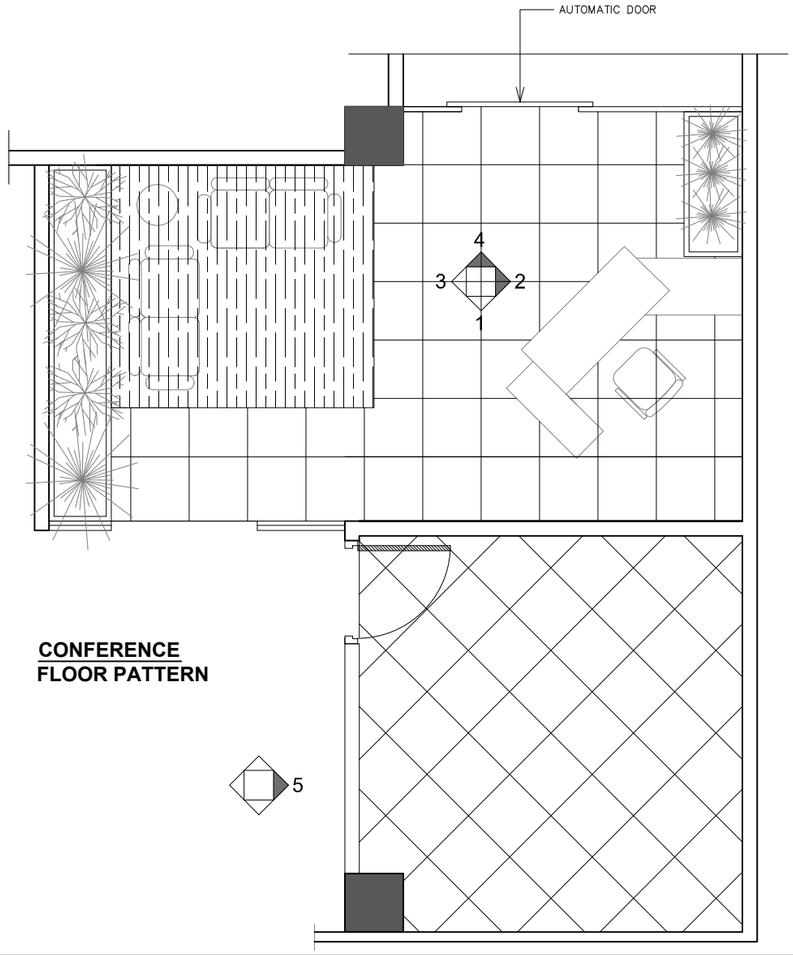


ELEVATION-2

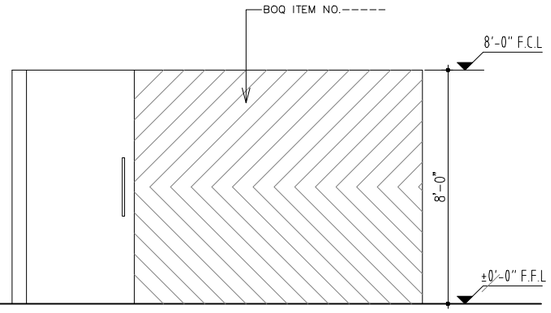


ELEVATION-3

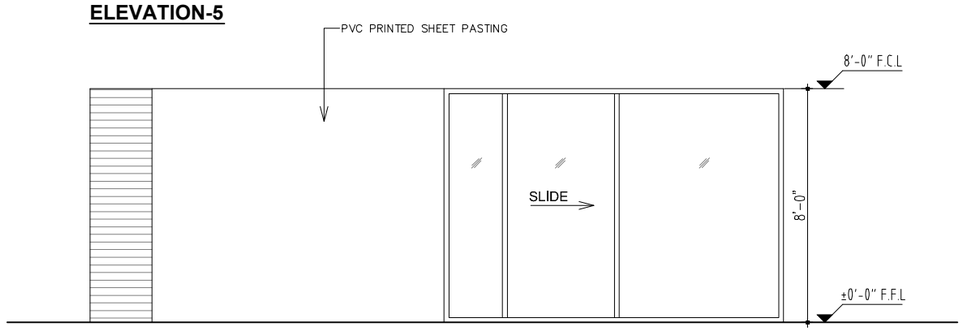
3D VIEW



CONFERENCE FLOOR PATTERN



ELEVATION-5



ELEVATION-4

CLIENT

EXIM BANK OF PAKISTAN

CONSULTANT

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD.

ARCHITECTURE & PLANNING DIVISION KARACHI.
4th Floor, N.I.C. Building, Abbasi Shaheed Road, Karachi, Tel: 99225430-34

REV.	DATE	DESCRIPTION	APPROVED
04			
03			
02			
01			

DRAWN	IMRAN
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT

OFFICE FOR EXIM BANK AT KARACHI

EXIM OFFICE
ENTRANCE LOBBY

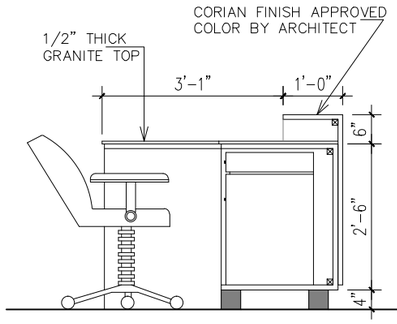
SCALE: 3/16"=1'-0"

