(SINGLE STAGE ONE ENVELOPE PROCEDURE)
(NATIONAL COMPETITIVE BIDDING)

STANDARD BIDDING DOCUMENT
FOR ENGINEERING WORKS

MINOR REPAIR & RENOVATION WORKS REQUIRED AT NBP ACP MODEL BRANCH, PACE TOWER GULBERG, LAHORE

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NATIONAL BANK OF PAKISTAN

INVITATION FOR BIDS

1. **MINOR REPAIR & RENOVATION WORKS REQUIRED AT NBP BHIKHI BRANCH, SHEIKHUPURA.**
2. **MINOR REPAIR & RENOVATION WORKS REQUIRED AT NBP JHABRAN MANDI BRANCH, SHEIKHUPURA.**
3. **MINOR REPAIR & RENOVATION WORKS REQUIRED AT NBP SUKHEKE BRANCH, SHEIKHUPURA.**
4. **MINOR WORKS REQUIRED FOR CONSTRUCTION OF 01 NO. OFF-SITE ARMY ATM ROOM AT CMH SARGODHA UNDER NBP, REMOUNT DEPOT BRANCH, SARGODHA.**
5. **MINOR REPAIR & RENOVATION WORKS REQUIRED AT NBP ACP MODEL BRANCH, PACE TOWER GULBERG, LAHORE.**
6. **MISCELLANEOUS REPAIR & RENOVATION WORKS REQUIRED AT NBP DIGITAL BANKING GROUP, 2ND FLOOR, RHQ BUILDING, LAHORE.**
7. **MAJOR RENOVATION & REFURBISHMENT WORKS OF NBP JAIL ROAD BRANCH, LAHORE EAST.**
8. **MAJOR RENOVATION & REFURBISHMENT WORKS OF NBP REHMAN PLAZA BRANCH, LAHORE CENTRAL.**
9. **MAJOR RENOVATION & REFURBISHMENT WORKS OF NBP MAIN BRANCH, SAMMUNDARI, R.O FAISALABAD.**
10. **MAJOR RENOVATION & REFURBISHMENT WORKS OF NBP MAIN BRANCH, BAHAWALNAGAR (EX-ZONAL OFFICE), R.O SAHIWAL.**

National Bank of Pakistan, a leading commercial bank of the country invites sealed bids from the experienced constructors for aforesaid works. The interested bidders who comply with the following eligibility criteria may participate in the bidding:

1. A bidder should have a valid registration in **Pakistan Engineering Council** in financial category **C-6** or above for (Sr. No.1, 2, 3, 4, 5, 6, 7, 8 & 9 only) and category C-5 or above for (Sr. No. 10 only) along with CE-10 and EE-04 construction specialties on bidding data.
2. Only constructor who has completed minimum two projects of Banks costing not less than one (1.0) Million Pak Rupees for (Sr. No. 1, 2, 3, 4 & 5 only), costing not less than four (4.0) Million Pak Rupees for (Sr. No. 6, 7, 8 & 9 only) & costing not less than twenty five (25.0) Million Pak Rupees for (Sr. No. 10 only) each during last three years are eligible to bid.
3. An active status on **FBR Active Taxpayer List.**
4. An active status on **Provincial Active Taxpayer List.**

Bidding documents, containing detail terms and conditions, etc. are available electronically and can be downloaded from EPADS-PPRA web site www.eprocure.gov.pk free of cost.
Bids should be submitted electronically ONLY through EPADS. Manual submission of bids is NOT allowed. For registration and training on EAPDS or in case of any technical difficulty in using EPADS, prospective bidders may contact PPRA Team, Director MIS Room No.109, 1st Floor, FBC building Sector G-5/2, Islamabad, Contact Number: 051-111-137-237.

The bids, prepared in accordance with the instructions in the bidding documents along with bid security instrument (Copy) & Proof of Eligibility documents as specified in bid documents in favor of the undersigned must be submitted through EPADS by April 17, 2024 at 11:30 AM. Original Bid Security instrument MUST BE submitted to the under signed before closing hours of the bids submission time. Bids will be opened in the presence of Procurement Committee and contractor's who wish to be participated on the same day at 12:00 PM through EPADS at the following venue:

"Wing Head, Engineering Wing (Central), National Bank of Pakistan, 26-McLagon Road, Lahore. Ph. 092-42-99210641"

This advertisement is also available on PPRA website at www.ppra.org.pk as well as on the National Bank of Pakistan website https:/www.nbp.com.pk/TENDER.

WING HEAD (CENTRAL)
NBP, ENGG: WING (CENTRAL),
RHQ BUILDING, 26-MCLAGON ROAD, LAHORE
PH. 042-99210641

TERMS & CONDITIONS FOR TENDERS/QUOTATIONS
MINOR REPAIR & RENOVATION WORKS REQUIRED AT NBP ACP MODEL BRANCH, PACE TOWER GULBERG, LAHORE

1. The payment shall be made as per actual measurement of works done at site.
2. Rates should be quoted on aggregate with percentage as detail given in BOQ and no conditional tender would be accepted.
3. The time limit will be **45** days from the date of start of work given in writing by the Wing Head Engineering. In case the contractor fails to complete the work within the stipulated period a penalty of Rs.0.1% per day shall be levied to the maximum of 10% of the total cost of work whichever is less or the work may be treated as cancelled and the same may be completed through other agency as the Risk & cost of the contractor.
4. The contractors shall also have to submit **(80,000/-)** Earnest money of Estimate amount in terms of payment order issued by any schedule Bank in favor of Wing Head Engineering to be attached.
5. 5% Security deposit will be deducted from running/final bills and be released after six months of the completion of work executed satisfactorily and if no effects occur during this period.
6. In case the contractor failure to complete the work within stipulated period a penalty of 0.1% per day shall be levied to the maximum of 10% of the total cost of work
7. It at any stage the Wing Head Engineering find that the progress of work is not satisfactory and the contractor is not be able to complete it within the time, he has right to get the work executed through some other agency at the risk & cost of the Contractor.
8. After the expiry of time limit if the works still remain incomplete this may be completed through some other agency without any notice to the contractors at his risk & Cost.
9. All work shall have to be carried out strictly according to the specifications any work not upto the specification will have to be dismantled and re-laid or its rate will be reduced if otherwise accepted by the WHE. In this connection the decision of the Wing Head Engineering will be final and binding upon the contractor.
10. Any extra item carried out by the contractor will be paid as per the rates of similar items include in tender of the contractor. However, if no similar item exists in tender the rates as fixed by the Wing Head Engineering will be final and binding on the contractor without appeal.
11. Quantities of items may decrease or increase or some items may be omitted at the discretion of the Wing Head Engineering at site.
12. If any items or work is carried out which is not covered in tender the rate fixed by the WHE for such item will be final and binding on the contractors. The Contractor in his own interest should get the rate for such item approved by the Wing Head Engineering before executing the work.
13. In case of any dispute arising during the execution of this contract the decision of the Wing Head Engineering will be final and binding upon the contractor without appeal.
14. The rates quoted by the contractor shall be binding to the contractors for a period of six months from the date of tender and No fluctuation of any sort in material, labour, cartage etc. will be considered before this date.
15. During the dismantling/removal or execution the work the contractor will not claim and increase in prices of any sort or escalation due to any cause or conditions

16. The Contractor will responsible for any hindrance in work from KMC, KDA or any agency and should sort out at his own cost.
17. The contractor should arrange power loading/unloading & labour charges to their own, the bank is not responsible for this in any case. Detail of work and measurement should be submitted with final/running bills
18. The Contractor should work in the Bank's premises as per instructions of Wing Head Engineering such that the working Office does not disturb. No extra payment will be made for fro working in the night or holiday.
19. During construction of work contractor is responsible for the branch/Office fixtures, fittings furniture and any damage to them is the responsibility of contractor to be indemnified to bank at actual cost.
20. The contractor should also deal with Sui Gas Co., Telephone Department and KESC and any other agency for shifting gate, fixture, fittings, furniture telephone cables and shifting of electric lines and meters etc. at his own cost. The bank will only pay departmental charges to the concerned Department on actual production of receipts/bills
21. No claim certificate will be submitted by the contractor with final bill without which No payment will be made to the contractor.
22. Completion Certificate will be submitted by the contractor with final bill without which No payment will be made to the contractor.
23. The bill will be submitted in duplicate (One original and one duplicates) on printed Letter head.
24. The payment of final bill will be made when the completion certificate is submitted from the respective Department/branches/Offices/group Wing.
25. The Bank reserves the right to reject any tender or part thereof.
26. In case of breaking/lost/damage or damage the premises any item of work during dismantling/shifting/removing, loading/un-loading, the cost of the same will be recovered/repaired from contractor's bill on prorate basis or the contractor will pay the cost of the same to the Bank.
27. The Contractor will responsible to clean up the site and disposal the unused/waste material from the site and throwing outside municipal limit after dismantling/removal from the site.
28. All the items should be handed over and stacking at the Bank's premises safely for future use after proper counting to the concerned staff.
29. The Standard Bidding Document (SBD) will be submitted on EPADS by **April 17, 2024 at 11:30** am and will opened on same date.

Accepted terms and conditions

Contractor

Wing Head Engineering
Sr. Resident Engineering

INSTRUCTIONS TO TENDERERS

A-GENERAL

1. Scope of Tender

The Employer as defined in the Tendering Data (hereinafter called "the Employer") wishes to receive tenders for the works summarized in the Tendering Data (hereinafter to as "the works")

Tenderers must quote for the complete scope of work. Any tender covering partial scope of work will be rejected as non-responsive.

2. Eligible Tenderers

Tendering is open to all those firms/ bidders who qualify the eligibility criteria as per invitation of bid.

3. Cost of Tendering

The tenderer shall bear all cost associated with the preparation and submission of its tender and the Employer will in no case be responsible or liable for those costs, regardless of the conduct or overcome or outcome of the tendering process.

B-TENDER DOCUMENTS

4. Contents of Tender Documents

The Tender Documents are those stated below and should be read in conjunction with any Addendum issued in accordance.

4.1 Instructions to Tenderers & Tender.

4.2 Forms of Tender & Schedules to Tender.

Schedule of Tender Comprise the following:

4.3 Schedule A: Schedule of Prices

4.4 Schedule B: Specific Works Data

4.5 Schedule C: Proposed Programmed of Works

5. Condition of Contract & Contract Data

6. Standard Forms:

6.1 Form of Contract Agreement.

6.2 Form of Performance Bond.

6.3 Form of Performance Security.

6.4 Form of Bank Guarantee for advance payment.

7. Specifications.

8. Drawings.

9. Clarification of Tender Documents.

9.1 A Perspective Tenderer requiring any clarification (s) in respect of the Tender Documents may notify the Engineer / Employer at the Employer's address indicated in the Tendering Data.

9.2 The Engineer / Employer will respond to any request for clarification which it receives earlier than 10 days prior to the dead line for the submission of tenders. Copies of the Engineer / Employer's response will be forwarded to all perspective tenderers, at least 5 days prior to dead line for submission of Tenders, Who have received the Tender Documents including a description of the enquiry but without identifying its source.

10. Amendment of Tender Documents.

10.1 At any time prior to the deadline for submission of tenders, The Employer may, for any reasons, whether at his own initiative on in response to a clarification requested by a prospective tenderer; modify the Tender Documents by issuing addendum.

10.2 Any addendum thus issued shall be part of the Tender Documents pursuant to Sub-Clause 10.1 hereof, and shall be communicated in writing to all purchasers of the Tender Documents. Prospective tenderers shall acknowledge receipt of each addendum in writing to the employer.

10.3 To afford prospective tenderers reasonable time in which to take an addendum into account in preparing their tenders, the Employer may at its discretion extend the deadline for submission of tenders.

C-PREPARATION OF OF TENDERS

11. Language of Tender

The tender prepared by the tenderer and all correspondence and documents relating to the Tender, exchanged by the tenderer and the Employer shall be written in the English language, provided that any printed literature furnished by the tenderer may be written in another language so long as accompanied by an interpretation of the tender, the English translation shall govern.

12. Documents Comprising the Tender

The tender prepared by the tenderer shall comprise the following components:

12.1 Covering Letter.

12.2 Form of Tender duly filled, signed and sealed, in accordance.

12.3 Schedules (A to C) to Tender duly filled and initialed, in accordance with the instructions contained therein & in accordance.

12.4 Tender Security furnished in accordance clause 17.

12.5 Power of Attorney in accordance with clause 18.5.

12.6 Documentary Evidence In accordance Clause 15.

13. Sufficiency of Tender.

13.1 Each tenderer shall satisfy himself before Tendering as to the correctness and sufficiency of his Tender and of the rates and prices entered in the Price Schedule, which rates and prices shall except in so far as it is otherwise expressly provided in the contract, cover all his obligations under the Contract and all matters and things necessary for the proper completion of Works.

13.2 The tenderer is advised to obtain for himself at his own cost and responsibility all information that may be necessary for preparing the tender and entering into a contract for execution of the Works.

14. Tender Prices, Currency of Tender and Payments

14.1 The tenderer shall fill up the schedule of prices indicating the unit rates and prices of the works to be performed under the Contract. Prices on the Schedule of Prices shall be entered keeping in view the instructions contained in the preambles to the Schedule of Prices.

14.2 Unless otherwise stipulated in the conditions of Contract, Prices quoted by the tenderer shall remain fixed during the tenderer's performance of the Contract and not subject to variation on any account.

14.3 The unit rates and prices in the Schedule of Prices shall be quoted by the tenderer in the currency as stipulated in Tendering Data.

15. Documents Establishing Tenderer's Eligibility and Qualifications.

15.1 Pursuant to clause 12, the tenderer shall furnish, as part of its tender, documents establishing the tenderer's eligibility to tender and its

qualification to perform the Contract if its tender is accepted.

15.2 Tenderer / Manufacture must possess and provide evidence of the experience as stipulated in Tendering Data.

16. Documents Establishing Works Conformity to Tender Documents.

16.1 The documentary evidence of the Works conformity to the Tender Documents may be in the form of literature, drawings and data shall furnish documentation as set out in Tendering Data.

16.2 The tenderer shall note that standards for workmanship, material and equipment and referred to brand names or catalogue numbers, designated by the Employer in the Technical Provisions are intended to be descriptive only and not restrictive.

17. Tender Security

17.1 Each tenderer shall furnish, as a part of his tender, a Tender Security of **Rs.80,000/-** of tenderer deposit at call issued by a Scheduled Bank in Pakistan in favor of the Employer valid for period 28 days beyond the tender validity date.

17.2 Any tender not accompanied by an acceptable Tender Security shall be rejected by the employer as non-responsive.

17.3 The tender securities of unsuccessful tenderer will be returned upon award of contract to the successful tenderer or on the expiry of validity of Tender Security whichever is earlier.

17.4 The tender security of the successful tenderer will be returned when the tenderer has furnished the required performance security, pursuant to Clause. 25 and signed the Contract Agreement, pursuant to Clause. 24.4 & 25.

17.5 The tenderer security may be forfeited:

17.5.i If a tenderer with draw his tender during the period of tender validity

17.5.ii If a tenderer does not accept the correction of his Tender Price, pursuant to Sub-Clause 20.3 (b)

17.5.iii In the case of successful tenderer, If he Fails to:

17.5.iii.a Furnish the required Performance Security in Accordance with Clause. 25, or

17.5.iii.b Sign the Contract Agreement, In Accordance with Clause. 24.2 & 24.3

18. Validity of Tender, Format, Signing and Submission of Tender

18.1 Tenders shall remain valid for the period stipulated in the Tendering Data after the date of tender opening.

18.2 All the tenderers shall down load the bidding document from EPADS web site. All Schedules to Tender are to be properly completed signed and stamped & upload the completed bidding document in PDF form on EPADS.

18.3 No alteration is to be made in the Form of Tender except in filling up the blanks as directed. If any alteration be made or if these instructions be not fully complied with, the tender may be rejected.

18.4 The tender shall be typed or written in indelible ink and shall be signed by a person or persons duly authorized to sign. All pages of the tender shall be initiated and official seal be affixed by the person or persons signing the tender.

19. Deadline for Submission, Modification & Withdrawal of Tenders

19.1 The tenders must be uploaded on EPADS and per scheduled time and date stipulated therein.

19.2 Tenders submitted through telegraph, telex, fax or e-mail shall not be considered.

19.3 Any tender received by the employer after the date and time of tender opening prescribed in Tendering Data will be returned unopened to such tenderer.

19.4 No tender may be modified by a tenderer after the deadline for submission of tenders. Withdrawal of a tender during the interval between the deadline for submission of tenders and the expiration of the period of tender validity specified in the Form of Tender may result in forfeiture of the tender Security pursuant to Clause. 17.5

D. TENDER OPENING AND EVALUATION

20. Tender Opening & Clarification and Evaluation

20.1 The Employer will open the tenders, in the presence of tenderer's representatives who choose to attend, at the time, date and location stipulated in the Tendering Data.

Any Tender price of discount which is not read out and recorded at tender opening, will not be taken into account in the evaluation of tender.

20.2 The tender's name, Tender price, any discount, the presence or absence of Tender Security and such other details as the Employer at its discretion may consider appropriate, will be announced by the Employer at the tender opening. Any tender price or discount, which was not red out and recorded at tender opening, would not be taken into account in the evaluation of tender.

20.3 To assist in the examination, evaluation and comparison of tenders the Engineers / Employer may, at its discretion, ask the tenderer for clarification of its Tender. The request for clarification and response shall be in writing and no change in the price or substance of the Tender shall be sought, offered or permitted.

20.4

20.4.i Prior to the detailed evaluation, pursuant to clause.20.6 to 20.8, the Engineer/ Employer will determine the substantial responsiveness of each tender to the Tender Documents. For purpose of these Clause, a substantially responsive tender is one which conforms to all the terms and conditions of the Tender Documents without material deviations. It will include to determine the requirements listed in Tendering Data.

20.4.ii Arithmetical errors will be rectified on the following basis:

If there is a discrepancy between the unit price and total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected. If there is a discrepancy between the words and figures the amount in words shall prevail. If there is discrepancy between the total tender price entered in Form of Tender and total shown in schedule of prices- summary, the amount stated in the Form of Tender will be corrected by the Employer in accordance with the Corrected Schedule of Prices.

If the tenderer does not accept the corrected amount of Tender, his tender will be rejected and his Tender Security forfeited.

20.5 A Tender determined as substantially non-responsive will be rejected will

not subsequently be made responsive by the tenderer by the correction of the non-conformity.

20.6 Any minor informality or non-conformity or irregularity in a Tender which does not constitute a material deviation may be waived by the Employer, provided such waiver does not prejudice or effect the relative ranking of any other tenderers.

20.7 The Engineers / Employer will evaluate and compare only the tenders previously determined to be substantially responsive pursuant to Sub-clauses 20.4 to 20.6 as per requirements given hereunder. Tender will be evaluated for complete scope of works. The prices will be compared on the basis of the Evaluated Tender Price pursuant to Sub-Clause 20.7 herein below.

20.7.i Technical Evaluation.

It will be examined in detail whether the works offered by the tender complies with the Technical Provision of the Tender Documents. For this purpose, the tender's data submitted with the tender in Schedule B to Tender will be compared with technical features/ criteria of the works detailed in the Technical Provisions, other technical information submitted with the tender regarding the Scope of work will also be reviewed.

20.7.ii Commercial Evaluation.

It will be examined in detail whether the tenders comply with the commercial / contractual conditions of the Tender Documents. It is expected that no major deviation / stipulation shall be taken by the tenders.

20.8 Evaluated Tender Price

In evaluating the tenders, the Engineer/ Employer will determine for each tender in addition to the Tender Price, the following factors (adjustments) in the manner and to the extent indicated below to determine the Evaluated Tender Price.

20.8.i Making any correction for errors pursuant to Sub-Clause 20.4 hereof.

20.8.ii Making an appropriate price adjustment for any other acceptable variation or deviation.

20.8.iii Making an appropriate price adjustment for Deviations in terms of price payments (if any and acceptable to the Employer).

20.9 Evaluation Methods.

Pursuant to Sub-Clause 20.8 Para (ii), and (iii) following evaluation methods for price adjustments will be followed.

20.8.i Price Adjustment for Technical Compliance.

The cost of making good any deficiency resulting from technical non-compliance will be added to the corrected Total Tender price for comparison purposes only. The adjustments will be applied taking the highest price quoted by other tenders being evaluated in detail in their original Tenders for corresponding item. In case of non-availability of price from other tenderers, the price will be estimated by the Engineer/ Employer.

20.8.ii Price Adjustment for Commercial Compliance.

The cost of making good any deficiency resulting from any quantifiable variations and deviations from the Tender Schedules and Conditions of Contract, as determined by the

Engineer/ Employer will be added to the Corrected Total Tender Price for comparison purpose only. Adjustment for commercial compliance will be added to the Corrected Total Tender Prices.

20.8.iii Price Adjustment for Deviation in Terms of Payments.

20.8.iv Refer to Tendering Data

21. Process to be Confidential

21..1 Sub to Clause 20.3 heretofore, no tenderer shall contact Engineer/ Employer on any matter relating to its Tender from the time of the tender opening to the time the contractor is awarded.

21..2 Any effort by a tenderer to influence Engineer/ Employer in the Tender evaluation, Tender comparison or Contract Award decisions may result in the rejection of his Tender.

E. AWARD OF CONTRACT

22. Post-Qualification

22..1 in the absence of pre-qualification, the Employer will determine to its satisfaction whether the substantially responsive, lowest evaluated tenderer is qualified to satisfactorily perform the Contract.

22..2 The determination will be take into account the tenderer's financial and technical capabilities. It will be based upon an examination of the documentary evidence of the tenderers qualifications submitted under Clause. 15, as well as such other information as the Employer deems necessary and appropriate.

23. Award Criteria & Employer's Right

23..1 Subject to Sub-clause. 23.2, the Employer will award the Contract to the Tenderer whose tender has been determined to be substantially responsive to the Tender Documents and who has offered the lowest evaluated Tender Price provided that such tenderer has been determined to be qualified to satisfactory perform the Contract in accordance with the provision of Clause. 22.

23..2 Not with standing Sub-Clause 23.1, the Employer reserves the right to accept or reject any tender, and to annual the tendering process and reject all tenders, at any time prior to award of Contract, without thereby incurring any liability to the affected tenderers or any obligation to inform the affected tenderers of the grounds for the Employer's action.

24. Notification of Award & Signing of Contract Agreement

24..1 Prior to expiration of the period of tender validity prescribed by the Employer, the Employer will notify the successful tenderer in writing ("Letter of Acceptance") that his tender has been accepted.

24..2 Within 7 days from the date of furnishing of acceptable performance Security under the Conditions of Contract, the Employer will send the successful tenderer the form of Contract Agreement provided in the Tender Documents, incorporating all agreement between the parties.

24..3 The formal agreement between the Employer and the successful tenderer shall be executed within 7 days of the receipt of Form of Contract Agreement by the successful tenderer from the Employer.

25. Performance Security

25..1 The successful tenderer shall furnish to the Employer a performance Security in the form and the amount stipulated in the Conditions of Contract within a period of 14 days after the receipt of Letter of Acceptance.

25..2 Failure of the successful tenderer to comply with requirements of sub-clauses. 24.2 & 24.3 or clause.25 shall constitute sufficient grounds for the annulment of the award and forfeiture of the Tender Security.

F. TENDERING DATA

Instruction to tenderers
Clause Reference

26. Name of Employer
National Bank of Pakistan

(Insert address of the Employer with telex / fax no.)

27. Brief Description of Works

MINOR REPAIR & RENOVATION WORKS REQUIRED AT NBP ACP MODEL BRANCH, PACE TOWER GULBERG, LAHORE

27.1. Employer's address
Engineering Wing (Central), RHQ Building, 26-Mclagon Road, Lahore

27.2. Engineer's address:
The Wing Head, Engineering Wing (Central), Engineering Wing (Central), RHQ Building, 26-Mclagon Road, Lahore

28. Tender shall be quoted entirely in PAK Rupees. The payment shall be made in PAK Rupees.

29. i) Amount of Tender Security
PKR. 80,000/- (Eighty Thousand Rupees), in favor of "Wing Head, Engineering Wing (Central)"

ii) Performance bond,
10% of the equivalent value of Contract Amount in shape of Bank Guarantee from any scheduled Bank or Insurance Bond issued by a reputable Issuance Company, valid for 28 days beyond the defect liability period (for above 10.00 M bid amount)

30. Period of Tender Validity
365 Days from the date of opening tenders

31. Number of Copies of the Tender to be submitted
Uploaded as per EPADS.

32. Employer's Address for the purpose of Bid Security Submission
Engineering Wing (Central), RHQ Building, 26-Mclagon Road, Lahore

33. Venue, Time and Date of Tender Opening

Venue: **should be submitted electronically ONLY through EPADS**

Date:**As per Invitation of Bid**

Time:**As per invitation of Bid.**

34. Time Limit for Raising of Quarries.

Bidders may raise queries (if any) on or before the 05 (Five) days before the closing date for submission of bid documents.

G. FORM OF TENDER

35. Tender Reference No._____

(Name of Works) _____

To:

_____

_____

_____

Dear Sir,

i. Having examined the Tender Documents including instructions to Tenderers, Tendering Data, Condition of Contract, Contract Data, Specification, Drawing, 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 and defects therein in conformity with the said Documents including Addenda thereto for the total tender price of Rupees_____. (_____) or such other sum as may be ascertained in accordance with the said Documents.

ii. We understand that all the Schedules attached hereto form part of this Tender.

iii. As security for due performance of the undertaking and obligations of this Tender, we submit herewith a Tender Security in the amount of _____ drawn in your favor or made payable to you and valid for a period of 28 days beyond the period of validity of Tender.

iv. We undertake, if our Tender is accepted, to commence the Works and to deliver and complete the Works comprised in the Contract within time(s) stated in contract agreement.

v. We agree to abide by this Tender 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.

vi. Unless and until a formal agreement is prepared and executed, this Tender together with your written acceptance thereof, shall constitute a binding contract between us.

vii. We undertake, if our Tender is accepted, the execute the Performance security referred to in Conditions of Contract for the due performance of the Contract.

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

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

Dated this _____ day _____ Signature_____ in the capacity of _____ duly authorized to sign tenders for and on behalf of _____(Name of Tenderer in Block Capitals)

Address_____

_____

Witness_____

_____

H. SPECIAL CONDITIONS OF CONTRACT CONSTRUCTION / REFURBISHMENT / RENOVATION WORKS

35. **Security Deposit**

The persons whose tender may be accepted (hereinafter called the contractor) shall permit the National Bank of Pakistan at the time of making any payment to him for work done under the Contract to deduct such sum as will amount to Five percent (5%) of all money so payable, such deduction to be held by the National Bank of Pakistan by way of Security deposit. All compensation or other sums of money payable by the contractor to the National Bank of Pakistan under the terms of this contract may be deducted from or paid by the sale of a sufficient part of his security deposit, or from the interest arising there-from, or from any sums which may be due or may become due to the' contractor by the National Bank of Pakistan on any account whatsoever, and in the event of his security deposit being reduced by reasons of any such deduction or sale as aforesaid the contractor shall within ten days thereafter make good in cash or Government Securities endorsed as aforesaid any sum or sums which may have been deducted from or raised by sale of his security deposit or any 'part thereof. However, the contractor will not be entitled to any interest or profits on his earnest money, security deposit or any other sums of money of the contractor remaining with the Bank for any period.

36. **Compensation or liquidated damages payable by contractors to. National Bank of Pakistan for delay in completion of work**

The time allowed for carrying out the work as entered in the tender by strictly observed by the contractor and shall be reckoned from the date on which the order to commence work is given to the contractor. The work shall throughout the stipulated period of the contract be proceeded with all due diligence (time being deemed to be the essence of the contract on the part of the contractor) and the contractor shall pay as compensation Rs._____ for every day that the work remains uncommented, or unfinished after the proper dates and further, to ensure good progress during the execution of the work, the contractor shall be bound, in all cases in which , the time allowed for any work exceeds none month, to complete one-fourth of the whole of the work before one-fourth of the whole time allowed under the contract has elapsed, one half of the work, before one-half of such time has elapsed, and three fourths of the work, before threefourths of such' time has elapsed. In the event of the contractor failing to comply with this condition he Shall be liable, without prejudice to the other rights of the employer, to pay as compensation Rs._____ for every day that the due 'quantity of work remains 'incomplete, provided always that the entire amount of compensation to be paid under the provisions of this clause shall not exceed fifteen percent on the estimated cost of the work as shown in the tender.

37. **Securing Bank Interest**

In any case in which under any clause or clauses. of this contract the contractor shall have rendered himself liable to pay compensation amounting to the whole of his security deposit (whether paid in one sum deducted by installment) or committed a breach of any of the terms contained in the Engineer Incharge on behalf of the National Bank of Pakistan shall have power to adopt all or any of the following courses without prejudice to its other rights, as he may deem 'best suited to the interest of the National Bank of Pakistan.

38. **Action When Whole Security Deposit Is Forfeited**

i To rescind the contract (of which rescission notice in writing to the contractor Under the hand of the Engineer shall be conclusive evidence) and in which case the security deposit of contractor shall stand forfeited, and be absolutely at the disposal of the National Bank of Pakistan.

ii To employ labour paid by the National Bank of Pakistan and to supply materials to carry out the work; or any part of the work debiting the

contractor with the cost of the labour and the price of material (of the amount of which cost and price certificate of the Engineer Incharge shall be final and conclusive against the contractor) and crediting him with the value of the work done, in all respects in the same manner and at the same rates as if it had been carried out by the contractor under the terms of his contract, the certificate of the Engineer Incharge as to the value of the work done shall be final and conclusive against the contractor.

iii To measure up the work of the contractor, and to take such part thereof as shall be unexecuted out of his hands, and to give it to another Contractor to complete, in which case any expenses which may be incurred in excess of the sum which would have been paid to the original contractor, if the whole had been executed by him (of the amount of which excess the certificate in writing of the Engineer incharge shall be final and conclusive) shall be borne and paid by the original contractor and may be deducted from any money due to him by the National Bank of Pakistan under the contract or otherwise, or from his security deposit or proceed of sale thereof or a sufficient part thereof.

In the event of the above courses being adopted by the Engineer Incharge the contractor shall have no claim to compensation of any loss sustained by him by reason of hi having purchased or procured any material or entered into engagements, or made any advances on account of or with a view to the execution of the work of the performance of the contract. And in case the contract shall be rescinded under the provision aforesaid, the contractor shall not be entitled to recover or be paid any sum for any work therefore actually performed under this contract unless and until the Engineer Incharge will have certified in writing the performance of such work and the value payable in respect thereof, and he shall only be entitled to be paid the value so certified.

39. **Contractor• remains liable to nay compensation if action not taken under lause-37**

In any case in which any of the powers, conferred upon the Engineer incharge by clause 37 hereof shall have become exercisable and the same shall not be exercised the non-exercise thereof shall not constitute a waiver of any of the conditions hereof and such powers shall not withstanding be exercisable in the event of any future case of default by the contractor for which by any clause hereof he is declared to pay compensation amounting to the whole of his security deposit the liability of the contractor for past and future compensation shall remain unaffected. In the event of the Engineer Incharge putting in force either of the power(a) or (c) vested in him under the preceding clause he may, if he so desire, take possession of all or any tools, plant materials and stores in or upon the works, or the site thereof or belonging to the contractor or procured by him and intended to be used for the execution of the work or any part thereof, paying / allowing for the same in account at the contract rates, or in case of those not being applicable at current market rates to be certified by the Engineer Incharge whose certificate thereof shall be final, otherwise the Engineer incharge may be notice in writing to the contractor or his clerk of the work foreman or other authorized agent require him to remove such tools, plants materials or stores from the premises (within a time to be specified in such notice) and in the event of the contractor failing to comply with any such requisition, the Engineer incharge may remove them at the contractor's expense or sell them by auction or private sale on account of the contractors and at his risk in all respects and the certificate of the Engineer Incharge as to the expenses of any such sale shall be final and conclusive against the contractor.

40. **Extension of time for completion of work**

If the contractor shall desire an extension in the time for completion of the work on the grounds at his having been unavoidable hindered in its execution or on any other ground he shall apply in writing to the engineer Incharge within 30 days of the date of the hindrance on account of which he desires such extension as aforesaid, and the Chief Engineer shall, if in his opinion (which shall be final) reasonable ground be shown thereof,

authorize such extension of time if any, as in his opinion be necessary or proper.

41. **Final Certificate for completion**

On completion of the work, and six-months thereafter the contractor shall be furnished with a certificate by the Engineer Incharge of such completion, but no such certificate shall be given, nor shall the work considered to be complete until the contractor shall have removed from the premises on which the work shall be executed all scaffolding surplus materials and rubbish and clean off the dirt from all wood work, doors, windows, walls, floors or other parts of any building, in upon or about which the work is to be executed, or of which he :may have had Possession for the purpose of the .execution thereof, nor until the work shall have been measured by the Engineer Incharge whose measurements shall be binding and conclusive against the contractor. If the contractor shall fail as to removal of scaffolding, surplus materials and rubbish, and cleaning off dirt on or before the date fixed for the completion of the work, the Engineer Incharge may at the expense of the contractor remove such scaffolding, surplus materials and rubbish and dispose of the same as he thinks fit and clean off such dirt as aforesaid, and the contractor shall forthwith pay the amount of all expenses so incurred and shall have no claim in respect of any scaffolding or surplus material as aforesaid except for any sun actually realized by the sale thereof.

42. **Confirmation to all laws and regulations**

The contractor shall confirm in all respects to the provision of all Central and Local Laws, Rules and Regulation which may be applicable to the execution of said works by contractors and indemnify the proprietor against all penalties incurred by reason of any such provision.

43. **All on intermediate payments to be regarded as advance**

No payment shall be made for works estimated to cost less than rupees one thousand, till after the whole of the works shall have been completed and a certificate of completion given. But in the case of works estimated to cost more than rupees one thousand the contractor shall on submitting the bill thereof be entitled to receive a monthly payment proportionate to the part thereof then approved and passed by the Engineer Incharge whose certificate of such approval and passing of the sum to payable shall be final and conclusive against the contractor. But all such intermediate payments shall be regarded as payment as payments by way of advance against the final payment only and not as payment for work actually done and completed and shall not preclude the requiring of bad, unsound and imperfect or unskilled work to be removed and taken away and reconstructed or re-erected, or be considered as an admission of the due performance of the contract, or any part thereof in any respect, or the occurring of any claim nor shall of the affect in any way the powers of the Engineer Inchagre under these conditions or any of the accounts or otherwise, or in any other way or affect the contract. The Engineer Incharge shall have power to amend or withhold any certificate if the works or any part thereof have not been carried out satisfactorily. The final bill shall be submitted by the contractor within one month of the date fixed for completion of work, otherwise the Engineer Incharge certificate of the measurement and of the total amount payable for the work accordingly shall be final and binding on all parties.

44. **Submission of bills**

A bill shall be submitted by the contractor for each month on or before the date fixed by the Engineer Incharge for all work executed in the previous month, and the Engineer Incharge shall take or cause to be taken the requisite measurement for the purpose of having the same verified, and the claim as far as admissible adjusted if possible, before the expiry of one month from the presentation of the bill. If the contractor does not submit the bill within the time fixed as aforesaid, Engineer Incharge may depute a subordinate to measure up the said work in the presence of the contractor, whose counter signature to the measurement list will be sufficient warrant; and the Engineer

Incharge may prepare a bill from such list which shall be binding on the contractor in all respects.

45. **Bill to be submitted on Printed Forms**

The contractor shall submit all bills on the printed forms and the charges in the bills shall always be entered at the rates specified in the tender or in the case of any extra work ordered in pursuance of these conditions, and not mentioned or provided for in the tender, at the rates previously approved by National Bank of Pakistan.

46. **Payment to the Contractor**

Payment due to the contractor will be made either by credit to his account with the Bank or direct to him.

47. **Supply of Materials by the Bank**

If the specification or estimate of the work provides for use of any special description of materials to be supplied from the National Bank's store, or if it is required that the contractor shall use certain stores to be provided by the Engineer Incharge (Such materials and stores and convenience of the contractor but not so as in any way to control the meaning or effect of this contract; specified in the schedule or memorandum hereto annexed) the contractor shall be supplied with such materials and stores as required from time to time to be used by him for the purposes of the contract only, and the value of the full quantity of materials and stores so supplied at the rates specified in the said schedule or memorandum may be set off or deducted from any sums then due, or thereafter to become due to the contractor under the contract or otherwise or against or from the security deposit, or the proceeds of sale thereof, if the same as held in Government Securities, the same or sufficient portion thereof being in this case sold for the purpose. All materials supplied to the contractor shall remain the absolute property of the National Bank of Pakistan and shall not on any account be removed from the site of the work, and shall at alltime be open to inspection by the Chief Engineer, Engineer Incharge. Any such material unused and in perfectly good condition at the time of the completion or termination of the contract shall be returned to the National Bank of Pakistan's store, if by a notice in writing it shall so require. The contractor shall not be entitled to return any such material except with the consent of the National Bank Pakistan. In case any such materials returned to the Bank with such consent, have remained unused by the contractor or any wastage or damage has been caused to such materials, the contractor will not entitle to any compensation from the Bank for such wastage, damage of non-use of the materials.

48. **Work to be executed in accordance with Specification, Drawings, Orders etc.**

The contractor shall execute the whole and every part of the work in the most substantial and workmanlike manner, and both as regard materials and otherwise in every respect in strict accordance with the specification. The contractor shall also confirm exactly, fully and faithfully to the design, drawing and instruction in writing relating to the work singed by the Chief Engineer and lodged in his office and to which the contractors shall be entitled to have access at such office, or on the site of the work for the purposes of inspection, during office hours, and the contractors shall, if he so requires, be entitled at his own expense to make or cause to be made copies of the specification and of all such design, drawings and instruction as aforesaid. The whole work shall be carried out to the entire satisfaction of the Chief Engineer whose decision regarding workmanship and interpretation of specifications shall be final and binding on the contractor.

49. **Alteration in Specifications, designs and Quantities**

The Chief Engineer, Engineer Incharge shall have power to make any alteration in omission from addition to, or substitutions for the original specifications, drawings, designs and instructions, that may appear to him to be necessary, or advisable during the progress of the works, and the contractor shall be bound to carry out the work in accordance with any instruction which may be given to him in writing signed by the Chief

Engineer / Engineer Incharge and such alteration, omission, additions or substitutions shall not invalidate the contract and any altered, additional or substituted work which the contractor may be directed to do in the manner above specified as part of the work shall be carried out by the contractor on the same conditions in all respects on which he agreed to do the main work and at the same rates as are specified in the tender for the main work. The time for the completion of the work shall be extended in the proportion that the altered, additional or substituted work bears to the original contract work, and the certificate of the Engineer Incharge shall be conclusive as to such proportion. If the items of the work corresponding to the altered, additional or substituted work are not already mentioned in, the Schedule of quantities and rates, the Chief Engineer in writing shall fix such other rate or price as in the circumstances he shall think reasonable and proper where extra work cannot be properly valued the contractor shall be allowed day work prices in accorded with the local day work rates and wages and in either case the vouchers specifying the daily time and the materials used by delivered to the Engineer for verification and if the altered, additional or substituted work is not entered in the said schedule off rates then the contractor shall within seven days of the date of his receipt of the order to carry out the work, inform the Chief Engineer / Engineer Incharge of the rate which it is his intention to charge such class of work, and if the Chief Engineer / Engineer Incharge does not agree to this rate he shall by' notice in writing, be at liberty to cancel his order to carry out such class of work and arrange to carry it out in such manner as he may consider advisable, provided always, that if the contractor shall commence work or incur any expenditure in regard thereto before the rates shall have been determined as lastly here in before mentioned, then and in such case he shall only be entitled to be paid in respect of the work carried out or expenditure incurred by him, prior to the date of the determination of the rate as aforesaid according to such rate or rates as shall be fixed by the Chief Engineer. The decision of the Chief Engineer as regards rates shall be final and binding on the contractor.

50. **Rates for substituted or additional items of works**

No deviation from specifications stipulated in the contract nor any additional items of work shall be carried out by the contractor unless the rates of the substituted, altered or additional items have been approved in writing by the Chief Engineer failing which the National Bank of Pakistan will not be bound to entertain any claim on this account

51. **No compensation for alteration in or restriction of work to be carried out**

If at any time after the commencement of the work National Bank of Pakistan shall for any reasons whatsoever not require the whole thereof as specified in the tender to be carried out, the Chief Engineer / Engineer Incharge shall give notice in writing of the fact to the contractor who shall have no claim to any payment or compensation whatsoever on account of any profit or advantage which he might have derived from the execution of the work in full, but which he did not drive in consequence of the full amount of the work not having been carried out, neither shall he have any claim for compensation by reason or any alteration have been made in the original specification, drawing, design and instructions which shall involve any curtailment of the work as originally contemplated.