DATE: JANUARY, 2023

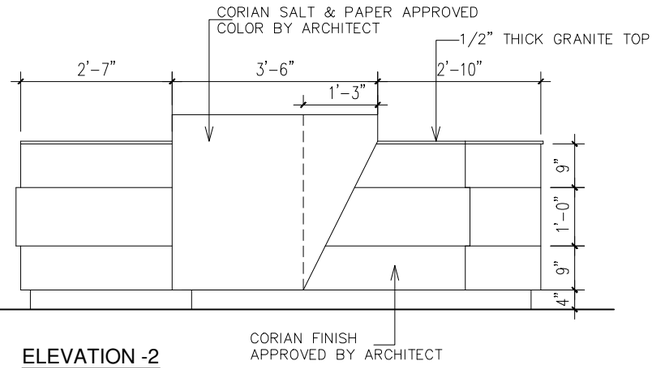
DRAWING No.: **41156/08/TD/ B 010**

REV.: 0

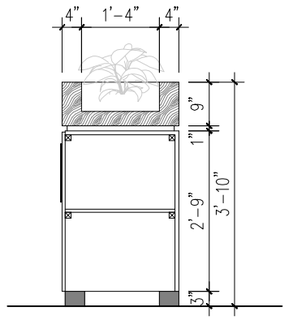
E:\NESPAK PROJECTS (IMRAN)\KIRAN\EXIM OFFICE\FLOOR PLAN.DWG



SECTION -B

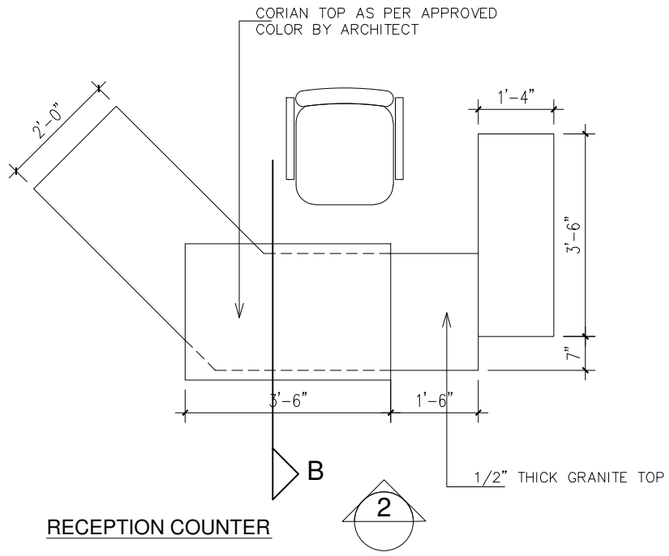


ELEVATION -2

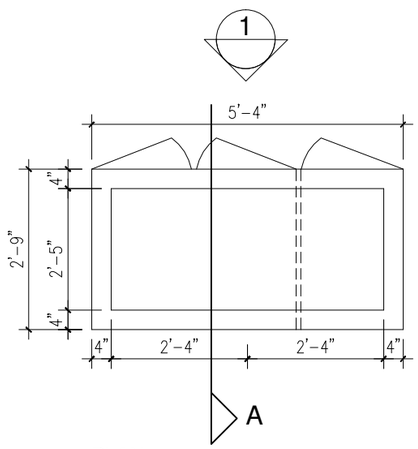


TYPICAL SECTION - A

CABINET/PLANTER

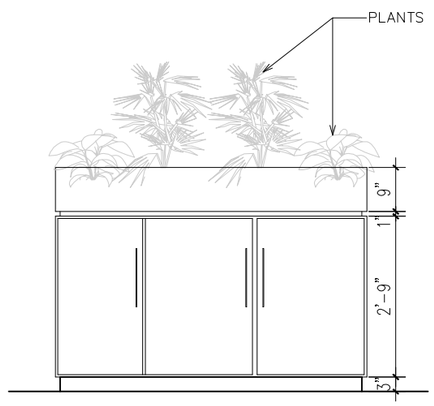


RECEPTION COUNTER



PLAN

CABINET/PLANTER



TYPICAL ELEVATION-1

CABINET/PLANTER

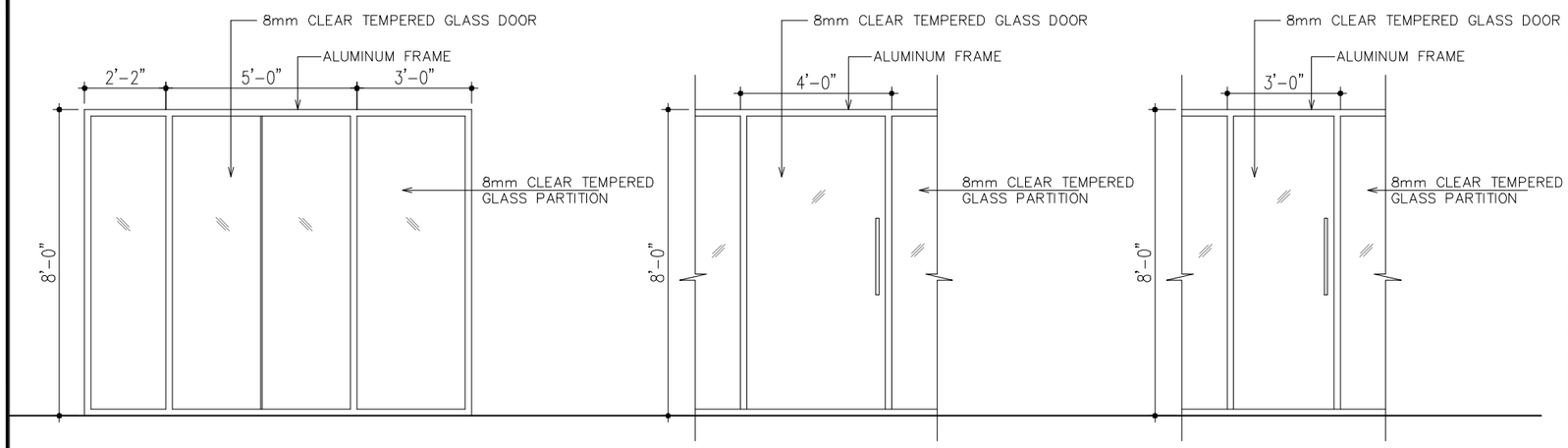
3D VIEW

3D VIEW

CLIENT	EXIM BANK OF PAKISTAN	PROJECT	OFFICE FOR EXIM BANK AT KARACHI
CONSULTANT	NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. ARCHITECTURE & PLANNING DIVISION KARACHI. 4th Floor, N.I.C. Building, Abbasi Shaheed Road, Karachi, Tel: 99225430-34		EXIM OFFICE RECEPTION & PLANTER DETAILS
		SCALE	3/8"=1'-0"
		DATE	JANUARY, 2023
		DRAWING No.	41156/08/TD/ B 011
		REV.	0

REV.	DATE	DESCRIPTION	APPROVED	
04				DRAWN: IMRAN
03				SUBMITTED
02				RECOMMENDED
01				CHD./VER.
				APPROVED

E:\NESPAK PROJECTS (IMRAN)\KIRAN\EXIM OFFICE\FLOOR PLAN.DWG

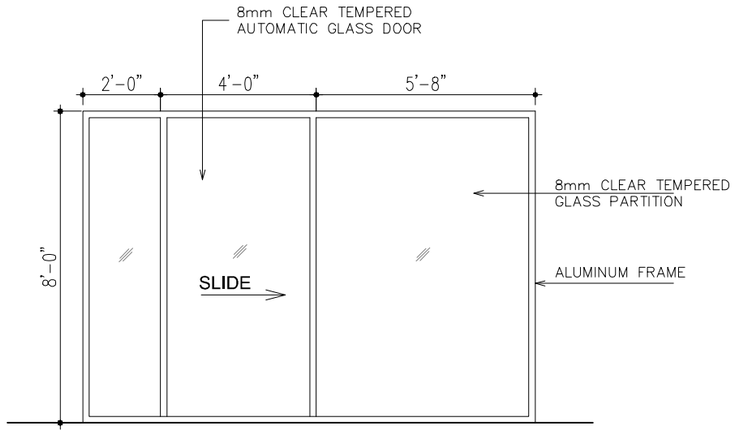


DW1
TYPICAL ELEVATION OF GLASS DOOR

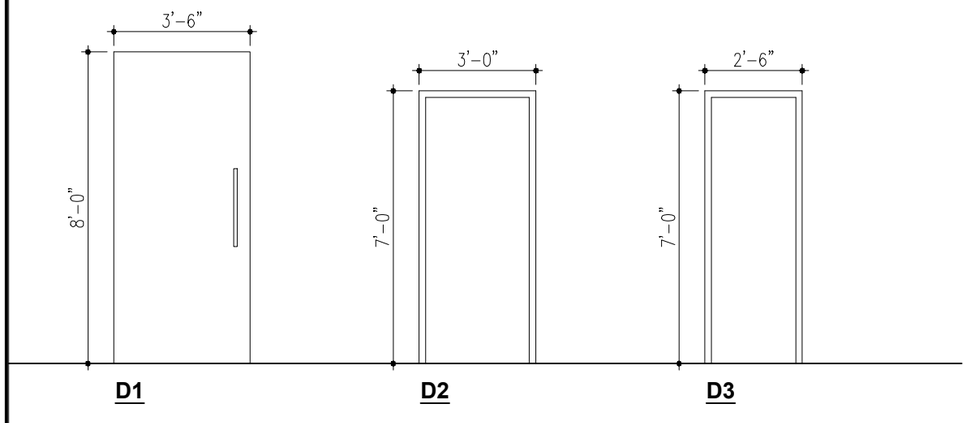
DW2
TYPICAL ELEVATION OF GLASS DOOR

DW3
TYPICAL ELEVATION OF GLASS DOOR

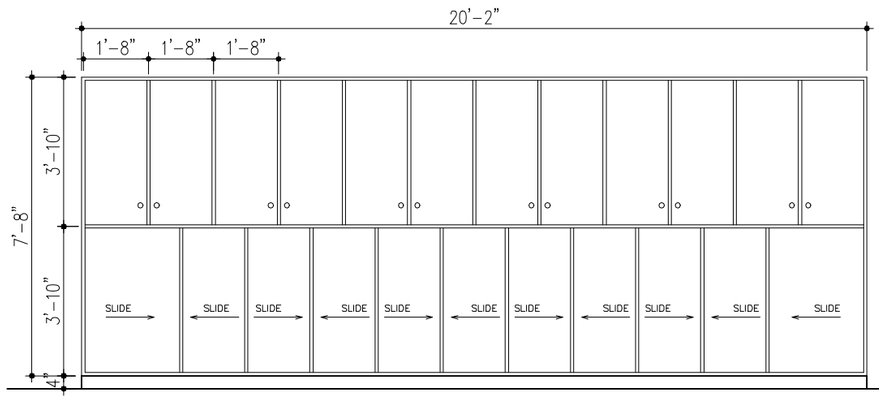
3D VIEW



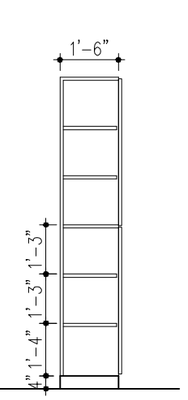
SLD



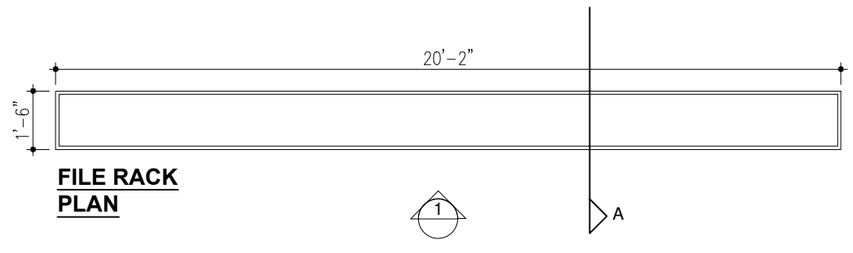
D1 **D2** **D3**



FILE RACK
TYPICAL ELEVATION



FILE RACK
SECTION-A



FILE RACK
PLAN

CLIENT
EXIM BANK OF PAKISTAN

CONSULTANT
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD.
ARCHITECTURE & PLANNING DIVISION KARACHI.
4th Floor, N.I.C. Building, Abbasi Shaheed Road, Karachi, Tel: 99225430-34

REV.	DATE	DESCRIPTION	APPROVED
04			
03			
02			
01			

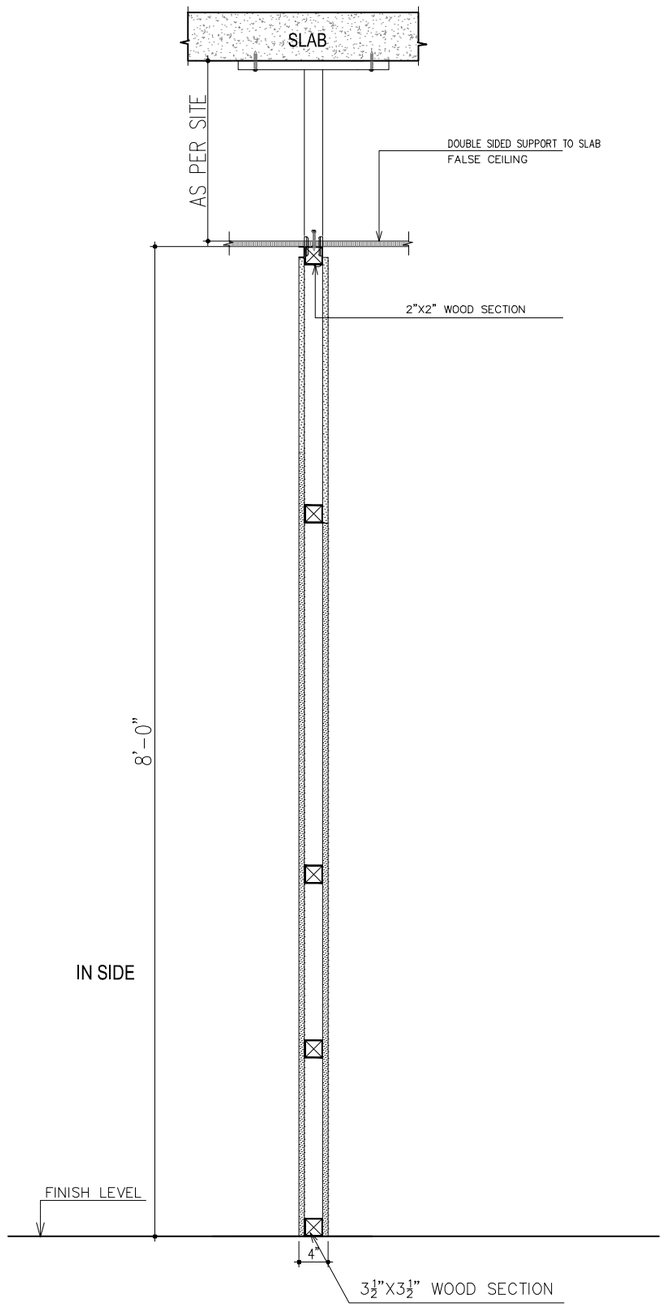
DRAWN	IMRAN
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT
OFFICE FOR EXIM BANK AT KARACHI

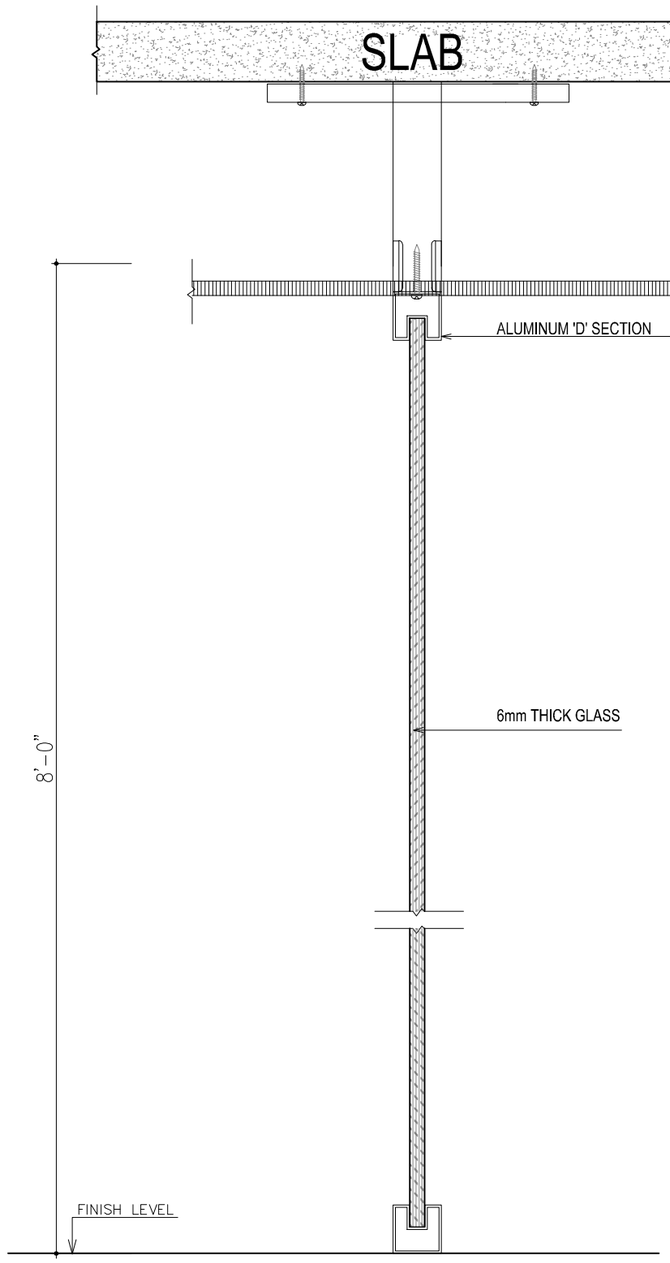
EXIM OFFICE
SCHEDULE OF DOORS & FILE RACK DETAILS

DATE: JANUARY, 2023
DRAWING No.: **41156/08/TD/ B 012**
SCALE: 1/4"=1'-0"
REV.: 0

E:\NESPAK PROJECTS (IMRAN)\KIRAN\EXIM OFFICE\FLOOR PLAN.DWG



TYPICAL DETAIL OF DRY WALL PARTTION



TYPICAL DETAIL OF GLASS WALL PARTTION

CLIENT
EXIM BANK OF PAKISTAN

CONSULTANT
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD.
ARCHITECTURE & PLANNING DIVISION KARACHI.
4th Floor, N.I.C. Building, Abbasi Shaheed Road, Karachi, Tel: 99225430-34

REV.	DATE	DESCRIPTION	APPROVED
04			
03			
02			
01			

DRAWN	IMRAN
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT
OFFICE FOR EXIM BANK AT KARACHI

EXIM OFFICE
DETAIL OF PARTITION WALLS

DATE: JANUARY, 2023
DRAWING No.: **41156/08/TD/ B013**
REV.: 0
SCALE:

E:\NESPAK PROJECTS (IMRAN)\KIRAN\EXIM OFFICE\FLOOR PLAN.DWG

ELECTRICAL & COMMUNICATION

LEGEND

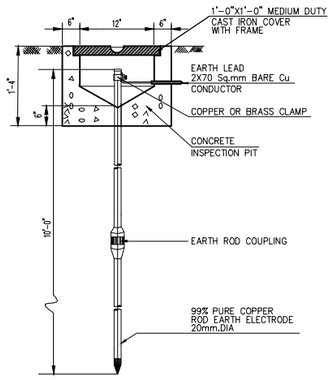
S.#	SYMBOL	DESCRIPTION
1		MAIN PANEL BOARD (MPB) OR SUB MAIN PANEL BOARD (SMPB)
2		DISTRIBUTION BOARD (DB) LDB – LIGHTING DISTRIBUTION BOARD, PDB – POWER DISTRIBUTION BOARD
3		BATTERY BACKUP LIGHTING CONTROLLER
4		MOTOR CONTROL CENTER
5		FEEDER PILLAR PANEL (FP)
6	ATS	AUTOMATIC TRANSFER SWITCH WITH AUTO MAIN FAILURE (ATS)
7	Adj.	TRIPLE POLE, 500 VOLTS, MOULDED CASE CIRCUIT BREAKER (RUPTURING CAPACITY INDICATED ON THE DRAWINGS) Adj.–INDICATES ADJUSTABLE TYPE
8		SINGLE POLE, 250 VOLTS, MINIATURE CIRCUIT BREAKER (RUPTURING CAPACITY INDICATED ON THE DRAWINGS)
9		DOUBLE POLE, 250 VOLTS, MINIATURE CIRCUIT BREAKER (RUPTURING CAPACITY INDICATED ON THE DRAWINGS)
10		TRIPLE POLE, 500 VOLTS, MINIATURE CIRCUIT BREAKER (RUPTURING CAPACITY AND RATING INDICATED ON THE DRAWINGS)
11	VSS	VSS – VOLTMETER SELECTOR SWITCH (7–POSITION)
12	V	AC VOLTMETER (MEASURING RANGE INDICATED ON DRAWING)
13	ASS	AMMETER SELECTOR SWITCH (4–POSITION)
14	A	AC AMMETER (MEASURING RANGE INDICATED ON DRAWING)
15	C	SINGLE POLE / THREE POLES, 250V / 500V, CONTACTOR "C" INDICATES CIRCUIT CONTROL THROUGH CONTACTOR
16	O M A	AUTO–OFF–MANUAL SELECTOR SWITCH
17	IP/C1/R1	ON–OFF PUSH BUTTON, IP/C1/R1 INDICATES 1 NO. PUSH BUTTON FOR CONTACTOR NO.1 FED FROM CIRCUIT NO. 1 OF RED PHASE
18	M	ENERGY METER AS PER WAPDA / KESC SPECS OR AS SPECIFIED SINGLE / THREE PHASE MENTIONED ON SLD
19		PHASE INDICATION LAMPS R – RED Y – YELLOW B – BLUE
20	3S/2DM/R1	10A LIGHT CONTROL GANG SWITCH WITH DIMMER, 3S INDICATES 3 Nos. SWITCH, '2DM' INDICATES 2 Nos. FAN DIMMER & R1 INDICATES CIRCUIT NO.1 FROM 'RED' PHASE
21		13 AMPS, 250 VOLTS, 3 PIN UNIVERSAL, SWITCH SOCKET OUTLET TV = INDICATES "TELEVISION" EP – INDICATES "ELECTRIC PLATE" EK – INDICATES "ELECTRIC KETTLE" MW – INDICATES "MICROWAVE"
22		16 AMPS, 250 VOLTS, 2 PIN+EARTH, SCHUKO SOCKET OUTLET,
23		1 NO. 13 AMPS, 250 VOLTS, 3 PIN UNIVERSAL, SWITCH SOCKET OUTLET, ON NORMAL SUPPLY 2 NO. 13 AMPS, 250 VOLTS, 3 PIN UNIVERSAL, SWITCH SOCKET OUTLET, ON UPS SUPPLY
24		VERTICAL 16 SWG POWDER COATED POST WITH 2 NO. 13 AMP 250 VOLTS, 3 PIN UNIVERSAL SWITCH SOCKET OUTLET
25		15A. 250V, POWER SOCKET
26		20 AMPS, 250 VOLTS, DP SWITCH WITH NEON INDICATION HD–INDICATES "HAND DRYER" EWH–INDICATES "ELECTRIC WATER HEATER"
27		13A SHAVER SOCKET
28		INDUSTRIAL SOCKET SINGLE PHASE, 3 PIN, L+N+E
29		INDUSTRIAL SOCKET THREE PHASE, 5 PIN, 3L+N+E
30		LOAD BREAK SWITCH SINGLE PHASE, DOUBLE POLE
31		LOAD BREAK SWITCH THREE PHASE, TRIPLE POLE
32	E	EARTH CABLE/EARTHING LEAD/EARTH CONTINUITY CONDUCTOR (ECC) FOR EARTHING SYSTEM
33	ECP	EARTH CONNECTING POINT
34		ROD TYPE EARTH ELECTRODE
35		PLATE TYPE EARTH ELECTRODE
36	MH	RCC MANHOLE, ALPHABETS INDICATES THE TYPE OF MANHOLES
37	HH	RCC HANDHOLE
38		CABLE TRAY PERFORATED TYPE WITH COVER (SIZE & THICKNESS AS INDICATED ON DRAWINGS)