52. **Action and Compensation payable in case of bad work**

If it shall appear the Engineer Incharge or his subordinate Incharge of the work, that any work has been executed with unsound, imperfect or unskillful workmanship, or with materials of any inferior description, or that any materials or articles provided by him for the execution of the work are unsound, or of a quality inferior to that contracted for or otherwise not accordance with the contract, the contractor shall on demand in writing from the Engineer Incharge specifying the work materials or articles complained of notwithstanding that the same may have been inadvertently passed, certified and paid for, forthwith rectify, or remove and reconstruct the work so specified in whole or in part, as the case may require or as the case may be, remove the materials or articles to specified and provide other proper and suitable materials or articles at his own proper charge and cost, and in the event of his failing to do so within a period to be specified the

Engineer Incharge in his demand aforesaid, then the contractor shall be liable to pay compensation at the rate of one percent on the amount of the estimate for every day not exceeding ten days, while his failure to do so shall contractor and in the case of any such failure the Engineer Incharge may rectify or remove and re-execute the work or remove and replace with others, the material on articles complained of, as the case may be at the risk and expenses in all respect of the contractor

53. **Insurance**

The Contractor shall be responsible for Itaim.ng insurance against all risk including war risk, mutiny, civil war, civil commotion and other risks as may be prescribed from time to time by the bank, to the works and materials used and unused issued by the Bank and shall make good at their own cost all loss or damage whether to the work themselves, materials and / or to the lives persons either under the workmen's compensation Act or third party risk or property of others from whatsoever cause arising out of, or in-connection with the works either during the progress of the works or during the period of maintenance provided by the contract. And all such insurance policies shall be assigned by the contractor to or in favour of the employer and if / any reason such assignment is not possible, then the contractor shall take out insurance policies jointly in his and in the name of the employer and for the benefit of the employer. The contractor shall obtain and keep in force policies in respect of the above risks and such risks as it may be prescribed by the Bank from time to time which shall apply specifically and solely to the contract and shall fulfill all, the contractors' obligations for insurance in connection with this contract from the National Co-Insurance Scheme. If the national Co-Insurance Scheme is unable to provide the cover from a Pakistani insurer or if neither the National Co-Insurance Scheme is unable to provide the cover from a Pakistani insurer or if neither the National Co-Insurance Scheme is unable to provide the cover from A Pakistani insurer or if neither the National Co-Insurance Scheme nor a Pakistani insurer are able to provide a cover, only in that event shall cover be obtained from foreign insurers

54. **Work open to Inspections**

All works under or in course of execution or executed in pursuance of the contract shall at all times be open to be inspection and supervision of the Chief Engineer / Engineer Incharge and his subordinate and the contractor shall at all times during the usual working hours, and at all other time at which reasonable notice of the intention of the Engineer Incharge or his subordinate to visit the works shall have been given to the contractor himself.

55. **Notice to be given before work is covered up**

The contractor shall be given not less than five days' notice in writing to the Engineer Incharge or his subordinate Incharge of the work before covering up to otherwise placing beyond the reach of measurement any work, in order that the same may: be measured and correct dimension thereof be taken before the same is so covered up or placed beyond the reach measurement, and work without the consent in writing of the Engineer Incharge or his subordinate Incharge of the work and if any work shall be covered up or placed obtained, the same shall be covered at the contractor's expense, or in default thereof no payment or allowance shall be made for such work or the materials with which the same was executed.

56. **Maintenance period after issue of certificate of completion**

i. After six months for refurbishment / renovation works
ii. After one year for construction of building works

If the contractor or his workmen or servants shall break deface, injure or destroy any part

of a building in which they may be working or any buildings, road, curbs, fence, enclosure water pipes, cables, drains, electric or telephone post of wires, trees, grass or grassland or cultivated ground adjoining contiguous to the premises on which the work or any part of it is being executed, or if any damage shall happen to the work, while in progress, from any cause whatever, or any imperfections become apparent in it after six months of completion of refurbishment / renovation works and after one year completion of construction of building works, the contractor shall make the same good at his own expense, or in default, the Chief Engineer may cause the same to be made good by other workmen and deduct the expenses (of which the certificate of the Chief Engineer shall be final) from any sums that may be then, or at any time thereafter may become, due to the contractor, or from his security deposits or the proceeds of sale thereof, or of a sufficient portion thereof. The security deposit of the contractor shall not be refunded before the expiry of six months after the completion of work.

57. **Contractor to supply plants ladders etc.**

The contractor shall supply at his own cost material except such special materials, if any, as may in accordance with the contract be supplied from the National Bank's stores, plant tools, appliance, implements, ladders, cordage, tackle, scaffolding and temporary works requisite or proper for the proper execution of the work, whether original, altered or substituted and whether in the specification or other documents forming part of the contract or included or referred to in these conditions or not or which may be necessary for the purpose of satisfying or complying with the requirements of the Engineer Incharge as to any matter as to which under these conditions he is entitled to be satisfied or which he is entitled to require together with carriage therefore to and from the work. The contractor shall also supply without charge the requisite number of person with the means and materials necessary for the purpose of setting out works, and counting, weighing and assisting in the measurement or examination at any time and from time to time of the work of materials. Failing his so doing the same may be provided by the National Bank of Pakistan at the expense of the contractor and the expenses may be deducted from any money cue to the contractor, or from his security deposit or the proceeds of the sale thereof or of a sufficient portion thereof. The contractor shall also provide all necessary fencing and lights, required to protect the public from accident, and shall be bound bear the, expenses of defense of every suit, action or other proceeding at law that may .be brought by any person for injury sustained owing to neglect of the above precautions and to pay any damages and cost which may be awarded in any such suit action' or proceedings to any such person or which may with the consent of contractor be paid to by any claim by person.

58. **Contractors' liabilities under Workmen's Compensation Act**.

In every case in which by virtue of the provisions of section 12, sub-section (1) of the workmen's compensation Act, 1923, the National Bank of Pakistan is obliged to pay compensation to a workman employed by the contractor, in execution of the works the National Bank of Pakistan will recover from the contractor the amount of the compensation so paid, and without prejudice to the rights of the National Bank of Pakistan under section 12, sub-section (2) of the said Act. the National Bank of Pakistan shall be at liberty to recover such amount or any part thereof by deducting it from the security deposit or from any sum by the National Bank of Pakistan to the contractor whether under this contract or otherwise. The National Bank of Pakistan shall not be bound to contest any case against it under Section 12, sub-section (1) of the said Act, except on the written request of The contractor upon his giving to the National Bank of Pakistan full security for all cost of which the National Bank of Pakistan might become liable in consequence of contesting such claims.

59. **Labor**

No female labor shall be employed within the limits of cantonment.

60. No labor below the age of twelve years shall be employed on the work

I. FAIR WAGES CLAUSE

61. The contractor shall pay not less than fair wages to labors engaged by him on the work.

62. Explanation. "Fair Wage" means wage whether for time or piece work notified at the time of inviting tenders for the work and where such wages have not been so notified, the rates prescribed by the Pakistan P.W.D for the district in which the work is done.

63. The contractor shall notwithstanding the provision of any contract to the contrary cause to be paid a fair wage to laborers indirectly engaged on the work including any labor engaged by this sub-contractor in connection with the said work, as if the laborers had been immediately employed by him.

64. In respect 'of all labor directly or indirectly employed, in the works for the performance of the contractor's part of this agreement, the contractor shall comply with or cause to be complied with Government Labor Regulations.

65. The National Bank of Pakistan shall have the right to deduct from the moneys due the contractor, any sum required or estimated to be required for making good the loss suffered by a worker or workers by reasons of non-fulfillment of the conditions of the contract for the benefit of the worker’s non-payment of wages or of deduction made from his or their wages which are not justified by the terms of the contract or non-observances of the Regulations.

66. The National Bank of Pakistan vis-à-vis the contractor shall be primarily liable for all payment to be made under, and for the observation of the Regulations aforesaid without prejudice to his right to claim indemnity from this sub-contractor.

67. The Regulations aforesaid shall be deemed to be a part of this contract and any breach thereof shall be a breach of this contract.

68. The contractor shall at his own expense provide or arrange for the provision of footwear for labour doing cement mixing work (the contractor has undertaken to execute under this contract) to the satisfaction of the Engineer Incharge and on his failure to do so the National Bank of Pakistan shall be entitled to provide same and recover the cost from the Contractor.

69. The Contractor shall submit, by the 4th and 19th of every month, to the Engineer Incharge, a true statement showing in respect of the second half of the preceding month and the first half of the current month, respectively.

70. Statement Showing Labour Employed etc.

71. The number of laborers employed by him on the work (2) their working hours, (3) the wages paid to them, and (4) the accidents that occurred during the said fortnight showing the circumstances under which they happened and the extent of damage and injury caused by them, failing which the contractor shall be liable to pay to the National Bank of Pakistan a sum not exceeding Rs.500/- for each default or materially incorrect statement The decision of the Engineer Incharge shall be final in deducting from any bill due to the contractor amount levied as fine.

72. **Observance of Government Labour Rules For Welfare**

In respect of all labour directly or indirectly employed on the work for performance of the contractor's part of this agreement the contractors shall comply with or caused to be complied with all rules framed by the Government from time to time, for the protection of Health and sanitary arrangement for workers employed by the National Bank of Pakistan and its contractor.

73. **Contract May Be Rescinded And Security Deposit Forfeited For Subletting Bribing Or Becomes Insolvent**

The Contract shall not be assigned or sublet without the written approval of the Chief Engineer. And if the contractor shall assign or sublet his contract or attempt so to do or become insolvent or commence any insolvency proceedings or make any composition

with his creditors, or attempt so to do, or if any bribe, gratuity, gift, loan, perquisite, reward or advantage, pecuniary or otherwise shall either directly or indirectly be given, promised or offered by the contractor, or any of his servants or agents to any officer of person in the employ of the National Bank of Pakistan, Any way relating to his office or employment or if any such officer or person shall become in any way directly or indirectly interested in the contract, the Chief Engineer may thereupon by notice in writing rescind the contract; and the security deposit of the contractor shall thereupon stand forfeited and be absolutely at the disposal of the National Bank of Pakistan and the same consequences shall ensure as if the contract has been rescinded under clause 37 hereof and in addition the contractor shall not be entitled to recover or be paid for any work heretofore actually performed under the contract.

74. **Sums Payable By Way Of Compensation**

All sums payable by way of compensation under any of these conditions shall be considered as reasonable compensation to be applied to the use of the National Bank of Pakistan without reference to the actual loss or damage sustained and whether or not any damage shall have been sustained.

75. **Changes In The Constitution Of The Firm**

In the case of a tender by partners any change in the constitution of the firm shall be forthwith notified by the contractor to the Chief Engineer for his information.

76. **Work To Be Under The Direction Of The Chief Engineer**

All works to be executed under the contract shall be executed under the direction and subject to the approval in all respect of the Chief Engineer of the National Bank of Pakistan for the time being who shall be entitled to direct at what point or point and in what manner they are to be commenced and from time to tune carried on.

77. **Settlements Of Disputes**

Except where otherwise provided in the contract all questions and disputes relating to the meaning of the designs, drawings and instructions hereinbefore mentioned and or as to any other question, claim, right, matter or thing whatsoever, in any way arising out of, or relating to the contract, design, drawings, estimates, instructions, ordered, or these conditions or otherwise concerning the Works, or execution, failure to execute the same, whether arising during the progress of the work or after the completion or abandonment thereof shall be referred to the Circle Head National Bank of Pakistan being the sole arbitrator and whose decision shall be final and binding on the contractor without any appeal.

78. That the courts at Karachi shall alone have jurisdiction in respect of all disputes which may arise between the Bank and the Contractor.

79. **Lump Sum In Estimate**

When the estimate on which tender is made includes lump sum in respect of the parts of the work the contractor shall be entitled to payment in respect of the items of work involved or the part the work in question at the same rates as are payable under this contract for such items, or if the part of the working question is not, in the opinion of the Engineer Incharge capable of measurement, the Engineer Incharge may at his discretion pay the lump sum amount entered in the estimate, and the certificate in writing of the Engineer Incharge shall be final' and conclusive against the contractor with regard to any sum or sums payable to him under the provisions of his clause.

80. **Action Where No Specification**

In the case of any class of work for which there is no such specifications as in mentioned in rule I such work shall be carried out in accordance with the Pakistan P.W.D specification for the district and in the event of there being no district specification then in such case the work shall be carried out in all respects in accordance with the instructions and requirements of senior Engineer.

81. **Definition Of Work**

The expression "work" or "work' where used in this conditions shall, unless there be something either in the subject or context repugnant to such construction, be constructed and taken to mean the works by or by virtue of the Contact contracted to be executed, whether temporary or permanent, end whether original altered substituted or additional.

82. **No Claim On Account Of Fluctuations**

It must be clearly understood by the Contractor that no claim on account of fluctuation of market rates on account of war or for any reason whatsoever will be entertained during the currency of this contract for items of the work as per schedule of quantities attached to the agreement.

83. **Rates Inclusive Of All Taxes**

The tendered rates or amounts should be inclusive of all taxes, income and sales faxes etc. payable to the central and provincial Government or local bodies and no claims on this account shall be entertained by the National Bank of Pakistan, even if the taxes are enhanced or any new taxes are imposed under any head by the Government of Pakistan / Provincial Government or a Local Body during the currency of the contract. Enhancement of taxes or levy of new tax shall not affect the rates which may be agreed upon.

84. **Rates Inclusive Of All Leads And Lifts**

The tendered rates shall be inclusive of all lead and lift.

85. **Contractor To Check Drawing, Specifications Etc. Before Execution Of Work**

The contractor shall check all dimensions and quantities on any drawing and schedule of items given to him by the Bank and shall notify the Bank of any discrepancy or divergence which may be discovered therein and the contractor must get it clarified in writing before execution of the work otherwise he will be solely responsible for any loss to him in rectifying the work.

86. **Rates Inclusive Of All Incidental Charges**

The contractor's rate shall include all incidental charges in connection with the work such as the cost of removing trees, shrubs, grass, etc. which interfere with the execution of the work.

87. **Alternation Or Additions By The Contractors**

No alternation or additions shall be made by the contractor in the schedule of quantities, and rates must be filled in ink or typed out both in figures and words clearly and legibly in the columns provided in the schedule of quantities. All corrections must be initialed by the contractors. Any tender who does not comply with this condition will be liable to be summarily rejected and not taken into account when preparing comparative statement.

88. **Reduction Of Rates-For Items Not Carried Out Properly**

The Chief Engineer has full power to reduce the rates for such items which have not been properly carried out but can be accepted otherwise. The decision of the Chief Engineer with respect to reduction or rates will be final and without appeal.

89. **Materials' Obtained for Execution**

Material obtained from execution will be the property of the Bank. Serviceable materials are to be stocked in the place pointed out by the places pointed out by Engineer Incharge. The contractor undertakes to have the site clean free from rubbish to the satisfaction of Engineer Incharge.

90. **Site Clearance On Completion**

On completion of the work or earlier as directed by the Engineer Incharge the contractor shall remove all temporary structure (Godown, site offices etc.) erected by him at the site work. He shall fill all tanks dug out by him at site, remove all debris and other materials like surplus send, stone ballast, rubbish etc. and if short shall leave the site in a neat and tidy condition.

91. **Depositing of Materials Without Inconvenience**

The contractor shall not deposit any mater, al on any site which will inconvenience to the

public. The Engineer Incharge may require the contractor to remove any material which are considered by him to be resource of danger or inconvenience to the public, or cause them to be removed the contractor's cost.

92. **Supply of Materials**

Owing to difficulty in obtaining certain materials in the open market, the Bank may arrange to supply the material from any source. There may be delay in obtaining the materials by the bank and the contractor is, therefore, required, to keep himself in touch with the day to day position, regarding the supply of materials from the Chief Engineer and to so adjust the progress of the work that their labour may not, remain idle. It should be clearly understood that the no claim whatsoever shall be entertained by the Bank on account of the delay etc. in supply of materials, it may however be clearly understood that this clause will be applied to such materials only or as required to be supplied by the bank as per contract.

93. It will be at the discretion of the Chief Engineer not to accept a power of Attorney granted by the contractor to some person who may appear undesirable to the Chief Engineer.

94. **Storage.**

The contractor shall make their own arrangement for storing their belongings and all the materials.

95. **Contractors as Trustee for Materials Supplied**

Notwithstanding anything contained to the contrary in any or all the clauses of this contract where any materials for the execution of the contract are procured with the assistance of Government either by issue from Government stocks purchase made under order or permits or licenses issued by Government, the contractor shall hold the said material as trustee for Bank and use such material economically solely for the purpose of the contract and not dispose of them without the permission of the Bank and return if required by the Engineer Incharge, all surplus or unserviceable materials that may be left with him after the completion of the contract, or at its termination for any reason whatsoever on his being, paid or credited such price as the Engineer Incharge shall determine having due regard to the condition of the material. The price allowed to the contractor, however, shall not exceed the amount charged to him excluding the storage charges, if any. The decision of the Engineer Incharge, shall be final and conclusive. In the event of the breach of the aforesaid condition, the contractor shall in addition to throwing himself open to action for contravention of the terms of license or permits and or permits and or for criminal breach of trust, be liable to Bank for all moneys, advantages or profits resulting or which in the usual course would have resulted to him by reason of such breach.

96. **Materials Obtained From Excavation Etc. Will Be National Bank Of Pakistan Property**

The contractors in the course of their works should understand that all material (e.g stone and other materials) obtained in the work of dismantling, excavation etc. will be considered Bank's property and issued to the contractor (if they require the same for their own use) at rates approved by the Chief Engineer. If these materials are not required by them they will be disposed off in the interest of Bank.

97. **Nomenclature Of Items**

The nature of work as to be carried out is given more or less in the nomenclature of the items in the schedule. But for all purposes Pak P.W.D specifications, will have to be followed and as per direction of the Engineer Incharge.

98. **Doubts About Specifications To Be Referred To Chief Engineer Before Submitting Tender**

The contractor shall carefully read the detailed specifications attached with the schedule of quantities and if they have any doubts they should get them clarified from the Engineer Incharge concerned, before execution of the work. In case detail of drawing of some items is not attached with the tender documents, but the item is given in the schedule of quantities, the contractor is bound to get it clarified from the Chief Engineer before submitting his tender, failing which the contractor will be bound to execute the work at

his tender rates according to the details of drawings and designs of the work, which may be supplied to him subsequently by the Bank and in such case the Bank will not be liable to pay any extra amount.

99. **Contractor Staff At Site**

The contractors must keep experienced Engineer who can understand drawing, specifications etc. on the site of work throughout the working time. He must be approved by the Engineer Incharge and should he not carry out his duties properly he shall be removed by the contractor within one week of a written request from the Engineer Incharge. When an Engineer is removed another approved one by the Engineer Incharge should be appointed.

100. **Detailed Evaluation Of Works Prior To Bid.**

The contractors should inspect the site of work and acquaint themselves with the nature and requirements of the work, facilities of access for materials, removal of rubbish, cost of carriage, nature of strata, etc. before submitting the tenders.

101. **Site Disturbance Issues.**

In case of work of, additions and alternation repairs or renovation of any Bank building the contractor should clearly understand that he will not disturb the normal activities in the said building in any way by his working. The contractor will not be entitled to any compensation due to inconvenience or difficulty in execution of the work or idling of his labour or piecemeal working or due to delay to delay in the clearance of work site on account of the above.

102. **Warning Signs.**

Whenever a work is carried out in a city area, electric light or electric danger signs shall be provided by the contractor in the barriers as well as paraffin ones at his own expense.

103. **Access To Construction Site**

The contractors may have to make temporary approach roads etc. at their own cost to facilitate carriage of materials, such approach roads shall be aligned in a manner approved by the Engineer Incharge.

104. **Construction Site Conservancy And Sanitation.**

The contractor(s) shall at his / their own cost provide his/ their labour with hutting on the approved site and shall make arrangement for conservancy and sanitation in the labour camp to satisfaction of the local public Health and medical authorities. He / they shall also at his / their own cost make arrangement for laying of pipe lines for water supply to his / their labour, camp from the existing means wherever available and shall pay all fees, charges and expenses in connection therewith and incidental thereto.

J. INTERPRETATION CLAUSE

105. The Architect, the Engineer Incharge and the Senior Engineer mean the Chief Engineer employed by the National Bank of Pakistan, Incharge of the department of Engineering at Head Office. The site Engineer means the duly authorized representative of the Chief Engineer.

Words importing the singular number shall include the plural number and vice versa.

Schedule showing (approximately) materials to be supplied by the Engineer Department, National Bank of Pakistan under clause (10) and (26) of the conditions of contract for work contracted to be executed and the rates at which they are to charge for.

106. **Right Of Employer Under Law**

Nothing contained in the Main contract shall in any way, affect or impair or be deemed or constructed to affect or impair any rights or remedies to which the employer may be entitled under law.

Interpretation of the Contract

107. That in the interpretation of the contract the following documents shall be taken into account which are attached herewith.

i. General specifications and plans
ii. Additional Condition.
iii. General rules and direction for the guidance of contractors.
iv. Tender for works.
v. Notice inviting tenders.
vi. Letters forming part of contact.

STANDARD FORMS

CONTRACT AGREEMENT

THIS CONTRACT AGREEMENT made (hereinafter called the "Agreement" made on the day of _____between National Bank of Pakistan, Engineering Wing I-I-Chundrigar Road Karachi (Hereinafter called the Employer) of the one part _____

_____**,** (Here-in after called the contractor) of 2nd part.

WHERAS, the Employer has desirous that certain work viz_____

_____ should be executed by the contractor and has been accepted abide by the contractor for the execution and completion of such work and the remedying of ant defects therein.

NOW THEREFORE for and in consideration of the promises, negotiations, covenants, and agreement hereinafter and to be performed by the parties hereto, the said parties hereby covenant and agree as follows :-

I) In consideration of the covenants and agreement to be kept and performed by the contractor and for the faithful performance of this contract and the completion of the work embraced therein, according to the specifications and conditions herein contained and referred to or agreed in course of subsequent negotiations and in accordance with the general agreement and condition of contact the National Bank of Pakistan shall pay and the contractor shall receive and accept as full compensation for everything furnished and done by the contractor under this agreement, the contract price stipulated in the contractor's tender or such other sums as may be ascertained in accordance with such conditions of contract etc. and rates quoted against each item of work and agreed to and accepted by the parties as one instrument and at the time and in the manner prescribed by the condition of contract.

II) The contractor at his own proper cost and expense shall do all work and furnish all labour materials tools, supply machinery and other equipment and constructional plant that may be necessary for the said work.

III) The maintenance of rate progress in the work, which will result in its completion within the specified time, is an essential feature of this contract and the contractor agree to process with due diligence and care at all times to take a precaution to ensure the time of completion as defined herein time being deemed to be essence of the contract on part of the contractor.

IV) The said work shall be started within seven days of the contractor's receipt from National Bank of Pakistan of a written order to process and the contractor shall have the work called for under the contract fully completed on or before _____ **(____ days)**

V) It is also understood and agreed that the contract documents including any addenda thereto, consisting of the instruction of the tenderers, the tender's condition of contract special condition, schedule of items and rates, technical specifications drawings and this contract and are each and all made a part hereof and have the same force and effect as if set-forth at length herein.

VI) It is agreed by the parties in this contract that the contract shall be executed in three counterparts, two copies to be filled in the office of NBP and one given to the contractor.

IN WITNESS WHERROF, the parties hereto have executed this contract in counterparts as of the day and year hereinabove set-forth.

WITNESTH **NATIONAL BANK OF PAKISTAN**

_____ By_____

(SEAL)

WITNESTH **CONTRACTOR**

_____ By_____

(SEAL) (SEAL)

PERFORMANCE BOND

The successful tenderer shall to have to execute the following performance Bond from an approved insurance company of the scheduled bank of the value of 10 % with sureties acceptable to Owner, on its standard form enclosed within the tender, as laid down in the conditions of the contract, within one month of issuance of the work order before entering into an agreement with the owner.

This guarantee given at _____day of _____20 by _____ hereinafter referred to as the guarantee (which expression wherever the context so admits mean and include their successors and assigns) to the National Bank of Pakistan incorporated under National Bank of Pakistan Ordinance 1949 having its Head Office at Karachi hereinafter referred to the Bank.

WHEREAS an agreement of contract (hereinafter called the contract) been executed on _____between_____(hereinafter referred to as the contractor) and the bank for the construction, completion and maintenance of certain works, viz _____as therein mentioned in conformity with the provision of contractor.

NOW THEREFORE in consideration of the premises herein contained hereby undertake and guarantee to the Bank the due performance of the agreement of contract by the contractor.

We further guarantee and undertake by order and on account of the contract to pay forthwith to the bank without any demur, enquiry or objection whatsoever the sum of Rs. _____ (Rupees _____) in case the contractor, fails to perform or observe any of the terms, provision, conditions or stipulations of the contract or in case of default by the contractor in fulfilling any part of Contact according to the true purport, intent and meaning thereof which the Bank's engineer shall sole Judge.

AND we further indemnify and agree to hold the Bank harmless damages, losses, costs charges and expanses whatsoever made or in consequence of the aforesaid contract.

AND the guarantee shall not be effected in any manner by any alteration or modification made in the contract or in the extent or nature of the works to be constructed completed or maintained thereunder or by any allowance of time given to the contractor by any forbearance or forgiveness shown the contractor in respect of any matter concerning the contractor.

AND we hereby declare and agree that this guarantee shall remain in full force unit the contract has been fully performed by the contractor the entire satisfaction of the Bank, the sureties /

surety shall satisfy and discharge the damages sustained by the Employer, without reference to the Contractor, upto the amount of the written Bond , Then this Obligation shall be null and void but otherwise shall be and remain in full force and affect, but no alteration in terms of the contract made by agreement between the Employer and the Contractor, or in the extent or nature of the work to be constructed, completed and maintained thereunder and no allowance of time by the Employer under the Contract, Nor any forbearance or forgiveness in or in respect of any matter of thing concerning the contract on the part of the Employer shall in any way release the sureties / surety from any liability under the above written Bond.

Signed, sealed and delivered by
the Contractor above Named in
the presence of

_____
(Contractor)

1. _____
2. _____

Signed, sealed and delivered by
the Contractor above Named in
the presence of

_____
(Sureties / Surety)

1. _____
2. _____

SPECIAL CONDITIONS

Clause 1: DESCRIPTION OF THE WORK

The work consists of furnishing all plant, labour, material, equipment and performing all the work in strict accordance with the contract documents, for the construction, as described, including the responsibility and performance of all related work necessary and apartment thereto; its proper functioning, testing and initial operations, performance. The contractor shall procure, furnish provide and arrange for all the necessary and appurtenant thereto; its proper functioning, testing and initial operation performance. The Contractor shall procure, furnish, provide and arrange for all the necessary construction and maintenance of the necessary construction camps, offices and warehouses, shall construct as required and maintain the diversion works for drainage and shall perform all other work necessary for completion of the works described herein in strict conformance with these specifications.

Clause 2: GEOLOGY

The Employer does not guarantee the correctness of the designations of any materials not any interpretations, deductions, or conclusions relative to sub-surface conditions. Each tenderer and the Contractor must form his own opinion of the character of the work and of the materials to be excavated; he must make his own interpretations, and satisfy himself by his own investigation and research regarding all conditions affecting the work to be done. Tender and the Contractor must assume all responsibilities for deductions and conclusions as to the nature or conditions of the materials to be excavated and of doing other work affected by the geology at the site of the work.

A copy of the subsoil investigations of site is available in the "Head Office National Bank" at Karachi and can be inspected by Tenderers for their information. This report is to be issued for information only and does not form part of the contract documents and does not in any way relieve the Tenderer of his responsibilities of fully informing himself of site condition nor shall this report be used as the basis of any claim of any nature whatsoever.

Clause 3: TEMPORARY WORKS

Within the areas which may from time to time be defined as the site, the Contractor shall carry out and perform the construction of the works, and subject to the approved of National Bank will be permitted to construct temporary roadways, railways, camp building and temporary works which he may require for the construction of the works. If the contractor wishes to use other land for camps or for other contractor purposes, the contractor shall make all necessary arrangement thereof and shall pay all rentals or other costs connected herewith. The National Bank will give to the contractor possession of the area designated and defined as the site, and shown on the drawing when the National Bank's order to commence work is given.

Clause 4: SITE OFFICE

Site office with sanitary facilities shall be erected at contractors cost for his own use and that of the site staff' of the National Bank and Engineer Incharge, minimum area for the use of site staff of National Bank and Engineer Incharge shall be 300 sft. And shall be of such dimensions and design as may be approved by the Engineer Incharge. On completion of the work the contractor shall remove the structure unless requested otherwise by the National Bank and clear the site without any claim for compensation. The contractor shall arrange a telephone connection at the site of work. The installation charges shall be reimbursed to the contractor by the Bank after completion of the job but the running expenses shall be borne by the Contractor without any claim, the telephone shall be maintained

in good order for the use of Bank's representative without any charges at all times during and for the period of construction.

Clause 5: NOTICE BOARD

The Contractor shall provide a notice Board of dimensions not exceeding 10' x 6' in a position on boundary wall to be approved by the National Bank. The contractor shall paint on the Notice Board lettering giving the name of the project, Owner's Name, the contractor's Name, the names of specialist Contractor.

Clause 6: USE OF SITE

The site is to be kept as clear as possible, to facilitate rapid progress of the work and no employees of the Contractor unless authorized by the National Bank will be permitted to live on the site.

Clause 7: SETTING OUT

The Contractor will have to layout the building as per plan. The Contractor will responsible for all errors that may be subsequently found and he will remedy it all his own expense. If certain portion of the Work has already been done by other contractors the contactor is to check all the center lines in, the work already performed and to report in writing any discrepancies between these checking and the National Bank drawings at the time of taking possessions of the site Once he has taken possession, the Contractor will be responsible for any errors that may subsequently be found in the visible portions of other contractor's' work and will have to remedy the same at his own expense.

Clause 8: SURVEYING INSTRUMENTS

The Contractor shall maintain in: his office at site required surveying instruments in perfect working condition to enable the National Bank and Engineer Incharge to check level and lines of the work. The contractor is to construct and preserve accurate setting out stations and bench marks so that the lines and levels may easily be checked.

Clause 9: CARE OF WORKS

The contractor will be held responsible for the care of the whole of the works including those executed by specialist contractors from damage arising from any cause whatsoever (same and except the Excepted risks and defined below) from the date of commencement to the date of completion. The contractor shall also be responsible for all damage to person, property, animal or thing arising during execution of the works. Excepted Risks as mentioned above are Nuclear Hazards, war hostilities (whether way is declared or not) invasion, act of foreign enemies' rebellion, revolution, insurrection or military or usurped power, civil war or riots (otherwise than among the Contractors own employees) or use of occupation by the National Bank of any portion of the works in respect of which a certificate of completion has been issued.

Clause 10: KEEPING FOUNDATIONS & WORKS FREE FROM WATER

If necessary, the contractor at his own expense shall provide and maintain power driven pumps to keep the works free from water. The water shall be disposed of to the satisfaction of the local authorities and / or the National Bank.

Clause 11: PROGRESS REPORT

The contractor shall be responsible for preparing and sending weekly report of progress to the owner and Engineer Incharge. The proforma for such weekly progress report shall approved by Engineer Incharge or amended from time to time as found necessary. All assistance by Contractor shall be given to Engineer Incharge or amended from time to time as found necessary. All assistance by contractor shall be given to Engineer Incharge, site staff as and when an assessment of such progress is to be made by Engineer Incharge.

Clause 12: TREASURE TROVE

The contractor shall hand over to the National' Bank any treasure coins or objects of antiquity or fossils etc. which may be found on the sited during excavation.

Clause 13: WATER AND WARD

The Contractor shall provide at his own expense day and: night watchmen for the protection of all works on site including materials already fixed in the work by him or by other specialist contractors employed will also be required to have their own watchmen for their own stores.

Clause 14: TEMPORARY POWER AND LIGHT

During the construction period temporary power and lighting facilities shall be provided by the contractor to supply electric service for construction tools, equipment and site lighting etc. The contractor shall assume responsibility for this service, its maintenance, repair and operation at his own cost, starting two weeks after notification of award of the contract and as directed by National Bank.

Clause 15: WATER. FOR CONSTRUCTION PURPOSES

Contractor will Make his own arrangements for water for construction, drinking and other purpose.

Clause 16: SITE ORDER BOOK

The contractor shall maintain a site order book (of triplicate leaves) for taking instruction and directions of the Bank's Chief Engineer or his representative at the site of work.

Clause 17: GENERAL

Wherever in the drawings and schedule of items etc. and specification any material or articles or matter is indicated to be under “approved”, “Requirement", "Direction" and instruction it will be of the Bank's Chief Engineer at the Head Office.

Clause 18: ATTENDANCE UPON SPECIALIST CONTRACTORS

The General Contractor shall at his own cost attend upon and allow all facilities and make good after all specialist contractors have executed their works. He shall allow sufficient time and free use of water, electricity, available or erected at site, at usual charge .as approved by the Chief Engineer. The following specific attendance will be required from the General Contractor.

a) Mechanical Service: The specialist contractor shall place sleeves in the form work concrete before pouring to allow, for the future passage of pipe. Where possible or essential, the specialist contractor will install such equipment which has to be embedded in structural concrete or brick work or floor and General Contractor and his workmen shall take care as not to dislocate such installation. Where this cannot be done in advance, the specialist contractor shall cut holes in floors and walls required to accommodate piping and fittings and the building contractor will make good any work cut away. Where the pipes are suspended from ceiling or clamped to walls, the specialist shall fix such hangers and clamps to ceiling or walls and the General Contractor shall do any making good ceiling or wall as required. IN case of all electrical conduits and all service pipes the General Contractor shall exercise care in covering such pipes with cement mortar so that any time concrete filling below floor tilling or roof terrace will not cause the pipes to deteriorate.

b) Air-Conditioning Heating and ventilation: The Building Contractor’s attendance will be as follows:

The ceiling ducts and pipes will be fixed by the specialist contractor secured to the structural slab by wrought iron hangers which will penetrate the underside

of the structural roof slab in order to secure the hangers.The specialist contractor will make good the cutting of the slab after the specialist contractor has done his work. After the ducts are in position, the special contractor will fix the ceiling as per his own vender.

He shall construct in the plant chamber heavy foundation using anti-vibration material supplied by the specialist, and shall also building reinforced concrete chambers for washers etc. as shown on the specialist drawings to be supplied by the Air-Conditioning Contractor. All builders work connected with foundations and concrete chambers in plant room shall be paid to this contract separately.

c) Lifts: The general contractor will hand over the lifts shaft with all its walls perfectly vertical and smooth. The General Contractor will provide all assistance to representatives of lifts specialist to check concrete work at each stage and to ensure that proper holes for beams recesses etc. are lift in the concrete as he requires. Where such holes and recesses cannot be provided accurately during casting of concrete, the General Contractor will cut holes for securing lift guides to the sides of the shaft where indicated by the lift contractor.

   He will also make cuttings where indicate for push buttons, indicators etc. as well as for the passage of pulleys through lift motor room floors, steel joints for the support of lift machinery and pulley wheels and heavy beams Where shown on the drawings. He will also hoist steel beams and machinery to any floor height for specialist contractor.

d) Permanent Electric & Water Connections theGeneral Contractor will be responsible for obtaining permanent electric and water connections etc. from the authorities and put all the electric wiring in working, order without which the work will not be considered as completed.

Installation of False ceiling and Aluminum windows:

The general Contractor will allow the false and aluminum windows contractors to install the falls ceiling / aluminum windows on each floor and will give him a free working space and sufficient time. He shall not claim any extension in time limit due to the hindrance or otherwise from the specialist contractor. In case of delay by the specialist contractors' the case may be referred to Chief Engineer whose decision will be binding on all the Contractors.

SPECIFICATION OF MATERIALS

1. SAMPLES & TESTS

i. Samples:-

In addition to the special provision made hereafter as to sampling and testing of material by particular methods; the Chief Engineer may call for samples of all materials together with details of their sources and workmanship proposed to be employed in the execution of the work, and such samples shall be furnished by the contractor without delay and without charges. Approved samples will be kept by the Chief Engineer who may reject at any time all materials or workmanship not corresponding in quality and character with the approved samples. The contractor shall provide without extra charges, suitable labeled containers for the storage of samples.

ii. Test:-

The Chief Engineer may send inspectors to the manufacturer's premises to test materials or supervise their manufacture, should the Chief Engineer decide not to send an inspector to the manufacturers, certificates of test, proof sheets, etc. showing that the materials have been tested in accordance with the requirements of this specification relating thereto. Notwithstanding any tests that may have been carried out before materials leave the manufacturer's premises, not the production of manufacturer's certificates of tests, proof sheets etc. materials may also be tested after delivery to site, and the Chief Engineer shall be at liberty to reject after delivery or after incorporation in the permanent works, only material found to be unsuitable or not in accordance with the specifications.

iii. Additional Tests:-

In addition to the tests required under either clauses hereof, the Chief Engineer shall have power to order independent test of materials to be carried out by some agency appointed by him at such place as he may determine, and the result to tests shall be binding upon all parties no claim by the contractor being admissible in respect of or as a consequence thereof.

iv. Standard Specifications:-

Except where otherwise specified or authorized by the Chief Engineer, all materials shall conform to the latest addition of the appropriate British standard specifications (hereinafter abbreviated to BSS) published by the British standard institute, or to any other standard specification of whatever origin, that may be approved by the Chief Engineer.

v. Work Test Rules:-

All test of concrete work shall be conducted in advance with British Standard Code of practice No. CP 110 (1972) or other equivalent approved by the Chief Engineer.

2. CEMENT:

i. General:-

Normal Portland cement complying with BS No. 12(1948) shall be arranged by the Bank for the entire works, from an approved manufacturer, contractors shall satisfy themselves regarding the quality and condition of the cement prior to accepting delivery, after which they shall be held completely responsible for the same.

ii. Protection & Storage at site:-

All cement kept on the site shall be stored in an approved manner to prevent deterioration and contamination. It shall be stored at the contractor's cost in a rain proof shed on a if dry floor which shall be raised above the general ground level so as to protect the cement against moisture from air on from any other source. Any precautions which may be necessary for effecting delivery during rainy weather shall be taken. Different brands of cement shall be stores separately and different brands shall not be mixed for any single pour.

iii. Consumption:-

No cement shall be kept stored for more the two months and care takes to see that cement bags are consumed in sequence with the batches delivered on site.

3. AGGREGATE:-

i. Prior Approval of Aggregate:-

The type and source of all aggregate shall be approved by the Chief Engineer before the materials are delivered to the site.

ii. Aggregate General:-

Aggregate for all concrete work shall unless otherwise specified or directed by the Chief Engineer. They will consist of natural sands and gravel, crusted stone or other approved sound materials and shall be hard, strong and durable, free from clay films, and other adhering coatings, and conform to the dimensions and grading's specified for the several parts of the works. Aggregate shall be stored at the work in such a manner as to avoid contamination and shall if ordered by the Chief Engineer, be washed before use. Clean fresh water shall be used for this purpose, and no extra charges paid for the same.

iii. Coarse Aggregate:-

Coarse aggregate shall be graded crushed stone from an approved quarry. The aggregate shall be screened and graded down to sizes as recommended in the various mixes. The pieces of aggregate shall be roughly cubical. Flat, this pie9es shall not be permitted to be used. Aggregate shall be dense and as far as practically possible of uniform specific gravity. Where ever so specified shingle shall be crushed or uncrushed gravel or crushed stone. The pieces shall be angular, roughly cubical, and shall have granular or crystalline (not glassy) non-powdery surface. Fire-cable, flaky and laminated pieces shall not be permitted to be used.

4. REINFORCEMENT:-

i. All finished steel bars shall be well and cleanly rolled, reinforcement shall be free from cracks, surface flows, laminations, rough, judged and imperfect edge and all other defects and shall be finished in a workmanlike manner.

ii. Steel reinforcement shall .be plain round hot rolled milled steel bars or high yield bonds bars complying with BS 785, Cold worked bars shall be square or round bars which have been twisted when cold and shall comply with BS 1144.

	Tensile Strength Lbs/ per Sq Inch	Yield Stress Lbs/ Per Sq. Inch
Plain round Mild steel Bars BS 788 part 1 1967	63,000	36,000
Hard drawn Mild steel Deformed Bars for the Reinforcement of Concrete conforming to ASTM A 615-76A 1977 or equivalent.	90,000	60,000

iii. Reinforcement shall be of Rolled Mild, steel bars. The contractor shall arrange for weighment of steel at his cost to satisfy himself. Prior to use, the Contractor shall be responsible to see that reinforcement is free from pitting, loose rust, mill scale, paint, oil, grease, adhering earth or any other material that may impair the bond between the concrete and reinforcement or that may cause corrosion of the reinforcement or disintegration of the concrete.

iv. Restless annealed tying wire 18 SWG shall be obtained from approved manufacturers and shall as regards strength, comply with the requirements specified. Binding wire to specifications shall be provided by the contractors at their own cost.

v. Supply and storage. All stacking and storing of bars is the contractor's liability and a contingent to the quotations.

vi. Weight of all the bars shall be taken off from the standard weight tables irrespective of re-rolling margins, and other such factors. Contractor's bill shall be paid on the basis of these weight is direct proportion to the steel as measured used in the works. No claims will be entertained on account of such re-rolling margins, wastage etc.