NOTE: THE MAKE OF COMPONENTS & MATERIAL IS AS PER APPROVED MANUFACTURER'S LIST IN VOL–I

LIGHT FIXTURES SCHEDULE

S.#	LEGEND	DESCRIPTION	REMARKS
1	DL1	SURFACE MOUNTED LED DOWNLIGHT SMD FIXTURE 150 MM OR LESS DIA, 1000 LUMENS LIGHT OUTPUT, 8 W OR LESS, DIE CAST ALUMINIUM HOUSING AND HEAT SINK, 4000K, CRI 80, LED OUTPUT DRIVER (PF 0.9), IP20.	SURFACE MOUNTED
2	SP1	RECESSED MOUNTED LED ADJUSTABLE SPOT LIGHT FIXTUE 100 MM OR LESS DIA, 500 LUMENS LIGHT OUTPUT, 5 W OR LESS, 36 DEG BEAM, 4000K, CRI 80, LED OUTPUT DRIVER (PF 0.5), IP20.	RECESSED TYPE
3	SP2	RECESSED MOUNTED LED ADJUSTABLE SPOT LIGHT FIXTUE 100 MM OR LESS DIA, 500 LUMENS LIGHT OUTPUT, 8 W OR LESS, 36 DEG BEAM, 4000K, CRI 80, LED OUTPUT DRIVER (PF 0.5), IP20.	RECESSED TYPE
4	PD1	DECORATIVE LONG CYLINDRICAL PANDENT LIGHT FIXTURE (MAXIMUM 100 MM OR LESS DIA) 350 LUMENS OUTPUT, 15 W OR LESS, ALUMINIUM BODY, 15 DEGREE BEAM ANGLE, 4000K, CRI 80, LED OUTPUT DRIVER (PF 0.5), IP20, SUITABLE LENGTH OF SUSPENSION SYSTEM AND MOUNTING ACCESSORIES INCLUDING CANOPY & PANDENT HOLDER.	RECESSED TYPE
5	MS1	RECESSED MOUNTED MULTIPLE LED ADJUSTABLE SPOT LIGHT FIXTURE, 100 MM OR LESS DIA, 2X350 LUMENS OUTPUT, 5 W OR LESS, 24 DEG BEAM, 4000K, CRI 80, LED OUTPUT DRIVER (PF 0.9).	RECESSED TYPE
6	MS2	RECESSED MOUNTED MULTIPLE LED ADJUSTABLE SPOT LIGHT FIXTURE, 100 MM OR LESS DIA, 2X500 LUMENS OUTPUT, 2X8 W OR LESS, 36 DEG BEAM, 4000K, CRI 80, LED OUTPUT DRIVER (PF 0.9).	RECESSED TYPE
7	MS3	RECESSED MOUNTED LED ADJUSTABLE SPOT LIGHT FIXTURE 100 MM OR LESS, 500 LUMENS LIGHT OUTPUT, 3X8 W OR LESS, 20 DEG BEAM, 4000K, CRI 80, LED OUTPUT DRIVER (PF 0.5), IP20.	RECESSED TYPE
8	PL1	RECESSED MOUNTED LED PANEL LIGHT FIXTURE, 300 X 1200 MM, 4000 LUMENS OUTPUT, 32 W OR LESS, 120 DEG BEAM, 4000K, CRI 80, LED OUTPUT DRIVER (PF 0.9), IP20.	RECESSED IN FALSE CEILING
9	PL2	RECESSED MOUNTED LED PANEL LIGHT FIXTURE, 600 X 600 MM, 4000 LUMENS OUTPUT, 32 W OR LESS, 120 DEG BEAM, 4000K, CRI 80, LED OUTPUT DRIVER (PF 0.9), IP20.	RECESSED IN FALSE CEILING
10	EB1	RECESSED MOUNTED, NON–MAINTAINED TYPE EMERGENCY LIGHT FIXTURE, 3.5 W WITH NI–CD BATTERY BACKUP UNIT FOR 3 HOURS STANDBY OPERATION, OVER CHARGE & DISCHARGE PROTECTION, 3 NO. INDICATION LIGHT FOR POWER, CHARGING & FAULT, TEST BUTTON, IP65 INGRESS PROTECTION.	RECESSED TYPE/ SURFACE MOUNTED/ SUSPENDED
11	EXT 1	RECESSED MOUNTED OR SURFACE MOUNTED OR SUSPENDED INCLUDING SUSPENSION SYSTEM WITH BASE, NON MAINTAINED TYPE EMERGENCY EXIT LIGHT FIXTURE WITH SIGN & DIRECTION PICTOGRAMS, WITH NI–CD BATTERY BACKUP UNIT FOR 3 HOURS STANDBY OPERATION,OVER CHARGE & DISCHARGE PROTECTION, 3 NO. INDICATION LIGHT FOR POWER, CHARGING & FAULT, TEST BUTTON, IP30 INGRESS PROTECTION (NOTE: THE LIGHT FIXTURE QUANITY FOR SURFACE MOUNTED OR SUSPENDED SHALL BE EVALUATED BY THE CONTRACTOR AS PER SITE CONDITIONS).	RECESSED TYPE/ SURFACE MOUNTED/ SUSPENDED
12	ST1	LED FLEXIBLE STRIP (SUITABLE FOR CURVED OR CORNOR SURFACES) 1200 LUMENS LIGHT OUTPUT, 15 W OR LESS, 3000K, CRI 80, LED OUTPUT DRIVER (PF 0.9), IP65.	

NOTE: THE MAKE OF LIGHT FIXTURES IS AS PER APPROVED MANUFACTURER'S LIST IN VOL–I



EARTH ELECTRODE (ROD TYPE)
N.T.S.

GENERAL NOTES

1. FOLLOWING NOTES SHALL IN GENERAL APPLY TO ALL ELECTRICAL DRAWINGS. THE INSTRUCTIONS IN THESE NOTES SHALL BE FOLLOWED UNLESS STATED OTHERWISE.
2. THESE NOTES SHALL BE APPLICABLE TO THE ENTIRE ELECTRICAL WORKS. IF THE SITE CONDITIONS NECESSITATE ANY ALTERATIONS OR DEVIATIONS THE DIRECTIONS OF THE ENGINEER SHALL BE OBSERVED AS FINAL INSTRUCTIONS.
3. ALL ELECTRICAL DRAWINGS SHALL BE READ IN CONJUNCTION WITH BOQ, TECHNICAL SPECIFICATIONS, ARCHITECTURAL, STRUCTURAL, PLUMBING AND HVAC DRAWINGS & ALL OTHER RELEVANT DETAILS.
4. DIMENSIONS/MEASUREMENTS GIVEN IN LAYOUT AND DETAILED DRAWINGS ARE APPROXIMATE. THE CONTRACTOR SHALL BE RESPONSIBLE TO CALCULATE THE ACTUAL DIMENSIONS/ MEASUREMENTS ACCORDING TO STRUCTURAL AND ARCHITECTURAL DRAWINGS.
5. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS WITH ALL RELEVANT DETAILS TO THE ENGINEER FOR APPROVAL ACCORDING TO THE GENERAL CONDITIONS OF CONTRACT WELL IN TIME BEFORE COMMENCEMENT OF THAT WORK.
6. PROPER CO–ORDINATION OF ELECTRICAL WORKS WITH OTHER SERVICES SHALL BE CARRIED OUT AT SITE.
7. ALL NON – CURRENT CARRYING PARTS i.e. OUTER CASINGS OF EQUIPMENT SUCH AS HT & LT PANELS, DISTRIBUTIONS BOARDS, CABLE TRAYS, AUXILIARY CONSTRUCTIONS FOR EQUIPMENT ETC. SHALL BE CONNECTED TO THE GROUNDING/ EARTHING SYSTEM AT REQUIRED NUMBER OF POINTS WITH SPECIFIED SIZES OF CONDUCTORS. WATER PIPES ALONG ELECTRICAL LINE SHALL BE BONDED TO THE EARTHING SYSTEM WITH 10 Sq.mm. SINGLE CORE, COPPER CONDUCTOR PVC CABLE.
8. ELECTRICAL POINTS FOR EQUIPMENT SHALL BE INSTALLED IN CO–ORDINATION WITH THE RELEVANT EQUIPMENT DRAWINGS OF OTHER SERVICES SUCH AS COMMUNICATION SYSTEMS, HVAC, PLUMBING ETC. THE LOCATION ON ELECTRICAL DRAWINGS IS ONLY INDICATIVE.
9. ARRANGEMENT OF ELECTRICAL EQUIPMENTS ON ELECTRICAL DRAWINGS ARE TENTATIVE. EXACT ARRANGEMENT OF EQUIPMENTS SHALL BE MADE IN VIEW OF ITS PHYSICAL DIMENSIONS AND EASE OF MAINTENANCE.
10. LOADS ON ALL PHASES SHALL BE BALANCED AT THE TESTING/ COMMISSIONING STAGE.
11. CONDUIT/DUCT RUN UNDER FLOOR SHALL HAVE A MINIMUM COVER OF 2" FROM TOP OF CONDUIT/DUCT TO FINISH FLOOR LEVEL.