5. FILLING MATERIALS:

Materials for filling shall be uniform in character throughout and free from substances that by decay or otherwise may cause the formation of bellow or cavities or otherwise affect the stability of the filling.

Earth filling shall be of selected materials obtained from the excavation or other approved sources. NO soft chalk or clay or earth with a predominating clay contact shall be used. Hard Caro shall be of selected hard clean gravel, broken brick, broken concrete, broken or crushed stone, quarry was or similarly approved material, concrete for filling shall be to the proportions described.

6. LIME:

i. Lime shall be of good quality high calcium lime containing from 95% upwards of calcium oxide. The impurities insoluble in acids should not exceed 3% for the quicklime or 1% for the kiln, kept thoroughly dry and prepared within 24 hours of its removal from the kiln.

ii. Storage of lime

Generally all approved lime shall be stored as specified for cement in Clause B2 hereof, care being taken that where lime is not stored in paper bags it shall be stored so that as small an area as possible, is exposed to the air, and all lime storage arrangements shall be to the approval of the Chief Engineer.

7. TIMBER:

i. **Timber general:-**

All timber for temporary or permanent work shall be of the best quality, sound, straight, well-seasoned, free from sap; clefts, radial cracks, cup shakes, large, loose or deed knots, or other imperfections and shall show a clean surface when cut.

Contractor shall be liable to bring to site the total quantity of timber cut to sizes with tolerances required for incorporation in the work on acceptance of the contract. Timber shall be stacked in such a manner as, to allow natural seasoning to take place for as long a period as possible.

ii. **Inspection:**

All timber shall be subjected to inspection on the site, piece by piece, and shall be to the approval of the Chief Engineer who may reject such timber as is considered by him to be below specification and in the case of timber specified to be creosoted or termite proofed, may reject such timber either before or after creosoting treatment. The contractor shall provide all necessary labour for handling the timber during inspection free of charge.

iii. **Wrought faces and allowance on joiner' work:**

All joiners' work shall be wrought and finished with a clean, even smooth face, the thickness given to include 3/ 32" for each wrought face in soft wood and 1/6" in hard wood.

8. GLASS:

i. **General:**

All glasses shall be obtained from an approved manufacturer and shall be free from blemishes of all kinds and descriptions, whether surface or internal, Claims shall not be entertained regarding poor quality of locally manufactured glass. The contractor shall have to select good pieces or make alternate arrangement for supply of the same.

ii. **Plate glass**

Plate glass shall be provided where Specified or directed in the following grades.

3 mm flat drawn or clear frosted sheet glass.

5 mm clear sheet glass.

¼" thick `Georgian' rough cast wired glass.

¼" thick polished plate glass.

Tinted / solar glass as specified in bill of quantities and in confirmation with latest B.S specification will be used with prior approval of Chief Engineer.

9. WIRE GAUGE:

Gauge for fly-proofing shall be of the quality uniformly woven webbing of 144 meshes per square inch. The wire for the gauge shall be best quality 22 SWG aluminum wire.

10. PAINTS AND. PROTECTIVE MATERIALS

i. **Knotting:-**

Knotting shall be uniform dispersion of lac or suitable resin (natural or synthetic) in a suitable solvent.

ii. **White lead paint:-**

White lead' paint shall be made from pure white lead in accordance with BS 239, mixed with fine boiled linseed oil, turpentine, driers and pigments, and stained free from skins and all extraneous matter before being pigmented and if so used, the quantity shall not exceed 8% (eight percent) of the paint mixed ready for the brush. No other ingredient' except the colouring matter will be allowed, and the colour shall be produced by using the latest possible. amount of colouring matter. The proportion of the ingredients for the various coats shall be subject to the approval of the Chief Engineer.

iii. **Red lead paint:**

Read lead paint shall be made from non-setting red lead in accordance with BS 217 thoroughly ground and well and freely mixed with approximately 15% of boiled linseed oil of give a paint with good covering power and adhesion shall be determined by tests to be made by the contractor to the satisfaction of the Chief Engineer. The Chief Engineer may select samples of the paint for analysis after a sufficient quantity for the work about to be painted has been mixed only red lead paint as manufactured by Messrs. Burger Paints has been deemed to satisfy the above standard.

iv. **Linseed oil putty:**

Putty for stopping and glazing shall consist of whiting thoroughly ground with linseed oil mixed with 5% of red lead of form a smooth paste, and shall comply with BS 544.

v. **Varnishes:**

The materials is required to be cleared and transparent and when applied shall on drying give a glossy coating free from runs and specks. The composition of the varnish shall conform to the requirements of BS .274.

vi. **a. White wash:**

White wash shall be made from pure fat lime: brought to the work in an un-shakes condition. Water shall be added to this lime in a tub until the mixtures is of the consistency of cream, and shall be allowed to rest for a period of 48 hours. The mixture shall then be stained through an approved cloth strainer and to each cubic feet of the mixture obtained shall be added 4 ounces of gum boiled with 12 ounces of rice and a suitable quantity of "Blue".

b. Colour wash:

Colour wash where not an approved proprietary branch shall be made from pure selected fat lime as described above for white wash, to which shall be added and intimately mixed the necessary pigment to produce to tint specified. The pigments shall be to the approval of the Engineer Incharge.

vii. **Oil bound washable distemper:**

Oil bound washable distemper shall comply with BS 1053. Type 1, and shall be obtained

from an approved manufacturer, prior approval from Chief Engineer to be obtained.

viii. **Emulsion paints:-**

Robbialac Emulsion / LC.I Dulex paints shall be used.

ix. **Proprietary brands:-**

Where the contractor proposes to use proprietary brands of materials in the works described as 'Paint work' except for emulsion paint, he shall state, when submitting his tender, the brand grade and manufacturer of the materials on which he has based his rates. All proprietary brands of materials shall be stored mixed, applied and treated strictly in accordance with the manufacturer's instructions.

x. **Creosote:-**

Creosote shall be pure tar distillate of the best quality as obtained and sold under the trade name of ' SOLIGNUM' that is creosote paint for the preservation of timber. The SOLIGNUM to be used shall be clear SOLIGNUM so as to mar the timber.

SECTION-1

A. EXCAVATOR

Clause 1: GENERAL

It is presumed that the contractor has familiarized himself with the soil condition at site before tendering for the work.

The contractor shall take levels of all the areas and check layouts and alignments if already established at site. The approval of this check shall be obtained from the Engineer Incharge and after such check the contractor shall be responsible for all errors and discrepancies in the work.

All excavation of every description and or whatever substances encountered shall be performed to the dimensions and elevations indicated on the drawings for each building and structure and shall include trenching for utility and drawing system occurring within the enclosing fields or appurtenances of building an 1 structures, Suitable materials shall be rated from unsuitable materials during excavation operations, Excavated material conforming to the specifications for material to be used for embankments, fills backfilling, grading, topsoiling, or rock slope protection, required for the project under the contract shall be considered as suitable. No materials shall be wasted or used for the convenience of the Contractor unless so authorized.

Clause 2: ANTIQUITIES. AND TREASURE- TROVES

An ancient carving, relics of antiquity coins or other curios which may be discovered or excavated during the progress of the work are to remain the property of the owner and are to be handed over to the owner.

Clause 3: SHORING

The contractor shall provide all necessary sheeting, timbering and shoring to excavations to insure the safety of the workmen, and freedom from damage to any adjacent paving, structures and utilities. The contractor shall be responsible for any injury to the permanent work any consequent damage caused by the removal for shoring or other supports from excavations. Where support is ordered by the Engineer Incharge to be left in, it will be measured and paid for, unless in the opinion of the Engineer Incharge, it is required to be lift in by reason of the Contractor's negligence or lack of foresight.

Clause 4: DISPOSAL OF EXCAVATED MATERIAL

1. Suitable excavated material shall be placed in the proper section of the permanent work required under these specifications, suitable excavated material in excess of that required for he work under this specification shall be used in other portion of the permanent site work required for the project under contract. Suitable material that can not be placed readily in the permanent work shall be separately stockpiled. Material in excess of that required for the permanent work under the contract, as decided by the Engineer Incharge and any unsuitable material shall be disposed of by the contractor to the satisfaction of local and municipal authorities, Excess suitable material may be ordered to be stockpiled within site for future use by owner.
2. Stockpiles shall be kept in a neat, well drained, workable condition at all times. Suitable excavated materials shall be separately stock- piled at approved location in the immediate vicinity of the work, so selected as not to interfere with the work being performed under the contract.
3. Waste material shall be disposed of in the spoil areas approved by the Engineer incharge and local or municipal authorities. The material shall be spread and graded to drain so as to avoid the forming of pounding areas. No compaction will be required other than the controlled movement of hauling

and spreading equipment.

Clause 5: DRAINAGE& DEWATERING DURING EXCAVATION

Excavation shall be performed in the dry. The excavation and the area and immediately surrounding each excavation for a distance of 25 feet, including slopes and ditches, shall be continually and effectively drained away from the excavation. The excavation for inlet, outlet and diversion ditches and the furnishing and operating of dewatering equipment, as necessary, shall be performed under this specification. Water from the excavation shall not enter the new drains or other construction work. The responsibility for removing water shall rest with the contractor and no claims for expenses incurred will be entertained. Suitable precautions shall be taken to prevent erosion from under-cutting previously concreted footings and slabs. Excavation shall be kept free from ponding until the permanent work in the excavation has been completed and accepted and the excavation have been completely backfilled.

Clause 6: EXCAVATION FOR BUILDING

The foundations, footings, etc. shall be taken out to the exact width and depth shown in the drawing or as directed by the Engineer Incharge. The bottom of the trench shall be in perfect level both longitudinally and transversely. The sides shall be left plumb, where the nature of the soil does not permit the sides being left plumb, they may be sloped down in accordance with the instructions of the Engineer Incharge. The foundations after being excavated shall be inspected and passed by excavated shall inspected and passed by the Engineer Incharge before any work is commenced or the contractor will be liable to have this work removed for inspection. Unless otherwise specified, the contractor shall at his cost do all shoring, pumping, bailing out dredging and keeping the excavation free from water while the exaction or any other item or work is in progress in such a manner as directed by the Engineer Incharge. Excavated material shall be kept at a sufficient distance from the trench to prevent the excavated material from falling back into the trench and for placing and removing shorting and form. Where unsuitable material underlies the floor areas below the specified stripped depth or building foundations same shall be immediately reported to the Engineer Incharge, and instructions obtained from the correction treatment to be performed. The same shall be instruction obtained from the corrective treatment to be performed. The same shall be inspected and passed by the Engineer Incharge before any further work is commenced, or the contractor will be liable to have this work removed for inspection at his own cost. Care shall be taken not to disturb the bottom of the excavation, and excavation, to final grade shall not be made until just before concrete is to be placed. Unauthorized width of excavation for footings for foundations shall be filled with concrete of the strength specified for foundations and footing at no expense to the owner. The bottom of foundation trenches should be slightly watered well rammed.

Clause 7: BACKFILLING OF FOUNDATIONS, TRENCHES, DUCTS, SUB-FLOOR ETC.

Backfilling shall be performed after the permanent work in the excavation has been inspected and approved. Shoring etc shall be removed in a manner to avoid damage or disturbance to the work and the excavation shall be free of forms and cleaned of trash. Backfill material shall consist of the excavation or borrow of sand, gravel or other material approved by the Engineer Incharge and shall be free of trash, lumber or other debris. Backfill shall be placed in layers not more than 6 inches thick and each layer shall be rammed or rolled to an approved degree of compaction. Backfill shall not be placed on surfaces that are muddy. Backfill shall be brought to final grade unless otherwise shown or specified and shall be brought up evently on each side of each wall. Care shall be exercised to avoid any wedging action or eccentric action upon or against the structure and to avoid any disturbance or damage to the work. Each layer shall be uniformly spread,

moistened or dried when required to the proper moisture content for the required degree of compaction, and uniformly compacted by hand or machine tempers or by other suitable equipment. Filling in the plinth shall be in excess of the depth required actually to be filled. This excess earth shall be removed to make room for the flooring.

Clause 8: MODE OF MEASUREMENTS

The measurements of excavation shall be taken as the area of the bottom of foundation trench multiplied by the depth of the foundation to the exact dimensions shown on the drawing. The area of the bottom of the foundation trench shall be the area of the wall, column duct or trench footing and shall not include the extra excavation required for formwork shoring etc. where required no payment will be made for unauthorized width and depth. The rate for excavation shall cover.

1. Excavation of foundation trenches to the exact dimensions shown on the drawing including formwork shoring strutting where required in all type of strata seen by the contractor before submitting tender. No claims regarding the variations in the strata from place to place on the same site will be entertained. Unless otherwise specified in the schedule of quantities the tendered rate will be for all type of soil including mud, silt etc.
2. Lifting and placing excavated material to any lift and distance.
3. Backfilling the sides of foundation trenches, filling under plinth if required, laid in courses, watered and rammed as specified.
4. Disposal of surplus earth as specified.
5. Provision of drainage as specified.

The cost of material, labor, shorting, supply of all appliances at sites and all operations to be performed in accordance with the instructions of the Engineer Incharge. Schedule of quantities and as specified above.

B. CONCRETOR

Clause 1: SCOPE:

The section of the specification covers requirements for material and work man-ship for cement concrete for the following items:-

1. In situ reinforced cement concrete:
    - 1.1 Quality controlled cement concrete of specified strength.
    - 1.2 1:2:4 cement concrete specified by proportion.
2. Mass Concrete
    - 2.1 1:4:8 binding concrete under floor and foundations.

Clause 2: APPLICABLE PUBLICATIONS:

The following British publications of the issues current at the date of the contract from a part of this specifications of the extent indicated by the reference thereto:

British Standards:

B.S.882	Concrete aggregates from natural sources.
B.S.12	Portland cement (Ordinary and rapid hardening)
B.S.15	Mild steel for General structural purposes.
B.S.785	Rolled steel bars an hard draw wire for concrete reinforcement.
B.S.1221	Steel fabric for concrete reinforcement.
B.S.1144	Cold twisted steel bars for concrete reinforcement.
B.S.1881	Methods of testing concrete.
B.S.C.P. 114	The structural use of reinforced concrete in buildings.

Clause 3: GENERAL

Full cooperation shall be given to other specialist contractors install embedded items. Suitable templates or instructions, or both, will be provided for setting items not items not placed on the forms. Embedded items shall have been inspected and tests for concrete or other materials or for mechanical operations shall have be in completed and approved before concrete is placed.

Clause 4: MATERIALS:

a. Coarse Aggregates:

Aggregate shall be crusted stone aggregate from an approved quarry ranging in size from ¾” down to 3/16" and shall comply with the requirements of B.S 882. Aggregate which in the opinion of the Engineer Incharge are not clean, or have become mixed due to defective storage shall be removed from the site immediately.

Sample of graded coarse aggregate weighing 14 lbs; Which it is proposed to be used, shall be submitted to Engineer Incharge for approval immediately after the contract has commenced, and at least five weeks before concreting is to start. The contractor shall perform sieve analysis for each consignment to the satisfaction of the Engineer Incharge and the percentage passing each individual sieve shall not very by more than 5% either way from that found for the approved sample, unless otherwise approved by the Engineer Incharge and subject to such changes in concrete proportions may be necessary. For “Quality Controlled Concrete" so as to prevent mixing and contamination of fine and coarse, graded aggregates shall be stored separately on site on a concrete slab 3 inches thick properly subdivided the approval of the Engineer Incharge and which must be removed completion of the

contract.

b. Fine Aggregates:

Sand or fine aggregate shall be clean, coarse, sharp and obtained from approved source and shall conform to B.S. 882. It shall be free from all dirt, earth organic and other injurious matter, The contractor will be required to screen and / or wash the sand to remove any foreign matter in it. The sand should be graded down from Tyler Sieve No. 4(3/16 inch) to Tyler Sieve NO. 100 in an approved manner. The sand shall be of such cleanness that when a handful of it is shaken in a glass tumbler with clean water and allowed the stand for one hour the precipitate of mud in the sand shall not exceed 2% by volume, and if more than 2% the sand shall be washed.

c. Cement:

The cement to be used for making reinforced concrete and mortars shall be ordinary Portland cement, white Portland cement or rapid hardening Portland cement, as specified herein, and as shown on the drawings or as directed. These cements shall not be used in combination. Only one brand of any type of cement shall be used for exposed concrete surfaces of any structure. Cement reclaimed from cleaning bags or leaking containers shall not be used. All Portland cements shall comply with the requirements of B.S. 12. Cement shall be stored in a damp\proof shed and shall be used in the order of its delivery. Any cement, which has deteriorated or become contaminated shall not be used and shall be removed immediately from the site by the contractor at his own expense.

Samples weighing in pounds shall be dispatched carriage paid in sealed tins to testing laboratories designated by the Engineer Incharge for testing as and when directed. The contractor shall bear the cost of all tests.

Reinforcement:

1. All finished steel bars shall be well and cleanly rolled. Reinforcement shall be free from cracks, surface flaws, Emanations, rough, jagged and imperfect edge and all other defects and shall be finished in a workmanlike manner.
2. Steel reinforcement shall be plain round hot rolled mild-steel bars or high yield bond bars complying with BS 785. Cold worked bars shall be square or round bars which have been twisted when cold and shall comply with BS 1144.

	Tensile Strength Lbs/ Sq. Inch.	Yield Stress Lbs/ Per Sq. Inch
Plain round Mild steel Bars BS 788 part 11967	63,000/-	36,00
Hard drawn Mild steel deformed bars for the reinforcement of concrete conforming to ASTM A 615-76a (1977) or equivalent.	90,000	60,000

3. Reinforcement shall be of rolled mild steel bars. The contractor shall arrange for weighment of steel at his cost to satisfy himself. Prior to use, the contractor shall be responsible to see that reinforcement is free from pitting Loose, rust, mill scale, paint, oil, grease, adhering earth or any other material that may impair the bond between the concrete and the reinforcement or that may cause corrosion of the reinforcement or disintegration of the concrete.

4. Rustless annealed tying wire 18 SWG shall be obtained from approved manufacturers and shall as regard strength, comply with the requirements specified. Binding wire to specifications shall be provided by the Contractor at their own cost.
5. Supply and storage: All stacking and storing of bars is the Contractor's liability and a contingent to the quotations.
6. Weight of all the bars shall be taken off from the standard weight tables irrespective of re-rolling margin and other such factors. Contractor's bills shall be paid on the basis of these weights in direct proportion to the steel a measured used in the works. No claims will be entertained on account of such re-rolling margins, wastage etc.

d. Forms:

Form shall be of wood, metal, structural hardboard or other approved material that will not adversely affect the surface of the concrete and that will produce or facilitate obtaining the specified surface finish of the concrete.

Wooden form work should be free from loose, knots and should be well seasoned. Unsound or very soft timber should not be used as distortion at bolted connections may occur. Lining for shuttering to produce smooth surfaces may of water proofed building paper, grain less wood, plywood, sheet metal or similar materials.

Metal forms, if used, shall be of an approved type that will produce surfaces equal to those specified for wood forms.

e. Forms Ties:

Forms ties shall be factory fabricated, removable or snap\off metal ties of approved design, fixed or adjustable in length and shall be free of devices that will leave a hole larger than 1 inch in diameter in the surface of the concrete. The portion of the tie remaining in the concrete after the removal of the exterior parts shall not project beyond the surface of the concrete and shall be at least inch back from any surface that will be exposed to view of painted in the finished work:

Clause 5. 1:4:8 BLINDING CONCIRETE UNDER FOUNDATIONS & SUBFLOOR

a. General:

Concrete layer shall be laid under all foundations, and floors on grade to a thickness shown on the drawings or as directed by the Engineer Incharge, but no layer of blinding concrete shall be laid wherever suitable in this clause shall conform with requirements of Clause 2-4 as and where applicable. The mix shall be 1-part cement to 4 parts fine aggregate and 8 parts coarse aggregate by volume. Coarse aggregate for this clause of Concrete shall be 1 ½" maximum size brick aggregate of stone aggregate as specified in bill of quantities.

Brick ballast shall be broken to the gauge specified, from will burnt bricks or their bats, or from dense over-burnt bricks. No under-burnt bricks or bats, not Jhama that has become spongy or porous in the process of burning, shall be broken up for ballast. The ballast shall be free from dirt, leaves, straw, earth sand or other foreign matter, and it shall be stacked in the manner and place designated by the Engineer Incharge. 1 ½ " gauge ballast shall be such as to all pass through a ring of 1 ½" internal diameter and not more than 20% shall be more than 2" in greatest length. If Engineer Incharge consider that an in duly large proportion of fine stuff has been supplied it shall be screened through ¾" x ¾" square mesh and if more than 15% pass through the screen, the Contractor shall screen the ballast so that not more than 15% pass through this screen.

The stone aggregate shall consist of good hard tough broken stone, gravel or shingle of gauge specified and from an approved. It shall be free from dirt, clay,

leaves or any organic matter or admixture of soft or decayed stone. 1 ½" size aggregate shall be screened to pass wholly through a screen of 1 ½" x 1 ½" and to be all retained on one of 3/16" square mesh, and shall be uniformly graded in between so that not more than 60% and not less than 30% shall be retained on a screen of ¾" x ¾" square mesh.

The stone aggregate shall consist to good hard tough broken stone, gravel or shingle or gauge specified and from an approved. It shall be free from dirt, clay, leaves or any organic matter or admixture of soft or decayed stone. 1 ½" size aggregate shall be screened to pass wholly through a screen of 1 ½ " x 1 ½ " and to be all retained on one of 3/16" square mesh and shall be uniformly graded in between so that not more than 30% shall be retained on a screen of ¾" x ¾" square mesh.

b. Proportions:

The units of measures shall be one bag of bag of cement and when bag of 1.2 cubic feet is used the standard proportioning shall be:

Cement	One part (1.2 Cft.)
Sand	Four parts (4.8 Cft)
Coarse Aggregate	Eight parts (9.6 Cft)

When a bag of 1 Cft. Is used the standard proportioning shall be:

Cement	One part, (1 Cft.)
Sand	Four parts (4 Cft)
Coarse Aggregate	Eight parts (8 Cft)

c. Mixing

The mixing shall be done in mechanical mixers. Hand mixing will not be permitted under any circumstances. The proportion of the ingredients having been specified as above, boxed or internal dimensions mentioned below shall be fabricated:

1. For fine aggregate two boxed of size feet 4-4/5 inches by 1 foot by one-foot high.
2. Four boxes of the size specified for fine aggregate.

For a bag of 1 CFT. The dimensions of boxes will be as under:

1. For fine aggregate 2 boxes of size 2 feet by 1 foot by 1 foot by 1-foot high.
2. For coarse aggregate four boxes of the size specified for fine aggregate,

The cement content of each mix shall be by bags, and fine aggregate will be into a heap and a cement bag emptied on top. The cement and fine aggregate will be thoroughly incorporated with each other in a dry state by being turned over and over backwards and forward several times until the mixture is of uniform colour.

The mixture of cement and fine aggregate will be placed on the coarse aggregate and thoroughly incorporated with it by being turned over and over backwards and forwards several times until every part of the ballast is surrounded with dry mortar.

The minimum quantity of water as directed by Engineer Incharge will be added slowly and mixture turned over and over again until it is` uniformly mixed. The mass will be of the required consistency and mortar should show no inclination to separate from coarse aggregate. Machine mixing will be done as specified under quality controlled concrete. The contractor will be required to mark a can of 4 Gallons in 8 parts showing half gallon each. The Engineer Incharge will specify the

amount of water to be strictly adhered to till any change is specified by the Engineer Incharge.

d. Laying

The concrete must always be used when quite fresh. It shall be laid gently and uniformly in layers not exceeding 6 inches in thickness. The concrete shall not be heaped in the position and allowed to floor by gravity. Each layer shall be thoroughly rammed and the concrete of the succeeding layer shall be immediately deposited over it. All the layer forming the required depth of concrete shall be deposited and consolidated within half an hour of the mixing of concrete so as not to disturb it after the initial set has commenced. The concrete will be consolidated with iron rammers until a listel of the mortar creams upto the surface. It is necessary to ensure that too much mortar does not come to the surface, only such quantity of mortar shall be allowed to work up as will just cover the surface.

e. Curing:

The concrete shall be kept wet for at least 10 days. The finished concrete must be cured by sprinkling water for at least two days after laying before commencing work over it. Even after commencement of masonry wok curing of raw masonry shall be thorough enough to provide curing to the concrete as well. The back filling of the foundation shall be done immediately after the masonry wok has started and the earth filled back shall be kept damp to provide curing for the concrete. When reinforcement work is to be laid on this, curing shall not be stopped, but it shall continue at least for 10 days during the laying of reinforcement.

Clause 6: QUALITY CONTROLLED CONCRETE:

Production and testing of concrete under this clause shall be under charge of a fully qualified and competent quality control Engineer. If at any time, the Engineer Incharge is not satisfied with the supervision of work till satisfactory arrangement is made. The concrete under this clause shall conform with the requirements of clause 2-4 of this section. The mix of the concrete to be used in the work shall be determined on the basis of Quality Controlled Concrete as laid down in this section of the specification and shall be designed by the required minimum crushing strength at the age of 28 days. Vibrated concrete shall be compared by the vibration in a manner complying with the requirements of this specification, to ensure a dense and homogeneous nature for every part of the work and, when cured, shall have the required strength and resistance to weathering.

1. The crushing strength of the 6 in, test cubes shall be taken as a measure of the quality of the work as placed, and the cubes shall be cast and supplied in the manner indicated in this specifications.
2. Frequent test shall be made of the water content and bulking of the aggregate, and an appropriate allowance shall be made in the gauging or the weighing machine.
3. The quantity of water introduce into the mixes shall be regulated and arranged, to the approval of the Engineer Incharge so as to ensure a constant water, cement ratio. This shall be the minimum required to produce concrete in formity with the specification requirements.
4. All material shall be measured separately by weight. The weight of cement per unit weight of aggregate shall be the minimum necessary to achieve the specified strength consistent with workability, but in no case shall the ratio of the weight of dry aggregate to weight of cement exceed the ratio indicated in (vii) this clause.

5. Where the density of the aggregate varies from 100 lb/cu ft.., the proportion indicated in (vii) may be adjusted accordingly.
6. The determination of the mix to be used between the limits indicated, and also the control of the work, shall conform to the preliminary and work Test procedures asset out in this specification.
7. Notwithstanding anything otherwise specified, the contractor will not use aggregate cement ration / higher than as specified below for various mix designations and for all coarse aggregate.

a. Test Cubes:

The contractor shall, at his own expense, supply test cubes from 6-inch iron moulds, as required by the preliminary and works Test procedure.

The test cubes, generally shall be made in accordance with B.s 1881 except that where the concreting work is being vibrated, the cubes shall also be vibrated in an agreed manner which most nearly reflects the quality of the concrete as placed. The cubes shall be removed from the moulds 24 hours after casting marked and dated, and immediately stored in water at the controlled temperature of 58-66 F or with special permission, in damp and as directed until required for testing.

The cubes shall be tested on prescribed days under the direction of Engineer Incharge. If a Government Laboratory is available conveniently, the Contractor can send the cubes for testing to such Laboratory on approval of the Engineer Incharge, in lieu of providing a cube crushing machine. If the cubes are to be sent away to a Laboratory from site of work then the cubes shall be packed in damp sand, in stout wooden boxes and dispatched for testing as directed so as to reach the Laboratory in time for testing at the age of concrete specified. Three cubes of each set of six shall be dispatched in time for testing at 7 days and remaining three for testing at 28 days. For cubes at 7 days the equivalent crushing strength at 28 days shall be assessed at 50% above the 7 days' value.

The cost of testing all test cubes required for the preliminary Test and work test procedure will be met by the Contractor but shall the results of the works Test Cubes, as specified, be unsatisfactory, the concrete work shall be stopped and not proceeded with until instructed. The executed work involved shall be liable to rejection and if so directed, shall be liable to rejection and if so directed, shall be cut out and re=executed or otherwise rectified, at the Contractor's expense.

A record of all tests on the aggregate, cement and test cubes shall be kept at the site identifying the tests with the parts of the work to which they relate and a copy of such test reports shall be supplied to the Engineer Incharge within two days of performing the test.

b. Preliminary Test Procedure:

At least 5 weeks prior to the commencement of the concreting work, the contractor shall carry out preliminary tests to determine the concrete mix which satisfied the requirements of their specification. Sufficient time shall be allowed for experimenting with a number of alternative mixes, and for the results of the crushing tests of the proposed mix to be available, prior to the commencement of the work.

1. Preliminary test cubes shall be taken from the proposed mix at the following times and conditions: On each of three consecutive days, six cubes, from identical concrete batches, three of which from each set of six shall be tested at age 7 days and three at age 28 days.
2. The minimum crushing strength of all eighteen preliminary test cubes shall not

be less than 33-1/3% above the required minimum strength at age 28 days of the concrete in production, or the equivalent value in the case of cubes crushed at age-7 days. The cubes strength is tabulated as under

Quantity of Concrete Poured per day	Total work cubes Per mix of concrete		Minimum Crushing at	
500 Cft. Of concrete of less		7 days		28 days
		1:2:4	1:1 ½ :3	1:2:4 1:1: ½ :3
	4	2000 Ls/ PSI	2500 Lbs / PSI	3000 Lbs/ PSI 3750 Lbs/ PSI
For every 500 Cft. of concrete or portion thereof over and above first 500 Cft.				

i. Prior to the commencement of the work the Contractor shall submit a statement of the mix he proposes to use, which must be based of the satisfactory results of these preliminary tests.

3. Whenever the source or quality of cement of cement and aggregate are changed or whenever it is proposed to change the mix this Preliminary Test Procedure shall be repeated.

c. Workability

The amount of water added to the mix shall be the minimum necessary to produce a workable concrete. The concrete shall be of such consistency that it can be readily worked into the corner and angles of the forms and around the reinforcement, without permitting the materials to segregate, or free water to collect at the surface. On striking the forms it shall present a fair face free from honeycombing, surface crazing or excessive dusting. In a slump test the maximum slump shall not exceed 2". Test shall also be made to conform to the satisfaction of Engineer Incharge workability of the proposed mix, consistent with the requirements of this specification. The contractor shall supply at his own expense, a suitable mould of approximately 8 Cft. capacity and representative of the proportions of the work. It shall be filled with concrete of the same mix and batch from which the preliminary test cubes are made, and shall be compacted in the same manner as is proposed for the constructional work, the mould being struck as soon as possible. The appearance of the concrete shall be carefully observed and used as a guide during the actual construction.

d. Work Test Procedure:-

The minimum crushing strength of the works test cubes shall be not less than the required minimum crushing strength of the concrete in production at age 28 days or the equivalent value in the case of cubes crushed at age 7 days. They shall be taken from the concrete work in progress at the time and conditions specified in the next paragraph.

On each of the first four days of concreting, six cubes shall be taken and cast, three of which shall be tested at age 7 days and three at age 28 days. Where the crushing strength of these works test cubes is less than the required minimum, the mix Proportions shall be modified to bring the concrete upto the required strength.

After the first four days, at least two sets of six cubes shall be cast for testing each week, them of each set to be tested at age 7 days and three at age 28 days.

e. Control Equipment: -

The contractor shall provide the following test equipment's and a suitable separate hut in which to have them.

1. A cube testing machine.
2. Two sets of 4 cast iron 6 inch cube moulds with two 4 lbs. 15 inches long tamping bar with ramming face one inch square.
3. Suitable graduated measuring tubes for measuring the moisture content of fine aggregates.
4. A set of British Standard Graded sieves.
5. Maximum and minimum thermometers.
6. Suitable weighing scales
7. A water tank with thermostatically controlled heating suitable for curing test cubes.
8. One standard cone for slump test.

Clause 7: 1:2:4 CEMENT CONCRETE BY PROPORTION:

a. General:

The concrete specified in this clause shall conform with the requirements of clause 2-4 as and when applicable. The mix shall be 1-part cement to 2 parts fine aggregate and 4 parts coarse aggregate by volume. Coarse aggregate for this class of concrete shall be crushed stone or natural gravel from approved quarries as specified in bill of quantities, ranging in size from ¾ inch down to 3/16-inch gauge well graded. The aggregate shall be free from injurious Amounts of soft friable or elongated or laminated pieces and shall also be free from clay or loamy admixture or any vegetable after being screened shall be graded in the following manner.

S.S.	Tyloro	Percentage	By weight	Total	Fineness
Sieve	Sieve	Passing on	Retained	Retained	Modulus
No.	No.	Sieve	Sieve	Sieve	-----
¾"	¾"	90-100	10-0	10-0	6-9 to 6.35
3/8"	3/8"	30.56	70.45	80.45	
3/16"	¼"	0.10	20.45	100.90	

b. Proportioning:

The unit of measure shall be one bag of cement and when a bag of 1:2 cubes feet (1 Cwt) is used the standard proportioning shall be:

Cement	One part (1.2 Cft)
Sand	Two parts (2.4 Cft)
Coarse Aggregate	Four parts .14.8 Cft)

When a bag of 1 Cft (94 lbs) is used the standard proportioning shall be:

Cement	One part (1.0Cft)
Sand	Two parts (2.0 Cft)
Coarse Aggregate	Four parts (4.0 Cft)

For volumetric batching of sand and coarse aggregate, boxes of following internal dimensions shall be fabricated for a cement bag of 1.2 Cft (1. Cwt)

1. For sand 2 feet 4-4/5 inches by one foot by one-foot high.
2. For coarse aggregate 2 feet 4-4/5 inches by 2 feet by one-foot high.

For a cement bag of 1 Cft. the dimensions of boxes will be as under:

1. For sand 2 feet by one foot by one-foot high.
2. For coarse aggregate 2 feet by two feet by one-foot high.

c. Mixing

The mixing shall be done in mechanical mixers as specified in clause "Mixing and placing" of this Section of specifications. Mixing shall be done in single bag batches of cement, unless otherwise specified by Engineer Incharge.

d. Slump Test:

The Engineer Incharge shall test the consistency of the mixture in the following manner:

Frustum of a metal cone 12 inches in height with a bottom diameter of 8 inches and a top diameter of 4 inches shall be completely filled with concrete and shall be tamped with a ½" diameter rod in the following manner:-

1. Cone filled to 1/4th depth and then tamped 25 times with a 5/8"dia rod. Tamping shall be done with strokes of medium strength.
2. Cone filled to ½ depth and then tapped 25 times with a ½”dia rod.
3. Cone filled to ¾ depth and then tapped 25 times with a ½”dia rod.
4. Cone filled in full depth and the tapped 25 times with a ½”dia rod.

The frustum of the cone shall then be immediately removed and the settlement or slump measured.

The slump is not to exceed 2 to 4 inches. The Engineer Incharge, however may at their discretion direct a particular slump to be maintained throughout the execution of the work which would be guided by site conditions such as degree of contractor’s control over production of concrete and type of labour and supervisory staff employed by them for placing of concrete and vibrations thereof.

Clause 8: CONCRETE PREPARATION

a. Mixing and Placing

The equipment shall be capable of combining the aggregates, cement and water, with in the specified time, and unless otherwise authorize by the Engineer Incharge, the concrete shall be mixed in a batch mixer of approved type, which will ensure a uniform distribution of the material throughout, the mass, as well as being capable of discharging the mixture without segregation. The equipment at the mixing plant shall be so constructed that all the materials, including the water, entering the drum can be accurate proportioned and controlled. The entire batch

shall be discharged before recharging. The volume of the mixed material per batch shall not exceed the manufacturer's rated capacity of the mixer.

1. Each batch shall remain in the mixer for a mixing period of not less than 2 minutes which shall be measured from the time when all the solid material is in the mixing drum. All the mixing water must have been introduced before one fourth of the mixing period elapses.
2. In case of power failure, hand mixing shall be allowed to carry the work upto a suitable stage of concreting to be approved by the Engineer Incharge. When hand mixing is authorized it shall be done a water tight platform with edging boards, and in such a manner as to ensure uniform distribution of the materials throughout the mass. It shall be turned 3 timed dry, and 3 times wet, and mixing shall continue until a homogeneous mixture is obtained.
3. The remixing of concrete which has partially hardened, with or without additional cement, aggregate or water will not be permitted. Mixture machine and platforms shall be cleaned on every cessation of work

b. Work in Cold weather:

If it is necessary to continue concreting in sold weather the precautions specified in the following paragraphs must be taken.

When the air temperature is 36 degree F. and falling or when night frost may reasonably be expected, the mixing water, sand and aggregate shall be heated by an approved means so as to ensure the concrete having a temperature of not less than 40 degree F. at the time of deposition.

1. In addition, the newly deposited concrete shall be thoroughly protected and kept at a temperature of not less than 40 F until it has thoroughly hardened. This shall be done by using tarpaulins or other suitable means, to the satisfaction of the
2. Engineer Incharge. Where such protective covering can not be used, where it is considered such protection is not sufficient, suitable heating facilities shall be provided. Subject to the approval of the Engineer Incharge admixture of calcium chloride may be introduced, in the proportion of 1 ½% by weight of the cement, provided that it is added in the form of a solution in the mixing water, or alternatively, special cold weather cement may be used. No frozen materials or material containing ice shall be used, and concrete which has become damaged by frost shall be cut out and replaced with new concrete, properly bonded as described in "Construction Joints".

c. Transporting, Depositing, placing and compacting:

1. Transporting and placing of concrete shall be arranged so that segregation is limited, and contamination and lose of cement prevented, Barrow used shall be cleaned on every cessation of work. Cutting of concrete will be permitted only be approved methods, and subject to the consent of the Engineer Incharge. Concrete shall not generally be dropped of thrown into place from a height greater than 4 ft. Pumping of concrete will not be permitted without the prior approval of Engineer Incharge.
2. Depositing of concrete, immediately after mixing and being run to the work shall be in a position as nearly as possible to its final before setting so as to reduce flowing and redistribution to a minimum and it shall not be disturbed subsequently, care should be taken to prevent displacing the reinforcement and embedded fixtures. Where depositing on hard core or other absorbent material, such surfaces shall be suitably and sufficient wetted before hand.

3. In placing, the concrete shall be efficiently tamped, sworded and compacted during the operation of placing. It shall be thoroughly worked around reinforcement, steel work, and embedded fixtures and into the corners of the forms so that no voids or honeycombing occur, and no reinforcement or embedded fixtures are displaced. Excessive taming shall be avoided to prevent segregation. Forms or walls and thin section of considerable height shall be provided with openings and other device that will permit the concrete to be placed in a manner that will prevent segregation, and accumulations of hardened concrete on the forms or metal reinforcement above the level of the concrete. A record shall be kept by the contractor of the time and date of placing concrete in each part of the work.

4. Compacting, whether by hand or by mechanical vibration, shall continue until a dense homogeneous mass, free from voids is obtained which on stricking the forms, presents a fair face which is free from honeycombing, crack or excessive dusting. Any concrete which is honeycombed or otherwise unsatisfactory shall be cut out and re-executed, or otherwise rectified, to the satisfaction of the Engineer Incharge accumulations of water on the surface of the concrete, due to water gain, segregation, or other causes, during placing and compacting will not be permitted and presentations shall be obtained by adjustments in the mix if necessary.

5. Rock foundation placement:

6. Rock surfaces upon which concrete is to be placed shall be approximately level, clean, free from oil and other objectionable coating, water, mud, debris, damaged rock, and loose semidetached or unsound fragments, and shall be sufficiently rough to assure satisfactory bond with the concrete. Faults or seems shall be cleaned to firm rock on the sides, and to a depth satisfactory to the Engineer Incharge. Immediately before concrete is placed, rock surfaces shall be cleaned by high velocity air water jets, and blasting or other means satisfactory to the Engineer Incharge.

d. Vibrations of Concrete:

Columns, beams, walls and suspended slabs s all cases be compacted by means of Internal vibrators, but surface and external vibrators may be used, either in conjunction with them or alone, as approved. Before commencing work the contractor shall indicate to the Engineer Incharge for approval, the number and type of vibrators and the manner in which he proposes to employ them. He shall state the characteristics of the machines and undertake such trails, at his own expense, as the Engineer Incharge may direct and shall employ an adequate number of vibrators, of suitable characteristics, so spaced that their effective ranges overlap, and with properly trained personnel to operate them. Compaction shall not be attempted of a thicker layer than that for which a machine is designed and wherever possible the process of placing shutters and raising vibrators shall be continuous. Vibrations shall be continued until the concrete reaches a state of optimum compaction, when air bubbles cease to break the surface and all loose stone are absorbed into the mass and the surface is free from pockets and is moist and glistening.

1. Internal vibrators shall not touch the shutters and shall not be used to push the concrete along the forms. An ample supply of concrete shall always be available in front of the needless. Where layer are thick, as with concrete columns, the needless when vibrating each lift shall also penetrate the previous layer to a depth of 4 to 6 in.