    RUN GREEN–YELLOW OR GREEN SINGLE CORE PVC INSULATED COPPER CONDUCTOR CABLE OF SPECIFIED SIZES AS EARTH CONTINUITY CONDUCTOR (ECC) ALL ALONG LIGHT AND POWER WIRING. WHEREVER THE SIZE IS NOT SPECIFIED THE FOLLOWING CRITERIA SHALL BE OBSERVED TO DETERMINE MINIMUM CROSS SECTIONAL AREA OF EARTH CONTINUITY CONDUCTOR (ECC) IN RELATION TO THE AREA OF ITS PHASE CONDUCTORS. RUN SEPARATE ECC FOR EACH CIRCUIT.

    – ECC & PHASE CONDUCTOR OF SAME SIZE FOR UPTO AND INCLUDING 16 Sqmm CABLES.
    – 16 Sqmm ECC FOR PHASE CONDUCTOR OF 16 Sqmm, 25 Sqmm & 35 Sqmm CABLES.
    – FOR CABLES OF 50 Sqmm AND ABOVE SIZES, ECC IS HALF SIZE OF PHASE CONDUCTOR.
    – MAXIMUM SIZE OF ECC IS 70 Sqmm (IF NOT MENTIONED OTHERWISE).
13. ALL WIRING TO LIGHT AND SOCKET CIRCUITS & FOR CONTROLS SHALL BE CARRIED OUT WITH SINGLE CORE PVC INSULATED COPPER CONDUCTOR CABLE OF SPECIFIED VOLTAGE GRADE IN SURFACE GI CONDUIT OF SPECIFIED SIZE. UNLESS SPECIFICALLY STATED ON DRAWINGS/BOQ.
14. LIGHT CONTROL SWITCH BOARD SHALL BE INSTALLED 6" AWAY
15. BEFORE DETERMINING THE CUT LENGTHS OF CABLE,THE ACTUAL MEASUREMENT AT SITE SHALL BE MADE WITH PROVISION FOR SLACK AT LT PANELS/ DISTRIBUTION BOARDS AND SPARE LENGTH FOR LOOPS AS REQUIRED.
16. ALL UNDERGROUND PIPES AFTER INSTALLATION SHALL BE PLUGGED AND SEALED AT BOTH ENDS AND JOINTS TO AVOID INGRESS OF WATER INTO PIPES.
17. APPROPRIATE SIZE CLASS 'D' PVC PIPES SHALL BE LAID ALL ALONG THE CROSSINGS OF CABLES UNDER ROADS OR PAVED AREAS.
18. THE No. OF SINGLE CORE CABLES IN ANY CONDUIT SHALL BE DETERMINED SUCH THAT THE RATIO OF CABLE AREA INCLUDING PROTECTIVE EARTH CONDUCTOR TO CONDUIT AREA IS NOT MORE THAN 0.4:1.0. WHERE DIFFERENT SIZES OF CABLES RUN IN SAME CONDUIT.THE SIZE SHALL BE BASED ON ACTUAL CABLE AREA. WHEREVER CONDUIT SIZE IS NOT SPECIFIED, 25mm. DIA CONDUIT SHALL BE INSTALLED PROVIDED IT MEETS THE ABOVE CRITERIA.THE FOLLOWING TABLE IS GIVEN AS GENERAL GUIDELINE.

S.NO	NOMINAL CONDUCTOR SIZE(SQMM)	NO. & DIA OF WIRES	NOMINAL OVERALL DIA	20 MM DIA (3/4" DIA)	25 MM DIA (1" DIA)	32 MM DIA (1¼" DIA)
1	1.5	1/1.38	3.1	10	18	30
2	2.5	1/1.78	3.5	8	14	23
3	2.5	7/0.67	3.8	7	12	20
4	4	7/0.85	4.3	5	9	15
5	6	7/1.04	4.9	4	7	12
6	10	7/1.35	6.2	2	4	7
7	16	7/1.70	7.3	–	3	5
8	25	7/2.14	9.0	–	2	3
9	35	19/1.53	10.3	–	–	2

19. EACH CIRCUIT NORMAL OR EMERGENCY SHALL BE LAID IN A SEPARATE CONDUITS OF APPROPRIATE SIZE AS MENTIONED IN ABOVE TABLE.
20. ALL WIRING FOR CONTROLS SHALL BE CARRIED OUT WITH MULTI CORE PVC CABLES OF SPECIFIED REQUIRED VOLTAGE GRADE AND SIZES.
21. THE WIRING SHALL BE CONTINUOUS LOOPING–IN AND LOOPING –OUT TYPE AND NO JOINT IN WIRES SHALL BE ALLOWED.
22. THE WIRING SYSTEM SHALL BE CARRIED OUT ONLY AFTER THE CONDUIT SYSTEM IS COMPLETELY INSTALLED AND ALL OUTLET BOXES, ETC. ARE FIXED IN POSITION. ALL ROUGH EDGES OF CONDUITS / ACCESSORIES SHALL BE SMOOTH BEFORE WIRING.
23. MOUNTING HEIGHTS OF ELECTRICAL FITTINGS WHEN MEASURED FROM FINISHED FLOOR LEVEL (F.F.L.) TO THE BOTTOM OF FITTINGS SHALL BE AS UNDER, UNLESS OTHERWISE SHOWN OR INSTRUCTED.

DISTRIBUTION BOARD/ISOLATED POWER PANEL	1200mm
ON/OFF PUSH BUTTON	1200mm
LIGHT CONTROL SWITCH (ONE WAY/TWO WAY)	1200mm
15A/16A/20A/GROUNDING JACK MODULES OUTLETS	250mm / REFER ARCH. DRAWINGS.
EXHAUST FAN	REFER ARCH DWG.
TELECOM OUTLET	250 mm
TELECOM OUTLET FOR WIRELESS ACCESS POINT	2400 mm
TV OUTLET	250 mm

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4th Floor, N.I.C. Building, Abbasi Shaheed Road, Karachi, Tel: 99225430–34

REV.	DATE	DESCRIPTION	APPROVED
04			
03			
02			
01			

DRAWN	IMRAN
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT
OFFICE FOR EXIM BANK AT KARACHI

EXIM OFFICE
ELECTRICAL LEGEND & GENERAL NOTES

SCALE: 1/16"=1'–0"
DATE: JANUARY, 2023
DRAWING No.: **41156/08/TD/ E 001**
REV.: 0

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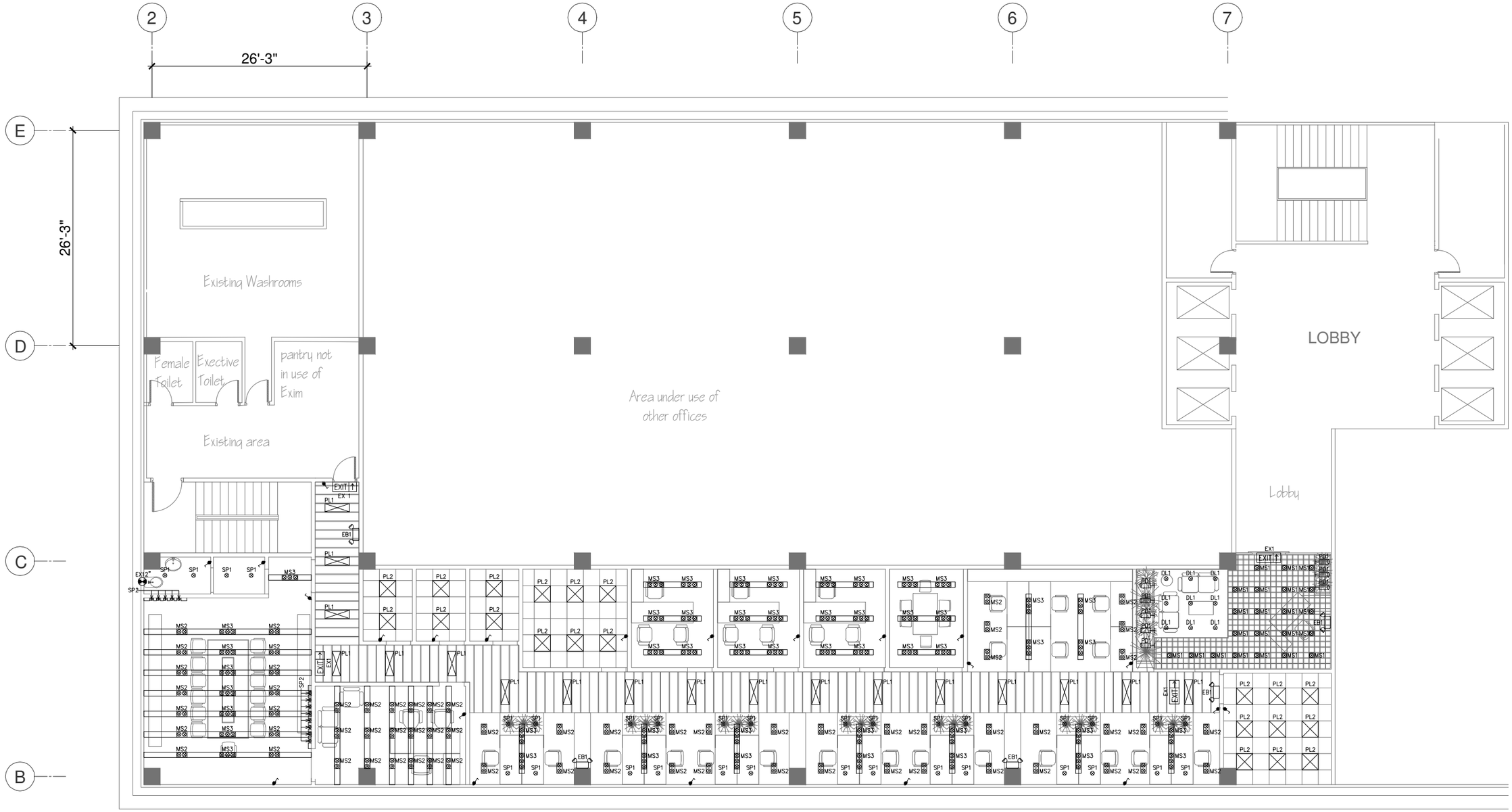