2. External vibrators shall be securely clamped to the shutter frames or stiffeners (as in columns) or against the shutter face with chain and vice.

3. Surface vibrators shall only be used where the reinforcement can be laid progressively in horizontal layers or where the disposition and density will permit proper compaction. Vibration shall be continued until the mortar can be clearly seen appearing at the edge of the plate. The Vibrator must not be allowed to remain stationary, and the rate of travel must be adjusted to ensure adequate compaction of the concrete. Immediately following vibration the surfaces of slab shall be leveled and smoothed with wooden floats or screens, but this final surface working must be kept to a minimum. Surface vibrators are permitted for road, floor and roof slabs.

e. Construction joints:

The type and location of construction joints shall as shown of the drawing or as separately agreed with the contractor. Concreting shall be carried continuously upto joints, and the sequence of pouring shall be carried out as directed or agreed with the Engineer Incharge concrete shall be deposited continuously or in layer of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams and planes of seams and planes of weakness within the section. All construction joints in watertight structures shall be provided with P.V.C. water stops.

1. Stop ends at construction joints shall be vertical with grooved faces and must be stripped within 24 hours of the concrete being placed. The surfaces must immediately be wire brushed or jetted with water at high pressure to remove all laitance and to expose the aggregated all to the Engineer Incharge. Failure to do this will involve the contractor in chipping the surfaces to a depth of ½ inch. All over and washing clean, at his own expense, to the satisfaction of the Engineer Incharge.
2. Horizontal surface shall be kept reasonably level and shall be similar treated within 24 hours of the concrete being placed. Failure to do will again involved the contractor on chipping to a depth of ½ inch over. Keys shall be formed in the surface as shown on drawing or as agreed with the Engineer Incharge.
3. Immediately prior to placing concrete on top of a completed horizontal surface this surfaces shall be well wetted and brushed with cement slut well worked in and then coated with ½ inch thickness of sand and cements mortar; the proportions being the same as the sand and cement in the concrete mixtures. Immediately after the application of mortar the new concrete shall be deposited and well rammed in position.

f. Expansion and contraction joints:

Expansion and contraction joints shall be formed in the positions and to dimensions and details shown on the drawings and as directed.

g. Connection and openings:

Bolts for holding pipes and fittings shall be concreted in or boxed out for the work proceeds. Opening shall be left as indicated of the drawings directed.

Clause 9: FORMWORK AND TEMPORARY SUPPORTS:

a. Formwork:

The contractor shall be required to submit drawings of the proposed method of formwork, details of scaffolding and positions of hoists, within four being given the order for the work. The formwork shall overlap the previous lift to minimize lipping which must not exceed 1/8 in, at any point and must in any case beddreassed off smoothly. Tolerances on dimensions and vertically shall be as shown on the drawings or as directed by the Engineer Incharge,

1. Formwork shall be so constructed as to safely support the fluid concrete and

all construction load, without appreciable movement or deflection. It shall be sufficiently tight to prevent loss of liquids cement from the concrete and so constructed that it can be removed without under vibration or shock.

2. Where formwork is supported from existing parts of the structure, it shall be so arranged as to produce no overstress in the structure and shall, where necessary, be built up from a solid bed.
3. Formwork for the sides of beams, etc. may be so arranged that it can be struck first leaving the soffits and the supports in position.
4. The soffits of suspended beams of more than 16 ft. span shall be laid to an upward camber of ¼ in per 12 ft. of span.
5. Provision shall be made in the formwork for any perforation, sinking's, of the inclusion of building in parts as required. Approval must be obtained from the Engineer Incharge for metal formwork, millboard or other linings to forms before use.
6. Unless specified otherwise, e.g for plastering, the surface finish of all concrete cast in wrought formwork shall be "fair faced". On removal of the formwork all pin holes and honeycombing shall be made good with cement mortar immediately after striking the forms and all irregularities and excrescences shall be rubbed smooth to the satisfaction of Engineer Incharge.
7. Bolts and rods, shall preferably be used for internal ties, they shall be so arranged that when the forms are removed no metal shall be within 1 in of the surface.
8. External corners of columns, girders, beams, foundation walls projecting beyond overlaying masonry and other exposed external corners shall be leveled, rounded, or chamfered by mouldings placed in the forms unless the drawings specifically state chamfering is to omitted.

b. Cleaning and Treatment of Forms:

Immediately before the concrete is placed, the formwork be the thoroughly cleaned. All rubbish particularly chippings, shavings and saw-dust shall be removed from the interior of the forms.

1. The surface of the form work which will be in contact with the concrete shall be well wetted of treated with a composition approved by the Engineer Incharge care should be taken that such approved composition shall be kept out of contact with the reinforcement.
2. Where concrete surfaces are to be treated later with chlorinated rubber or epoxy resin based paints or compounds, the mould oil for the shutters shall be high grade, emulsifiable and contain no mineral oil.
3. Retarding fluid shall be used only where specifically approved.

c. Stripping Formwork:

All formwork shall be removed without undue vibration or shock and without damage to the concrete. Proper precautions shall be taken to allow for the decrease in the rate of hardening that occurs with all cements in cold weather.

1. The minimum times for stripping formwork shall be these given in the following table:-

Stripping of formwork to	Normal Portland cement concrete	Rapid Hardening Portland Cement concrete
	Days	Days

Walls, sides of beams, columns	2	1
Slabs	14	10
R.C. Beam Soffits	21	10

2. Notwithstanding the previous paragraph the forms may be removed when trial shows that the concrete is sufficiently strong for corners and edges not to be damaged during stripping.
3. The soffits of beams and slabs will still need shoring and the shores may be removed subject to the following conditions.
4. At the time of casting, four test cubes a day shall be made from the concrete deposited in the location under consideration. They shall be duly marked and dated by the Engineer Incharge or his representative. These specimens will then be kept on the same site in conditions approximating as closely as possible to the work as cast. When one of the test cubes attains a strength of twice the stress to be sustained during construction, the shoring may be removed
5. The Engineer Incharge shall specify to what loads the member will be liable. Should it prove necessary to carry greater loads temporary shoring must be reinstated to the satisfaction of the Engineer Incharge.

Clause 10. REINFORCING STEEL

Reinforcement shall be fabricated to shapes and dimensions shown and shall be placed where indicated on drawing or where required to carry out the intent of the drawings and specifications. Before being placed, reinforcing steel shall be thoroughly cleaned of loose or flaky rust, mill scale, or coating, and of any other substance that would reduce or destroy the bond. Reinforcing steel reduced in sections shall not be used. After any substantial delay in the work, previously placed reinforcing steel left for future bending shall be inspected and cleaned. Reinforcing steel shall not be bent or straightened in a manner injurious to the steel. Bars with kinks or bends not shown on drawings shall not be placed. The use of heat to bend or straighten reinforcing steel will be permitted only if the entire operation is approved. In slabs, beams and girders, reinforcing steel shall be of adequate length to transmit stresses and splices in adjacent bars shall be staggered. Splices in columns piers and struts shall be lapped sufficiently to transfer the full stress by bond.

a. Design and Details:

Unless otherwise indicated, the bending of reinforcing steel shall conform to the British standard code of Practice, C.P 114. Unless otherwise indicated, construction shall conform to the following requirements:

1. Concrete covering over steel reinforcement:

   The thickness of the covering coving over steel reinforcement shall be not less than the diameter of round bars, or less than 1 ½ times the side, dimensions of square bars, and in the following specific instances not less than specified instances below in less specified otherwise on the drawings. Footing and other principal structural 3 inches between steel & members in which concrete is deposited Ground against the ground.

   Where concrete surfaces, after removal of forms, are exposed to weather or grounds:

For bars more than 5/8 inch in diameter	2	inches
For bars 5/8 inch or less in diameter	1 ½	inches

Where surfaces are not directly exposed to weather or ground

For slabs and walls	¾	inch
For beams, girder and tied columns	1 ½	inches
For spiral columns (covering) to be max	1 ½ inches or 1 ½ times	
cast monolithically with core aggregate.	size of coarse	

Exposed reinforcement bars intended for bending with future extensions shall be protected from corrosion by adequate covering.

2. Spiral reinforcement shall consist to evenly spaced continuous spirals held firmly in place and true to line by vertical spacers, using at least two for spirals 20 inches or less in diameter, three for spirals 20 to 30 inches in diameter, and four for spirals more than 30 inches in diameter or composed of spiral rods 5/8 inch or large in size. The spirals shall be of such size and so assembles as to permit handling and placing without being distorted from the designed dimensions. Anchorage of spiral reinforcement shall be provided, by 1 ½ extra turns of spiral rod or wire at each end of the spiral unit splices, when necessary shall be made in spiral rod by a lap of 1 ½ turns. The reinforcing a spiral shall extend from the floor level in any story or from the top of the footing in the basement, to the lowest horizontal reinforcement in the overhead slab, drop panel, beam, or girder, in a column with a capital the opiral shall extend to a plane at which the diameter or width of the capital is twice that of the column.
    1. Stirrup spacer bars:
    2. All stirrups, except ties, shall be held in place by two 3/8.inch spacer bars extending the full length of the portion of the beam or girder occupied by stirrups.
    3. Outside bars of slab reinforcement, both main and temperature, parallet to beams, girders, or walls, shall be placed not over one-half bar spacing from the adjacent face of each member
    4. wire-mesh reinforcement, between expansion joints in slabs shall be continuous and shall have joints lapped at least one full mesh. Lapping of sheets shall be staggered to avoid continuous lap in either direction. Reinforcement shall be supported by standard accessories for slabs above grade and by properly sized precast concrete blocks for slabs one earth.
    5. Shop drawings:

    Shop detail and placing where necessary for reinforcing steel shall be furnished for approval. This shall be produced from details as shown on drawings.

b. Supports:

With the exception of temperature reinforcement, which shall be tied to main steel approximately 9-24 inches on centers, reinforcement shall be accurately placed and securely tied at all intersections and splice with 18 gauge black annealed wire, and shall be securely held in position during the placing of concrete by spacers, chairs, or other approved supports, Wire tie ends shall point away from the form. Unless otherwise indicated, the number, type, and spacing of supports shall be as approved by the Engineer Incharge.

For Slabs on grade (over earth drawings fill) and for footing reinforcement bars of mesh shall be supported on precast concrete blocks, spaced at intervals required

by size of reinforcement the minimum height specified above the under side of slab or footing.

Clause 11. CURING:

Curing shall be accompanied by preventing lost of moisture, rapid temperature change, and mechanical injury or injury from rain or flowing water for a period of 7 days when normal portland cement has been used or 3 days when rapid hardening Portland cement has been used. Curing shall be started as soon as free water disappeared from the surface of the concrete after placing and finishing. Curing of formed under surface of beams, girders, floor slab and other similarly undersurface, shall be accomplished by moist curing with forms in place for the full curing period or if form are removed prior to the end of the curing period by other approved means. Curing may be accomplished by any of the following methods or combination thereof as approved.

a. Moist Curing:

Unformed surfaces shall be covered with burlap cotton, or other approved fabric mats, kept in intimate contract with the surface, or with stand and shall be kept continually wet. Where formed surfaces are cured in the forms, the forms shall be kept continually wet. If the forms are removed before the end of the curing period, curing shall be continued as one the unformed surfaces using suitable materials. Burlap shall be used only of surfaces that will be unexposed in the finished work and shall be in two layers.

b. Water proof paper curing:

Surfaces shall be covered with waterproof paper lapped 4 inches at edges and ends, and sealed with mastic or pressure-sensitive taps not less than 1 ½" wide, paper shall be weighed to prevent displacement, and tears or holes appearing during the curing period shall be immediately repaired by patching.

c. Polyethylene Sheeting:

Surface shall be completely covered. Where single sheet does not cover entire surface the ends and edges shall be laped not less than 4 inches and sealed with adhesive tape.

Clause 12. CONCRETE LIFTS:

a. General:

Except where limited by construction joints, by requirements noted on the drawings, or by other specification requirements, the vertical depth or height of concrete placed in one continuous operation in walls of the structure need not be limited except as follows:

1. Within a vertical depth or height of concrete placed in one continuous, operation, concrete shall be deposited in horizontal layer of uniform thickness not to exceed 12 inches in depth.
2. The rate of rise of concrete in the wall forms shall be such that deformations of the forms at any point will not exceed 1/16 inch in 10 feet in each wall face.
3. The rate of rise of concrete in the wall forms shall be such that adequate vibration during placement of the concrete can be ensured to avoid honeycomb or other non- uniform surface finish and such that no concrete surface shall have reached its initial set before additional concrete is placed upon it.
4. The concrete in high walls shall be placed through 'window' construction opening in the form or by other 'Engineer Incharge' approved means which will insure placement of the concrete at its final location and which will limit the drop of concrete in accordance with the provision of this specification.

Clause 13. HARKING CONCRETE SURFACES:

Where surface are specified or required to be plastered, they shall be hacked, until approximately 40 percent of the surface is roughened to approval. Retarding liquid, applied to the surface of the formwork, so that the surface can be roughened and keyed for plastering must not be used unless specially approved.

Clause 14. ALTERNATE BAY CONSTRUCTION:

Large areas of non-suspended flooring shall be of alternate bay construction. The areas of each bay shall not exceed 300 Sft. for reinforced floor, unless otherwise directed. No other method of laying shall be adopted unless approved by the Engineer Incharge. Edges of slabs shall be a square but unless otherwise directed and shall be thickly coated with tar before the adjoining slabs are laid.

Reinforcement shall stop 2 inch from the edges of the slabs, Long wall in general shall be cast with 1 feet closure gaps and shall be provide with water stops when below grade.

Clause 15. FALLS THICKENING AND SINKING:

Floors shall be level or to falls, and increased, in thickness to form foundations for walling and under channels, trenches etc as shown on drawings or as directed. Sinking's for mat walls, pipes of trenches, and holes for buildings in posts stanchions, fixing bolts, etc. shall be formed as shown on drawings or as directed.

Clause 16. MASS CONCRETE RETAINING WALLS:

Walls more than 30 ft. log shall have gaps not less than 11 ft, not more than 3 ft. wide well vertical rebate joints on both sides, in approximately every 30 ft. These Gaps shall not be filled in until at least 14 days after concreting the adjoining sections.

Clause 17. LOADING TEST:

If the Engineer Incharge is dissatisfied with any portion of the work, the following tests shall be carried out by the contractor as per decision of the Chief Engineer whose decision will be final and binding on the contractor. The cost of testing and any reconstruction shall be borne by the contractor.

1. The test shall not be performed before the expiry of 56 days after effective hardening of concrete and procedure followed shall be as laid down as under:

1.1 Core Test, as per method & procedure being carried out by C.D.A

1.2 PANDIT Test, as being carried out by University of Engineering & Technology, Lahore.

2. The test load shall be as directed and shall exceed 125% of the total load for which the word was designed. The total load shall include dead loads, supper-imposed load and such dead loads which are not already applied at the time of test such as floor finishes partition loads etc.

3. The test loading shall be maintained for a minimum period of 24 hours and the structure should show a recovery of at least 75% of maximum deflection within 24 hours of removal of load. If the structure does not show the recovery in the firms test, it shall be subject to a second test as specified in the above mentioned clause of CP. 114. The decision of the Engineer Incharge as to the acceptance or rejection of the work under consideration, shall be final.

Clause 18. MEASUREMENTS AND RATES:

1. All in situ concrete items shall be measured in cubic contents of finished concrete as shown on the drawings:

2. Items for reinforcing bars shall be paid by weight ascertained from their diameter and length according to the shop drawings approved by the Engineer

Incharge, Bends, hooks, cranks, cranks, shall included in the quantity. No payment shall where indicated or approved by Chief Engineer shall be paid. No payment shall be made for steel or concrete chairs, spacer bars and binding bars. The rate for all items of concrete under this sub-section shall cover the cost of furnishing all materials, labour, scaffolding formwork, curing and appliances at site and performing all operations at any height in accordance with drawings finish schedule and as specified above. This rates does not include providing, bending and placing in position of reinforcing bars, but include cost of all inserts and anchorage item specified for completion this contract, cost of which has already not been covered by other sections of these specifications cost of installation and supply of inserts and anchorage items required by other specialist contractors is not included in the above rate. If this contractor is required to supply and install such items it shall be paid separately. The rate for reinforcing bars shall include the cost of providing, bending and placing in position of bars for all bar diameters at any height including cost of chairs, binding wire, furnishing all labour, material scaffolding, appliances at site and performing all operations in accordance with drawings and as specified in this section.

SUB-SECTION 2-A

PRECAST CONCRETE

Clause 1: GENERAL:

1. Precast concrete structural members shall conform to the special provisions of this subsection in addition to all applicable clause of section 2 ‘concreter'
2. Should an applicable clause in Section 2 overlap with an applicable clause of this sub-section, the more stringent clause shall prevail. The stringency of the contesting clause shall be determined by the discretion of the Engineer Incharge.

Clause 2. CONFORMITY TO BRITISH STANDARD:

The work and materials shall conform to all British standards and code of practices as specified earlier in this section under the head ‘CONCRETOR' and shall also conform to B.S. 1217 ‘Cast stone' as applicable to the work and specified.

Clause 3. MATERIALS:

1. **Aggregates:** Coarse and fine aggregates shall be of uniform colour and shall conform to the requirements of section 2, coarse aggregate shall be of size as mentioned on the drawings and approved by the Engineer Incharge.
2. **Cement:** Cement shall be grey Portland cement conforming to the requirements of section2.
3. **Reinforcement:** shall conform to the requirement of section 2.
4. Anchor, supporting angles, dowels etc. shall be heavily dipped galvanized steel?
5. **Mortar:**For setting precast concrete units shall be mixed in proportions by volume of one part Grey cement, one part hydrated lime putty and five parts of fine aggregate. Mortal for pointing shall be mixed in the proportions by volume of one part Grey cement, one part hydrated lime putty and four parts sand made up into stiff plastic batches. Setting mortar shall have the minimum amount of water added to make it flow.

Clause 4: SHOPS DRAWINGS:

Shop drawings and description of the proposed formwork shall be submitted by the contractor the Engineer Incharge for approval within two month of award of contract. The form drawings shall show complete detail of each unit to be case and eye bolts for handling shall be as directed on the drawings, the description shall cover the method of removal from the forms and the methods of handling and erecting of the units. Work shall be executed and erected in conformity with the approved shop drawings and description of work.

Clause 5: WORKMANSHIP:

1. Concrete for precast wall panels in Toilets window sills roof, planks etc. shall be 3000 PSI quality control concrete and specified in section 2.
2. Proportioning of mixes shall be determined by weight batching and the amount of water added to the mix shall be the minimum necessary to obtain sufficient workability and produce a dense concrete without segregation of the aggregate. Coarse aggregate shall be of maximum size shown on the drawings, graded crushed aggregate.
3. Each unit shall be reinforced as indicated on the drawings and shall have additional reinforcement if required for handling or erection.
4. All anchorage items as shown of the drawings or as directed for fixing precast units shall be cast integrally with the panels at the exact locations. Care shall

be exercised so that anchorage items are not dislodged during the casting and compacting operations. The precast units in which door or windows are to be installed shall have built in Anchors for fastening doors and windows to the frame.

5. Each unit shall be equipped with eye bolts, welded with, reinforcement and located so as to be concealed when the unit is erected for handling hoisting and erecting the units in a vertical position. Additional embedded and welded eye bolts shall be provided if required by the proposed method of handling and hoisting the units.
6. Casting shall be done in accurate moulds designed to withstand vibration. The surface of moulds which will form exposed surfaces of the precast units shall be coated with an approved plastic or resin to ensure smoothness of the precast concrete. The vibration shall be continuous during the process of casting. Compaction shall be thoroughly carried out by mechanical vibration such that a solid mass without a solid mass without voids is produced entirely filling the mould and surrounding all reinforcement.
7. Exposed faces of precast concrete shall be smooth and free from cavities, lines or other defects detrimental to the appearance, and shall be even in colour, Units varying in colour within the units or varying from other units will not be acceptable.
8. All precast items shall be carefully handed during precasting, handling and erection. Any units that become damaged will be liable to rejection. Units shall be well wetted and then placed in position with cement mortar. Where any additional in-situ Structural filling between units is required, the units shall be well wetted before the concrete is placed.

Clause 6: MATURING:

Precast concrete units shall be matured and cured before being handled or erected.

Clause 7: PATCHING:

In general, no patching, will be allowed, and damaged units shall be replaced at no additional cost. Mirror patching, defined as such by the Engineer Incharge will be permitted when authorized by the Engineer Incharge.

Clause 8: CLEANING:

All mortar daubs and droppings shall be removed as the work is erected. On completion of work, all exposed surfaces shall be cleaned.

Clause 9: MEASUREMENTS AND RATES:

All precast units shall be measured in cubic feet, superficial area of running feet of finished work as specified in schedule of quantities.

The rate for all items of precast concrete under this sub-section shall cover the cost of furnishing all materials, labour, scaffoldings, formwork, curing erecting, anchors, fasteners etc. and appliances at site and performing all operations at any height in accordance with drawings, schedule of quantities and as specified above.

This rates does not include providing bending binding, and placing in position of reinforcement bars but include cost of all inserts and anchorage items specified for completion of this contract, cost of which has already not been covered by other section of these specifications.

The rate for reinforcing bars shall be as specified under Section 2 ‘Concreter’.

SECTION-3 BRICK & STONE MASONRY

Clause 1: CONFORMITY TO BRITISH STANDARD CODE OF PRACTICE:

C.P. 121101

Except as otherwise specified, all brickwork shall be erected in conformity with C.P.121 101 "Brickwork", as applicable to the work shown on the drawing and as specified.

Clause 2: MATERIAL:

a. Brick shall be sound, well burned clay, uniform in shape, colour and shall measure 9” x 1 ½" x 2 ¼'' so that every four courses laid shall measure in height Bricks should produce a ringing sound when struck. The brick shall be free from flaws, cracks, chip stones, nodules of lime or kankar or other blemishes. The brick should not absorb more than 1/6th of its weight, when soaked in water for an hour. Bricks of only one size shall be used throughout the work and bricks from different kilns not having the same size shall not be allowed. The minimum compressive strength of the gross area of the brick flat wise shall be 1250 pound with an average for five bricks not, less than 1500 pounds. Brick shall be tested for compressive strength in accordance with B.S 1257 "Method of testing clay Building Bricks"

b. Cast stores or cc jali shall be made from 1:2:4 cement concrete as specified in section "concreter" colour additive if specified shall be inert chemically and shall give shade as shown on drawings or as instructed at site.

c. Grey stone: shall be lime stone. Sound free from cracks, cavities and should be of uniform grey colour and fixture, and shall measure 3" to 4" thick, 2" long 1” wide. The sides cut truly in plumb and corners at right angles. The exposed face should be fine chiseled.

d. Mortar: shall be mixed in the proportions by volume as specified in bill of quantities.

    1. Portland cement shall conform to B.S 12.
    2. Sand and other fine aggregate shall conform to B.S. 1200, "Sands" and crushed' Natural stone for Brickwork (plain and reinforced) and for Masonry"
    3. Water shall be clean, free from any organic impurities, acids, alkalis greasy or oily substances either in solution or in suspension.

e. Wall ties: Metal wall ties shall conformed to the requirements of B.S. 243 "Metal wall Ties", where applicable. Other ties shall have stiffness. Strength and durability at least equal to the weakest ties specified in this standard. All meta1 wall ties shall be galvanized,

Clause 3. SAMPLES:

The samples of all the material used for brickwork shall be approved by Engineer Incharge & same type of material shall be used during the work in progress. If the Engineer Incharge desires to get the material tested, this will be got done by the contractor from a laboratory approved by them at his own expenses.

Clause 4: WORKMANSHIP FOR BRICKWORK:

a. Brick laying: Brick laying shall conform to the applicable requirements of C.P.121.101 notably clause 501,508 and 512. The brick work shall be done from approved bricks and shall be strictly in accordance with the drawings. The bricks shall be laid in mortar specified in schedule of quantities. Before the brick are used, they shall be soaked in water tanks (to be constructed by the contractor at

his own cost), for at least four hours. The brick shall be placed in the water tanks in a manner that they do not get damaged. Bricks shall always be laid in English. bond (unless otherwise specified) with frogs upwards. Bricks shall be laid with bed and vertical joints properly filled with specified mortar. Bricks work must be truly plumb and must be checked by plumb bobs and straight edges frequently. Brick work should present a perfect straight and vertical surface and no chipping or rubbing shall be allowed.

Brick work where necessitated by the drawings to have curved or champhered surface shall be cut and chiseled finely such that when placed in position they do not present ugly look or require leveling up with extra mortar. Where work has to be left, the wall shall be left in slope and in no case the difference of height between different walls shall be more than 5' at any section of the building.

All brick work shall be bonded where it abuts other bricks work, concrete walls and concrete columns. Where bricks walls or partitions interest or abut, it is absolutely necessary to interlock the masonry of the two walls in such a way as not to leave a straight vertical joint between the two walls. In such cases the bond shall be obtained by placing a closer 41/2 inches from the face in every alternate course of the wall or masonry ties shall be provided. Where brick work abuts concrete, wall ties engaging in dove tail slots shall be provided at every fourth course. 3” long dove-tail slots cast in concrete members at every fourth brick course height shall be considered sufficient under these specification, unless contractor considers continues length of slots convenient for his working. Brick work shall be wedged to the underside of floor and roof slabs and the top most horizontal joints shall be filled with mortar well-compacted.

Putlog holes shall always be along headers and not more than one brick in length and shall be neatly bricked in on removal of scaffolding.

Built in anchor bolts, inserts, pipe supports, hangers pipe sleeves, dowels, ties and all items shown on the drawings, or specified are required to be build into the masonry as the work progresses.

Frames and other built in work shall be maintained in their proper position and bracing shall not be removed until they are securely held by the masonry. The spaces around all built in items shall be filled with masonry. Where required for latter building in, leave opening in masonry for heating and plumbing pipes, electric conduits etc. and after piping or conduits have been installed, fill around same brick work.

Do all cutting and patching of masonry required for installation of built in work supported by masonry.

The masonry shall be kept properly cured for at least 10 days where cement mortar is used. Where according to plans and sections, the masonry would require cut bricks to be used, the same shall be done by the contractor free of cost to obtain correct thickness according to drawings.

b. Jointing Vertical joints in alternate courses must be directly one over the other, horizontal joints shall truly level. The thickness of joints shall be between 3/8” to ½” or as shown otherwise on the drawings. The thickness of joints must be kept uniform throughout the progress of work and varying sizes of joints shall not be allowed. The joints of the masonry must be raked out uniformly at the close of each day's work, and any extra mortar sticking on the face of the work must be scrubbed out and cleaned daily.

Clause 5: WORKMANSHIP FOR CAST STONE AND JALI WORK:

Stones and jali shall be precast in 1:2:4 cement concrete, to sized and shapes shown on the drawings. An approved colour additive if specified shall be added to the concrete mix to give the desired colour. The exposed to view faces of precast

stone or jali shall be well rubbed and grounded to present uniform finish. The contractor shall manufacture sample pieces and obtain the approval of the Engineer Incharge and such approved samples shall be used as standard for the whole job for colour and finish. The mortar used for jointing shall be 1:3 cement sand mortar. Where mild steel reinforcement is shown in drawings or specified in bill of quantities, the same shall be provided and anchored properly.

Clause 6: WORKMANSHIP FOR STONE MASONRY:

The stone shall be sound, free from decay flaws, cracks, veins or cavities and shall be as far as possible of uniform grey colour and texture and best obtained from specified quarry.

Porous stones such as coarse, grained sand stone should not be used which being previously dry absorbs more than 5% of its weight of water after 24 hours immersion.

The facing of stone shall be of live stone grey in colour and texture 3” to 4" thick, 2' long and 1' wide cut truly to dimensions with sharp edges and corners and would be set in cement mortar 1:2. The exposed face should be fine chiseled and sides, truly cut in plumb, rubbed and smoothened so that the vertical joints when fixed side by side may become practically invisible. The horizontal joints should have V shaped groove 3/8" thick and ½ " deep at intervals as shown in drawing

Clause 7: MEASUREMENT & RATES:

Brick work will be paid in cubical contents i.e. multiplying the length and breadth of wall with height of the wall. All the openings in the masonry wall will be deducted. Cast stone and Grey stone veneering of jail work will be paid for in square ft. of the superficial area covered. All mild steel reinforcement shall be measured as specified in section “Contractor". The rate of this item shall cover:

1. The cost of material, labour, curing, scaffolding racking out joint and appliance at site and all operations in connection with the installation of masonry in accordance with the drawing, finish schedules and as specified above.
2. Cutting and patching work required for installation of built in work:
3. All assistance to other trades for built in items to the satisfaction of the Engineer Incharge.
4. Providing and fixing wall ties for joining or stone masonry with cement concrete members and cast stone veneering or a jali with brick masonry where specified in bill of quantities, these specification, or shown on drawing.
5. All mild steel reinforcement shall be specified in section concreter.

Clause 8: MASONARY:

1. Masonry: Definition:

   All mason's work in brick work / block work shall be referred to here in as masonry.

2. **Mason General:**

   All masonry shall be constructed in bonds and dimensions shown on the drawing or as directed by the Engineer Incharge.

3. **Work to proceed uniformly:**

   Where practicable the whole masonry in any structure shall be carried out at a uniform level and where break are unavoidable the joints shall be made in 'toothed’ stops. Gross walls and all junctions of walls shall be formed at the time the wall are being built.

4. **Soaking and protection**

   All materials for masonry (other than cement mortar) or cement blocks shall be thoroughly soaked in clean water in tanks or pits for not less than 15 minutes before incorporation in the work.

   All work shall be kept wet whilst it is in progress, care being exercised to avoid washing mortar out of joints. Masonry shall be protected during construction from adverse climatic effects and shall be kept moist for a period of not less than ten days after completion.

5. **Mortar:**

   Unless otherwise specified or directed, all masonry shall be constructed in 1:5 cement and sand mortar.

6. **Joints:**

   Nor four courses of masonry shall rise more than five percent above the same laid dry.

   All, masonry work shall be laid true to line and level with horizontal courses and vertical prepared. Where painting is not specified the joints in each day's work shall be struct to depth of ½" whilst the mortar is green ad such striking of joints shall be contingency of contact.

7. **Fixtures:**

   Holdfasts and similar fixtures shall be built in with the surrounding masonry in their correct position in 1:3 cement and sand mortar and 1:2:4 concrete depending on the type and amount of fixing required.

8. **Quoins and jambs:**

   Quoins and jambs shall be dressed at true right angle, and corner being straight and vertical. Unless otherwise specified or directed, quoins shall be laid alternate head and stretcher wherever possible.

BOND:

The bond used shall be English or such other as may be specified, and shall be carried throughout the work. At the corners alternate courses of brick work / block work shall be laid header and stretcherwise so as to bend the two walls together.

No bats shall be permitted except where absolutely required-for-obtaining the dimensions of the different courses of four obtaining the specified bend.

CLEARING WORKS:

No mortar shall be smeared over the face on completion of the work all exposed surface shall be washed down all stains removed.

FACING WORK IN POINTED BLOCKWORKS:

All the best shaped blocks and those most uniform in colour shall be reserved for face work

All face work must be finished with a neat drawn joint and pointed to specification. All block work must be washed down on completion and all stained removed from the face. ON completion of a work, all rubbish to be removed unsightly holes or pits leveled up, and the whole surroundings of the work left clean and neat before the final bills are prepared:

SECTION-4 PAVIOR

Clause 1: CONFORMITY WITH BRITISH STANDARD CODEOF PRACTICE:

Except as otherwise specified, flooring work shall be in conformity to British standard C.P.2004. In situ flooring, as applicable to the work shown on the drawings and as specified.

Clause 2: MATERIAL

a. Cement:

Shall be standard grey Portland cement conforming to the requirements of B.S. 12 “Portland cement”.

b. Sand shall conform to B.S. 1199 "BUILDING SANDS FROM NATURAL SOURCES”.

c. Aggregate:

Shall be in accordance with the requirements of B.S. 1201. "Aggregate for Granolithic concrete floor finishes."

d. Reinforcement

For R.C.C sub floor shall as specified under concrete.

e. Water shall be clean, free from any organic impurities, acids, alkalies, greasy or oily substances, either in solution or in suspension.

Clause 3: SAMPLES:

All the material used under this section shall be approved by Engineer Incharge and same type of material will be used throughout the work in progress. If Engineer Incharge desired to get the material tested, this will be got done by the contractor at his own cost from a Laboratory approved by the Engineer Incharge.

Clause 4: WORKMANSHIP:

A. Cement Concrete, Topping.

Material method of mixing and laying of cement concrete floors shall be in the manner as specified for mixing of cement concrete under section “CONCRETOR”. The laying shall be in accordance with British Standard Code of practice 2004. In situ flooring part 2 concrete flooring and in manner as specified under section "CONCRETOR”: Surface shall be truly leveled or shall be pitched to drain where required. The concrete after laying shall be finished by tamping the concrete with special tools to force the coarse aggregate away from the surface, then screening the floating with straight edges to bring the surface to the required finish level. While the concrete is still green, but sufficiently harended to bear a man's weight without deep imprint, it shall be wood floated to a true even plane with no coarse aggregate visible, sufficient pressure shall be used on the wood floats to bring moisture to the surface. After the surface moisture has disappeared, surface shall be steel toweled to a smooth even, impervious finish, free from trowel marks. After the cement has sent enough to ring the trowel, the surface shall be given a second steel troweling to a furnished finish. The use of addition al mortar or neat cement for giving a smooth finish is definitely prohibited. The surface over which the topping to be laid shall be divided into square or rectangular panels not exceeding 50 sq.ft or as shown on the drawings the exact size will be decided by the Engineer Incharge. The symmetrical panels shall be formed by wooden or iron screeds of 1 ½" width and of a depth equal to the thickness of the floor concrete. The top of these screeds should be at the exact level of the finished floor. Alternate panels shall be laid on alternate days. The surface shall be tested with a straight edge to detect high and low spots which shall be eliminate. The contractor must keep a straight edge not less than 8' with parallel sides as well as a 10' spirit level, for the purpose of testing the trueness of the floor being laid throughout the

time the work is in progress. In no case will hammering of any type be allowed on a finished surface.

Concrete shall be left undisturbed for 24 hours after laying. During the process of laying as well as for a period of 14 days after, the concrete shall be protected by suitable covering from the weather and the extreme of temperatures and kept wet for that period. During laying the covering will be damp gunny bags, and after laying damp sand or saw dust.

b. R.C.C. Sub-Floor

Materials, method of mixing and finishing R.C.C sub floor be as specified under section concreter'. Reinforcing bars shall be placed in the slab in both directions as shown in drawings. "Expansion joints" if shown on drawings or specified in schedule of quantities shall be ½" thick filled in with approved bitumentic filler. Alternate bay construction of section 'Concreter' shall be strictly adhered to.

Clause 5: MEASUREMENT AND RATES:

The work under this section shall be measured as product of length and breadth of the area over which floor is laid.

Rates for all items under this section shall cover the cost of furnishing all the materials, labour, scaffolding and appliances at site and performing all operations in connection with laying all the items in accordance with drawings schedule of Quantities and as specified above. The rate shall include all assistance to other trades for built in items to the satisfaction of the Engineer Incharge. Reinforcement in R.C.C floors shall be measured and paid for as under "Concreter'.

SECTION-5 PORCELAIN TILES FLOOR

Providing and laying floors of Porcelain Tiles 600mm X 600mm (Lapata) / 1200mm x 600mm (Grit White) of UAE/ Malaysia/ Qua Granite Turkey make imported tiles including average 2-1/2" thick C.C base and mortar and matching colour, cement slurry for fixing of tiles, complete in all respects as per drawings, specifications and as directed by the Consultant/Engineer.

SECTION-6 JOINER: CARPENTEURE & GLAZIER

Clause 1: CONFORMITY TO BRITISH STANDARDS:

Except as otherwise specified carpentry and joinery shall be in accordance with B.S 1186"Quality of Timber and workmanship in joinery" as applicable to work shown on the drawings and specified.

Clause 2: MATERIAL:

1. Timber: Timber shall conform to the applicable requirements of B.S 11886 "Quality of Timber and workmanship in joinery" Part 1 Quality of Timber: Where teak wood is mentioned in the specifications schedule of items and drawings, it shall be best quality Burmah teak wood. Wood core for flush doors shall be of best quality block board. Timber shall be well seasoned felled for not less than two years before use, uniform in substances and colour, free from large or dead knots, cross grains, wind shakes, cracks or blemishes of any kind. The sap should be entirely removed. The fibers shall be straight and smooth and shall not give a dull appearance. When the timber is struck it shall not give a dull sound. Any timber rejected by the Engineer Incharge shall be removed from the site of the work immediately.
2. Bolts, Nuts & Studs etc. Bolts, "nuts and studs shall conform to the requirements of the applicable sections of B.Ş. 325 "Black Gup and Counter

sunk Nuts and Washers.

BS 916 “Bolts, screws and Nuts":

BS 1494 "Fixing Accessories for building purposes”

3. Nails: Nails shall conform to the requirements of B.S 1202 “wire Nails and cut: Nails for building purposes"
4. Screw: Screws shall conform to the requirements of B.S. 1210 “Wood Screws”.
5. Wood preservative: Wood preservative shall be creosote or pentachlorophenol and shall conform to the applicable requirement of B.S. 1286 “Classification of wood preservatives and their method of application.
6. Glue: Glue shall conform to the applicable requirements of B.S 745” Animal Gule for wood or B.S: 1204 “Synthetic Resin (Phenolic and Amino Plastic Adhesives for construction work in wood.”
7. Plywood: Plywood shall conform to the applicable requirements of B.S 1455 “British made plywood” for workmanship and quality. Unless otherwise specified or shown or the drawings the thickness of the plywood shall be 3/4” and shall be teak veneered for all exposed faces.
8. Formica:. It shall be of approved shade or pattern.
9. Flush door: Flush doors shall conform to B.S. 459.'"Flush.door” & B.S.C.P. 151 part-I. “Flush wood door” It shall have 5 ply 6mm thick plywood face veneered on all exposed face, conforming to the applicable requirements of B.B.459.
10. Class:-
    i. General: Unless otherwise indicated glass shall be of the following weight per square foot for various sized mentioned below
        i.i Not exceeding 12" x 14" - 16 óż.
        i.ii Exceeding 12” x 14” but not exceeding 24” x 21 oz.
        i.iii Exceeding 24" x 24" but not exceeding 30" x 30" -26 oz.
        i.iv Exceeding 3.0x 30" but not exceeding 36" x 36"-32oz.
        i.v Exceeding 36”x 36" plate glass (1/2 thick).

    For other sized smaller dimensions will determine the weight. Glass shall be free specks, bubbles, distortion and flaws of every kind.

    ii. Obscure glass obscure glass shall not be less tan 7/32 inches thick with one side, smooth and the other side with pattern to be selected by the Engineer Incharge.

    iii. Plate glass: Plate glass shall be first quality polished transparent glass conforming to the applicable requirements of B.S.952 “Glass for Glazing”. Unless otherwise indicated, plate glass shall be ¼” thick with the two surface ground smooth and polished as to give clear undistorted vision and reflection

    iv. Wire glass: Wired glass shall be Georgian wire ¼” polished plate conforming to the applicable requirement of B.S. 962 "Glass for glazing”.

    v. Putty: Putty shall be an elastic glazing compound suitable for interior and exterior glazing shall conform to the requirements of the B.S. 544:"Linseed Oil Futty for use wooden frames”. The putty for metal frames shall be of a type specially prepared for use with

metal frames conforming to the applicable requirements of the British standard or of a make approved by the Engineer Incharge.

vi. Hardware: Hardware shall be of best quality and make of approved manufacture. Their size, material and number shall be as detailed in the tender documents.

vii. Paint: Paint shall be as specified under section "Painter and Decorator". Wood preservative shall conform to B.S 1202.

Clause 3: SAMPLES:

All samples of the material used for the work under this section shall be approved by the Engineer Incharge and same type of material shall be used throughout the work. If the Engineer Incharge desires to get the material tested, this will be got done by the contractor at his own cost. from a laboratory approved by the Engineer Incharge.

Clause 4: WORKMANSHIP:

1. General: Wood work shall be neatly and truly finished to exact dimensions and details as shown of the drawing. The plans and scantling shall be sawn slightly in excess of the actual measurements required to allow for planning. All joints shall be simple tenon and mortise joints unless otherwise specified or directed by the Engineer Incharge. All mortise and tenon joints shall fit truly and fully Holes of correct size shall be drilled before inserting screw. Driving in or starting in screws with a hammer shall not be allowed. All screws shall be dipped in oil before being inserted in the wood. If after the wood work has been erected, any undue shrinkage or bad workmanship is discovered, the contractor shall forthwith amend the same without any extra charge. All portions of timber, built into or against or close to masonry or concrete or used as sub frame for ceiling or paneling shall be treated with wood preservative as application which is included in the rate.

2. Door and window Frame: Door and window frames shall conform to the applicable requirements of B.S. 1567 “Wood door frames and linings”. The door frame shall be of best quality Burmah Teak or of the timber specified and shall be fabricated of the exact sizes and dimensions as provided in the drawings stops shall be of best quality timber of same specifications as that for frames. Where the door frames are not to have any sills the vertical length shall be embedded in the floor at least 2" deep. No extra payment will be made for this extra length. Frames shall have a rebate to receive the leave, the rebate shall be ½” deep and of width equal to the thickness of the leaf. All the frames shall be ready before the work reaches sill level so that they can be built in as the work proceeds. The frames shall be secured to be brick work or concrete by holdfasts or expanded bolts as shown on the drawings or as approved by the Engineer Incharge. The number and sized of Hold fasts or Expanded Blots to each frame shall be 6' x 3/16” or as indicated on the drawings on in table elsewhere in these specifications.

3. Paneled Doors & Windows: Paneled doors and windows shall conform to the applicable requirements of B:S.459 “Paneled and glazed wood doors” part 1 and B.S Code of Practice 151 Part 1

   Doors shall be of well-seasoned Burmah Teak wood or of the timber specified. Panel shall be of teak veneer plywood or glass as indicated in the drawings. Stile, rails and beads shall be of well-seasoned best quality burmah teak wood. Glazing beads shall be removable on the exterior.

4. Flush Doors: Flush doors shall conform to the applicable requirements of B.S. 459 “Flush Wood Door" and B.S code of practice 151 “Door Windows” Part-I.

   Door leaf shall be of well seasoned solid core of block board, cross grained and

face veneered with 5 ply 6mm thick plywood of teak on each side. Frame shall be of teakor other wood as indicated on drawings and schedule of quantities. Door leaf shall have well-seasoned hard wood edge strips of quality and design shown of drawings on all four edges of leaf. Overall thickness of door leaf shall be as shown on the drawings.

Face veneers shall be free of saps and mineral streaks, Knots and irregularities and shall be suitable for paint and polish finish. Veneer construction shall provide for equal stress on both side to ensure absence of warp: Flush doors shall be screwed to the frames by means of hinges which shall be counter sunk in the wooden frames.

5. Toilet doors: Toilet doors shall be veneered flush type doors as specified in 'd' above fixed as shown on the drawings & schedule of quantities. These doors shall be supplied and fixed with bolt hinges, occupancy & slide bar latches, coat hook, rubber tipped bumper and paper holder in toilet compartment. Cost of the hardware shall be included in the rate for doors.

6. Glazing: The sized of glass indicates on the drawings are approximate only, and the actual sized required shall be determined by measuring the frames to receive the glass. All glass shall be factory labeled on each pane and the lable shall not be removed until finally approved by the Engineer Incharge. One field coat of paint shall be applied to windows before glazing. Glazing will fixed with best quality gold size putty, teak wood or steel moulding as directed at as shown of drawings or give in · schedule of quantities. Glass if specified to be fixed with putty shall be bedded in

   putty and face puttied. Saches shall be fixed so that they can not move until putty or glazing compound has set:

   Glass shall be protected against damage. After inspection, any label and paint sports shall be removed from the glass and glass shall be washed clean. Damaged or broken glass shall be removed and replaced before acceptance at no expense to the owner.

7. Glass handrail: It shall consist of flowered or patterned plate glass attached to aluminum mullions fixed to floor as shown on drawings.

8. Teak wood Paneling: "Teak shall be of well seasoned best quality wood. Unless otherwise indicated the planks shall be ¾" thick. Deodar wood battens shall be screwed to hard wood plugs fixed in slab or wall creosoted before fixing as specified above. Teak wood panels shall be screwed to the deodar wood under frame as shown on the drawings. Teak wood beading shall be provided wherever indicated on the drawings.

9. Wood Handrails: It shall be of well-seasoned wood. Handrail shall be accurately shaped to detail and made in as long sections as possible. Joints shall be fastened from the underside with concealed hand rail bolts. All changes in direction shall be have smooth even curve cut out of one solid piece. Handrails shall be secured to metal railing with ¼"x 2" screws at 12" centers. It shall be French polished or wax polished as under section " Painter Decorator".

   Hardware shall be chromium plated brass of local manufacture as detailed in table elsewhere in these specifications. It shall be carefully fitted and securely attached. Upon completion of the work all locks and hinges shall be oiled and all hardware shall be demonstrated to work freely in the presence of owner's representative. Keys shall be fitted into their locks and upon acceptance of the work, Key shall be tagged and delivered to the Owner.

   i. Sub-Frames for coiling, wall paneling wooden floors and cat-walks:-

They shall be of best quality deodar wood of the size and fixed as shown in drawings. Enough of nails, screws etc. shall be used and shall be specified under materials. The timber members shall be given two coats of wood preventative before they are installed in position.

Clause 6: PAINTING:

All wooden doors, windows, paneling's etc. shall be painted, polished as specified in schedule of quantities. The specification for painting, polishing etc, shall be as given under "Painter and Decorator"

Clause 7: MEASUREMENT AND RATE:

The measurement of wood work will be the net area, after fixing, no allowance being made for waste, overlaps, rebates or the like. All doors except toilet doors shall be paid by measuring the area of clear opening in brick work or concrete. Toilet doors will be measured for the net area of door including frame without gap at bottom. The rate for all the items under this section shall cover the cost of furnishing all materials hardware, Labour, scaffolding creosoting Paintings or polishing as specified under "Painter & decorator" and appliances at site and performing all operations in connection with the installation of carpentry, joinery, glazing, hardware in accordance with drawings, finish schedule and as specified above.

SECTION-7 STEEL ERECTOR AND METAL WORKER

Clause 1: MATERIAL:

i. Steel Channels: shall conform to the applicable requirements of B.S. 15 'Structural steel'.

ii. Steel Plates: shall conform the requirements of B.S. 14449 "Steel Plates sheet and Strips".

iii. Steel Sections" shall conform to B.S 15 "Structural Steel".

iv. Glazing: shall be as specified under " Joiner Carpenter and Glazier".

v. Wrought Iron: shall conform to, B.S 51 "Wrought iron for General Engineering puroses" and B.S. 858 Best Yorkshire wrought iron" as suited for the purpose.

vi. Metal Casement Windows and Casement Doors shall conform to B.S. 990 metal Casement windows and casement doors for domestic building or as shown of the drawings and specified in the schedule of Quantities in case of locally rolled window sections.

Clause 2:- SAMPLES:

All samples of the material used for the work under this section shall be approved by the Engineer Incharge and same type of material shall be used throughout the work in progress. If the Engineer Incharge desires to get the material tested, this will be got done by the contractor at his own cost from a Laboratory approved by the Engineer Incharge.

Clause 3:- WORKMANSHIP FOR DOORS- WINDOWS AND SHUTTERS:

a. Steel Casement Windows: ventilators and doors.

Shall be medium universal sections. Vent and frame section shall have a depth front in back of 1-5/16" and steel thickness of 3/16" conforming to requirements of B.S.990 "Metal Casement windows and Casement Doors". All sections shall be hot rolled low carbon steel shapes and shall be solid one piece sections with flanges rolled integral. Flanges forming the weathering contracts shall provide not less than ¼" contact at both inside and outside points of closures. If some sections are shown on drawings as composite section made by welding steel channels, angles and plates, these would only be accepted in lieu of one piece section under these specifications. In case it is specifically mentioned in the schedule of Quantities, that locally rolled section are to be used in manufacture of steel casement windows and doors, then the 'E' section used shall be 1" deep and 1/8" thick unless shown other wise on the drawings.

Corners of frames and vents shall be mitered, solid welded and shall be finished flush and smooth on surface that will be exposed after installations

Where composition steel sections are shown on drawings, weld shall be continuous but shall be staggered in welding in wider to avoid warping and twisting of members. Completed members shall be in one length without splices and shall be straightener so that they shall not be more than 1/16 inch from a straight plane in either direction for the full length of member. The standard of workmanship acceptable under the specification shall be equal to "Crittal Standard". Care shall be taken in handling doors, windows etc. During transportation and at job site. These plumb, shall be stored under cover. These shall be installed only by skilled mechanics, set plumb, level, in alignment and properly braced to prevent distortion. These shall be erected in position as the building progress using proper holdfasts as shown on drawing or counter sunk bolts and screws as dictated by site requirements. Hinges for windows shall be of steel or malleable iron with non ferrous bushings or washers. Two hinges per

ventilator shall be furnished, except that for ventilator exceeding 5'-6' in height three hinges shall be furnished. Ten inch long solid Bronze or moulded heavy gauge galvanized iron peg slays, one for each ventilator shall be provided. These shall be of manufacturer's standard design and shall be secured to windows with corrosion resisting bolts. All single locking handle in accordance with manufacturers, standard or as approved by the Engineer Incharge shall be furnished point locking device with steel connecting rode shall be furnished. Locking handles shall be smooth finished solid bronze. They shall be attached securely to the windows with brass or other corrosion resisting screws. Metal glazing bead if shown on the drawings shall be galvanized of minimum 18 SWG and in the size details shown on the drawings or shall be of a standard detail of manufacturer approved by the Engineer Incharge.

Three hinges of steel or malleable iron with non-ferrous bushings or washers shall be provided for each leaf of the doors. Approved type locks and other fittings shall be installed as shown on the drawings, bill of quantities and as specified elsewhere in these specifications. After installation, doors, windows and ventilators shall be protected from construction hazards that will interfere with their operation or damage their appearance or finish. They shall be cleaned on inside and outside of all mortar, plaster, paint or other foreign matter to present a neat appearance. Hardware and moving parts shall be lubricated.

b. Glazing:

Shall be as specified under section "joiner Carpenter and Glazier".

All doors, windows and ventilators shall be painted with three coats of approved paint.

c. Rolling Shutters:

Shall be of solid front made of 22 gauge G.I. sheet strips G.I. sheet strips shall be 22/1" wide and shall be machine moulded so that covers and silts represent neat appearance. The rolling rails and frames shall be of approved make and secured firmly to concrete by means of bolts and nuts. The rolled top portion shall be encased in 1/8" thick sheet casting. When installed the shutters shall be capable of easy operation and provided with approved type of handles, eyes from padlock etc. They will be painted two coats of anti-rut and three coats of approved paint.

Clause 4:- **RAILING**

a. Ornamental Wrought Iron/S.S Railing:

Wrought iron shall be well formed to the shape and size shown, with sharp lines, curves, angles and smooth surfaces. Balustrades shall be formed with all turns and casing and shall be secured to the top rail at intervals of 12 inches on centers or as directed. Balustrades shall be set parallel to each other to horizontal lines and to the rake of the stairs. The balusters and posts shall be set into concrete stairs, curbs and slabs etc. As directed. The space between the balusters or posts and the opening shall be solidly filled with molten lead, trimmed flush with the finished floor, stair or curb. Wall handrails shall be supported on rail brackets, securely fastened to back plates. All ferrous surfaces, except surfaces embedded in and / or in contact with concrete or terrazzo, shall be shop primed.

b. Wooden handrails:

It shall be of Burmah teak wood and as specified under Section " Joiner' Carpenter and Glazier"

c. Aluminum Doors and Windows:

Aluminum doors- windows, ventilators, fixed frames etc. shall be provided by the manufacturer. Any breakage or damage and other defects of any sort should be rectified before erection. All the metal frames as said hereinabove are to be

erected after the masonry or concrete work is complete with the hold fast etc. bending for its full depth and grounding etc, complete. Contractor should ensure direction of these metal frames to be in plumb line, level and at their required position as shown on the drawings. It will involve all cutting, painting and other operations complete.

Clause 5- STRUCTURAL STEEL WORK:

All finished steel shall be well and clearly rolled to the dimension's sections and weight as specified or required.

All members shall be sound and free from cracks, scales, blisters, surface flaws, laminations cracked edges and defects of every sort. If any structural member is later discovered to be having any such defects, the Contractor shall at his own cost replace such components to conform to the Specifications. The structure shall be shop fabricated in convenient number or pieces and these pieces shall be reunited, welded, riveted or field bolted to the architectural details and structural drawings at site prior to their being lifted in position. In no case will be Assembly be allowed on the false work.

All points will be out truly square as to butt properly together and will be made only in such positions as shown on drawings or as directed by the Engineer Incharge. All field work of fabrication riveting, bolting and welding would be in the best workmanlike manner. During erection, bending, straining or pounding with sledges shall not be allowed.

The structure will be given two coats of suitable lead primer. All connections meeting surface of structural steel work shall be covered with sufficient red lead to ensure that it squeezes out all round in riveting or bolting up. The structure will be fixed as shown on drawings by bolts and bed plates embedded in masonry or concrete. The shoe plates shall be fabricated alongwith and the slotted sides shall be correctly, aligned and fixed according to the position shown on the drawings. Finally it shall be coated with two coats of approved rust proof paint as pacified under 'Painter'.

Clause 5- MEASUREMENTS & RATES:

Payment for doors, windows and ventilators will be made by measuring clear opening area in brickwork or concrete. Railing with balustrades and with brackets shall be measured by the length of handrail. Structural steel work will be measured and paid for by weight.

Rates for all the items under this section shall cover the cost of furnishing all the materials, labour, scaffolding and appliances, at site and performing all operations in connection with their installation in accordance with instructions of the Engineer-in-Charge. It is particularly mentioned that the rate for doors and windows etc. shall include supplying, fixing, including glazing, fittings such as locks, peg stays, handles etc. as specified and indicated on drawings and Bills of quantities, and painting etc as described above Bills of quantities, and painting as described above complete. It shall also include painting and polishing of balustrades and railings as described.

The rate for structural steel shall include supply, fabrication, fixing the same in position as desired and painting 2 coats of primer and 2 coats of rust proof paint as specified under "Painter & Decorator".

SECTION-8 ALUMINUM DOORS AND WINDOWS

1. **Scope:-**

   The work covered under this section comprises the following:-

   i. Fixing in position of aluminum doors, windows and ventilators complete with metal ware, fixtures as shown in the drawings, and specified in these specifications and the Bill of quantities. Aluminum doors and windows must be heavy section deluxe type of approved manufacturer,

   ii. Fixing plate glass of specified quality to doors, windows and ventilators.

2. **Materials:-**

   i. The aluminum sections for windows shall be extruded from aluminum alloy of composition H-9 (99% AI.0.5% Si) of approved equivalent. The aluminum plates and sheets shall be of the same composition. For door it shall be alloys He-9 WD (Box-section) or approved equivalent.

   Mongery, fittings and locks shall be of bronze, staircase steel and aluminum as shown on the drawings or as approved by the Engineer-in-Charge,

   ii. **Glazing:-**

   The clear plate glass shall conform to latest revised BS 952, special type of glazing such as toughened glaze, armors plate glass, tinted glass, wired glass and colored glass shall be of approved make and of sizes specified on the drawings and specifications.

   The supplier shall indicate to the Manufacturers that latest and approved method of jointing employed in the manufacture of high class work viz. Mechanical jointing, reinforced with concealed welding shall be used in the manufacture of doors and windows. The workmanship of Metal doors and windows shall conform to applicable provision of B.S.990: 1970

   iii. **Fixing:-**

   The fixing of doors and windows to concrete openings shall be carried out in approved method as indicated in the drawings or as directed by the Engineer-in-charge, Provision of necessary groove or rebate and holdfasts in the concrete shall be made in the formwork and no holding or drilling shall be allowed in the exposed concrete finishes. These shall be executed in position after the building structure is completed and by using proper holdfasts as shown on drawing or counter sunk bolts and screws as per site requirements.

3. **Glazing:-**

   The word of fixing glazing to doors, windows, ventilators shall carried out with the type and special quality of glass specified for each door and windows and as indicated in the drawings or as directed by the Engineer-in-charge.

   Plate glass shall be best quality transparent / polished glass conforming to applicable requirements of latest revised B.S.952, “Glass for Glazing” and as specified herein under:

   Clear plate glass 5mm thick or as specified. The sizes of glass indicated on the drawings are approximate only, and the actual sizes required shall be determined by measuring the frames to receive the glass. All glass shall be factory labeled on each pave and the same shall not be removed until finally approved by the Engineer-in-charge: Glass will be fixed with best quality mastic compound of approved make suitable for thick glass, tinted glass or wired glass or with special bead or molding as directed or as shown on the drawings or specified in the Bill of Quantities. Special rubber lining and weather proof brush joints for sliding surfaces shall be provided where indicated. Glass shall be protected against damage. After inspection, labels and paint spots shall be removed from the glass and glass shall be washed clear. Damaged or broken glass shall be removed and replaced before acceptance.

4. **Measurements and Payments:-**

Payment for doors, windows and skylights partition walls will be made by measuring clear opening area in the brick or concrete in Sq.ft. Rates for all items under this section shall cover the cost of furnishing all the materials, labors, scaffoldings and appliances at site and performing all operations, in connection with their installation in accordance with instructions of the Engineer. It is particularly mentioned that the rates for fixing doors and windows etc. shall be included foreign of all iron mongory fittings such as locks, peg keys, handles, push plates, kicking plates, door closers etc as specified and indicated on the drawings, including fixing of glazing glasses.

SECTION-9 PLASTER WORK

Clause-1: CONFORMITY WITH BRITISH STANDARD CODE OF PRATICE:

Except as otherwise specified plaster work shall be in conformity with B.S.C.P. 211 "Internal Plastering" and C.P 221 "External rendered finishes" as applicable to work shown on drawings and specified.

Clause-2: MATERIALS:

i Cement shall be as specified under section "Concreter".

ii Sand shall be of medium coarse grain obtained from local approved quarries subject to the approval of the Engineer-in-charge. It shall conform with B.S 1198.

iii Water shall be as specified under section "Concreter".

iv Lime shall be as specified under section "painter & Decorator".

Clause-3: SAMPLES:

All the material used for plastering, shall be approved by the Engineer-in-charge and same type of material will be used throughout the work in progress. If the Engineer-in-charge desires to get the material tested, this will be got done by the contractor at his own cost from a Laboratory approved by the Engineer-in-charge.

Clause-4: WORKMANSHIP:

a. Preparation of Surface:

The surfaces on which plaster is to be applied should be in case of brick walls properly racked and wetted before application of plaster. In case of concrete face to receive plaster, all surfaces shall be properly roughened by dragging wire brushes while the concrete surface is still raw or by backing if the surface had hardened so that 40% of the surface is roughened to approval. This is included in the rate of plaster.

b. Plastering:

Plasterwork shall be done in conformity with B.S Code of Practice 211 "Internal plastering" & B.S. Code of Practice 221 "External rendered finishes". All tools should be cleaned by scrapping and washing at the end of each day's work, or before use. Metal tools should be cleaned after each operation. All tolls should be examined and thoroughly cleaned before plastering is begun. All corners and arises shall be rounded if required while plastering and the rate of plaster is inclusive of this proviso. The plaster shall be laid to a true and plumb surface and tested frequently with plumb bob and straight edge not less than 10 feet in length. All. horizontal lines and surface shall be tested with a level and all jambs and corners with a plumb bob as the work proceeds. All moldings shall be worked true to template and shall be neat, clean, level and parallel or truly plumb as the case may be.

Wherever a thickness of more than ¾" is specified it shall be applied in 2 coats' rendering coat and final coat. The rendering coat shall be carried to full length of walls or natural breaking points. No vertical or horizontal joints, which show themselves, shall be permissible. The rendering coat shall be roughened with waving lines drawn by wire brushes when wet to provide bond for final coat. The final coat shall be applied only after the rendering coat has been properly cured. Before final coat is applied the rendering coat shall be properly wetted. The final coat shall then be applied and finished with wooden floats to present smooth and uniform surface. All putlog holes shall be filled up in advance of the plastering as the scaffolding is being taken down. The plaster is kept wet for 10 days after completion.

c. Patching:

Plaster containing cracks, blisters, pits, etc or discoloration will not be acceptable. Such plaster shall be removed and replaced with plaster conforming to this specification and approved by Engineer-in-charge. Patching of defective work will be permitted only when approved by the Engineer-in-charge and such patching shall match existing work in texture and color with expanded metal on brick or concrete junctions.

d. Floating Coat:-

Floating coat of neat cement if specified in schedule of quantities shall be carried out as follow:

Immediately after the surface has been plastered and while the plaster is still green a floating coat of neat cement shall be applied on it and the surface rubbed smooth with steel trowel. No trowel marks are to be left of on the surface. If trowel. 1 marks are visible after the surface has been finished it may required to be dismantled and redone. No payment for the work dismantled will be made.

Clause-5: MEASUREMENT AND RATES:

Plaster shall be measured as product of length and height of walls over which it is laid. One side deduction of opening will be made if plastered both faces of the wall and no deduction of opening will be made when plaster is one side of the wall. No addition for plaster of jambs and soffits of opening will be made and paid for. Plaster on ceiling etc. will be measured as total area covered. The rates will include:-

i. Plastering surfaces and corners with the mortars specified including cost of labor and materials.

ii. Preparing, cleaning and watering the surface to be plastered.

iii. Water and protecting the plaster after completion.

iv. Provision, erection and removal of scaffolding and tools and plants like special floats, levels and plumb bob.

SECTION-10 PAINTER & DECORATOR

Clause-1: CONFORMITY WITH BRITISH STANDARD CODE OF PRATICE:

Excepts as otherwise specified, all painting shall be applied in conformity with C.P 231 "painting" as applicable to the work.

Clause-2: COLOUR SCHEDULE:

The colour and surface finish required for various materials shall be as approved by the Engineer-in-charge.

Clause-3: MATERIALS:-

i. Paint shall be high grade enameled products of known manufacturers and when approved, shall be delivered on the work in original unbroken packages bearing the makers name and brands Materials shall conform to the applicable British Standard Specifications and shall be used in accordance with the manufacturer's printed directions.
ii. Colour pigments shall be pure, non-fading pigments finely ground; at least 99 percent passing a 325-mesh sieve.
iii. Emulsion paints Robialac Berger Plastic emulsion or I.C.I. Dulex emulsion paints will be used.
iv. Distemper shall I.C.I. Vinyl emulsion or Berger Nu emulsion. It shall consist of lime proof pigment. Distemper shall be delivered on the work in original unbroken packages bearing the maker's name and brands. :
v. Snowcem Durocem weather shield shall be obtained sealed tin. It shall be delivered on the work in original and sealed packages bearing the maker's name etc.
vi. Lime shall conform to B.S. 890: “Building Lime"
vii. Wax Polish shall be mansion/ wax polish or of equal brand approved by the Engineer-in charge.
viii. Spirit Polish shall have shellac of approved quality.

Clause-4: SAMPLES AND DETAILED APPLICATION SPECIFICATIONS:

Certified data, test samples and detailed application specifications shall be submitted for approval of the Engineer-in-charge. The detailed application specifications, when approved by the Engineer-in-charge will become the approved application specifications. Any subsequent changes in the approved application specifications shall be approved by the Engineer-in-charge. Samples of the paints used for the work shall be approved by the Engineer-in-charge, and same type of Paint shall be used throughout the work in progress. If the Engineer-in-charge desires to get the material tested this will got done by the Contractor at his own cost from a Laboratory approved by the Engineer-in-charge.

Clause-5: WORKMANSHIP:

1. Preparation of Surfaces:

i. All surfaces shall be clean, dry and free from dust at the time any coating is applied. Base coats applied shall be in good condition and surfaces well covered by touching up any base or abraded sports. Base coats shall be rubbed smooth.
ii. Woodwork shall be smooth and free from raised grain or other surface imperfections. Knots and pitch streaks shall be shellacked before painting. Nail holes, cracks and similar blemished shall be neatly puttied and sanded smooth after priming and before body or finish coats are applied.
iii. Concrete surface shall be cleaned until free of all loose and foreign material and excess mortar, using metal scrappers and wire brush if necessary. Grease and Oil spots shall be removed by suitable cleaning compound and then rinsed with clean water to remove all traces of alkali. Efflorescence

(alkali salts) shall be removed by washing with 5 to 10 percent solution of muriatic acid, allowed to stand until effervescing ceases, then rinsing with clean water to remove all traces of acid. Interior concrete surfaces shall be washed with zinc sulfate solution. Treated surfaces shall be allowed to dry thoroughly before any distemper or snowcem Durocem is applied.

iv. Plasterwork shall dry a minimum of 60 days prior to distempering or snowceming. Surfaces shall be clean and free from grit, loose plaster and surface irregularities before distemper or snowcem Durocem is applied.

v. Ferrous surfaces that have not been shop coated shall be cleaned and painted with protective paint conforming to British Standard Specifications B.S 2521/4 followed by finish coats. Shop coated metal shall be protected from corrosion before and after installation by treating corroded areas immediately upon detection.

Abraded spots on shop-coated surfaces shall be wire-brushed and touched up with the same material as the shop coat

2. Touching up:

At the completion of other branches of work all finished work shall be touched up and restored where damaged or defaced and the entire work left free from blemishes at no expense to Owner.

3. Painting of Timber & Metal Surfaces:

Paint and finishing materials shall be free from skins, lumps or any foreign matter when used. Pigments and fillers shall be kept well stirred while being applied. Work that is not to be finished under this section shall be protected against spatters; stains or soiling and each type of finish shall be protected against similar defacement by other finish and shall be left clean.

Each coat of paint shall be evenly worked out and allowed to become dry before any subsequent coat is applied or rubbing done and shall be of different tint from that of preceding coat.

Finish coats shall be of the exact shades selected. The finished work shall be free from rungs and sags, defective coverage and clogging of lines or angles. Edges of Paint adjoining other materials or other closures shall be full and clean cut without over lapping. Adjacent and uncoated areas, and installations shall be protected by the use of drop clothes or other approved precautionary measures. Spray painting shall not be employed for joinery work, which must be done by brush to obtain proper penetration into joints and cracks etc. When the painting is applied by brushes, the following instructions shall be followed:-

i. Brushes shall be in conformity to the applicable requirements of B.S 2992.

ii. All coats shall be spread as evenly and smoothly as possible means of crossing and laying off, the later in the direction of the grain in case of wood work. The priming coat must be mixed thinner than subsequent coats to assist penetration on adhesion. The final coat shall be very carefully crossed and laid off so that brush marks are not visible.

iii. Brush shall be reversed at frequent intervals so that wears down evenly. A free easy stroke shall be cultivated. Short and Jerky strokes results in uneven surface. Stretching the stroke too far shall not be allowed to avoid an uneven surface.

4. <u>Distempering Concrete Surfaces:</u>

Before work of distempering is commenced the plaster surface must be sized with a priming coat consisting of size to which a little distemper has been added and which should be applied hot. Distemper shall be applied quickly and boldly with large flat brushes of approved make. The brush is to be dipped and stroked cross-

wise on the surface and then immediately stroked up and down, this process shall be considered to form one coat of distemper. The distemper shall be mixed in the manner specified by the makers and each coat shall be inspected and passed by the Engineer-in-charge, before the next coat is applied. The finished surface shall be carefully stippled to remove any brush marks. The contractor shall carry out as many coats as are specified in the schedule of quantities in accordance with the above specifications. The number of coats specified should be enough for producing a uniform smooth finish and if the finish, produced by the contractor is not upto the requirements, he will be required to apply as many more coats as maybe required to produce the required uniform finish, and no payment for the extra coats applied to produce the desired uniformity will be made.

5. Snowcem Durocem Painting/ weather Shield to Plastered Surfaces:

No further material shall be added to the snowcem Durocem obtained in sealed tins. Where different colors may have to be mixed together to provide the desired shade, the quantities of the various colors required to give the desired shade shall be intimated by the Engineer-in-charge and this shall be mixed together by weighing (not by measuring volumes of different colors). The weighed quantities of snowcem Duroçem should be mixed as well as possible by means of trowel on a clean mixing board after which it must be sieved through 202-mesh sieve. This preparation i.e, mixing with trowel and sieving may have to be repeated two or more time until when a trowel is passed over the surface of separate colour remains.

Snowcem Durocem must be mixed in two stages. First by adding a little quantity of water to form a paste and the further quantity of water being added to get a mix of liquid consistency. In the first stage one measure of water to two similar measures of snowcem durocem be thoroughly stirred and allowed to stand for 10 minutes. A further measure of water should then be added and thoroughly mixed. This mix must be applied within one hour of the mixing. The lid of the container must be tightly replaced immediately after the material has been taken out from it. Immediately before the first coat is applied the surface shall be thoroughly saturated with water.

The snowcem Durocem should be applied with brushes conforming to British Standard 2992. The first coat of snowcem durocem shall be well scrubbed and allowed to set for a period of 24 hours after which period the next coat shall be applied. The number of coats shall be as specified in Schedule of quantities but if the contractor has not produced finished surface to the satisfaction of the engineer-in-charge he shall do more coats till a uniform smooth surface is obtained at no expense to the Owner.

6. White Washing:-

The unslaked lime shall be placed in a large vessel full of water and shall be thoroughly mixed and stirred up with pole or rod until the mixture attains the consistency of thin cream. It will then be strained through a clean and coarse cloth and two chattacks of gum boiled with six chattack of rice added for each cubic foot of lime. The white wash then being applied in the same manner as distemper. When completed the wash shall not crack or come off on finger when rubbed.

7. Colour Wash:-

It is prepared and applied in the same manner as white wash except that sufficient coloring matter shall be added to give the desired tint on drying. When completed, the surface must have uniform colour free from blotches. If the finished surface is not to the expectation of the Engineer-in-charge, Contractor shall apply extra coat at his own cost till such finish is attained.

8. Wax Polishing:-

Before wax polishing is started, the surface shall be knotted, stopped and sand

papered till a complete smooth and even surface is obtained. The wax polish must be applied strictly in accordance with the specifications and instructions issued by the manufactures. It shall contain the minimum of coloring material to keep the finished surface as light as possible. The polish should be rubbed into wood until all the pores have disappeared.

9. <u>Spirit Polishing:-</u>

It shall be prepared by dissolving 3 ounces of shellac-dissolved cold in a pint of spirit and shall be applied on the prepared surface as specified under Wax Polishing.

Clause-6: CLEANING:-

All cloths and cotton waste thạt might constitute a fire hazard shall be placed in closed metal containers or destroyed at the end of each day: Upon completion of the work, all staging, scaffolding and containers shall be removed from the site or destroyed in an approved manner. Paint spots, oil or stains upon adjacent surfaces shall be removed. The contractor shall be responsible for the protection arrangement of other work while painting or distempering work is in progress.

Clause-7: MEASUREMENT AND RATES:-

The work of painting wood and metal surfaces, and wax polishing shall not be measured separately but shall be paid with the item over which it is done.

Distempering, snowcem Durocem painting, white washing or colour washing on concrete and plastered surfaces shall be paid on the basis of area over which they are done and this area shall be obtained by multiplying length or breadth by height less the area of openings for doors and windows in the surface. This reduction for area of openings shall be one time the area of the opening if the surface is treated on both sides and no deduction of opening if surface is treated on one side only. No addition shall be made for jambs, soffits, sills, etc. where two different type of finishes are specified for two sides of the surface half the opening area shall be deducted from each type of finish. The rate for all the items under this section or paid with items in other sections shall cover the cost of furnishing all materials labor, scaffoldings and appliances at site and performing all operations in accordance with instructions of the Engineer-in-charge, Schedule of Quantities and as specified above.

SECTION – 11

ROOFER AND WATER PROOFER

Clause-1: CONFORMITY TO BRITISH STANDARDS:-

Except when otherwise specified, the work of waterproofing shall be in accordance with B.S.C.P. 14.101 "Bitumen felt roof covering" and B.S.C.P 1.201. "Mastic Asphalt roofing" as applicable to the work specified.

Clause-2: MATERIALS:

Materials shall, where applicable, be delivered to the Site in manufacturers, original unopened containers with manufacturers label having grade and name clearly marked thereon. A copy of printed instructions of manufacturers shall be supplied to the Engineer-in-charge.

1. **Cement:-** Cement shall conform to specifications as described under section "Concreter"
2. **Additive for Foam Concrete:-**Additive for Foam Concrete shall be of manufacture approved by the Engineer-in-charge.
3. **Water:-**Water shall be as described under-section "Concreter".
4. **Bitumen:-** Bitumen shall conform to B.S. 1310 having a softening point not lower than 160 F
5. **Bitumen Felt:-**Bitumen felt shall conform to B.S.747 saturated water proofing bitumen felt type 1A.
6. **Sand:-**Sand shall be as specified under section "Plaster".
7. **Gravel:-**Gravel shall be ¼" to 5/8" size and shall be dry, free of dust soil or foreign matter. All shall pass through a ¾"screen.

Clause-3: SAMPLES:-

All the materials used for the items under this section shall be approved by the Engineer- in-charge and same type of material shall be used throughout the work in progress. If the Engineer-in-charge desire to get the material tested, this will got be done by the Contractor at his own cost from a laboratory approved by the Engineer-in-charge.

Clause-4: WORKMANSHIP:-

1. **Membrane Water Proofing**

i. <u>General:-</u>

Waterproofing shall be three to five ply as specified in schedule of Quantities. Waterproofing shall not be applied when the ambient temperature is 40 degree or below. Water proofing on roofs floor slabs in toilet rooms, shower rooms and similar spaces above grade shall be turned up around the walls or partitions enclosing such areas for a height of at least 6 inches, unless other height is indicated. Where pipes, conduit, or other items pass through the areas to be water proofed, and where floor drains occur in such areas, the waterproofing shall not be installed until after the flashing around of these items has been installed. The flashing thus installed shall be lapped and mopped into the plies of the water proofing in a manner that will ensure a waterproof joint.

ii. <u>Preparation of Surfaces:-</u>

Surfaces to receive waterproofing shall be clean and dry. All holes, joints, and creaks shall be pointed flush with mortar and high spots shall be cut of ground smooth. Before waterproofing is applied, the surfaces to be covered shall be carefully swept to remove all dust and foreign matter, and shall be

inspected and approved.

iii. Application of Water Proofing:-

Bituminous felts shall be applied in a solid mop coat of bitumen using not less than 30 pounds of bitumen for each 100 sq.ft. of surface. The bitumen shall be heated to flow freely, but the pitch shall not be heated above 350 degree F. The felt shall be applied in the hot bitumen free from wrinkles or buckles. The entire top surface shall then be given final mopping, using not less than 70 pounds of pitch for each 100 sq.ft of surface.

iv. Reinforcement of membrane at Corners:-

Additional membranes shall be used for reinforcing at angles and at other plies where the waterproof membrane may be subjected to unusual strain. Reinforcing shall consist of two additional plies of saturated felt of fabric and alternate mopping of bitumen. Saturated bitumen felt type 1A, as per BS 747 shall be applied in the hot, bitumen free from wrinkles and buckles. Membrane shall be applied by the shingle method with each strip lapped over the preceding strip 22 inches of 24-1/2 inches, for 32 inches wide or 36 inches wide material, respectively. Turn down on walls as indicated on drawings.

v. Protective Coating:-

If a protective coat of cement concrete is specified in Schedule of quantities, it shall be of the thickness specified in Schedule of Quantities and shall be composed of 1 part cement and 2 parts sand 4 parts aggregate mixed in the manner as specified under section "CONCRETOR" and laid in panels of 6'x6" as specified under "PAVIOR". The joints shall be filled with bitumen.

2. **Foam Concrete:-**

It shall be prepared by using additive for foam concrete of approved manufacture that will ensure the weight of concrete per Cft as specified in bill of quantities. It shall be prepared, and laid to slope as per printed instructions of manufactures:

Clause-5: MEASUREMENT & RATES:

The work of water proof felts shall be measured by multiplying the clear length by width or height of the surface. The rate shall be for the finished works for the number of felt layers specified. No allowance of waste, overlaps, turn up around the walls partitions etc. shall be made. Foam concrete shall be measured in cubic feet, and flooring shall be measured in Square feet. Rates for all the items under this section shall cover the cost of furnishing all the materials, labour scaffolding and appliances at site and all operations performed in accordance with the instruction of engineer-in-charge, Schedule of Quantities and as specified above.

SECTION - 12

EXPANSION JOINTS

Clause-1: MATERIALS:-

1. **Copper:-** Copper shall conform to the requirements of B.S 1569 “Copper sheet and strip for roofing” and shall be of 24 gauges.
2. **Wood:-** Wood shall be best quality Shisham wood to be used as hard wood conforming to the requirements of Timber as specified under section "Carpenter, Joiner and Glazier”.
3. Lead flashing shall conform to the requirements of B.S 1178 “milled lead sheet and strip for building purposes” and shall be 1/8" thick.
4. P.V.C. water Stops shall be 5-1/2” wide with central bulb and shall be equal to Hydrofoil water stops manufactured by Expedites.
5. Filler shall be non-extruding of approved type and an approved flexible bitumastic seal of the normal joints type, which will retain its plastic properties at a temperature of 120 degree F.
6. Aluminum sheet shall conform to the requirements of B.S 170 Wrought aluminum and Aluminum alloys, sheet and strip and shall be 1/8" thick.
7. Angles, Bolts, Nuts, & Nails" etc. Shall be as specified under “Carpenter joiner and Glazier” & Steel Frector & metal worker”.

Clause-2: SAMPLES:-

All the material used for all the items under this section shall be approved by the Engineer-in-charge and same type of material will be used throughout the work in progress. If the Engineer-in-charge desires to get the material tested, this will be got done by the contractor at his own cost from a laboratory approved by the Engineer-in-charge.

Clause-3 WORKMANSHIP:-

The work shall be carried out strictly as detailed in drawings and specifications and in a workmanlike manner. Special care shall be taken during construction that joints are not clogged by debris and mortar droppings during construction. Before joints are filled by the non-extruding bit mastic fill, the joints should be certified by the Engineer-in-charge to be free of all debris otherwise contractor would be required to redo the joints at his own cost. Patentee's method of welding P.V.C. water stops should be used and no other method would be accepted. Tee or L junctions of P.V.C. water stops should be made as per printed instructions of the manufacturer.

Clause-4: MEASUREMENT & RATES:-

Expansion joints shall be measured by their length. Rates for all the items under this section shall cover the cost of furnishing of all the materials, labour, scaffoldings and appliances at site and performing all operations in connection with laying all the items under this section in accordance with the instructions of the Engineer-in-charge, Schedule of Quantities and as specified above.

SECTION-13

RAIN WATER DISPOSAL

Clause-1: SCOPE:-

The work covered under this section consist of furnishing all labour, supplies, equipment and materials, and in performing the portion of the work covering "Rain Water Disposal" in accordance with the drawings and specifications.

Clause-2 PRELIMINARY:

The materials used and workmanship applied in the works shall be of highest quality and grade and conform to the British Standard specifications and the code of practice and as per directions of the owner or his authorized representative and details laid out in the drawings, specifications and the bill of quantities. All materials, fittings, fixtures etc. shall be invariably got approved before hand by the Consultants. No substitute will be accepted in place of the specific types of brands provided for in the Schedule of quantities enclosed with the tender.

Clause-3: MATERIAL:

1. **Cast Iron rain water pipes and fittings:-**

   i. Cast Iron pipes and fittings 6" dia and 4" dia shall be of medium grade and the pipes shall weight not less than 73 lbs/6ft and 48 lbs / 6ft length respectively. These shall be perfectly straight and have uniform diameters and thickness. The pipes and fittings shall be coated with bitumen form inside and outside and costing shall be hard enough not to flow at a temperature of 145 degree F.

   ii. Hangers Supports and Anchors:- These shall be of suitable and approved design and shall be so arranged as to allow the pipes to lift in case of settlement of the buildings. These shall be painted with bit mastic enamel paint, to the paint of the same quality as per the pipes supported by these hangers.

2. **Jointing and packing Material:**

   i. Lead shall be sound, free from inclusion, and shall be of the best quality available in the market.

   ii. Packing Material:- The packing shall be of pure jute, hemp of hempen spun yarn.

Clause-4: WORKMANSHIP:

1. **Examination of Pipes:**

   Each pipe shall be carefully examined before being laid and defective, of damaged pipes shall not be used. The pipes shall be gently hammered with a wooden mallet to judge their soundness before these are laid or fixed.

   Any hollow sound showing cracks shall be rejected and removed immediately from site.

2. **Preparation of Pipes:**

   The pipes before being laid shall be brushed throughout to remove any soil or stones that may have accumulated therein, the inside of the sockets and outside of spigot being carefully cleaned.

3. **<u>Laying and Jointing of Pipes:</u>**

   i. General requirements:- The interior of the pipes shall be thoroughly cleaned off foreign matter before being fixed into position and shall be kept clean during laying operation by plugging or other approved method.

Any section of the pipe found to be defective before and after fixing, shall be replaced with sound pipe without additional expense to the owner. Fittings at bends in the pipeline shall be firmly anchored against the vertical face of the duct and ceiling of the basement in order to prevent the fittings form being blown off the lines when under pressure.

ii. **Jointing :-** Cast iron rain water pipe and fitting joints shall be made with lead jute, and hempen spun yarn. The packing material shall be well packed into the annular space so as to prevent the entrance of lead into the pipe. The remainder of the space shall be filled with molten lead that is hot enough to show a rapid change in colour when stirred scum shall be removed before pouring. The lead shall be caulked to form a tight joint without over-straining the bell and shall have a minimum depth of one inch after caulking. Horizontal pipes shall have a min slope of 1/16 inch per foot.