CEILING LAYOUT

CLIENT	EXIM BANK OF PAKISTAN		
CONSULTANT	NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. ARCHITECTURE & PLANNING DIVISION KARACHI. 4th Floor, N.I.C. Building, Abbasi Shaheed Road, Karachi, Tel: 99225430-34		
PROJECT	OFFICE FOR EXIM BANK AT KARACHI		
EXIM OFFICE LIGHTING LAYOUT			
DATE	JANUARY, 2023		
DRAWING No.	41156/08/TD/E002		
SCALE	3/16"=1'-0"		
REV.	0		

REV.	DATE	DESCRIPTION	APPROVED
04			
03			
02			
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DRAWN	Junaid Ahmad
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

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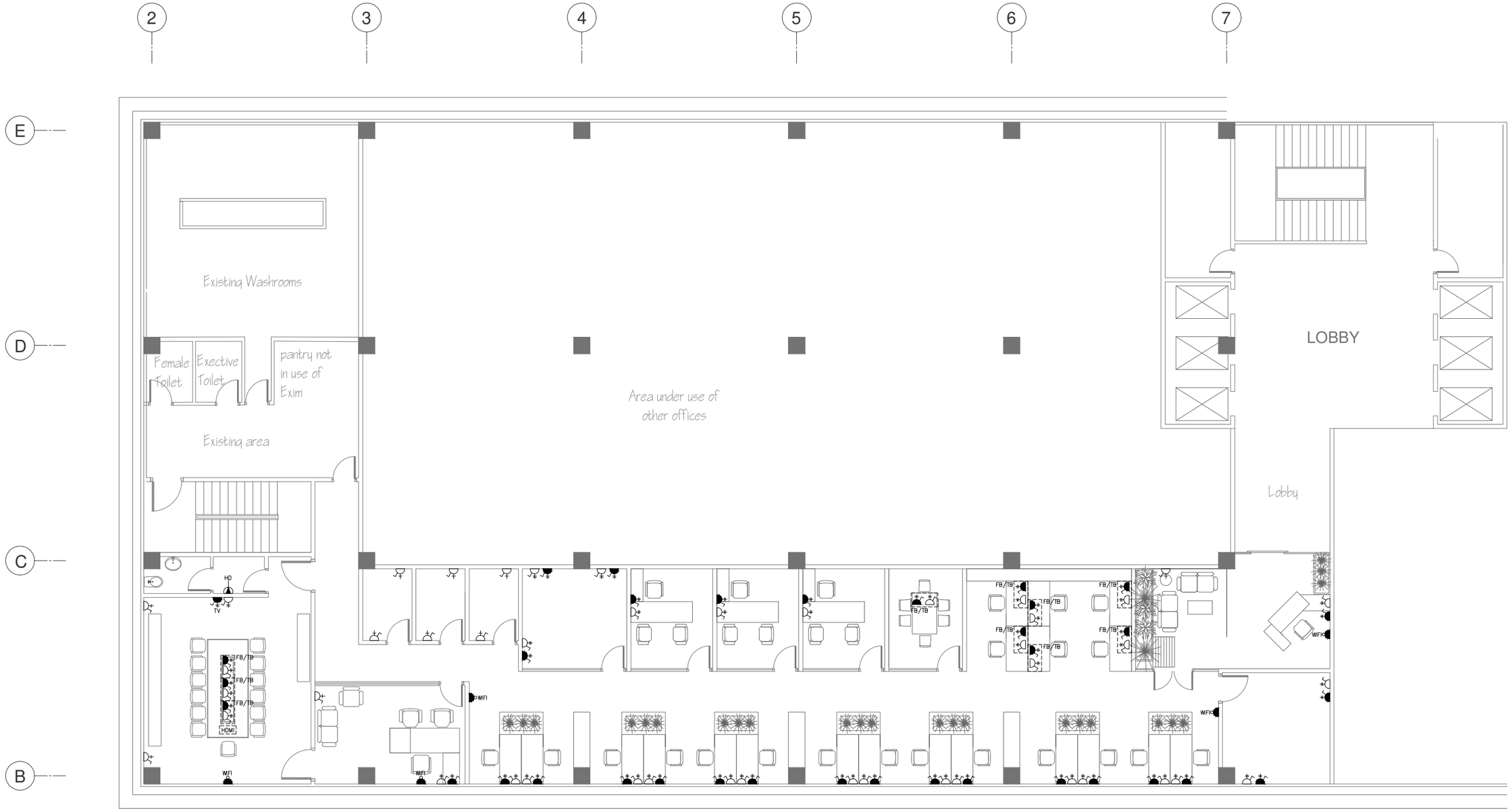

CLIENT: EXIM BANK OF PAKISTAN	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. ARCHITECTURE & PLANNING DIVISION KARACHI. 4th Floor, N.I.C. Building, Abbasi Shaheed Road, Karachi, Tel: 99225430-34	PROJECT: OFFICE FOR EXIM BANK AT KARACHI	EXIM OFFICE POWER LAYOUT	SCALE: 3/16"=1'-0"	
			DATE: JANUARY, 2023	DRAWING No.: 41156/08/TD/E003	REV.: 0

REV.	DATE	DESCRIPTION	APPROVED		
04				DRAWN	Junaid Ahmad
03				SUBMITTED	
02				RECOMMENDED	
01				CHD./VER.	
				APPROVED	

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GENERAL NOTES:

1- CO-ORDINATE AT SITE WITH OTHER SERVICES FOR EXACT LOCATION AND POSITION OF CONDUITS AND COMMUNICATION EQUIPMENT/DEVICES.

2- ALL COMMUNICATION DRAWINGS SHALL BE READ IN CONJUNCTION WITH SPECIFICATIONS, BOQ, ARCHITECTURE, ELECTRICAL, STRUCTURE, HVAC, PLUMBING DRAWINGS AND ALL OTHER RELEVANT DETAILS.

3- DIMENSIONS/MEASUREMENTS GIVEN IN LAYOUTS ARE APPROXIMATE. THE CONTRACTOR SHALL BE RESPONSIBLE TO CALCULATE ACTUAL DIMENSIONS/MEASUREMENTS ACCORDING TO STRUCTURE AND ARCHITECTURE DRAWINGS.

4- THE ROUTES OF EXTERNAL CABLE AND PIPES SHALL BE FOLLOWED AS SHOWN ON THE DRAWING, ANY CHANGE IN ROUTES REQUIRED DUE TO SITE CONDITIONS SHALL BE MADE IN CO-ORDINATION WITH OTHER SERVICES, AFTER OBTAINING ENGINEER'S APPROVAL

5- WHERE CABLES ENTER BUILDINGS, THESE SHALL BE LAID IN PROTECTIVE PIPES. HAND HOLE SHALL BE PROVIDED OUTSIDE THE BUILDING.

6- ALL UNDERGROUND PIPES SHALL BE LAID MINIMUM 1.5 FEET BELOW THE TOP OF PAVEMENT THE DEPTH MAY BE INCREASED / DECREASED DUE TO THE SITE CONDITIONS AFTER OBTAINING ENGINEERS APPROVAL

7- ALL UNDERGROUND PIPES, MAN HOLES & HANDHOLES SHALL BE PROPERLY SEALED WATER TIGHT AT ENDS/JOINTS AFTER INSTALLATION.

8- SPARE PIPES SHALL HAVE THEIR ENDS PROPERLY PLUGGED WITH CAP AND MADE WATER TIGHT. BOTH ENDS OF PIPES SHALL BE MARKED BY PIPE END MARKERS FOR IDENTIFICATION.

9- CABLE MARKERS SHALL BE PROVIDED AT 30 METER INTERVALS ALONG STRAIGHT RUNS OF CABLE DUCT / ROUTE AND AT EACH BEND.

10- ALL ROUTING OF PIPES, PIPE DUCTS & CONNECTION DETAILS SHALL BE CARRIED OUT WITH THE APPROVAL OF THE ENGINEER.

11- MANUFACTURER'S RECOMMENDATION SHALL BE FOLLOWED FOR SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF ALL COMMUNICATION SYSTEMS.

12- THE CONTRACTOR SHALL TAKE THE RESPONSIBILITIES OF GENERAL INTEGRATOR FOR ALL THE SUB-SYSTEMS AND EQUIPMENT WITHIN THE SCOPE OF WORK INCLUDING INTERFACES WITH OTHER SYSTEMS.

13- ALL COMMUNICATION SYSTEMS SHALL BE FED FROM UNINTERRUPTED POWER SUPPLY (UPS).

14- CONDUIT SHALL BE SIZED ACCORDING TO CLAUSE 4.4.2.4 OF EIA/TIA 569 STANDARD AS GIVEN BELOW.

CONDUIT TRADE SIZE		CONDUIT SIZING MAX.NUMBER OF CABLES BASED UPON ALLOWABLE FILL									
		CABLE OUTSIDE DIAMETER,mm (in)									
		3.3	4.6	5.6	6.1	7.4	7.9	9.4	13.5	15.8	17.8
mm.	inch	(.13)	(.18)	(.22)	(.24)	(.29)	(.31)	(.37)	(.53)	(.62)	(.70)
21	(3/4)	6	5	4	3	2	2	1	0	0	0
27	(1)	8	8	7	6	3	3	2	1	0	0
35	(1 1/4)	16	14	12	10	6	4	3	1	1	1
41	(1 1/2)	20	18	16	15	7	6	4	2	1	1
53	(2)	30	26	22	20	14	12	7	4	3	2
63	(2 1/2)	45	40	36	30	17	14	12	6	3	3
78	(3)	70	60	50	40	20	20	17	7	6	6
91	(3 1/2)	—	—	—	—	—	—	22	12	7	6
103	(4)	—	—	—	—	—	—	30	14	12	7

15- EN 50174-2 RECOMMENDATIONS SHALL BE FOLLOWED FOR SEPARATION DISTANCE BETWEEN POWER AND VOICE/LAN NETWORK CABLES IN GIVEN BELOW TABLE.