Clause-5: TESTING OF PIPELINES:

All piping shall be tested by the Contractor and approved by the owner or his authorized representative before acceptance.

i. Water Test:- The entire rain water drainage system shall have all necessary opening plugged to permit the entire system to be filled with water to the level of the highest stack. The system shall hold this water for 30 minutes without showing any drop.

ii. Air Test:- If tests are made with air, a pressure of not less than 5 lbs/sq. in shall be applied with a force pump and main tainted at least 15 minutes without leakage. A mercury column gauge shall be used in making the air test.

Clause-6: MEASUREMENTS AND RATES:-

All pipe work including fittings shall be measured in running feet of finished length. No wastage of length consumed in joints shall be measured and paid for the rate for pipe work shall include the following in addition to the provision mentioned in the bill of quantities and specifications.

i. Cost of providing, fixing in position and jointing of pipe work.

ii. Making and repairing any cuts, holes and chases in walls, floors slabs etc. where necessary.

iii. Providing and fixing hangers, supports clamps or anchors for installing pipes to floors, walls and ceiling.

iv. Painting exposed to view pipe work and supports as specified.

v. Testing and clearing of pipelines. All fixtures and fittings shall be measured in number or in Rft etc. as specified in the bill of quantities.

SECTION-14

GENERAL SPECIFICATIONS FOR DRAINAGE AND SANITARY INSTALLATION

PLUMBING WORK

A. DRAINAGE:-

1. **Scope:-**

The work covered by this section of the specification consist of furnishing all paints, labour, equipment, appliances and materials and in performing all operations in connection with plumbing, including all items of special equipment specified herein, complete in strict accordance with the specifications, Engineer Incharge instructions and the applicable drawings and subject to the terms and conditions of the Contract.

2. **General:-**

General arrangement of plumbing has been indicated on the drawings. Sketches and drawings sufficient to indicate proposed departure due to actual field conditions of other causes shall submitted by the contractor to the engineer-in-charge. Contractor shall carefully examine all the drawings and specifications and shall be responsible for proper fitting of all materials and equipment in each building as indicated, without substantial alterations. All work shall be so installed as to be readily accessible for operations, maintenance and repair.

3. **Gradient:-**

Every line of grain shall be accurately laid and shall be perfectly true to line and gradient from point to point in both vertical and horizontal planes. Every main drain shall be true for manholes and any change in direction shall take place inside drain shall be true from manholes and any change in direction shall take place inside the manhole by the use of curved main channels, similar change in internal diameter in drain shall be made in manholes by the use of tapers or bends in the line of drain outside the manhole. The following gradient shall be followed normally when not shown in the drawings otherwise actual gradient as shown on the drawing will be followed.

4” (I.D.) Pipe, a gradient of at least 1 in 40
6” (I.D.) Pipe, a gradient of at least 1 in 60
9” (I.D.) Pipe, a gradient of at least 1 in 90
12” (I.D.) Pipe, a gradient of at least 1 in 120.

Where the falls are restricted and where the drains are well designed and well laid in accordance with the clauses herein stated 1 in 30 may be used with 4” dia pipes.

4. **Bends and Junctions:-**

No bends are to be permitted in drainpipe nuns except at manhole. All junctions shall be oblique and the contained angle to be not less than 45 degrees. Access to be normally provided at bends in drain all cases where the change of direction angle is more than 45 degrees and elsewhere if there is a rise of flow being impeded The use of quarter bends (1/4 90 degree) shall be avoided except at the foot of vent pipe at manhole.

5. **Excavation:-**

i. **<u>TRANCHING OUT GROUND FOR PIPES AND TURNELLING:-</u>**

Excavation for drains in open trenches shall be to the line and depth indicated in the drawings or as directed by the Engineer-in-charge. Great care shall be taken to excavate only to such depths as are correct and required for regular gradient grips for joints as required shall be formed. Trench bottom shall be of sufficient width to allow adequate working space for the pipe jointer, and should in no case be less than 15 inches or the external diameter of the pipe plus 12 inches. Trenches are to be kept clear

of water including all necessary pumping or dewatering as required. No extra payment shall be made for any dewatering and pumping for keeping the trenches dry.

In event of excavations being made deeper than necessary by contractor then shall be filled proper level with cement concrete 1:4:8 at the contractor's expense. If the ground is very loose, ramming shall not be allowed and in that case cement concrete 1:4:8 is to be laid before the pipes are laid in position. Before the drainpipes are laid 6" sand filling will be done where the structure of soil is not uniform earth, but pebbles. Uniform bearing materials will be from manhole to manhole.

ii. **PLANKING, STRUTTING AND STAGING:-**

Excavated materials shall not be deposited within 1'-6" of the edge of the trench and the sides of the excavation shall be supported by planning and strutting if necessary to ensure a proper and speedy excavation of the work no extra cost will be paid.

iii. **BLASTING:-**

All pipes, ducts, cables mains and other services exposed by the excavations shall be effectively protected from damage and in and approved manner as directed by the Engineer-in-charge.

6. **Drain Laying:-**

Each pipe shall be carefully examined on arrival; any defective pipes shall not be used and shall be segregated and marked in a conspicuous manner. Minor damage to the protective coating of iron drain pipes shall be made good by pointing with hotter. F major defects in the coating exist, the pipes shall be returned to the works for recoating Drains shall be laid in straight lines and to even gradients as shown upon the drawing or as directed. Great care shall be exercised in setting out and determining the levels of the pipes and the Contractor shall provide suitable instrument and shall setup and maintain all sights fails bending rods and bench marks etc. necessary for the purpose. All drains shall be kept free from earth, debris, superfluous cements and other obstructions during laying and until completion. Pipes shall be laid with the sockets loading up hill and shall rest on solid and even foundations for the full length of the Harrell, socket holes shall be formed in the foundations short as practicable but sufficiently deep to allow the pipe joiner enough room to work right round the pipes.

7. **Concrete Cast in SITU for Manholes and Chambers:-**

The specified sizes of the manholes and chambers refer to inside dimensions. Execute the cast situ work manhole and chambers with cement concrete 1:2:4 on 6 inches to 9 inches cement concrete foundation. All situ work shall be plastered with cement plaster 1:4, ¾" thick and finished smooth with cement neru.

8. **Laying and Jointing R.C.C. Drain Pipes:-**

The pipes used will be R.C.C. pipes class "B" made" to Director General, Supply and Development specification No.G/W/W/58 unless specified otherwise. The jointing will be done first with spun yarn rope (dipped in standard mexphalte composition for jointing) filled in the grooves provided in the pipes and the pies are pressed together. The rope will be 1-1/2 times the dia of the groove so as to be sufficient to fill the groove in the other pipe also and make allowance for tightening up. After this, the collar will be slipped on the joint and cement joint with 1:1 mortar will be made between the pipes and the collar and finished off on the outside at an angle of 45 proper tools and plants such as jacks and templates will be used for pressing together pipes and making cement joints. In other respects, the R.C.C. pipes will be treated as the S.W. pipes.

9. **Testing of Rains:-**

Every drain shall be tested in sections between manholes by water test; in which they are to be filled with water to a feet head of water above the top of the highest pipe.

If it is found that certain pipe joints are leaking the water must be run of and joints recalled with cement and the drain got retested.

All expenses of testing drains, including the provision of the necessary pumps, temporary bulk heads, funnels, stoppers and other things and also the supply of water for testing are to be borne by the Contractor and shall be included in his rate for laying drains.

10. **Refilling:-**

Refilling in trenches for drains, shall be commenced after the drains have been tested and approved and the concrete have been approved. The refilling on the top and round the drain shall be done with great care and in such manner as will obtain the greatest amount of compactness and solidity possible. For that purpose the earth shall greatest amount of compactness and solidity possible. For that purpose the earth shall be laid in regular layers not more than 9" thick upto the surfaces and also watered and rammed at each layer.

11. **Shallow Manholes type "A":-**

For depth upto 3-1/2 ft (measured from the top of C.I. cover to the invert level of the drain), the internal dimensions of the manholes shall be 2ft x 1-11/2 ft. These shall be built on abed of 1:4:8 cement concrete 3'-10" by 3'-4". All walls shall be 9" thick in C.C. block masonry 1:3:6 in cement mortar 1:3. The internal surface shall be provided with 1/2" thick cement plaster (1:3) all round and fitted with C.I. cover and frames 16" dia inside, held in position by forced cement concrete slab 4” thick and 3’-10” long by 3'-4” wide.

12. **Manholes Type "B":-**

The internal size of plain manholes shall be 3' long add 2'-6" wide. These shall be built on a bed of 1:4:8 cement concrete 4’-10”c9’-4"x6" thick. All walls shall be 8" thick in C.C. block masonry 1:3:6 in cement mortar 1:3. The internal surface shall be provided with ½" thick cement plaster (1:3) all round and fitted with 1'-6" dia cast iron cover in R.C.C. slab at the top. The cement concrete in R.C.C. slab to be of 1:2:4 ratio (1 cement, 2 coarse sand, 4 of ¾" stone aggregate). The foot irons in manholes shall be cast iron of approved design, quality and ¾" tick, in cross section. These shall be fixed l' apart vertically and staggered laterally and shall not protrude more than 4-1/2" from wall. Benching in all types of manholes shall be of fine cement concrete and of dimensions as specified in the detailed drawings.

Type Design “A”	Maximum depth 3'-6"
Type Design “B”	For depth over 3 - 6” to 7-11”

Manholes for greater depth and larger size of sewers will have to design as required in each case. The size and weight of the cast iron cover and frame as required in each type design are specified as follows.

Type Design “A”	16” dia clear opening 1 Cwt 1 Qr.
Type Design “B”	18” dia clear opening 1 Cwt 1 Qr.

If the manhole happens to be on road, the clear opening of the frame shall be 20" dia and the weight 4 Cwts. The inside meeting of the cover and frame shall be of slanting design and the clear opening mentioned above shall be the inside dia of the frame at the bottom. The cover and frame shall be given a thick coat for anticorrosive bit mastic points. The cover shall be provided with strong lifting arrangements. The cover and frame shall conform the standard drawings and will be supplied to contractor.

13. **House Drainage:-**

Material and size: House drains shall be 4” dia: UPVC pipes as mentioned under sub-head Drainage but if they pass through any covered area or under floor, they shall be 4” dia. Upvc pipe conforming to Sch-40 UPVC pipe shall be of the plain spigot and socket type jointed with spun-yard packing in half the depth of the jointing space and the rest of the space filled in with lead and properly caulked and finished. After test, the pipe shall be

encased in cement concrete (1:2:4) 6" thick all round.

14. Gully Traps:-

These shall have traps of suitable size and design according to the situation and fixed as described below. Each gully trap shall have one UPVC. grating 6”x6” and one C.I. cover and frame 12”x12”. Gully's are to be fixed on concrete foundation 1” square and not less than 4" thick. After fixing and testing galleys and branch drain and after permission has been given to concrete round the pipe the level with top edge of gully. A curb in cement concrete 1:3:6 block or brick masonry in 1:3 cement mortar about 3” high from the ground level is then to be built round top edge of gully rendered in ½”cement plaster, (1:3) in such a manner that surface water may not allowed to enter the gully.

Gully traps will be of cast iron or of cement concrete as stated in the Schedule of items of work:

NOTE:- House drains and each rain connection from W.C. pan or gully shall also be put to water test and treated in this respect similar to the pipe work in the main drains as described in Sub-head Drainage".

15. C.C. Gully Trap:-

The C.C. Gully Trap must be new, perfectly sound, and free from cracks, or standard nominal diameter and other dimension. Each gully trap shall have one C.I. grating 6" x 6” and one water tight C.I cover with grame (12”x12” inside dimensions) with machined seating faces. The excavation for gully traps shall be done true to dimensions and levels as indicated on plans or as directed by the Engineer-in-charge.

The gully trap shall be fixed on cement concrete foundations 2’--3” square and not less than 4" thick. The mix. For the concrete will 1:2:4:

After fixing and testing gully trap and branch drain a block masonry chamber 12” x12” (inside) laid in cement mortar 1:6 shall be built with 4” thick wall round the gully trap from the top of the bed concrete upto ground level. The space between the chamber walls and the trap shall be filled in with cement concrete of the specifications of bed concrete. The upper portion of the chamber i.e, above the top level of the trap shall be plastered inside with cement mortar 1;3 finished with floating coat of neat cement. The corners and bottom of the chamber shall be rounded off so as to slope towards the grating.

C.I. cover with frame 12”x 12” (inside) with machined seating faces shall then be fixed on the top of the block masonry with cement concrete 1:2:4 and entered smooth. The finished top of cover shall be left about 1-1/2" above the adjoining ground level so as to exclude the surface water from entering the gully trap.

16. Septic Tank:-

i. EXCAVATION:-

As specified in "Excavation” of civil contract. The rate shall be inclusive of back filling and disposal of surplus earth outside the municipal limits of the city or cantonment.

ii. CEMENT CONCRETE:-

As specified in section of concrete of Civil contract.

iii. BRICK MASONRY:-

As specified in section of concrete brick masonry of civil contract.

iv. REINFORCEMENT:

As specified in section of R.C.C. of Civil contract.

17. S.W. Drainage:-

Stone ware pipe drains: All drain shall be laid on a bed of 6’ thick concrete projection on each side of the drain to the full width of the trench. The drains with their invert level at four feet depth and less from ground level shall also be covered with 6" thick concrete above crown of pipe and filled in a manner that it extends level to the top of pipe. The

width at bottom of trenches ready for concrete shall be:-

For 4" S.W. Drain 1’ - 9”

For 6" S.W. Drain 2’ - 0”

For drain of larger sizes, working space on either side of the pipes, should not be less than 9” as measured from the outside of the pipe to the side of the trench and the whole width shall be concreted and treated in other respects as above.

NOTE:- Concrete for pipe work will be raised in trenches in soft and reclaimed soils only and where it is considered necessary as cover on top of the pipe for extra protection on a-c of traffic on it or other reasons, in the case, order of the Engineer-in-charge shall be obtained for its use and rate settled.

Stone ware Pipes:

All pipes shall be new and perfectly sound free from fire cracks and imperfection of glaze, cylindrical, straight, in length of stand and nominal diameter, length and depth of socket and barrel made of hard burnt stone ware of droll gray colour and thoughts salt glazed inside and outside. Pipes made to British Standard Specification of equivalent will be accepted for use on works.

Laying and jointing of Stone ware Pipes:

The pipes shall be carefully laid to the level and gradient shown on the plans and section and great care shall be taken to prevent any sand, etc from entering the pipes. The pipe between manholes shall be laid truly in straight line without vertical or horizontal undulations.

The pipe will be laid "Socket up" the gradient. The bocley of the pipe must for its entire length rest on an even bed and places must be excavated in the trench to receive the socket of the pipe. In each joint, spun yarn socked in cement wash shall be passed around the joint and inserted in it by means of a calking tool are more yarn shall be added and well rammed home.

The object of the yarn is to center the spigot of one pipe, within the socket of the other and to prevent the cement mortar of the joint penetrating into the pipe.

Cement mortar (l cement 2 sand) shall be slight by mast end and must be on account, be soft or sloppy and shall be carefully inserted by hand into the joint, when the cement has been inserted it shall be added on until the space of the caulked cement. The joint shall be finished off neatly outside the joint it to be removed and to guard against any projection sacks or gunny bag shall be drawn past each joint after completion. The Contractor shall be responsible that each section of pipe is properly cleaned on completion of the work.

B. SANITARY FITTINGS

1. European type W.C. Pan:-

The W.C pan shall be readily flushed of “wash down type” and shall bear the mark of the manufacture. The pan shall be that of ICL/ Karam Ceramics. The closet shall be white vitreous China.

The seat with lid shall be of black Bacolite of approved make and size complete with rubber buffers and one-piece hinge. The flushing of W.C. pan shall be done by 3 gallons "low level” flushing cistern of white vitreous china with internal fittings, brackets and C.P. brass flushing handily, which shall be fixed at low level and connected to the W.C. pan by means of 1-1/2" diameter white enameled porcelain bend, and rubber inlet connection. There shall be ¾” over flow with mosquito proof coupling with 0.05 diameter per formations.

The pan shall be fixed with gunmetal screws to rough wood plugs let into the floor:

OR

The flushing of W.C: pan shall be done by the Medus valve brass chromium plated, with lever handle regulating valve on inlet and loose wall flange two piece flush pipe with clamp and buffers (Shanks No.49683 Catalogue "H" Page 84).

2. Orisa Type W.C. Pan:

The W.C pan shall be that of ICL/ Karam Ceramics type or in white vitreous China having not less than 19" clear opening between flushing rims. It shall have the flushing horn in the front unless it is not possible to accommodate, cistern to suit this design. The pan shall bear the mark of the manufacturing firm. It shall have integral foot treads and trap 2" vent arm shall be provided, if required.

The W.C Pan shall be sunk in floor sloped towards the pan in a workmanlike manner, care being taken not to damage the pan in the process of fixing. If damages in anyway, it shall be replaced. It shall be fixed on proper cement concrete bare taking care that the cushion is uniform and even without having any hollows between the cement base and the pan. The flushing of the W.C. pan shall be done by pull and let go flushing cistern. The cistern shall be of best case iron mosquito proof of 3 gallons' capacity together with cover, level chain and pull, ball valve with copper float and necessary unions etc for connection with inlet and outlet pipes and overflow. It shall be of valve-less siphon type.

3. Lavatory Basins:

The basins shall be of White vitreous China of slotted pattern. The size of the basin shall be 25" x 28" or 22" x 16". The basins shall be of Swat Ceramics. Each lavatory basin shall be provided with a pair of ½" C.P. Pillar taps 1-1/4" C.P brass waste of standard pattern with C.P. brass waste of standard pattern with C.P brass chain and 1-1/4" rubber plug and 1-1/4" diameter C.P. brass bottle trap and union which shall be connected to 1-1/4" dia waste pipe. The fitting shall be of foreign make and will be approved before use.

The basin shall be supported on a pair of C. I cantilever bracket etc embedded or fixed in position by means of wooden cleats and screws. The brackets shall be painted to the required shade. The waste pipe shall discharge on a floor trap leading to gully trap or direct into gully trap or shall be connected to a waste pipe stack. C.P. brass bottle trap and union may not be provided where surface drain or a floor trap is placed directly under lavatory basin and waste discharged into it vertically.

4. European Type Stall Urinals:-

These shall be of white glazed fireclay and of the following dimensions, unless specified otherwise.

Height from treads to top or Division = 4'-0"

Width Center to Center of Division = 2'-0"

The urinal range shall be provided with automatic flush cistern in white glazed fireclay of the capacity according to the No. of stalls to be flushed. The flush pipe and spreader shall be off C.P. brass. The trap shall be proper C.I. urinal trap 2-1/2" to 3" dia depending on the number of stalls in the range and approved by the Engineer-in-charge. For approved pattern of trap, see twyfords general catalogue page 255 No.354 and No.407.

5. Lipped Urinal:-

The urinal shall be flat back-lipped front basin 17" high of glazed earthen ware of shanks or its approved equivalent make. It shall be fixed in the position by using wooden plugs embedded in wall and screws of proper size each urinal shall be connected to 1-1/2" dia waste paper which shall discharge into a channel or a floor trap.

6. Stainless Steel Sink:-

The sink shall be Stainless steel sheet (size 40" x 20") of the 18/18 quality (18% chromium and 8% Nickel). The bowl is die drawn from one-piece stainless steel with outlet placed in the corner. It shall be provided with overflow arrangement. The drain channel of which is

placed on the outside in the corner. The outlet in the bowl shall have 1-1/4” N.P. screwed ripple. The sink shall be provided with 1-1/2" N.P brass waste standard pattern with C.P. brass chain and 1-1/2" rubber plug and 1-1/2" dia waste pipe. The fitting shall be of foreign make. The sink shall be supported on C.I. cantilever brackets embedded or fixed into positively by means of a wooden cleat and screws. The brackets shall be painted to the required shade as specified under flushing cistern.

7. **Towel Rail:-**

   Rail shall be of C.P. brass with two C.P. brass brackets. The size of the rail shall be 30” x ¾". The brackets shall be fixed by means of C.P. brass screws to wooden cleats firmly in the wall.

8. **Mirror:-**

   The mirror shall be of Belgium make glass with leveled edge. The size of the mirror shall be 24” x 18" unless other size is asked for. It shall be mounted on hardboard ground and shall be fixed in position by means of 4 C.P brass screws and washers over rubber washers and wooden plugs firmly embedded in the wall C.P. brass clumps with C.P. brass screws may be an alternative method for fixing.

9. **Glass Shelf:-**

   The shelf shall be of glass of best quality with edges rounded off. The size of the shelf shall be 25" x 5" x 14" unless otherwise specified. The shelf shall have C.P. brass brackets, which shall be fixed with C.P brass screws to wooden plugs firmly embedded in the wall.

10. **Toilet Paper Holder:-**

    The paper holder shall be C.P. brass screws shall be used for fixing (similar to 'Twyfor' design No.1108).

11. **Plastic Connection:**

    ½" dia plastic pipes shall be provided and fitted completed with two unions and heavy C.P: brass stopcock.

12. **Floor Traps:**

    The traps shall be of self-cleaning provided with 1” puff pipe, where the length of the waste is more than 5'-0" or the floor trap is connected to a waste sack with bends. The other specifications for these shall be the same as those for H.C.I. soil, waste and vent pipes and fittings (the traps for the urinal connection shall have dome shaped C.P. brass grating with hinge).

13. **Bib Cocks:-**

    The Bibcock shall be brass, acres down patterns of the size and quality as specified. “Waste Not/ Waste” type may also be used if required. All the fittings shall be approved by the Engineer-in-charge before they are installed.

SECTION-15 SOIL WASTE, VENT PIPE AND FITTINGS

1. **Heavy Cast Iron Pipes and Fittings:**

All soil waste and vent pipes and fittings shall conform to the British Standard Specification for 'Heavy Quality'. They shall be free from creaks and other flaws. The interior of pipes and fit tings shall be clean and smooth and painted inside and outside interior of pipes and fittings shall be clean and smooth and painted inside and outside while, họt with D. August Smith's solution or their approved anticorrosive paint. The access door fittings shall be of proper design so as not to form any cavities in which filth may accumulate. Doors shall be provided with 1/3” rubber insertion packing and when closed and bolted they shall be watertight. The pipes and fittings shall be fixed to walls by curing proper holder-bat clamps. The pipes shall be fixed perfectly vertical or in a line as directed. The spigot and shall about the shoulder of the socket and leave no angular space in between. All soil pipes shall be carried up above the roof and shall have H.C.I. terminal guard. Connections between main pipe and branch pipes shall be made by using proper branches and bends with across doors for cleaning.

All H.C.I pipes and fittings including joints will be tested by a smoke test and left in working order after completion. The smoke test shall be carried out stated under:

Smoke shall be pumped into the drains at the lowest and from a smoke machine, which consists of a blow and burner. The materials usually burnt are greasy cotton waste, which is easily detectable by sight as well as by smell if leaking at any point of the drain.

All the exposed H.C.I pipes and fittings shall be painted with enamel paint to match the colour of the surroundings.

The surface of the pipes and fittings to be painted shall be painted thoroughly. Redoxide of other primer shall be painted and allowed to dry. The finishing shall be done by painting 2 or more coats with paint of any shade matching with surroundings.

Lead Caulked Joints:

The annular space of between the socket an spigot will be first well packed in with spun-yarn leaving 1” from the lip of the socket for the lead. The joint may be leaded using proper leading rings or if they are not available by wrapping a ring of bump rope covered with clay round the lead shall be poured in (for pipes with sockets facing upwards ½" high small clay bund on the socket edge may be used).

The lead shall be rendered thoroughly fluid and each joint filled in one pouring. Before caulking the project in lead shall be removed by flat chisels and the joints caulked round with proper caulking tools and hammer of 2 to 3-pound weight in such a manner as to make the joint quite sound. After being well set joint is to be left flush, neat and even with the socket

2. **PVC Pipes:**

Soil waste and ventilation pipes shall be general-purpose poly vinyl chloride rigid pipes class “B” as manufactured by “AROKEY CHEMICAL INDUSTRIES LTD” Karachi or equivalent. Pipes shall be jointed using "Shavyl” solvent cement 70 or equal material with tapered sleeve fittings for permanent jointing. All horizontal runs of pipe work shall be supported at interval of 5 feet maximum; these supports shall comprise 1-1/2" M.S angles cast into the walls. All vertical stacks shall be supported in the walls with clamp anchors as required to relive joint stresses. Each pipe shall be carefully examined on arrival and the site of work, any defective pipes shall not be used and shall be segregated and marked in a conspicuous manner. Minor damage shall be made good by cutting the damaged portion. If major defect exist the pipes shall be removed from the site of works. All pipes shall be laid in straight lines and to the proper gradient as shown on the drawings or as directed. All pipes shall be kept free form earth debris, superfluous cement and other obstructions and shall be laid in clean condition. All horizontal pipes shall be run at a uniform grade of mot less than 1/8” inch per foot of fall in the direction of flow except as noted. All vent

pipes shall extend through the roof. It is emphatically stressed that all pipes shall be recessed in the floor and the walls and no pipe shall be exposed to the naked eye except where not possible to do so. Where ever the pipes pass through the floor or the wall sleeves should be provided of the required sizes. Cutting of opening and installation of sleeves through walls and surface shall be done in neat workman like manner. Opening shall be cut only as large as required for the installation of sleeves. Sleeves shall be made of 16 gauge M.S sheet and shall extend upto-finished surfaces.

3. G.I. Pipes fittings:-

The pipes shall be of galvanished wrought iron and of water quality manufactured by a firm of repute. The fittings may either be of galvanished wrought iron or galvanished malleable iron. Pipes and fittings shall conform to the specifications of the British Tube Makers Association for water pipe. Pipes and fitting of which the gal vanishing has been damaged shall not use.

The approximate weight of the pipes shall be as under:-

Bore in pipe in inches	Approx; weight in lbs per ft.
½’	0.89
¾”	1.19
1”	1.77
1-1/4”	2.40
1-1/2"	2.87
2”	3.86
2-1/2"	6.04
3”	8.00
4”	11.43
6”	13.00

Where pipes have to be cut or rethreaded ends shall be carefully filed out so that no obstruction to bore is offered. In jointing the pipes, the inside of the socket and screwed end of the pipe shall be rubbed over with white leave and free turns of hemp yarn wrapped round the screwed end of the which shall then be screwed home in the socket with pipe wrench. Care must be taken that all pipes and fittings are kept at all times free from dust and dirt during faxing.

For internal work, G.I. pipes and fitting inside and outside the walls shall be fixed visible. (not in chase) by means of standard pattern holed-bat clamps peeing the pipe ½” clear of the wall everywhere. When it is imperative to fix the pipe in front of house or in any conspicuous position, where it looks unsightly, chasing may be adopted.

All pipes and fittings shall be fixed truly vertical and horizontal unless unavoidable.

For external work G.I. pipes and fittings shall be laid in trenches. The width of the trench shall be minimum width required for the working. The pipe laid under ground shall not be less than 2-1/2” feet from the ground level. They shall be surrounded on all sides by 6” river sand. The work of excavation and refilling shall be done in accordance with the general specifications for earthwork.

Al internal G.I. pipes and fittings shall be painted with white or any other tint, as specified. G.C.I pipes and fittings.

All pipes and fittings in external work shall be painted with anti-corrosive paint as directed by the engineer-in-charge. All G.I. pipes and fittings may be tested to a pressure of 100 lbs.per sq inch to ensure that pipes have proper threads and that proper materials (such as white lead and hemp) have been used in jointing. All leaky joints must be made leak-proof by tightening or redoing.

4. **Brass and Gun Metal Water fittings:**

The fittings shall be of strong construction and good finish as made in Pakistan to the Standard specification noted against each category or by any reputable maker to these specifications:

a.	Brass bib Cocks (tape) Stop Cocks	B.S.S. No. 1010
b.	Gun Metal Full way valves Ball Valves	D.S. &D.P.S.D/C-WW/57
c.	Ball Valves	B.S.S. 1212.

Pillar taps of ½" dia for fixing to lavatory basins and ¾"dia to baths shall be of reputable manufacturer as approved by the Engineer-in-charge.

In case of hot water supply, the pipe and special shall be under sub-head "D". The pipes and fitting shall be wrapped round with asbestos rope and then covering the same with Hessian clothe smearing properly with asbestos paste.

5. U.G. Hydrant:

The underground Hydrant shall be of spinal type with body, cover gland, cap on spindle of best iron, Nuts and valve (with leather face) valve sea, plug and outlet piece, which can be screwed to suit any brigade thread, of gun metal. Cap of the outlet piece screwed valve by a W.I. chain, may in either G.I. or gun metal screwed or unscrewed as desired. The spindle shall be of forged bronze (size 2-1/2" dia).

i. Stand pipe Hydrant shall be of valve type. The valves shall be of brass or gun metal with adopter and union of hosepipe. The valve shall have a brass or C.I. Wheel.

ii. The hosepipe shall be made of rubber-lined nylon, with brass coupling, brass nozzle; the length of pipe shall be as per schedule.

6. Sluice valve:

The sluice valves are to be of cast iron and to have gunmetal faces and removable seats and are also to have machine cut gunmetal screws. They are to work easily and smoothly under all conditions and are to be watertight when close a head of 200 ft. or such greater head as may be specified.

7. Overhead Water Storage Tank:

The overhead water storage tanks shall be built by the Civil Contractor in waterproof reinforced cement concrete as per design and drawings. The Contractor shall have to supply and fix the following to the O.H. Tank during the progress of the construction of the same. Paddlo will be used at the rate of 5 lbs per bag of cement by weight in the concrete and inside plaster for waterproofing

i. **Outlet:-**

G.I. pipe as required with sluice valve and a G.I Tees arm of the required length. This pipe shall be carried 2 inside the internal side of the wall of the Reservoir. The "Tees" Arm will accommodate the number of outgoing branches of the required size and branch sluice sub- valves. The branches will not be allowed to be connected to the reservoir directly.

ii. **Cleaning out Pipe:-**Cleaning put pipe shall be G.I. pipe of required diameter with sluice draining valve. It shall be fitted as flush with the bottom of Reservoir as for as possible and carried down to the ground level as required and instructed by the Engineer-in-charge.

iii. Inlet Pipe:-

Inlet pipe shall be G.I. pipe according to the size of the pump or as indicated in the drawings and shall be fitted 12 inches below the ceiling of the R.C.C. roof of the Reservoir.

iv. Overflow:-

Overflow shall be G.I. pipe of the size greater than the inlet pipe and shall be

brought down to the ground level and connected to special manhole chamber. The overflow pipe shall be fitted 8.inches below the ceiling of the R.C.C top slab of reservoir. An overflow warning pipe of higher dia than the outlet pipe shall be installed as directed by the Engineer-in-charge and or as indicated on the drawings.

SECTION-16 TECHNICAL SPECIFICATIONS FOR ELECTRIFICATIONS WORKS

01. GENERAL INSTRUCTIONS

1. The Contractor must have an electrical Contractors license issued by the Electrical Inspector, Government of Pakistan of the concerned region. The electrical work shall be carried out only by licensed workmen authorized by the Government of Pakistan to under take such work under the

   Provision of Indian Electricity Act and Rules as adopted in Pakistan as per latest I.E.E Regulations and under the direct supervision of whole a time Electrical Engineer and Electrical Supervisor having a certificate of competency for the type of work under execution. The Electrical Contractor license number, name of the Electrical Engineer, Electrical Supervisor, Electrician wiremen and particulars of their license shall be intimated in writing to the owner before the commencement of work.

2. The installation generally shall be carried out in conformity with the Pakistan Electricity Act and Rules and the latest addition of I.E.E. Wiring Rules:

3. Any special requirements of the local Electric Supply Company shall be complied with and all work shall be carried out to the entire satisfaction of the Bank or his representative, as provided in the contract.

4. The Contractor shall set out the work himself and if any discrepancy is found he shall report the matter to the Engineer Incharge and shall act as directed. If any defective or modify set out is carried out by the Contractor on his own will, he shall rectify or make it good at his own cost.

5. The Contractor shall keep pace with the work of Civil Contractor and site Engineer will be kept informed about the progress of his work so that there is no hindrance in the progress of work at site.

6. The Contractor shall take care not damage the structure during execution of the work in such as case repair and make good all losses at his own cost.

7. The Contractor will be responsible for arranging electric service connection for the premises. The pursuance of the case so as to ensure expeditious action by the supply authorities will also be the responsibility of the contractors. All expenses in this respect except service connection charges payable to Electric Supply Authorities shall be borne by the Contractors.

8. The rates against all the items of schedule of quantities shall include all labour and material specified.

9. **Temporary Electric Connection:** During the construction period and upto the time the building is handed over to the bank temporary electric connection shall be obtained by the contractor himself through local electric supply agency for the use of tools, equipment and lighting etc. at site. The contractor shall be responsible for this service, its maintenance repairs, payment to supply company and its operations at his own cost, starting two weeks after notification of award of the contract and as desired by the Bank.

02. MATERIAL REQUIREMENTS:

1. **General:** The Contractor shall furnish all material at site confirming fully to the specifications given herein and to the accepted standards as laid down by B.S.S, I.E.E. and P.S.I. It is not the intent of these specifications to include all details of design and Construction of various material and equipment to be supplied under this tender. The requirements of Material and equipment's shall in all respect conform to the high standard of engineering design, workmanship, performance and function as herein specified and shall fully meet the quality level and ruggedness requirements of the specifications. All material and equipment which has to be supplied and installed by the

Contractor shall be passed / approved by the Engineer Incharge at site even if the same is exactly in accordance with the catalogue number or types specified in the schedule of Quantities of this tender.

2. **Wires & Cables:** Cables used for conduit wiring shall be single core with standed copper conductors except where specified P.V.C. insulated, tested to B.S2004-1961 and a manufactured by M/s. Pakistan cables Ltd. The cables shall be 250/440 volt grade unless other wise specified in Schedule of Quantities.

3. **Earth Continuity Conductors:**Earth continuity conductor and earthling leads shall be hard drawn solid bare copper wires except where specified. It shall be soft drawn standed cooper wires. The necessary fixing accessories, earthling clips, sweating sockets etc. shall be provided.

4. **Conduit & Conduits Accessories**

i. **Conduit**

All conduit supplied by the Contractor shall be in standard Manu factured lengths of heavy gauge steel (16.S.W.G) threaded type conduit, protected by the black enamel coating, manufactured and tested according to B.S 31 - 1940.

The coating shall be of heavy enamel which should not flake or crack from bending or rough usage. Before applying black enamel coating on the outside surface of conduit a Red, oxide anti-rust coating shall be given on the cleaned surface of conduit. The black enamel coating shall also be given on the surface of conduit after fixing it in position. Each length of conduit shall be furnished with threaded ends and threaded coupling screwed on one end. The minimum size of conduit used shall be 3/4" dia unless a smaller size is specified situation which would be light gauge. Test certificates for tests carried out by the manufacturer according to B.S: 31 – 1940 shall be produced when ever required.

ii. **Flexible Conduit:**

Flexible conduit shall be furnished and installed where required or indicated on the drawing for connection to equipment subject to vibration or where necessary for convenient dismantling. Flexible conduit for use in dry locations shall be of spiral inter locked steel strip construction, zinc coated. The water tight flexible metal conduit shall be of spiral interlocked steel strip construction zinc coated, with rubber or plastic covering over all.

iii. **Conduit Accessories:**

The Contractor shall furnish all conduit fittings bushing elbows, coupling, bends inspection box, junction box, solid plugs, check nuts etc. as required for a complete conduit installation and they shall be of a quality equal to that specified for conduit above. Soft metal bushes shall be used at conduit termination ends in order to save wire insulation for damage, due to sharp conduit edges, in cable pulling operations. The bush shall be of standard design and shall have soft rounded edges.

Fittings for use with flexible conduit shall adopt the conduit to threaded connections and shall have an inside diameter not less than the corresponding size of the heavy gauge steel conduit.

Junction boxes shall be 4 inch square minimum 1 ½" or 2 1/8” deep as required to accommodate the numbers of conductors or taps necessary. The junction boxes shall be made of 16 S.W.G sheet steel, with protective paint, coating inside and outside the box. All cost iron outlet boxes a light or fan point on ceiling or wall shall be large enough to accommodate the number of wires necessary. These shall not be less than 2” diameter round type and 1 5/8” deep except that smaller boxes may be used where required by the particular light fitting to be installed. The sizes of junction boxes and outlet boxes are given as minimum only. The actual sizes required at

different situations shall be determined by the Contractor, keeping in view the case of operation at installation and maintenance.

All such outlet boxes shall be provided with one piece type cover plate, suitable for the device installed and blank for the junction boxes. The cover plates shall be flush with the finished surface of wall, ceiling etc. in the case of concealed wiring.

In case PVC conduit pipes are to be used the same and their accessories should be of Shavyl Galco or Rivna makes only.

5. **Switch & Socket outlet Boxes:**

Switch and socket outlet boxes shall be of the size suitable to the dimensions of switch and socket unit gang outlet boxes shall be use where two or more devises are grouped in location.
These outlet boxes shall be made of 16 S.W.G. sheet steel with protective black enamel paint coating inside and outside the box.
Before applying black enamel the cleaned surface of sheet steel box shall be given Red oxide anti-rust coating inside and outside the box. The cover of such outlet box shall be approved Masonite, tufnol, bakelite or plastic as specified in the Schedule of Quantities, mounting the switches or switch socket unit. Where switch and socket outlet boxes are to be installed on surface in an exposed conduit wiring system, these shall have, in addition to the protective quoting, colour paint to match the colour or the wall etc.

6. **Switches:**

Switches controlling light and fan points shall be single pole, suitable for 250 volts 50 c/s circuits. The ratings of switches shall be as called for in the schedule of quantities. These shall be made of bakelite or plastic and suitable for flush mounting in the outlet box as called for in schedule of quantities. Where more than one switch is to be installed at one location, the switches on one common board on a common outlet box. The gauges switches shall be molded type have in a plastic face plate for flush mounting. Where there are more than three switches at one location or fan regulators and switches are on common board, gang switches should not be used. At such location single switches and fan regulators, if any shall be grouped on a common outlet box and mounted on a 1/8" thick white plastic sheet / flush with the surface wall. Where switches are installed in damp or wet area these shall be weather - proof type. The switches shall be as manufactured by M/s Pakistan plastic industries.

7. **Switch & Socket Units:**

Switch and socket units shall be 3-pin rated for 15 Amps at 250 V 50 c/s A.C as specified in schedule of quantities. These shall be moulded type with white plastic face plate and suitable for mounting recessed on wall or column on a 16 SWG sheet-steel box of appropriate size. Each socket shall have its control switch by the side of it on a common board and thus the complete unit specified in schedule of quantities shall comprise of switch and a 3-pin socket of the rating specified.

The unit shall be as manufactured by M/s Pakistan Plastic Industries. Where switch and socket unit are installed in a damp or wet area, they shall be weather proof type.

03. LIGHTING FIXTURES:

Lighting fixtures details are given in the Schedule of quantities. Where a definite manufacturer's type of lighting fixture has been specified it shall serve as an illustration of type and if that particular type is not available in the market any approved equal type may be suitable after getting prior approval of the Bank. The determination of equality will be based on certified photometric data, covering the coefficient of utilization, average brightness data, etc, as well as equivalence or construction material shape, finishes etc. For any substitution Banks Architects approval must be obtained. Lighting fixtures shall in all respect confirm to high standard of engineering design and workmanship,

performance and function as specified as specified and shall fully meet the quality level requirements.
Where the type of fitting is not specified the Contractor shall submit samples based on the requirements of specifications and approval of the owner shall be obtained.

All fluorescent light fittings shall have lamps, and blasts of proper type and wattage as specified in the schedule of quantities. The fluorescent light fitting with more than one lamp shall have power factor correction capacitor to give a power factor of 0.9. All fluorescent light fittings shall have capacitors against radio interference. The fluorescent lamps shall be of cool day light colour. The sheet steel body of the flours cent light fitting shall be decreased and de-rusted. White stove enameled and shall have been bushed wire entries. The plastic diffuser with fluorescent light fittings shall be of 'PERSPEX' only. Chokes starters, holders shall be Philips make only.

The glass globes and shades specified with incandescent lighting fittings shall be of first quality glass without any air bubbles or voids. The wall bracket-fitting shall have adoptable plate to mount the fitting on the standard conduit outlet box.

04. L.T. SWITCH BOARDS:

Cubical Type:

The main İ.T switch board shall be sheet steel fabricated, cubicle type, floor mounting, factory assembled, ready wired. The rated voltage shall be 500 Volts, 50 c/s three phase. The rupturing capacity shall be 31 MVA at 415 Volts. The switch board shall be divided into panels and each panel shall be divided into compartments to accommodate the required number of switches, circuit breakers, bus bar and meters.