TYPE OF INSTALLATION	MINIMUM SEPERATION DISTANCE (mm.)		
	WITHOUT METALLIC DIVIDER	WITH METALLIC DIVIDER	WITH STEEL DIVIDER
UNSCREENED POWER CABLE AND UNSCREENED COMMUNICATION CABLE	200	100	50
UNSCREENED POWER CABLE AND SCREENED COMMUNICATION CABLE	50	20	5

16- MOUNTING HEIGHT OF FOLLOWING DEVICES SHALL BE INSTALLED AT THE INDICATED HEIGHT FROM FINISHED FLOOR LEVEL (F.F.L) TO THE BOTTOM OF DEVICE UNLESS OTHERWISE MENTIONED OR INSTRUCTED:

- TELECOMMUNICATION OUTLET FOR TELEPHONE/DATA------ 10 INCH/AS PER SITE
- TELECOMMUNICATION OUTLET FOR WIFI---------- 87 INCH/AS PER SITE
- TELECOMMUNICATION OUTLET FOR ACCESS DOOR---------- 87 INCH/AS PER SITE
- FLOOR DISTRIBUTOR---------- 56 INCH
- BUILDING DISTRIBUTOR---------- FLOOR STANDING/56 INCH
- MAIN DISTRIBUTION FRAME---------- 56 INCH
- ADDRESSABLE FIRE ALARM CONTROL PANEL---------- 56 INCH
- ADDRESSABLE CONTROL/MONITOR MODULE---------- 87 INCH/AS PER SITE
- ADDRESSABLE MANUAL CALL POINT ---------- 56 INCH
- ADDRESSABLE SOUNDER---------- 87 INCH
- IP CAMERA---------- 95 INCH / AS PER SITE
- MICRO PHONE SOCKET OUTLET---------- 10 INCH
- HORN SPEAKER---------- 95 INCH / AS PER SITE
- DOOR CONTROLLER ---------- 87 INCH / ABOVE DOOR
- CARD READER/EXIT PUSH BUTTON---------- 56 INCH
- TV OUTLET---------- 56 INCH

17- COLOUR, SHAPE & MOUNTING HEIGHT OF FACE PLATE OF TELECOM SOCKET OUTLETS SHALL MATCH WITH ELECTRICAL SOCKET OUTLET

18- DETECTORS SHALL BE INSTALLED 1 FEET AWAY FROM ANY PART OF ANY LIGHT FIXTURE AND 3 FEET AWAY FROM DIFFUSER OF HVAC SYSTEM.

19- WHERE MANUAL CALL POINT AND SOUNDER ARE SHOWN SIDE, BY SIDE THEY SHALL BE INSTALLED IN SAME VERTICAL LINE.

20- CONTRACTOR SHALL SUBMIT CO-ORDINATION DRAWING SHOWING MOUNTING DETAIL AND HEIGHT OF EACH COMMUNICATION FIXTURE IN PROPER CO-ORDINATION WITH LIGHTS, FANS ETC. AND OTHER RELEVANT ITEMS.

21- AT LEAST 30 DAYS OF RECORDING CAPACITY SHALL BE PROVIDED FOR ALL CCTV CAMERAS WITH 25% EXPANSION CAPACITY.

22- ALL COMMUNICATION RACKS SHALL BE FED FROM UNINTERRUPTED POWER SUPPLY (UPS) TO AVERT ANY INTERRUPTION IN SECURITY SYSTEM.

23- CONTRACTOR SHALL SUBMIT SOUND PRESSURE LEVEL (SPL) CALCULATION OF SPEAKERS ON THE LAYOUT DRAWINGS FOR REVIEW AND APPROVAL OF ENGINEER.

24- CONTRACTOR SHALL CO-ORDINATE WITH THE CLIENT FOR EXACT LOCATION OF ACCESS CONTROL SYSTEM AT ENTRANCE OF THE BASEMENT.

25- CONTRACTOR SHALL SUBMIT CO-ORDINATION SHOP DRAWING OF COMMUNICATION LAYOUT WITH POWER LAYOUT BEFORE EXECUTION OF WORKS.

26- CONTRACTOR SHALL CO-ORDINATE WITH HVAC LAYOUT FOR PLACEMENT OF RACKS IN COMMUNICATION EQUIPMENT ROOM.

27- CONTRACTOR TO PROPOSE/SHOW CABLE TRAY IN SHOP DRAWING AS PER NEED IN EACH FLOOR.

LEGEND:

STRUCTURED CABLING NETWORK

- V1 — ONE GANG ONE PORT RJ45 CAT7 S/FTP TELECOMMUNICATION OUTLET FOR TELEPHONE, FLUSHED IN WALL/SURFACE MOUNTED
- V2 — TWO GANG TWO PORT RJ45 CAT7 S/FTP TELECOMMUNICATION OUTLET FOR TELEPHONE, FLUSHED IN WALL/SURFACE MOUNTED
- D1 — ONE GANG ONE PORT RJ45 CAT7 S/FTP TELECOMMUNICATION OUTLET FOR DATA, FLUSHED IN WALL/SURFACE MOUNTED
- D2 — TWO GANG TWO PORT RJ45 CAT7 S/FTP TELECOMMUNICATION OUTLET FOR DATA, INSTALLED IN WALL/SURFACE MOUNTED
- V1 / D1 FB/TB — TELECOMMUNICATION OUTLET FOR DATA & TELEPHONE, INSTALLED IN FLOOR BOX/ TECHNOLOGY BOX
- D1 WIFI — ONE GANG ONE PORT RJ45 CAT7 S/FTP TELECOMMUNICATION OUTLET FOR WIFI, FLUSHED IN WALL/SURFACE MOUNTED
- D1 TV — ONE PORT RJ45 CAT7 S/FTP TELECOMMUNICATION OUTLET FOR IPTV, INSTALLED IN WALL/SURFACE MOUNTED
- DR — DATA RACK (AS SPECIFIED IN DRAWING & BOQ)
- MDF — MAIN DISTRIBUTION FRAME (MDF)
- IDF — INTERMEDIATE DISTRIBUTION FRAME (IDF)
- TJB — TELEPHONE JUNCTION BOX

CLOSED CIRCUIT TELEVISION SYSTEM (CCTV):

- IP COLOR CAMERA, DOME TYPE, CEILING MOUNTED
- IP COLOR CAMERA, BULLET TYPE, WALL MOUNTED

CABLE SHEDULE

- 4C7SFL — 4 PAIR CAT7 S/FTP LSZH CABLE
- 25C5UL — 25 PAIR CAT5 UTP LSZH CABLE.
- 100C5UL — 100 PAIR CAT5 UTP LSZH CABLE.
- 6FM4NT — 6 CORE 50um/125um (OM4) MULTIMODE INDOOR TIGHT BUFFER LSZH FIBER OPTICS CABLE
- 12FM4NT — 12 CORE 50um/125um (OM4) MULTIMODE INDOOR TIGHT BUFFER LSZH FIBER OPTICS CABLE
- 12FSUUL — 12 CORE FIBER OPTICS CABLE SINGLE MODE OUTDOOR TYPE WITH UNITUBE SHEATH HEAVY ARMOURED WITH PE JACKET
- 2C1.5CWZ — 2 CORE 1.5 Sq.mm (120 min) FIRE RESISTANT ENHANCED LSZH CABLE COMPLYING BS 5839, BS 6387, EN50200. BS 8434-2:2003 + A2:200 CABLE
- 2C2.5CWZ — 2 CORE 2.5 Sq.mm (120 min) FIRE RESISTANT ENHANCED LSZH CABLE COMPLYING BS 5839, BS 6387, EN50200, BS 8434-2:2003 + A2:200 CABLE
- RG7 — RG-7 CO-AXIAL CABLE
- RG11 — RG-11 CO-AXIAL CABLE

MISC

- INDICATES RECESSED/ SURFACE MOUNTED ENCLOSURE
- FB1 — INDICATES CONCEALED IN FLOOR BOX WITH 300 mm(L) X 300 mm(W) X 56 mm(D) WITH ONE EMERGENCY POWER SOCKET, TWO NOS. UPS SOCKET & ONE NO. TWO GANG VOICE SOCKET ONE NO. TWO GANG VOICE & STENO SOCKET & ONE NO. TWO GANG DATA SOCKET. THE DATA & VOICE WIRE SHALL BE PULLED THROUGH FLOOR BOX & TERMINATED ABOVE TABLE SOCKET.
- FB2 — INDICATES CONCEALED IN FLOOR BOX WITH 300 mm(L) X 300 mm(W) X 56 mm(D) WITH ONE EMERGENCY POWER SOCKET, TWO NOS. UPS SOCKET & TWO NOS. TWO GANG VOICE SOCKET & ONE NO. TWO GANG DATA SOCKET. THE DATA & VOICE WIRE SHALL BE PULLED THROUGH FLOOR BOX & TERMINATED ABOVE TABLE SOCKET.
- TB1 — INDICATES FOR ABOVE TABLE TECHNOLOGY BOX FOR POWER, DATA, VOICE, HDMI, VGA & AV SOCKETS INCLUDING METAL TRUNKING ROUTED FROM NEARSEST FLOOR BOX/SPUR/SOCKET OUTLET. (TO BE COORDINATED WITH FURNITURE MANUFACTURE)
- TB2 — INDICATES FOR ABOVE TABLE BOX FOR POWER, AND DATA SOCKET INCLUDING METAL TRUNKING ROUTED FROM NEAREST FLOOR BOX/SPUR/SOCKET OUTLET. (TO BE COORDINATED WITH FURNITURE MANUFACTURE)

CLIENT
EXIM BANK OF PAKISTAN

CONSULTANT
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD.
ARCHITECTURE & PLANNING DIVISION KARACHI.
4th Floor, N.I.C. Building, Abbasi Shaheed Road, Karachi, Tel: 99225430-34

REV.	DATE	DESCRIPTION	APPROVED
04			
03			
02			
01			

DRAWN	IMRAN
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT
OFFICE FOR EXIM BANK AT KARACHI

EXIM OFFICE
COMMUNICATION LEGEND & GENERAL NOTES

SCALE: 1/16"=1'-0"
DATE: JANUARY, 2023
DRAWING No.: **41156/08/TD/ T 001**
REV.: 0

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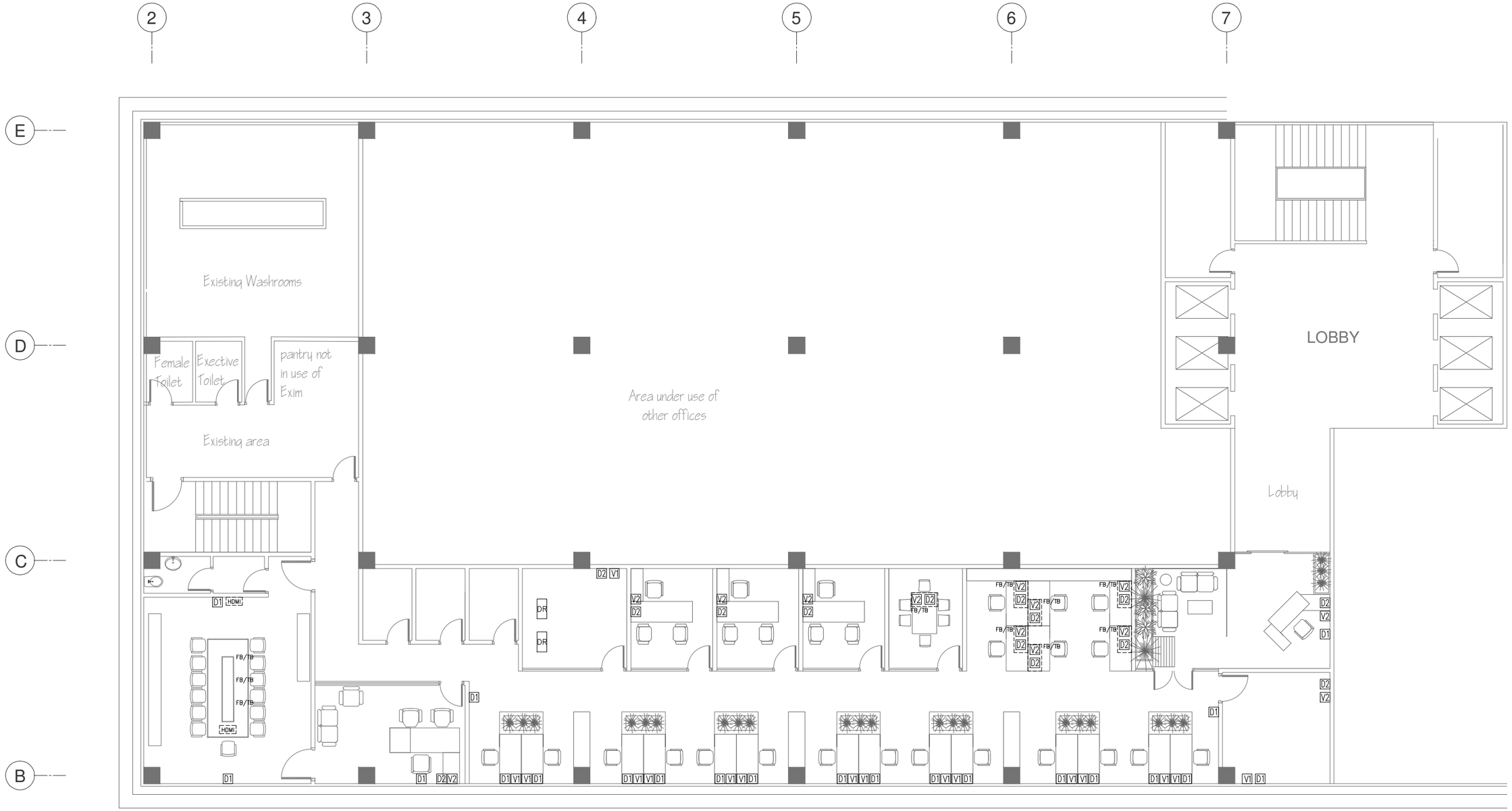

CLIENT: EXIM BANK OF PAKISTAN	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. ARCHITECTURE & PLANNING DIVISION KARACHI. 4th Floor, N.I.C. Building, Abbasi Shaheed Road, Karachi, Tel: 99225430-34	PROJECT: OFFICE FOR EXIM BANK AT KARACHI	EXIM OFFICE DATA AND TELEPHONE LAYOUT	SCALE: 3/16"=1'-0"

REV.	DATE	DESCRIPTION	APPROVED		
04				DRAWN	Junaid Ahmad
03				SUBMITTED	
02				RECOMMENDED	
01				CHD./VER.	
				APPROVED	

DATE	DRAWING No.	REV.
JANUARY, 2023	41156/08/TD/T002	0

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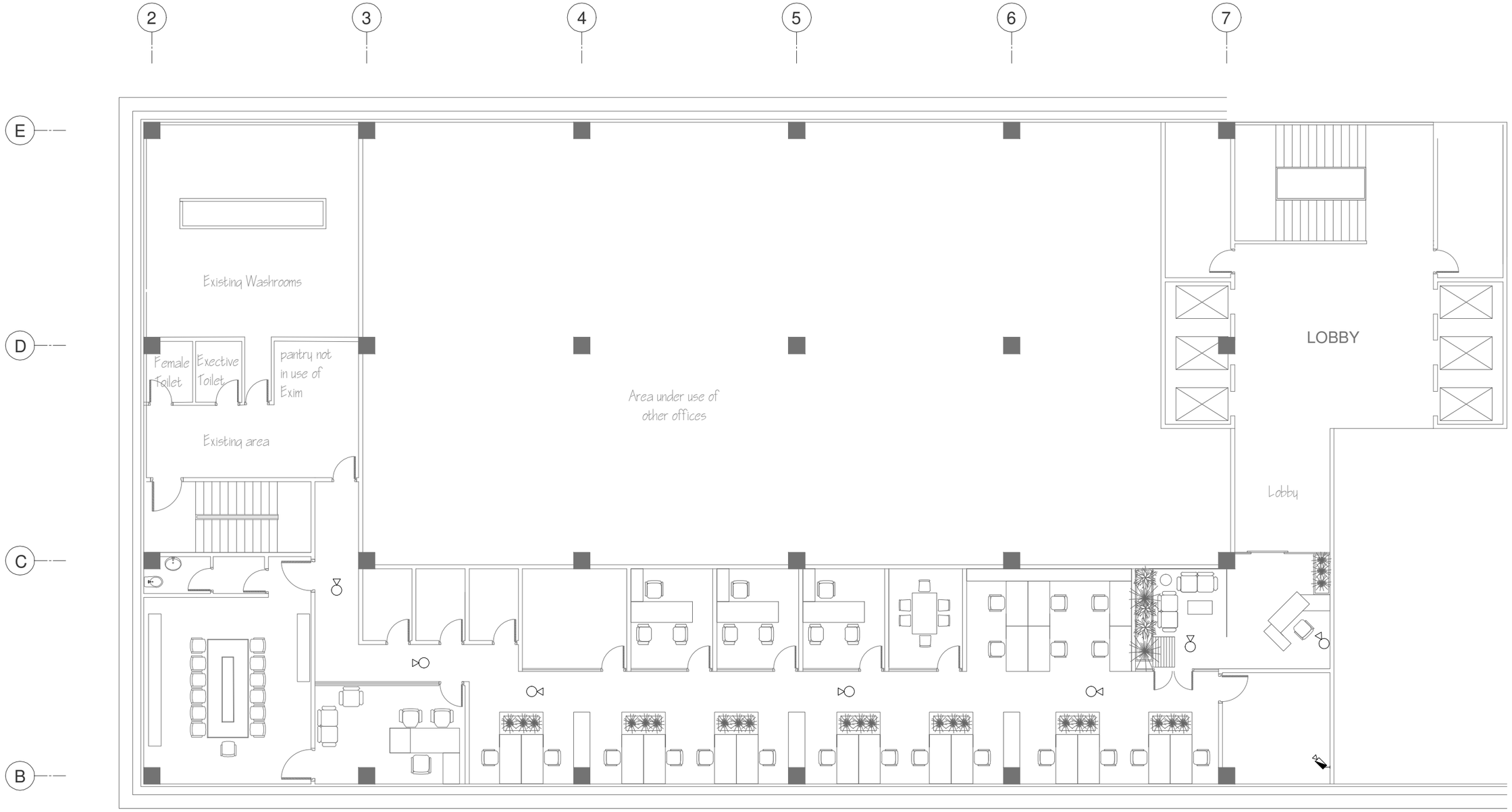

CLIENT	**EXIM BANK OF PAKISTAN**		
CONSULTANT	NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD.		
	ARCHITECTURE & PLANNING DIVISION KARACHI. 4th Floor, N.I.C. Building, Abbasi Shaheed Road, Karachi, Tel: 99225430-34		

REV.	DATE	DESCRIPTION	APPROVED
04			
03			
02			
01			

DRAWN	Junaid Ahmed
SUBMITTED	
RECOMMENDED	
CHD./VER.	
APPROVED	

PROJECT

OFFICE FOR EXIM BANK AT KARACHI

EXIM OFFICE
CCTV LAYOUT

DATE	DRAWING No.	REV.
JANUARY, 2023	**41156/08/TD/T003**	0

SCALE: 3/16"=1'-0"

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