The main incoming manually operated air circuit breaker shall have current rating as specified in the schedule of quantities. It shall be triple pole and neutral with rated voltage 500 V. The following protective releases shall be provided:-

i. Triple pole series connected adjustable bimetallic over current releases.

ii. Triple pole series connected instantaneous action magnetic short circuit releases.

The current transformers with suitable rating shall be provided for metering and protections. ON. OFF. And TRIP visual indicators shall be provided.

The following metering shall be provided on the incoming side of the main L.T switch board:

Ammeter of range and make as specified in the schedule of quantities.

Voltmeter 0-500 volts range and makes as specified

KWH meter, 3 phases, 4 wire for unbalanced loads. Make as specified

Power factor meter, 0.5 – 10.5 ranges, Make as specified.

The meters shall be square shaped, and flush mounting type. The bus bar chamber shall consist of air insulated, four hard drawn electrolytic flat copper bars with porcelain insulators. The current ratings of bus bar shall be as specified in the schedule of quantities.

The outgoing air circuit breakers shall have short circuit and over current protections. The over current bimetallic release shall be adjustable and the range of adjustment shall be as specified on the drawings. The outgoing switch fuses shall have H.R.C. type fuses with fuse grip and fuse base suitable for H.R.C designed to B.S.S 88 and ASTA 20 Certified. The H.R.C fuses shall have a category of duty 440 AC5. The visual indicators of 'blown' fuse link shall be provided on H.R.C fuses.

05. MINIATURE CIRCUIT BREAKERS:

In case where MCB's are specified in the schedule of quantities the same shall be of the following specifications:-

The MCB's used in distribution system shall be moulded case no fuse type having a switching mechanism. The MCB's shall have protection against overload and short circuit.

The MCB shall have a magnetic tripping time of 0.2 SEC max. When more the its rated current passes through it.

In the distribution boards the MCB's should be neatly installed in gang form by an appropriate arrangement. The MCB's shall be of Dorman, BBC AEG or. Terasaki make only.

The switch board shall be supplied with cable and boxes end cable glands for the sizes or cables shown on the drawing for incoming and outgoing connections.

The L.T panel shall be given Red oxide anti rust coating and two coats of approved colour paint. The switches etc, shall be numbered and the designations shall be printed in 3/8" high letters with black paint.

The tenderers shall submit the drawings and all relevant details of L.T. switch board offered.

06. PEDESTAL TYPE:

The pedestal type sub-main switch board shall be factory assem beld, ready wired for all internal wiring. The rated voltage shall be 500 volts, 50 c/s three phase. It shall consist of angle iron frame and pedestal and sufficient angle iron enforcing members to make it robust, self contained and rugged. The front shall have fixed sheet steel cover on which switches, circuit breakers etc. shall be mounted. There shall be a removal sheet steel cover on the back such that the internal wiring connections and live parts are not accessible in the normal working of the switch board. Necessary conduit entry holes shall be provided on the top and the bottom for outgoing connections. The incoming connections hall is in the bottom. The required number of circuit breakers, switches and distribution boards etc, as detailed in the schedule of quantities shall be mounted on the front securely and firmly.

The technical specifications of circuit breakers and switch fuses shall same as given for the outgoing circuit breakers and switches for the main L.T. switch board. The incoming load break switch shall be provided with arc Shutes and quick breaking mechanism. The rupturing capacity shall be 25 MVA

The switch shall be given Red Oxide anti rust coating and double coating of approved colour paint. The switches etc. shall be numbered and the designations shall be painted in 3/8" high letters in red colour. The required number of cable end boxes and cable glands for the incoming and outgoing cables as shown on the drawings shall be provided with the switch board.

The tenderer shall submit dimensioned drawings and all relevant details of the switch boards offered at the time submitting the tenders.

07. SUB-MAIN SWITCH BOARD:

The sub-main switch board shall comprise of switch fuses, bus bar chamber and distribution boards as detailed in schedule of quantities.

The switch fuse shall be iron clad or sheet steel fabricated, mounted on the surface of the wall, unless otherwise specified on the schedule of quantities. The position of the operating handle of the switch fuse shall be clearly marked ON/OFF on the cover. The switch fuse shall remain in locked position when the operating handle indicates ON. The switch fuse shall have only H.R.C type fuses. The fuse portion shall consist of porcelain fuse base and porcelain or bakelite fuse grip accommodation the H.R.C fuse.

The distribution fuse board shall have heavy gauge sheet steel enclosure with one leaf door and latch. The fuses shall be H.R.C type designed to BS.S.88 & ASTA 20, certified only, accommodated in a porcelain or bakelite fuse grip with porcelain fuse bases embedded firmly to the board. The number of ways shall be clearly marked and circuit numbers shall be printed on a bakelite strip mounted on the top of each row of fuses.

The bus bar chamber shall consist of high conductivity flat copper bars, supported on porcelain or bakelite bushes. The number of copper bars shall be four for triple pole and neutral and two for double pole. The bus bar chamber shall be enclosed in a heavy gauge sheet steel enclosure with one leaf door and latch.

All component of switch bard shall have separate individual housing and they shall be mounted on a common 16 SWG sheet steel enclosure, arranged neatly to occupy minimum space, keeping in view the free and unhindered operation of individual component. All live parts shall be enclosed and shall not be accessible in normal operations of the switches and distributions fuse board. The switch fuse, bus bar chamber, and distribution fuse boards shall be suitable for operations on 440/250 volt, three phase/single phase 50c/s A.C system as specified on drawings.

08. H.T SWITCH BOARD:

The high voltage, 11 KV switch board shall be totally enclosed, floor mounting, cubicle type, factory assembled, ready wired for 11 KV 3 phase, 50 c/s system. The breaking capacity of the switch board shall be 350 KVA at 11 KV.

The incoming 11 KV, triple pole oil circuit breaker shall be withdraw able type arranged for vertical isolation and horizontal withdrawal, It shall be trip free and fitted with adjustable trip devices to prevent incorrect and hesitant closing. The main contract shall be double break types fitted with D-Iron grid are control devices. The circuit breaker shall be fully interlocked. The interlocking mechanism should ensure that

i. The breaker can be closed only if the roll-out truck is in the operating or isolated position and not in any intermediate position.

ii. The roll-out truck cannot be moved out from the operating or isolated position when the breaker is close. Indicators shall be provided for indication of ON. OFF. Trip and positions of the breaker at withdrawal, earth and operation.

iii. The circuit breaker shall be fitted with voltage transformer and current transformers of appropriate ratings for metering and protections. The relay operated tripping mechanism for over current, earth fault and short circuit protections shall be provided with time delay and instantaneous settings of appropriate ranges.

iv. The following material shall be provided of the make as indicator in the BOQ.

v. Moving iron ammeters range 0-100 Amps with ammeter selector switch:

vi. Moving iron voltmeter, range 0-13 KV with voltmeter selector switch.

vii. Kilowatt hour meter, suitable for 3 phase wire system and for balanced and unbalanced loads, complete with maximum demand indicator.

viii. All meters shall be flush mounting type and square shape. The bus bar shall be of high conductivity solid copper bars with insulation covering and porcelain bushings.

ix. The outgoing 11 KV switch fuses shall be rated for 400 amps and shall have 30 Amps and 45 Amps H.R.C type fuses designed to B.S.S 88 & ASTA 20 certified respectively. The switch fuse shall have trip free mechanism and automatic mechanical trip mechanism action on all three fuses blow of. There shall be tripping device to operate in conjunction with the Bechholz relay provided at the transformers.

x. The 11.KV switch board shall be complete in all respect including cable lend boxes for paper insulated underground 11 KV cables of suitable size as specified in the schedule of quantities for incoming and outgoing connections. The anchor bolts, name plates etc, shall also be provided.

09. H.T & L.T CABLES:

The high tension cables shall be copper conductor, 11 KV 3 core, paper insulated double steel tape armored and served. The serving shall be both below and above the armor, by means of compounded paper tape and compounded hesian tape. In order to prevent adhesion a coating of lime wash or other suitable material shall be applied to the outer surface of the cable. The core identifications marking shall be provided. The cable shall confirm to British Standard Specifications 480 part-I 1954.

The low tension P.V.C cables shall be copper conductor, 1.1 KV, 3½ core PVC insulated and PVC sheathed non-armored. The core identification marking shall be provided.

The low tension PVC armored cables shall be 1.1 KV, 3. ½ core PVC insulated, PVC bedded, single wire armored and sheathed with PVC overall. The cables shall conform to B.S.3346-1961. The core identification marking shall be provided.

The low tension paper insulated cable shall be copper conductor 1.1 KV 3 ½ core paper insulated lead covered double steel tape armored and served both below and above the armored by means of compounded paper tape and compounded hesian tape. The core identification marking shall be provided.

Wall mounting indoor type cable end boxes:

The wall mounting indoor type cable end boxes shall be used for H.T incoming L.T. outgoing connections at transformers. The HT cable end boxes shall be suitable for terminating the 11 KV 3 core paper insulated, lead covered double steel tape armoured cables of size as per schedule of quantities.

The L.T cable end boxes shall be suitable for terminating the 1.1 KV 3.1/2 core paper insulated, lead covered double steel tape armoured cables of size 6.4 sq. inch.

The cable end boxes shall be constructed of cast iron. Adequate space should be provided for splaying of cores. The box shall have a top cover with perfect fit and compound tightly joint. The black bituminous cable compound shall be provided, for terminating and bonding the lead sheath of the cable on incoming side of the box, brass wiping gland shall be provided. An armour clamp shall also be provided for bonding the armoring. On the outgoing side the box shall have insulator bushing made of glazed porcelain suitable for individual core of cable to pass. The box shall be of standard make and the tenderer shall submit the drawing and the relevant details of cable end boxes at the time of tendering.

10. TRANSFORMER:

The transformers shall be three phase oil immersed, and self cooled, indoor type and of the rating specified in the schedule of quantities. The no-load voltage ratio shall be 11 KVI / 430 V and frequency 50 c/s. the transformer shall be Delta-Star connected and the vector group shall be DYli. The percentage impendence shall be 4-5% taking ambient temperature of 45 C the temperature rise shall confirm, to B.S.S. 171.1959.

The manually operated off-load tap changer on H. V side shall have tapings of 7% ±5% and ± 2.5%

The transformer shall be provided with a double float Bechholz relay for tripping and alarm as protection against abnormal working of the transformer.

The transformer tank shall be of welded steel construction tubular type. The transformer shall be complete with conservator, silica gel breather, oil gauge, dial type thermometer, arcing horns, oil drain plug, oil filling cap, drain valve with sampling device, lifting lugs, earthing terminals bi-directional rollers, diagram and rating plates, etc.

The transformer shall be tested at the factory, as per B.S.S.171, 1959 and a test certificate shall be provided at the time of approval.

The transformer shall be painted with anticorrosive paint of approved quality and finished in enamel steel grey colour. The drawings and complete technical data shall be submitted with the tender.

11. EARTHLING CONDUCTOR & ELECTRODES:

The earth continuity conductors shall be solid hard drawn bare copper wire of sizes specified on the drawings and schedule of quantities. The earth continuity conductors of size above 3/0 SWG shall be hard drawn standard bare copper wire. All fixing accessories earthling clips, sewating sockets, lugs, thimbles etc. shall be provided for a complete earthling insulation.

The earthling set shall be 2'x2'x1/4 in thick electrolytic copper plate. The surface of plate shall be tinned for protection. The plate shall have two terminals for connection the earthling leads, Nuts, Bolts and washers etc. shall be of either brass or copper tinned for protection against corrosion. The earthling points shall, comprise of tinned copper bar rectangular in shape having dimensions 6”x2”x1/4” Two terminals for connections shall be provided. The terminals shall have copper or brass bolts, nuts, and washers tinned for protection against corrosion. There shall be one galvanized iron bolt provided in the center for fixing the copper bar on the surface of wall.

12. GALVANIZED IRON PIPES:

The G.I pipe shall be used for protection of earth leads from earthling set to the earthling points and at locations shown on the drawings.

The pipe shall be galvanized inside and out by hot dip galvanizing process. The G.I pipe shall be free from stains, bars spots or any other defect. The G.I pipe shall be KPM Hyesons brand.

The pipe fittings and specials such as sockets, bends, check nuts etc. shall be galvanized inside outside. The saddles and clamps used for fixing the pipe on the surface shall be of gal vanished iron.

13. LIGHTENING PROTECTION SYSTEM

i. General:

The contractor shall furnish all material required for a complete lightening protection system as specified herein and as per British standards CP 326 101.

The system shall consist of vertical and horizontal air terminations, down copper conductors, and earth electrodes and joined effectively to form a continuous path for lightening current to earth.

ii. Air termination:

The vertical air termination shall consist of ¾” diameter 3 feet long tinned copper rod, pencil shape pointed at top end, copper terminal with clamp for connection to down conductor at the lower end of the rod and a self supporting base frame with two fixing holes, bolts, and nuts for fixing on the RCC roof. The vertical air termination shall be as shown on the drawings.

The horizontal termination shall consist of 1" x 1/8” copper strip.

iii. Down conductor:

The down conductor shall be 1/0 S.W.G hard drawn bare copper wire.

iv. Earth electrodes:

The earth electrode shall consist of ¾" diameter, steel cored copper rod less than 4 feet length with coupling and stud bolts at driving end for installing additional sections. The rod shall be tinned for protection against weather. There shall be three 4 feet sections of rod to be driven in the ground to form one 12 feet earth electrodes. The last 44 feet section of the rod shall have an earth terminal for connection to the down conductor and to adjacent earth electrodes.

14. INSTALLATION INSTRUCTIONS:

1. Wires & cables:

i. General:

The contractor shall furnish all material and labour to install wires and cables as indicated on drawings or listed in the schedule of quantities and as specified herein. Apart for the material specified under heading material specification the contractor shall provide, without any extra cost, material for terminating the wires and cables such as ceiling rose lugs, solder , clamps supports, bushes, fixing pipe etc. necessary for a complete wiring installation. Other miscellaneous items such as filling compound identification tag, earthling clips and straps shall also be furnished for a complete wiring installation in accordance with best modern practice.

All wires and cables shall be arranged to provide bends of reasonably large radius, whether they are run in conduit or cable turn king, bens shall not be made to a radius less than 10 times the overall diameter of cables. Wiring shall be continuous between terminations and use of connectors or joints will not be allowed. Looping in system shall be followed throughout.

ii. Concealed Conduit Wiring:

The installation of wires and cables in conduit or G.I pipes shall be done with care to prevent damaging the cables. To facilitate pulling cable, lubrication only as recommended by the cable manufacturer may be used for decreasing friction. Under no circumstances shall soap or oil of any kind be used. The cable manufacturer's specifications for minimum bending radius, pulling speed and maximum pulling tension on cables shall govern the cable puling operations. Where several cables or wires are to occupy the same conduit, they shall be pulled together.

Pull boxes shall be installed in conduit runs, wherever required to limit the pulling length of cables. The drawings are diagrammatic and do not indicate the locations of pull boxes, however, they should be installed in conduit runs to limit pulling lengths to the following:

i. Straight runs - not more than 200ft.
ii. Runs with on 90 degree bend – not more than 100ft:
iii. Runs with two 90 degree bends – not more than 50ft.

The minimum length of all inspection boxes, shall be equal to not less than four times the cable manufacturer's recommended bending radius of the cable.

iii. Cable termination:

Terminal lugs for most equipment are included with the equipment itself except lugs for connection to motor leads and necessary devices; the contractor shall furnish and install all lugs required for such equipment. Cables connectors and lugs shall be rated in capacity equal to or greater than the conductor with which they are used. Control cables entering control boards, switch gear etc, shall be surely fanned out in a neat arrangement and laced with linen waxed cord where the

terminations are made. Wires and cables shall not be laced to conduction material unless a 1/16" tick plate of insulating material is placed between the conduction material and the cable. The ceiling roses in concealed conduit wiring shall be flush type. These shall be mounted on the conduit outlet boxes at light points such that the lip of the ceiling rose finishes flush with the surface. The terminal blocks shall be of the moulded base type with separate studs for incoming and outgoing cables, with barriers between terminal and terminal making strip sand cover. Terminal blocks shall be used at special locations where looping in is rendered difficult. The consent of Engineer-Incharge is required for the use for terminal blocks.

2. Conduit Installation:

i. General:

The contractor shall furnish all labour and material for the installation of conduit on surface or concealed in concrete or brick work, as required. The drawings show the approximate routes and terminal points of conduit. However; if for any reason the contractor desires to use any alternate rout, he may do so at his own responsibility as to the interference with other equipment's and maintaining concealed runs of conduit. Such alternate routes shall incur no additional cost to the owner and must have prior written permission from the engineer-in charge.

Conduit and conduit accessories shall be as specified herein and shall be so installed that the require field conditions are full met.

ii. Concealed Conduit Runs:

The conduit runs shall be concealed in ceiling, floor slabs, columns wall etc. changes in direction of conduit runs shall be made with sweep bends using bending tools. Standard conduit bends may be used to facilitate installation and where conduit turns out of thin slabs. Where conduit is to be concealed in RCC work, the laying of conduit shall be complete in all respects before pouring of concrete. The conduit shall be laid above the bottom reinforcement steel of the slab and shall be firmly secured by tying to the reinforcing steel, in order to avoid being disturbed during the pouring of concrete. After pouring of concrete the concealed conduit shall have a covering of 11/2"to 2 inches. Junction boxes, pull boxes, outlet boxes etc, shall be held firmly and shall be flush with the suffix of the slab or beam, and keeping this in view the depth of outlet boxes, junction boxes etc. shall be appropriate.

The termination of conduit at or near the equipment, switch gear etc. is shown diagrammatically on the drawings. The exact final locations of the terminations shall be coordinated with the switch gear, panel board and other equipments to be installed. Any extension of conduit near the equipment, switch etc. to suit the field condition shall be made without any extra cost. All conduit terminations shall conform to the type of equipment enclosures to which the conduit connections are to be made. Conduit end pointing upward or downward shall be properly plugged, in order to prevent foreign matters entering it. All opening through which concrete may leak shall be carefully plugged and boxes themselves shall be suitable protected against filling with concrete. All ends of M.S conduit shall utilize bushes of soft material to prevent sharp edges of conduit ends from cutting or damaging the wires or cables to be pulled through them. Conduit crossing expansion joints in concrete slabs shall be provided with expansion fittings to compensate for the building expansion or construction.

Where conduit have to be concealed in RCC work after pouring of concrete or in brick work, chases shall be first made with appropriate tools not to dig unduly deeper than required. The conduit shall be firmly fixed into the recesses made

previously and then it shall be covered to have at least 1-1/4" cover before plastering. The work of cutting in the RCC work or brick work shall be coordinated with the civil work and contractor shall get approval be the Engineer Incharge for the route etc. to suit the site conditions, before starting chasing and cutting. Where conduit passes through the wall, holes just enough to pass the conduit shall be made with special tools.

iii. Conduit on Surface:

Exposed runs of conduit on the surface of wall, column or ceiling shall be as indicated on drawings. The conduits and accessories shall be firmly held with the surface of wall by means of saddles, clamps, brackets etc, Special plugs such as Rawl plugs or Phil plugs must be used for fixing clamps, saddles etc. in the wall to support the conduit. In case where the use of such plug is not feasible due to the consideration of wall structures, wooden plugs may be used, but on all cases these should be capable of sustaining the weight of conduit and its accessories. The clamps shall be fixed at intervals depending upon the size and weight of conduit. In any case these shall not be fixed at more than 2-1/2 feet intervals. The straight runs of conduit shall not be more than 1-1/2 to 2ft below the ceiling level and share hindrance is met in the rout, the conduit shall be taken round the hindrance above or below neatly, and then run at the same height.

The exposed conduit and its accessories including clamps and support shall be given coats of anti-corrosive paint of approved standard, before and after the installation.

iv. Cleaning:

The entire conduit system shall be essentially completed before wiring is installing. Conduit shall be tested for continuity and obstruction. Any obstruction found shall be cleaned by use of a cutting mandrel of other approved device, and the conduit be cleaned out before the installation of cables.

v. Earthing:

The earth conductors shall be installed along the sub-main cables as shown on the drawings. At terminations copper earth continuity conductors shall be connected to the body of the switch board or to the earthing point by means of proper size brass or copper socket soldered to the earth wires ad fixed by means of proper size nuts, bolts and washers. All equipment frames, L/T & HT switch board, transformer, cable trays etc. shall be connected with earthing leads or earth continuity conductors of sizes shown on the drawing.

The earthing sets shall be installed at locations shown on the drawing. A 15 feet deep pit in the bare ground shall be excavated and the copper earth plate shall be placed vertically in bottom of the pit. The earth leads of 7/0.166 standed bare copper wire shall be connected at two points on the earth of ptate by means of copper sockets nuts and bolts. The copper earth leads shall be taken out of the pit and up to the earthing point in a 2” G I pipe. A mixture of grinded charcoal and powdered lime in the ratio of 4:1 by volume shall be poured around the earth plate to cover it by one foot on sides and top. The charcoal mixture shall be rammed in layers. The pit shall be back filled in layers of the earth consolidated by watering and ramming. At the ground level a 2 x 2 x 1 ½ deep cement concrete inspection chamber shall be constructed. The inside surface of the Chamber shall be plastered and an angle iron frame and a heavy duty cast iron cover with lifting lugs shall be provided and fixed. A ½ inch diameter G.I. pipe piece shall be fixed as inlet of water to the inspection chamber as directed at site.

The earth resistance shall be tested with and without water as per instructions given under section D-Testing of these specifications.

vi. Installation of Switches & Socket Outlets:

All light control switches and socket outlet units shall be fixed flush with the surface of wall on recessed 16 SWG sheet Stel box of appropriate dimensions. The light control switches up to 3 numbers at one location are specified as gang switches. These shall be mounted on gang boxes with the plastic face plate flush with the surface of wall or columns

At locations where any number of switches with fan regulator is grouped, gang type switches shall not be used. At such location single switches shall be grouped and fixed flush on a plastic sheet mounted on a recessed sheet steel box of appropriate dimensions. The mounting height of light control switch shall be 4 1/2ft, above finished floor level unless otherwise specified on the drawings. The switch and socket outlet units shall be fixed, flush with the surface of wall on recessed sheet steel box of appropriate dimensions, The mounting height of switch and socket outlet units shall be 9 inches above finished floor level unless otherwise specified on drawings

The fixing of plastic plate on outlet boxes and of single switches and fan regulators on plastic sheet shall be by means of flat head chromium plated brass screws. The' flat head of the screw shall be sunk in the plastic plate so as finish flush with the surface of plate.

vii. Installation of H.T & L.T Switch Board:

The Contractor shall provide all labour and material to install, test and commission the high tension and low tension switch boards. The anchoring bolts, angle iron supports, foundation plates etc. shall be provided and installed. After this Contractor supplies the detailed foundation drawings of the switch boards, the building contractor shall leave approved sized holes in cement concrete floor and the electrical contractor shall place the foundation bolt and anchoring plates in the holes and fill the same with 1:2:4. cement concrete mixture for preparing the foundation for the switch board.

The cubicle type and pedestal type switch boards shall be installed on the floor having a minimum clearance of 2 ft. between the back of the switch board and the wall. The switch board shall be bolted firmly and in level on the floor. In general the manufacturer's instructions for installations shall be followed.

The incoming and outgoing cable shall enter to switch board from the bottom. Special care shall be taken in connecting the paper insulated cable to cable and boxes so as to have no danger of compound leakage during operating. The cable compound and insulation tape etc. shall be furnished without additional cost to the owner.

The body of the switch board shall be connected at two points with the earth continuity conductor from the earthing point. Proper size brass or copper thimbles or sweating sockets shall be used for connecting the earthing conductor.

15. INSTALLATION OF H.T. & L.T CABLES:

The H.T and L.T cables shall be installed in the prepared cable trenches and on the surface of wall, column or ceiling as required. The cable trenches shall be constructed by the Building Contractor, details of which are required to be submitted by the electrical contractor at the time of submitting his tender.

The L.T cables shall be laid in cable trenches neatly such that they do not cross each on the haphazardly. At directions and bends, the minimum interval radius of bend shall be 4 times the overall diameter for PVC armoured and for paper insulated armoured cables.

The L.T cables shall be fixed on the surface of ceiling or wall, where shown on the drawing, by means of approved cast aluminum cleats of appropriate dimensions. The aluminum cleats shall be in two parts as shown on the drawing. The cleats shall be fixed by means of galvanized bolts or screws at six feet internal.

The Contractor shall provide all fixing material such as clamps, cleats screws, bolts etc required for the installation of cables without any additional cost to the owner.

i. Transformer:

The contractor shall furnish all labour and material to install, test and commission the transformers. The Building Contractor shall construct the cement concrete cable trenches in the transformer room.

The transformer shall be installed at the location shown on the drawings and all fittings dispatched loose from the factory shall be assembled as per manufacturer's instructions. All site tests shall be performed as per instructions given in Section “D-Testing” of these specifications.

The H.T and L.T cable end boxes shall be installed on the wall. The angle iron brackets for installing the cable end boxes shall be provided and installed. The cores of cables coming out of the cables end boxes shall be neatly fanned out and connected to the transformer terminals by means of proper size thimbles, nuts and bolts.

The transformer neutral shall be earthed via sub-station earth point. Two separate connections for transfer body earth shall also be made.

The transformer shall be tested and commissioned in the presence of the Engineer Incharge.

ii. Installation of Lightening Protection System:

The Contractor shall furnish all labour and material required for a complete installation of Lightening protection system. The air termination shall be installed at locations shown on the drawing. The vertical air termination shall be fixed on the flat roof surface rigidly and firmly. The horizontal air termination shall be connected effectively to the vertical air termination. The copper clamps, nuts, bolts and washers shall be provided. The horizontal air termination shall be fixed on the flat surface of the RCC roof by means of copper or brass fixing clamps at 6 feet intervals. All joints and bonds in the horizontal air termination shall be mechanically and electronically effective. The joints shall be bolted and shall have an overlap of at least one inch. Before bolting at the joint the surface of overlap shall be thoroughly cleaned and after bolting up, the joint shall be protected from weather by applying bitumen coat all round the joint. The down conductor shall be fixed on the outside surface of wall or column by means of copper or brass clamps fixed at 4 feet intervals. The I/O S.W.G down conductor shall be connected to the horizontal air termination copper strip be means of proper size compression type socket and nut bolt. The protection of joint shall be made as for the joints in horizontal air termination mentioned earlier. The down conductor shall be connected effectively to the earth electrode.

The earth electrodes shall be driven in the ground as close to the building as possible. These shall be driven in three sections of 4 feet length to from one 12 feet long earth electrode. At each location shown on the drawing at least four such electrodes shall be fixed 12 feet apart, unless a lower earth resistance is obtained in lesser number of electrodes. The maximum earth resistance measured

between the electrodes shall be 10 ohms. All earth electrodes at one location shall be connection to each other by means of I/O SWG bare copper wire buried directly underground. At each earth electrodes a cement concrete inspection chamber of l'xl'x6” deep with case iron cover shall be constructed for inspection and protections of down conductor's connection with the earth electrodes.

The completed system shall be tested for continuity and earth resistance. The combined earth resistance shall not exceed 10 ohms.

16. TESTS:

i. **General:**

Upon completion of installation the Contractor shall perform field tests on all equipment, materials and systems. All tests shall be conducted in the presence of the Engineer Incharge for the purpose of demonstrating equipment or systems compliance with specifications. The Contractor shall furnish, install and maintaining all tools, instruments test equipment, material, connections, etc and furnish all personnel including personnel including supervision and "stand- by” labour required for the testing, setting and adjustment of all electrical facilities, and other component parts, including putting same into operation.

All tests shall be made with proper regard for the protection of the equipment, and the Contractor shall be responsible for adequate protection to all personnel during such tests.

The Contractor shall record all test values of the tests made by him on all equipment, giving both “as found” and “as left” conditions. Three (3) copies of all test data shall be given to the Engineer Incharge for record purposes.

The witnessing of any tests by the engineer Incharge does not relieve the Contractor of his guarantees for material, equipment and workmanship as specified in the conditions of Contract.

ii. **Insulation Test:**

Insulation resistance tests shall be made on all electrical equipment, using a self-contained instrument such as the direct indicating ohm-meter of the generator type. Direct current potentials shall be used in these tests and shall be as follows:-

Circuits under 220 Volts -- 500 Volt Test

Circuits 220 Volts to 400 Volts – 1000 Volt Test

The minimum acceptable insulation resistance value will be 5 Megohms.

The test equipment for insulation testing will be furnished by the Contractor. Before making connections at the ends of each cable the insulation resistance measurement test of each cable shall be made. Each conductor of a multi-core cable shall be tested individually to each conductor of the group and also the 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 the new cable tested.

All transformers, switch gears shall be given on insulation resistance measurement test to ground 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 that specified above, the case 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 have been necessary and the insulation resistance readings taken after the correction has been made satisfy the requirements specified herein, repeat

insulation resistance measurements shall be made twice and at least 12 hours apart: The maximum range for each reading on the 3 successive tests shall not exceed 20% of the average value. After all tests have been made, the equipment shall be reconnected.

iii. **Earth Resistance Test:**

Earth resistance test shall be made by the Contractor on the earthling system, separating and reconnecting each earth connection as may be required by the Engineer Incharge. If it is indicated that soil treatment or other corrective measures are required to lower the ground resistance values, The Engineer Incharge will determine the extent of such corrective measures,

The electrical resistance of the E.C.C together with the resistance of the earthling lead measured from the connection with earth electrode to any other position in the completed installation shall not exceed one ohm.

Earth resistance test shall be performed as per Electrical Inspector's requirements. Where more than one earthling sets are installed, the earth resistance test between two seats shall be measured by means of resistance bridge Instrument. The earth resistance between two sets shall not exceed one ohm.

iv. **Transformers & Switchgear:**

In addition to the insulation resistance test on the transformer, a polarity or phase rotation test shall also be made. Auxiliary devise breather, Buchholz, relay etc shall be tested for satisfactory operation.

Each air circuit breaker shall be operated electrically and mechanically, ascertaining that handle mechanisms are operating. All interlock control circuits shall be checked out for proper connections in accordance with the wiring diagrams given by the manufacturer.

The Contractor shall identify the phases of all switchgear and power cables by stenciling the switchgear and tagging the cables so that the phases can be identified for connections to give proper phase sequence.

Series over current trip elements shall be checked against rating of equipment served. Also to be checked for correct size and function are fuses, disconnect switches, number of interlocks, indicating lights, alarms and remote control devise. Name plates shall be checked for proper designation of equipment served.

v. **Operating Tests :**

Current load measurement shall be made on equipment and on all power and lighting feeders. The current reading shall be taken in each phase wire and in each neutral wire while the circuit or equipment is operating under actual load conditions. Clip-on ammeters may be used to take current readings. All light fittings shall be tested electrically and mechanically to check whether they comply with the standard of specifications. Fluorescent light fittings shall be tested so that when functioning properly no flickering or choke singing is felt.

vi. **Completed Tests:**

After any equipment has been tested, checked for operation etc and is accepted by the Owners representative, the Contractor shall be responsible for the proper protection of such equipment for assurance that subsequent testing of other equipment or systems do not disturb the completed work.

SECTION -17 TELE PHONE

MATERIAL REQUIRMENT:-

1.**Conduit & Conduit Accessories:**

The Contractor shall furnish and install a complete conduit system with associated outlet boxes and terminal boxes, so as to complete in all respects for installation of wires, cables and instruments. Conduits shall be of heavy gauge steel 16 SWG back enameled. The specification for conduit accessories remain same as given in D (i) of Section I of these specifications. At each telephone outlet location as shown on the drawings, The contractor shall furnish heavy gauge sheet steel box black enameled inside and out and install flush with the surface of wall suitable for mounting the telephone rosette.

2.**Distribution Boxes:**

Telephone cable distribution boxes shall be constructed with interior dimensions not less than those indicate in the Schedule of Quantities & Drawings. Distribution boxes for telephone cables shall be made of superior quality teak wood ½" thick and enclosed in tight fitting in black enameled steel outer box of 16 SWG the two being fixed together by means of nuts and bolts. A sheet steel door of 16 SWG with locking mechanism shall be fixed on the box, flush with the surface of the wall. The colour of the door shall match the wall colour.

The terminal strips fixed in the distribution box shall be made of copper. These shall be of Telephone Industries of Pakistan, or equivalent.

3.**Telephone Cables:**

Single pair telephone cables shall be P.V.C insulated twin copper conductor P.V.C sheathed flat. Multicore cables shall be P.V.C insulated and P.V.C. sheathed circuits in cross section containing as may pairs as called for in Schedule of Quantities and Drawings. All cables will be made up of bare copper wire conductors of 0.6 mm diameter, P.V.C. insulated, twisted in pairs and P.V.C. sheathed. The cables shall be of 250 volt grade with insulation resistance of 100 megohms / km

4.**Telephone Rosettes:**

Telephone rosettes shall be with copper terminals, 2-way 5amp, made of Plastic or bakelite, having a screw type dome cover with lip opening for outgoing cables.

INSTALLATION INSTRUCTIONS:

1.**Conduit Installation:**

The telephone conduit installation shall be as outlined in 1.2 of Section 1 of these specifications. Telephone conduit shall be laid not less than 6" away from the electrical conduits or cables, and wherever electrical conduit and telephone conduits cross each other they shall do so at right angles only.

Identification marking shall be given at the termination or free end of conduit so that it may not be confused with electrical conduits. The marking shall be both by colour and by attaching an approved brass tag using brass of bronze tie wire. Each tag shall be clearly stamped with "T" fore telephone conduit.

2.**Distribution Boxes:**

Distribution boxes for telephone cables shall be fixed recessed in the wall or column as called for in the drawings and shall be provided with sheet steel hinged door with locking mechanism having a common key for operating those boxes.

3.**Pulling of Telephone Cables in Conduits:**

Telephone cables shall be pulled in conduits following the same instructions as for pulling of electrical wires and cables given in Section 3, under the heading "Wire and Cables Installation". Where telephone cable enter distribution box, one foot length of cable shall be

left coiled in the distribution box for T&T Department to solder them on the soldering terminals.

SECTION-18 FIRE ALARM

MATERIAL REQUIREMENTS:

5.**General**

The Contractor shall furnish and install a complete electrically supervised non coded fire alarm system as specified herein and as indicated on drawings. The fire alarm system shall be non-coded electrically supervised system. Operation of any manual station shall cause all sounding devices to sound continuously until the alarm condition is corrected and system is reset. The system shall operate on 230/415 volts, single phase/3 phase 50 c/s A.C supply. The fire alarm system is specified here on the basis of the equipment manufactured by Minneapolis Honeywell Regulator Co. U.S.A. represented in Pakistan by M/s Zelin Ltd, Zelin's Corner, Victoria Bunder road, Karachi. Any equipment manufactured by other standard companies may be offered.

6.**Manual Station.**

The manual station shall be operated by pulling down on the lever, when operated the lever shall remain down with the alarm contact closed until the station is resent. Honey well type S464B or similar. The manual station shall have sheet steel housing and mounted on a sheet steel box recessed on the wall.

7.**Alarm Bell**

Fire alarm bells shall be vibrating type with 6” gong. The alarm bells shall be provided with adaptor plate for mounting on standard conduit outlet box. The Alarm Bell shall be Honeywell type SC40 similar.

8.**Annunciator Panel:**

The main Annunciator panel located near the fire alarm panel shall have zone identifications, to identify each zone in the event of operation of manual station in that zone. The zone identification shall be printed on replaceable tape between the panel display screen and lamp. Display screen shall be of Tran's lucent glass. The sub main Annunciator shall be similar to the main Annunciator but with two zone identifications only. The Annunciator shall be Honeywell type W649B or similar.

9.**Fire Alarm Panel:**

The Fire Alarm Panel shall operate on 230/415 volt single phase 50 c/s A.C supply. The panel components shall include supervisory meter and relay for bell station circuit, trouble and alarm lights, integral trouble buzzer, and silencing switch. The fire alarm panel shall provide required bell circuit as shown on the drawings. A transformer for low voltage bell circuit shall be provided. The fire alarm panel shall be semi-recessed or recessed mounting with hinged doors. The fire alarm panel shall be Honeywell type W728A or similar.

INSTALLATION INSTRUCTIONS:

10.**Conduit & Wiring:**

The installation of conduit and wiring shall be as given in Section 1 of these specifications

11.**Manual Stations:**

The manual Stations shall be installed on the surface of wall on the recessed conduit outlet boxes, at locations shown on the drawings. The center line of the unit shall be 5 feet above finished floor level. The manufacturer's installation instructions shall be followed.

12.**Fire Alarm Panel:**

The fire alarm panel shall be installed recessed or semi-recessed in the wall at location shown on the drawings. All wiring connections shall be made as per manufacturer's instructions. The

center line of the panel shall be at height of 5 feet above finished floor level. The main Annunciator panel shall be mounted adjacent to the fire alarm panel. The sub-main Annunciator panels shall be fixed recessed or semi-recessed in the wall at locations shown on the drawings. The mounting height of sub-main Annunciator shall be same as that of fire alarm panel.

SECTION-19 CLOCK SYSTEM

MATERAIL REQUIREMENT:

13. **General:**

The clock system will consist of master clock unit producing electrical impulses at definite interval and feeding them over a two wire circuit to the secondary clocks installed at various locations. The secondary clocks will run by the impulses received from master clock and therefore all clocks will give on time indication

The contractor shall supply and install conduit, wires, Master clock, secondary clocks and all accessories required for a complete clock system as specified herein and as called for in the drawings.

14. **Conduit:**

The conduit shall be black enameled heavy gauge 16 S.W.G. The conduit and conduit accessories requirements shall be same as detailed in section 1 of these specifications.

15. **Wiring:**

The wires shall be single core standed, and P.V.C insulated and shall be of M/s Pakistan Cables Ltd.

16. **Master Clock:**

The master Clock unit is required to control minimum of 29 secondary clocks by sending electrical impulses at regular, intervals to the secondary clocks. The Master Clock shall be pendulum operated and shall incorporate an impulse transmitter to send impulses to secondary clocks over a two wire circuit. Should the main supply fail, the system will be kept going very many hours by the accumulators. For advancing all clocks in the system, and advancing lever shall be provided. The accuracy of the clock shall be within ½ second per day.

The Master Clock unit shall be suitable to operate on 250 Volts, 50 c/s A.C single phase supply. The current supply is taken from trickle charged accumulator.

17. **Salve Clocks:**

The slave clock shall be suitable to operate in conjunction with the above specified master Clock. The slave clock shall have 12” diameter aluminum dial with black glistens serif numerals hour marking, convex face glass and satin silver colour metallic body.

INSTALLATION INSTRUCTIONS

18. **Conduit and Wiring:**

Identification marking shall be given at the termination of free end of conduit so that it may not be confused with the electrical conduit. The installation for wiring remains same as far electrical wires.

19. **Master Clock:**

The Master Clock shall be installed on the surface of wall. Manufacturer's instructions for installation and connections shall be followed.

20. **Slave Clock:**

The clocks shall be installed on the surface of wall or column at a height of about eight feet from the finished floor level or on the side of the beam as specified. The clock shall be installed, connected and tested so as to be ready for operations. The manufacturer's instructions for installation shall be followed.

MODEL OF PRICING

WIRING OF LIGHT POINT:

1.**One Point Controlled By One Switch:**

The rates against this item of schedule of quantities shall include all labour and material specified for wiring between the point and switch. The circuit conduit and siring are covered by separate items in schedule of quantities.

2.**Two or Three Points Controlled By One Switch:**

The rates against this item of schedule of quantities shall include all labour and material specified for wiring between outlet to outlet and the switch. Two or three light point outlets controlled by one switch shall be counted as one light point. The circuit conduit, and wiring are covered by separate items in schedule of quantities for this item.

3.**Wiring of 5 AMP Plug Point:**

The rates against this item of schedule of quantities shall include all labour and materials specified for wiring of plug point from the nearest circuit available as shown on the drawings. The socket and switch unit is covered schedule of quantities.

4.**Light Circuits:**

The rates against these items shall include all labour and material specified for circuit wiring. The circuit conduit is shown as bold continuous line on the drawing and the number of 7/0.29 wires are indicated. Where the circuit wires pass through the light point conduit, the conduit is not counted under items pertaining to it but the wire is measured upto its termination at switch or outlet. At such location conduit is considered included is wiring of light point items. The contractor shall determine the size of conduit for wiring of light point according to the number of wires shown on the drawing.

MINOR REPAIR & RENOVATION WORKS REQUIRED AT NBP ACP MODEL BRANCH, PACE TOWER GULBERG, LAHORE

TENDER

ABSTRACT OF COST

1	Cost of Civil work	Rs.	
2	Cost of Electric Work	Rs.	
2	Cost of Air-Condition Work	Rs.	
	TOTAL COST **Including all applicable Taxes** **(GST/PRA/Income Tax etc.)**	**Rs.**	

Amount in Words

_____

_____

Contractor's
Signature

_____

(Seal & Signature)

CIVIL WORKS

S.NO	DESCRIPTION/SPECIFICATION	QTY	UNIT	RATE	AMOUNT
	DISMANTLING WORKS (where required)				
1	Dismantling and removing of existing masonry walls, False ceiling, Flooring, Doors, Windows, Glass work, electrical, plumbing fitting / fixtures, front boundary wall and grills and any other material etc. complete in all respects as per drawings.	1	job		
	BRICK MASONARY WORK				
2	Providing and laying Block /brick masonary with 1:4 cement sand mortar in super structure, including raking out joints, scaffolding, curing, drilling for walls/ Ramps where required complete in all respects as per drawings, specifications and as directed by the Consultant/Engineer.				
	9'' (228 mm) Thick or Above	50	Cft		
	PLASTER WORK				
3	Providing and applying Plaster (thickness and cement / sand ratio as indicate in sub items below) including making edges and corners, curing, scaffolding etc, complete in all respects as per drawings, specifications and as directed by the Consultant/Engineer.				
	12mm Thick in (1:4) on walls	150	Sft		
	GLASS DOORS (External)				
4	Providing and fixing Tempered frame less glass door using 12mm clear glass , imported concealed floor door closers GCC made, door locks, and approved handles on both sides, complete in all respects as per drawing, specifications and as directed by the Consultant / Engineer.	25	Sft		
	PARTITION				
5	Providing and fixing of Glass partition consisting of 12mm thick imported clear tempered glass with frosting paper in pattern as shown on drawings, with approved aluminum H section as frame on top and bottom and all necessary joinery details complete in all respects as per drawing, specifications and as directed by the Consultant / Engineer.	400	Sft		

	INTERNAL PAINT WORKS				
6	Providing and applying Paint on internal/ External walls of ICI or Berger including rubbing with sand stone, filling the uneven surfaces with putty, rubbing with sand paper and preparation of surface perfect in all respects, applying one coat of primer on prepared surface of plastered and finish paint coats as indicated in sub items, complete in all respects as per drawings.				
	Plastic Emulsion Paint ash white (on Internal walls)	400	Sft		
	Weather shield paint on external walls (approved by the Engineer)		Sft		
	Wooden CABINETS				
7	P/fixing of wooden filling cabinets low and full height at any height made with 16mm MDF laminated 7419 with edging made of laminated Al.Noor 4024 veneer properly fixed and Internal carcass in 16mm thick lamination chipboard # 7056 , including approved handles, hings and shelf approved drawing and design. Complete in all respect. (Size upto 4'x8' approx.)	2	No.		
8	P/F imported glass paper at required places, job complete in all respects	400	sft		
	STEEL DOOR FOR EMERGENCY EXIT				
9	Providing and fixing of M.S steel sheet 14SWG on both sides and M.S pipe frame 16SWG frame at inner side of leaf, door frame of M.S angle Iron+M.S drip, applying of approved enamel paint and all necessary joinery details, complete in all respect.	25	Sft		
10	Removing and re- fixing of existing Glass partition/glass door consisting of 12mm thick imported clear tempered glass with frosting paper in pattern as shown on drawings, with approved aluminum H section as frame on top and bottom and all necessary joinery details complete in all respects as per drawing, specifications and as directed by the Consultant / Engineer.	100	Sft		
	BLINDS				
11	Providing and fixing imported synthetic fibre roller Blinds according to the instructions of the manufacturer, complete in all respects as per drawing, specifications and as directed by the Consultant / Engineer.	200	Sft		
				TOTAL	

ELECTRICAL WORKS

Item No.	Description	Unit	Quantity	Unit Rate	Amount
PART A	**WIRING WORKS**				
A-1	**ELECTRICAL WIRING**				
	Supply, laying, connection and testing of following wiring types; in heavy duty PVC Conduit recessed in walls, columns, slabs, floors or fixed at Ceiling above false ceiling or in Dura duct if exposed on walls, with all necessary fixing accessories, conduit/duct accessories, pull boxes, steel pull wires complete in all respects, required as per site conditions. with make/brand of material being specified in Annexure A. (PVC insulated Copper - 300/500 Volt Grade Wires to be used)				
A-1-1	**(a)** **Circuit Wiring (For Switchboard/Light Plug etc.)**				
	From DB to Switch Board or 2/3 pin Light Plug (5/10/13A) to be wired with 2x2.5 sq.mm S/C wires and 1 X 2.5 sq.mm S/C wire of Green/Yellow Colour as Circuit Protective Conductor (CPC) in 25 mm dia. heavy duty PVC conduit Each circuit shall have independent CPC. Maximum wiring of 2 light circuits can be pulled through 25 mm dia. PVC conduit.	Nos.			-
	(b) **Switch Board to Switch Board OR Switch Board to Light plug etc. Circuit Wiring**				
	Same as item No. A-1-1 (a) but from point to point i.e. Switchboard to Switchboard/Light Plug or Light Plug to Light Plug. (Side by Side or Back to Back Wiring points will not be payable and will be considered to be included in item No. A-1-1 (a)	Nos.			
	(c) **Strong & Locker Rooms Wiring Circuit**				
	Same as item No A-1-1 (a) but including 40/.076 Cable with 20 A Switch Socket Outlet (SSO), back box etc. for connection to Switchboard in Strong & Locker Rooms complete with connections in all respects.	Nos.			
A-1-2	**(a)** **Point Wiring (Light/Fan etc.)**				

		From Switchboard to 1st Point (Light/Fan) with 1 x 1.5 sq.mm S/C wire from Piano Switch and 1 x 2.5 sq.mm wire common neutral including i/c P/F 10A Piano Switch in 20 mm dia. heavy duty PVC conduit, recessed in walls, columns, slabs, floors or fixed at Ceiling above false ceiling with all necessary fixing accessories, conduit accessories, 75 mm high PVC junction boxes, pull boxes, steel pull wires, connectors, M.S. sheet steel switch box 16 SWG with earth terminal with 2 coats of powder coating of orange colour, M.S. box shall be of the same size as that of 1, 2 or 3 upto 6 gangs flush type plate switches complete in all respects, required as per site conditions. (In case of point wiring at Ceiling, 2 X 1.5 sq.mm wires in Flexible Conduit from junction box equiped with PVC gland to light/fan fixture, will also have to be provided). Maximum wiring of 6 points (light/fan) can be pulled through 20 mm dia. PVC conduit.	Nos.	6		
	(b)	**Point to Point Wiring (Light/Fan etc.)**				
		Same as item No. A-1-2 (a) but from Point to Point and without including cost of Switch and M.S. sheet steel switch box 16 SW. (Maximum of 05 points can be connected with 1st Point)	Nos.	12		
A-1-3	**(a)**	**Wiring Circuit for 1 x 13/15/16 A Simplex/Duplex - Switch Socket Outlet (SSO) installed at Wall/Workstation/Floor Box etc. or any other purpose.**				
	(i)	From DB to SSO with 2 x 2.5 sq.mm S/C wire + 1 x 2.5 sq.mm S/C wire of Green/Yellow Colour as Circuit Protective Conductor (CPC) in 25 mm dia. heavy duty PVC conduit, recessed in walls, columns, slabs, floors or fixed at Ceiling above false ceiling with all necessary fixing accessories, conduit accessories, pull boxes, steel pull wires complete in all respects, required as per site conditions. Each circuit shall have independent CPC. (Maximum wiring of 3 circuits can be pulled through 25 mm dia. PVC conduit).	Nos.	12		

	(ii)	Same as item No. A-1-3 (a) (i), but from Point to Point I.e. 1st SSO to 2nd SSO and onwards. (Side by Side or Back to Back Wiring points will not be payable and will be considered to be included in item No. A-1-3 (a) (i) (Maximum of 03 SSO can be connected with 1st SSO).	Nos.	12		
	(b)	**Wiring Circuit for 1 x 20 A Switch Socket Outlet (SSO) for AC connection or any other purpose**				
		From DB to SSO with 2 x 4.0 sq.mm S/C wire + 1 x 2.5 sq.mm S/C wire of Green/Yellow Colour as Circuit Protective Conductor (CPC) in 25 mm dia. heavy duty PVC conduit, recessed in walls, columns, slabs, floors or fixed at Ceiling above false ceiling with all necessary fixing accessories, conduit accessories, pull boxes, steel pull wires complete in all respects, required as per site conditions. Each circuit shall have independent CPC. (Maximum wiring of 2 circuits can be pulled through 25 mm dia. PVC conduit).	Nos.			
	(c)	**Wiring Circuit for 1 x 30/32 A Switch Socket Outlet (SSO) for AC connection or any other purpose**				
	(i)	From DB to SSO with 2 x 6.0 sq.mm S/C wire + 1 x 2.5 sq.mm S/C wire of Green/Yellow Colour as Circuit Protective Conductor (CPC) in 25 mm dia. heavy duty PVC conduit, recessed in walls, columns, slabs, floors or fixed at Ceiling above false ceiling with all necessary fixing accessories, conduit accessories, pull boxes, steel pull wires complete in all respects, required as per site conditions. Each circuit shall have independent CPC. (Maximum wiring of 1 circuit can be pulled through 25 mm dia. PVC conduit).	Nos.	4		
	(ii)	Same as item No. A-1-3 (c) (i), but from Point to Point I.e. 1st SSO to 2nd SSO. (Side by Side or Back to Back Wiring points will not be payable and will be considered to be included in item No. A-1-3 (c) (Maximum of 01 SSO can be connected with 1st SSO). This can be used for Heater connection as well.	Nos.			
A-1-4		**Wiring Circuit for 03 Phase - 04 Ton AC connection or any other purpose**				

		From DB to AC etc. with 1 X 6.0 sq.mm 4/C PVC/PVC insulated Cable + 1 x 2.5 sq.mm S/C wire of Green/Yellow Colour as Circuit Protective Conductor (CPC) in 25 mm dia. heavy duty PVC conduit, recessed in walls, columns, slabs, floors or fixed at Ceiling above false ceiling with all necessary fixing accessories, conduit accessories, pull boxes, steel pull wires complete in all respects, required as per site conditions. Each circuit shall have independent CPC. (Maximum wiring of 1 circuit can be pulled through 25 mm dia. PVC conduit).	Rft.			
A-1-5	**(a)**	**Wiring for Industrial Sockets for UPS Connections**				
	(i)	From UPS DB to Branch UPS I/O Connections (two connections) with 1 x 6.0 sq.mm 3 Core wire in 25 mm dia. heavy duty PVC conduit or PVC Dura duct (appropriate size), with all necessary fixing accessories, complete in all respects, required as per site conditions.	Rft.	50		
	(ii)	From ATM DB/Branch UPS DB/Branch UPS to ATM UPS I/O Connections (two connections) with 1 x 4.0 sq.mm 3 Core PVC/PVC insulated wire in 20 mm dia. heavy duty PVC conduit or PVC Dura duct (appropriate size), with all necessary fixing accessories, complete in all respects, required as per site conditions.	Rft.			
	(b)	**Wiring from Main DB to UPS DB or any other purpose.**				
		Wiring with 1 x 6.0 sq.mm 3 Core PVC/PVC insulated wire in 25 mm dia. heavy duty PVC conduit or PVC Dura duct (appropriate size), with all necessary fixing accessories, complete in all respects, required as per site conditions.	Rft.			
A-2	**DATA / VOICE / TV WIRING**					
	Supply, laying, connection and testing of following wiring types; with make/brand of material being specified in Annexure A.					
A-2-1	**(a)**	**Data points/outlets**				

		Wiring for each Data point from Communication Rack (Patch Panel) to each Data point on wall or in M.S floor outlet box with 4 pair Cat. 6E 23 AWG cable in 20 mm dia. heavy duty PVC conduit recessed in walls, columns, slabs, floors or above false ceiling with all necessary fixing accessories as required as per site condition, complete in all respects.	Nos.	24		
	(b)	**Voice points/outlets**				
		Wiring for each Voice point from Telephone Junction Box to each telephone point on wall or in M.S floor outlet box or in Data Cabinet/Communication (Wall mounted or Floor Standing) with 4 pair Cat. 6E 23 AWG cable in 20 mm dia. heavy duty PVC conduit recessed in walls, columns, slabs, floors or above false ceiling with all necessary fixing accessories as required as per site condition, complete in all respects.	Nos.	6		
A-2-2		**Main Telephone Cable**				
		Supply, installation and connection of 10 pair telephone cable to be connected from Utility MDF to Telephone Junction Box (TJB) in 25 mm dia PVC conduit including cost of identification tags, all necessary material / accessories complete in all respects.Actual length of cables to be installed shall be practically measured at site by the Contractor, duly checked by Engineer Incharge.	Rft.			
A-2-3		**TV Point Wiring**				
		Wiring for wall mounted TV outlets wired with RG-6 / RG-7 cable or as directed by the Engineer from TV Cable Splitter/distribution to each TV point, including 20 mm dia. heavy duty PVC conduit, recessed in walls, floors, column or as required as per site conditions, all PVC conduit accessories, pull boxes, steel wires etc. complete in all respects.	Nos.			

PART B	**MAIN / SUB MAIN CABLES**					
B-1	**ELECTRICAL LT CABLING**					
	P/L, connection, testing and commissioning of PVC insulated PVC sheathed non armoured copper conductor power cable 600 / 1000 Volt grade manufactured by any one of the manufacturers as mentioned in					

	Annexure A. The cable would be recessed in walls, columns, slabs, floors or fixed at Ceiling above false ceiling with all necessary fixing accessories either in already laid PVC Conduit/Dura duct or otherwise openely laid complete in all respects, required as per site conditions. and approval of Engineer Incharge including cost of all necessary materials, connections of cables and identification tags at both ends, cables lugs properly crimped at both ends for the following sizes. Actual length of cables to be laid shall be practically measured at site by the Contractor, duly authenticated by the Electrical Engineer / Engineer Incharge / Supervisor before placing the order with the manufacturer, however, approximate length of cables are shown herewith. Payments shall be made as per actual length laid.					
	(a)	4 Core 10 sq.mm	Rft.			
	(b)	4 Core 16 sq.mm	Rft.			
	(c)	4 Core 25 sq.mm	Rft.			
	(d)	4 Core 35 sq.mm	Rft.			
	(e)	4 Core 50 sq.mm	Rft.			
	(f)	1 Core 6 sq.mm Green/Yellow Colour as CPC	Rft.			
	(g)	1 Core 10 sq.mm Green/Yellow Colour as CPC	Rft.			
	(h)	1 Core 16 sq.mm Green/Yellow Colour as CPC	Rft.			

PART C	**FITTINGS, FIXTURES & ACCESSORIES**					
	Supply, Installation, testing and commissioning of following fittings/fixtures as per specified brand/make given in Annexure "A" recessed in or on wall / ceiling / column etc. complete in all respects, duly approved by Engineer Incharge prior to installaion.					
C-1	**LIGHTS**					
	(The temperature / Colour Index to be got confirmed from Site Engineer before installation)					
	(a)	Ceiling mounted LED Panel Light - 48W - 610 x 610 mm (Warm White/Warm/DayLight) recessed in False Ceiling	Nos.	12		
	(b)	Same as C-1 (a) but surface mounted	Nos.			

	(c)	Ceiling mounted LED Down Light - 18/20W - 20 mm dia (Warm White/Warm/DayLight) recessed in False Ceiling	Nos.			
	(d)	Same as C-1 (c) but Surface mounted	Nos.			
	(e)	Ceiling mounted LED Down Light - 10/12W - 15 mm dia (Warm White/Warm/DayLight) recessed in false Ceiling	Nos.			
	(f)	Same as C-1 (e) but Surface mounted	Nos.			
	(g)	Ceiling mounted LED Spot Light - 7/8W - 7-8 mm dia (Warm White/Warm/DayLight) recessed in False Ceiling	Nos.			
	(h)	Same as C-1 (g) but Surface mounted	Nos.			
C-2	**FANS**					
	(a)	False Ceiling Fan 14/16 " sweep, Size(2'X2')	Nos.	6		
	(b)	Ceiling Fan 56" sweep, complete with capacitor, hanging rod, canopy, blades, ceiling hook, dimmers nuts and bolts etc.	Nos.			
	(c)	Wall Bracket Fan 18" sweep - Plastic body louvre type	Nos.			
	(d)	Same as C-2 (c) but Metal Body.	Nos.			
	(e)	Exhaust Fan 10" sweep, Plastic body, louvre type.	Nos.			
	(f)	Same as C-2 (e) but 12" sweep.	Nos.			
C-3	**POWER SOCKETS**					
C-3-1		**Switch Socket Outlet**				
		Following SSO complete with back box i.e. M.S. box, made of 16 SWG sheet steel with earth terminal having 2 coats of powder coating of orange colour, M.S. box shall be of the same size as that of SSO.				
	(a)	5 A - 2 Pin Round type SSO (for General Use)	Nos.			
	(b)	10/13 - 3 Pin round type SSO (for General Use)	Nos.			
	(c)	13A Duplex SSO - 3 Pin Flat type / Universal type (for UPS Power)	Nos.			
	(d)	Same as item No. C-3-1 (b) but Simplex SSO (for Normal Power)	Nos.	36		
	(e)	15/16A Simplex SSO - Round Pin or Multi type (for AC or General Purpose)	Nos.			
	(f)	Same as item No. C-3-1 (e) but 20 A Rating	Nos.			
	(g)	Same as item No. C-3-1 (e) but 30 A Rating	Nos.	4		

C-3-2		**Industrial Sockets**				
		Following Industrial Socket Unit (Male & Female Complete Set) complete with back box i.e. M.S. box, made of 16 SWG sheet steel with earth terminal having 2 coats of powder coating of orange colour.				
	(a)	32 A, 3 Pin	Nos.			
	(b)	Same as item No. C-3-2 (a) but 16 A Rating	Nos.	1		
C-4	**CABLE CONTAINMENT**					
C-4-1		**P.V.C. Conduit / Dura Duct**				
		Supply and installation of following sizes of heavy duty PVC conduits recessed in walls, columns, slabs, floors or fixed at Ceiling above false ceiling or in Dura duct if exposed on walls, with all necessary fixing accessories, conduit/duct accessories, such as junction box, bend, socket, saddle, screws etc. complete in all respects as per site requirement and as per brand/make of material specified in Annexure "A" (These PVC Conduits & Duraducts will be used if missed or not included in any of the item's description of this BOQ)				
	(a)	20 mm dia PVC Conduit	Rft.			
	(b)	25 mm dia PVC Conduit	Rft.			
	(c)	33 mm dia PVC Conduit.	Rft.			
	(d)	38 mm dia PVC Conduit.	Rft.			
	(e)	50 mm dia PVC Conduit.	Rft.			
	(f)	75 mm dia PVC Conduit.	Rft.			
	(g)	16 x 16 mm Dura duct with cover	Rft.			
	(h)	16 x 25 mm Dura duct with cover	Rft.			
	(i)	16 x 38 mm Dura duct with cover	Rft.			
	(j)	25 x 25 mm Dura duct with cover	Rft.			
	(k)	25 x 38 mm Dura duct with cover	Rft.			
	(l)	33 x 33 mm Dura duct with cover	Rft.			
	(m)	40 x 40 mm Dura duct with cover	Rft.			
	(n)	50 x 50 mm Dura duct with cover	Rft.			
	(o)	60 x 40 mm Dura duct with cover	Rft.			
	(p)	60 x 60 mm Dura duct with cover	Rft.			
C-4-2		**Floor Box**				

		Fabrication, supply and installation of Floor Box i.e. M.S Box made of mild steel 16 SWG duly painted initially with Red Oxide and finally with approved Colour of appropriate size but not less than 10" x 10" x 4-1/2" deep with openable hinged cover 2.5mm thick, all necessary materials / arrangements for fixation of sockets, holes for passage of outgoing cables, rubber, groumet, earthing terminal, and partition made of backlite. Boxes shall be installed flush with floor and should be suitable for installation of following number of Simplex SSOs or Face Plates. (The cost of SSOs or Face Plates not be included)				
	(a)	Four Nos. Simplex SSOs or Face Plates.				
	(b)	Same as item No. C-4-2 (a) but for Five - SSOs/Face Plates				
	(c)	Same as item No. C-4-2 (a) but for Six - SSOs/Face Plates				
C-4-3		**TECHNOLOGICAL BOX**				
		Fabrication, supply and installation of Technological Box i.e. M.S Box made of M.S 16 SWG duly painted initially with Red Oxide and finally with approved Colour of appropriate size suitable for fixation of following number of Switch Socket Outlets / Face Plates etc. having holes for passage of outgoing cables, rubber, groumet, earthing terminal, and partition made of backlite. (The cost of SSOs or Face Plates not be included)				
	(a)	Four Nos. Simplex SSOs or Face Plates.	Nos.			
	(b)	Same as item No. C-4-3 (a) but for Five - SSOs/Face Plates	Nos.	12		
	(c)	Same as item No. C-4-3 (a) but for Six - SSOs/Face Plates	Nos.			
C-4-4		**PULL BOX**				
		Fabrication, supply and installation of Pull Box i.e. M.S Box made of 16 SWG sheet having heavy duty SS Top Cover of 16 SWG Sheet of following size, complete in all respects as per site requirements.		-		
	(a)	300 mm x 300 mm x 62 mm	Nos.			

C-5	**DATA / VOICE FIXTURES**					
C-5-1		**Face Plates with I/Os**				
		Following Face Plates white/off white finish, complete with shuttered Click-ins, labels and all accessories including back box i.e. M.S. box, made of 16 SWG sheet steel having 2 coats of powder coating of orange colour. M.S. box shall be of the same size as that of Face Plate.				
	(a)	Dual Face Plate with I/Os (1 x RJ45 and 1 x RJ11)	Nos.			
	(b)	Same as item No. C-5-1 (a) but with I/Os (2 x RJ45)	Nos.	12		
	(c)	Same as item No. C-5-1 (a) but with I/Os (2 x RJ11)	Nos.			
	(d)	Simplex Face Plate with 1 x RJ45 I/O	Nos.			
	(e)	Same as item No. C-5-1 (d) but with 1 x RJ11 I/O	Nos.	12		
	(f)	Simplex Face Plate with RG-6 / RG-7 Connector for TV Cable	Nos.			
C-5-2		**Supply of Patch / Drop Cords**				
		Factory tested (imported) Cords of Cat6 - 23 AWG Cable of following sizes				
	(a)	01 meter Patch Cord	Nos.	24		
	(b)	03 meter Drop Cord	Nos.	12		
C-5-3		**Racks and Panels**				
	(a)	**19" Rack for Data Communication**				
		Supply and Installation of 19" - Communication Rack made of M.S Frame, Glass Door, Pull Handle, supported by perforated sides / M.S Cover of following size:				
	(i)	12U wall Mounted	Nos.			
	(ii)	15U Wall Mounted	Nos.			
		27U Floor Standing	Nos.			
	(b)	**Thermostatic type Exhaust/Cooling Fans**				
		Supply and Installation of Thermostatic type Exhaust/Cooling Fans in Communication Rack, with proper connections, complete in all respects	Nos.			
	(c)	**PDU**				
		Supply of PDU with 04 x 13 A Flat Pin or International Type Switch Sockets for Communication Rack	Nos.			
	(d)	**Front Cable Manager**				

		Supply and Installation of Front Cable Manager in Communication Rack with proper labelling / tagging / harnessing.	Nos.			
	(e)	**Patch Panel**				
		Supply and Installation of 24 Port - Patch Panel - in Communication Rack with proper labelling / tagging / harnessing.				
	(i)	Unloaded (Without I/Os)	Nos.			
	(ii)	Loaded (With 24 I/Os)	Nos.			
	(f)	**RJ-45 I/Os for Patch Panel**	Nos.			
C-5-4		**Telephone Junction Box (TJB)**				
		Supply, installation and commissioning of Telephone Junction Box vermin and dust proof, made of M.S 18 SWG sheet with door, handle, anti-rust paint and 2 coats of enamelled paint, locking arrangement, all fixing accessories for following pairs telephone terminal strips (KRONE Strip) with tagging/marking arrangements including cost of all necessary material to connect incoming and outgoing telephone cables, complete in all respect				
		1 x 10 Pair	Nos.			

PART D	**DISTRIBUTION BOARDS AND INTERNAL COMPONENTS**				
D-1	**DISTRIBUTION BOARDS (DBs)**				
	Fabrication, Supply and installation of DBs from the Manufacturer's Names specified in Annexure "A" at designated walls concealed or opened, made up of M.S Sheet of 16 SWG, with flexible earthing straps, degreased and de-rusted, zinc phosphated, finished with electrostatic powder coating of 15 microns thikness in approved colour, housing to comply with Protection Class IP-40, with hinged door, lockable handle, all auxilliaries, internal wiring, combs, designation labels on breakers, earthing bar, numbering beads on the control wires, suitable for System Voltage of 415 V, 50 Hz, 3/1 Phase and earthing with 01 or 02 neutral bus bars of 99.98% pure electrolytic Copper, including appropriate size Cable termination lugs and brass cable glands for incoming and outgoing cables, wiring from breakers, indication lamps (Voltmeter type with voltage reading) and fuses, with M.S Sheet cover beneath front door, gaskets shall also be provided, where necessary,				

	complete in all respects as per Site requirement and approval of Bank's Engineer Incharge.					
	(a)	**Size 15" x 18"**	Nos.			
	(b)	**Size 15" x 21"**	Nos.			
	(c)	**Size 15" x 24"**	Nos.			
	(d)	**Size 18" x 21"**	Nos.			
	(e)	**Size 18" x 24"**	Nos.			
	(f)	**Size 18" x 36"**	Nos.			
	(g)	**Size 24" x 36"**	Nos.			
	(h)	**Size 42" x 48"**	Nos.			
D-2	**INTERNAL COMPONENTS OF DBs**					
	Providing, installation, testing and commissioning of following Components as per brands/makes specified in Annexure "A" in already installed or to be installed DBs with proper connections and tagging, complete in all respects, as per Site requirements and prior approval of Bank's Engineer Incharge.					
D-2-1		**Miniature Circuit Breakers (MCBs) Rail Type, C Type, 6 K - RC**				
	(a)	**Single Pole (SP) - RC-6 KA**				
	(i)	6/10 A	Nos.	5		
	(ii)	16/20/32 A	Nos.			
	(iii)	40 A	Nos.			
	(b)	**Double Pole (DP) - RC - 10 KA**				
	(i)	16/32 A	Nos.			
	(c)	**Three Pole (TP) - RC - 10 KA**				
	(i)	16/20/32/40 A	Nos.			
	(ii)	63 A	Nos.			
D-2-2		**Moulded Case Circuit Breakers (MCCBs)TP, C Type, RC - 10 KA**				
	(a)	40/50/60 A	Nos.			
	(b)	75/100 A	Nos.			
	(c)	150/200A (18KA)	Nos.			
D-2-3		**Four Position Phase Selector Switch - (0-1-2-3-4)**				
	(a)	32 A	Nos.			
	(b)	40/50 A	Nos.			
	(c)	63 A	Nos.			
	(d)	75/80 A	Nos.			
	(e)	100 A	Nos.			
D-2-4		**Change Over Switch 1-0-2**				
	(a)	**Double Pole (DP)**				
	(i)	16 A	Nos.			
	(ii)	32 A	Nos.			
	(b)	**Four Pole (FP)**				
	(i)	32 A	Nos.			
	(ii)	40/50 A				
	(iii)	63 A	Nos.			

PART E	**BURGLAR ALARM SYSTEM**

E-1	**WIRING**					
	Supply, laying, connection and testing of following wiring types; in already laid heavy duty PVC Conduit recessed in walls, columns, slabs, floors or fixed at Ceiling above false ceiling or in already laid Dura duct if exposed on walls, with all necessary fixing accessories, conduit/duct accessories, pull boxes, steel pull wires complete in all respects, required as per site conditions. with make/brand of material being specified in Annexure A. due in consultation with & recommendation of any one of Bank's approved Security Company for different security sensing components, devices, sirens, smoke detector etc. complete with connections in all respect.					
	(a)	1 x 5 Pair Cable	**Rft.**			
	(b)	1 x 2 Pair Cable	**Rft.**			
E-2	**DEVICES / COMPONENTS ETC.**					
	P/F & connections of undernoted security sensing components, devices and siren etc. with the consultation & recommendations of one of the Bank's approved Security Company, complete with testing & commissioning in all respects.					
	(a)	Alarm Panel DSC with Keypad	Nos.			
	(b)	PCB – DSC	Nos.			
	(c)	Keypad Extra (DSC)	Nos.			
	(d)	Battery 12Volts 6/7 Ah	Nos.			
	(e)	Regulated Power Supply	Nos.			
	(f)	Magnetic Contact (Flush)	Nos.			
	(g)	Magnetic Contact (Surface)	Nos.			
	(h)	Audible Warning Device (Siren)	Nos.			
	(i)	Foot Panic switch	Nos.			
	(j)	Panic Switch (Fixed)	Nos.			
	(k)	Passive Infrared Detector (PIR)	Nos.			
	(l)	Auto Telephone Switch (ATS)	Nos.			
	(m)	Smoke Detectors	Nos.			
	(n)	Heat Detector	Nos.			
PART F	**EARTHING SYSTEM**					

	Supply, installation, testing and commissioning of Earthing / Grounding System including all material, boring, labor, tools, transportation, construction of appropriate sized Main Hole Pit (1' x 1' or 13" dia) with CI Cover, other accessories etc. Complete in all respects with detailed test report. TThe Earth Resistance should be below 05-OHM / Neutral to Ground potential less than 03V otherwise earthing would not be acceptable and neither payable.				
F-1	**CHEMICAL TYPE**				
	Supply, installation, testing and commissioning of Chemical Enhanced Earthing System comprises of the following:				
	(a)	1-1/2" dia - 10 ft Copper pipe filled with soil conditioning material/chemical with termination Clamps for Wire connections.			
	(b)	11 ft or more boring of 6" dia and placing above Copper pipe in it.			
	(c)	Back filling of 6" dia boring with Chemical to enhance Conductivity.	Job		
	(d)	Fixing of 02 Nos. Copper Equipotential bars made with 150 mm wide, 50 mm high, 5 mm thick Earth Connecting Points (ECP) respectively with holes for fixing of Copper Conductor.			
	(e)	Interconnection of ECP with termination Clamps of Chemical Pipe with 2 x 8 SWG Solid Copper Conductor or 2 x 10 sq.mm bare flexible Copper Conductor			
	OR				
F-2	**COPPER PLATE OR ROD TYPE**				
	P/M Earth system with 10' long ¾" dia copper bar as required complete with connections with 2 x 10 mmsq. bare flexible copper conductor or 2 x 8 SWG solid copper conductor in 1"dia PVC conduit (holes at every 1") upto permanent water table, terminated on ECPs, with suitable watering arrangement complete as per site requirement or equivalent method i.e by excavation of dig of appropriate size, with copper plate (1-1/2' x 1-1/2' x 1/4"), earth material (salt, coal 15 Kg each & nitric acid 4 liter), appropriate size PVC conduit with tee etc and Fixing of 02 Nos. Copper Equipotential bars made with 150 mm wide, 50 mm high, 5 mm thick Earth Connecting Points (ECP) respectively with holes for fixing of	Job			

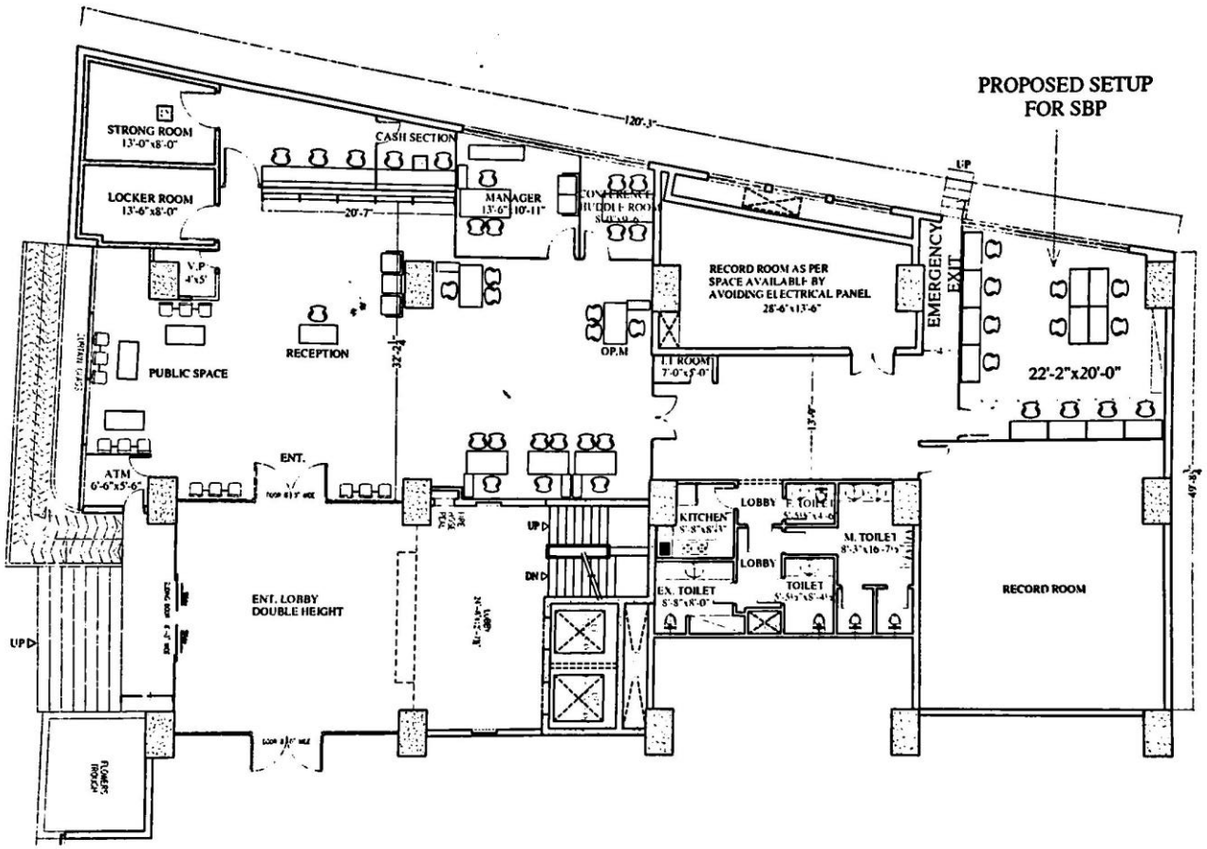
	Copper Conductor.as directed by Engineer Incharge.					
PART G	**MISCELLANEOUS ITEMS**					
G-1	**FIRE EXTINUISHERS**					
	Providing & placement / fixing of under noted Fire Extinguishers at selected/identified locations by the Engineer Incharge.					
	a	Dry Chemical Powder (DCP) portable type 06Kg	Each			
	b	Dry Chemical Powder (DCP) Ball type 03Kg alongwith wall mounted bracket.	Each			
G-2	**COPPER PIPE & CONTROL CABLE**					
	a	Providing & Lying of following size of copper pipe (22 Gauge) including Insulation, complete in all respects.				
	i	3/8" and 5/8" (combine)	Rft			
	b	Providning & Lying of 4 core PVC/PVC control cable(Size 110/0.0076), from indoor unit to out door unit complete with connection.	Rft			
G-3		**CCTV WIRING**				
	i	Providing & Lying Cat-6 Cable 23 AWG (as mentioned in attached annexure) for CCTV Camera with splitter Complete PVC pipe/duct as per site requrement	Each			
G-4	**AS BUILT DRAWINGS**					
	Preparation and submission of As-built drawing of complete electrical and allied works duly approved by Client's Engineer until their level of satisfaction. (2 Sets)		Job			

Note: Electrical material specifications to be followed as given in attached annexure .

				Total:	

AIR-CONDITIONING WORKS

Sr. No.	Description	Qty.	Rate in word & figure	Unit	Amount
1	Supply & installation of single phase 220/240 V, 50C/S **DC Inverter AC Unit (Hot & Cool)** capacity 18000 BTU (1.5 Ton), comprises of evaporating & condensing units wall mounted with rotary/reciprocating compressor alongwith 22 gauge 10 Rft copper pipes and insulation, hole filling with white cement & L-type power quoted angle iron frame size 1-1/2" x 1-1/2" x 1/8" thick, handling charges (loading, unloading, transportation etc.) i/c evacuation, nitrogen pressure, testing, gas charging with standard suction and discharge pressures and amperes, control wiring, rawal bolts, drain piping, testing commissioning complete in all respect. The specifications of quoted AC must be filled in Annexure "A" for scrutiny.	1 No.		Each	
2	Supply & installation of single phase 220/240 V, 50C/S **Floor Standing AC Unit Inverter type Heat & Cool** capacity 24000 BTU (2.0 Ton), comprises of evaporating & condensing units wall mounted with rotary/reciprocating compressor alongwith 22 gauge 10 Rft copper pipes and insulation, hole sealing with white cement & L-type power quoted angle iron frame size 1-1/2" x 1-1/2" x 1/8" thick, handling charges (loading, unloading, transportation etc.) i/c evacuation, nitrogen pressure, testing, gas charging with standard suction and discharge pressures and amperes, control wiring, rawal bolts, drain piping, testing commissioning complete in all respect. The specifications of quoted AC must be filled in Annexure "A" for scrutiny.	1 No.		Each	
3	Extra copper piping 1/4, 1/2 - 1.0 / 1.5 Ton A.C Units with Installation, control wiring gas Charging, insulations drain piping complete in all Respect.	60 Rft		P.Rft	
4	Extra copper piping 5/8, 3/8, 2.0 Ton A.C Units with Installation, control wiring gas Charging, insulations drain piping complete in all Respect.	70 Rft		P.Rft	
5	Underground drain piping of high density PVC 1" dia with cutting and patch works for A.C unit etc.	60 Rft		P.Rft	
6	Providing & fixing 3" dia PVC duct for concealing copper piping of AC units.	15 Rft		P.Rft	
				Total:	



PROPOSED GROUND FLOOR LAYOUT PLAN

COVERED AREA = 5500 Sft.

National Bank of Pakistan
Engineering Wing
26- Mclagon Road, Lahore
T: 042 - 9210641

Drawing Title:	Proposed Ground Floor Layout Plan
Project Location:	N.B.P ACP Model Branch 27H Gulberg Lahore
Date:	08-01-2024
Scale:	To Fit
Project Code:	P-18-6-13
Drawing Number:	00
Revision Number:	00
Drawn By:	M.Ashraf
Instructing Engineer:	

MINOR REPAIR & RENOVATION WORKS REQUIRED AT NBP ACP MODEL BRANCH, PACE TOWER GULBERG, LAHORE

(ANNEXURE "A")

(List of approved Brands/ Manufacturers)

S. #	DESCRIPTION	MAKE
1	PVC Pipes & Accessories	Galco
		Jeddah
2	PVC Channel Patti / Dura Duct	Adamjee
		Jeddah
3	MS Back Box/Pull Box/ Technological Box etc.	Local Made
4	Floor Box	Clopal
		Schneider
		Local made
5	Switch Socket Outlets (SSOs) / Switches	Clipsal
		Orange
		Bosch
6	Industrial Sockets	Clipsal
7	DATA/ Voice Face Plates, RJ45/RJ11 I/Os / Connectors	3M
		Schneider
8	Factory tested Patch / Drop Cords	3M
		Schneider
9	Data Cabinet / Communication Rack	Local Made
10	Patch Panel	3M
		Schneider
11	Front Cable Manager	Local Made
12	Telephone Junction Box	Local made
13	Telephone Tag Block	Krone
14	Telephone Cable 10 Pair	Pony
15	Cat 6E, 23 AWG Cable	3M
		Schneider
16	Electrical Wires / Cables	Pakistan Cables
		Newage Cables
		Fast Cables
		Pioneer Cables
		AGE Cables

17	Burglar Alarm Cables	Million cables
		Pakistan Cables
18	Lights (all types)	Philips
		E-Delux
		Osaka
		Opple
19	Fans (all types)	Pak
		GFC
		Voldam
		Royal
20	Distribution Board	Universal
		Engineers & Engineers
		Prem Engineering
21	Circuit Breakers	ABB
		MG
		Terasaki
22	Change Over Switch	OPAS
		Kraus & Naimer
		Gave
23	Phase Selector Switch	OPAS
		Kraus & Naimer
		Gave
24	Control Fuse	DF
		ETI
25	Earth Copper Plate / Rod	Local made

Note: Material if installed other than manufacturers listed above will not be entertained/paid.

CHECK LIST

ELIGIBILITY CRITERIA

No.	**Document**	Attached (Yes/No)	Attachment Annexure
1.	**Valid Registration Certificate** of Pakistan Engineering Certificate	Yes	Annexure- A
2.	Certificate of income Tax FBR Active Taxpayer List (ATL)	Yes	Annexure- B
3.	Certificate of Sales Tax On Services (SRB) Active Taxpayer List (ATL)	Yes	Annexure- C
4.	Completion Certificates (02 Nos.) of works completed in Last Three Years costing not less than 1.00 Million, any Bank.	Yes	Annexure- D & E

NOTE:

In case of non-submission of any eligibility documents listed above the bid will be rejected.

Annexure- A

Annexure- B

Annexure- C

Annexure- D

Annexure- E