TENDER DOCUMENT

FOR

RENOVATION WORKS

OF

PTU's MOHALI CAMPUS

AT

C102B, PHASE – VII

INDUSTRIAL AREA, MOHALI

TECHNICAL BID

PART - I

OCTOBER 2013

PUNJAB TECHNICAL UNIVERSITY
JALANDHAR-KAPURTHALA HIGHWAY
PUNJAB

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PUNJAB TECHNICAL UNIVERSITY
JALANDHAR-KAPURTHALA HIGHWAY
(PUNJAB)
(Established By Punjab Government)

NOTICE INVITING TENDER

1.0 Sealed tenders are invited from contractors/agencies having requisite experience and financial capability under 'Two Packet System' (Technical Bid – Unpriced & Financial Bid – Priced) on behalf of Punjab Technical University hereinafter referred as PTU for the following works:-

S. No.	Name of Work	Estimated cost (Rs)	Earnest Money (Rs)	Completion Period
1.	Renovation works of PTU's Mohali campus at C-102B, Phase-VII, Industrial Area, Mohali.	308.76 lacs	6,17,500/-	4 months (Phase-I to be completed in three months)

2.0 The tender document can be obtained from 10.00 AM to 04.00 PM on all working days from 28.10.2013 to 15.11.2013 from the office of 'The Registrar, Punjab Technical University, Jalandhar-Kapurthala Highway, Punjab on payment of Rs. 1000/- (Rupees One Thousand only), non-refundable, in cash or demand draft/pay order drawn in favour of 'The Registrar, Punjab Technical University payable at Jalandhar towards the cost of one tender document. Tender document can also be downloaded from PTU's website www.ptu.ac.in and in such a case, the bidder shall deposit the cost of tender documents alongwith submission of the tender, failing which his tender shall not be opened. The cost of tender documents in this case shall be deposited in the form of demand draft/pay order and submitted in the envelope containing Earnest Money Deposit (EMD).

3.0 The Earnest Money for an amount as specified above shall be deposited in the form of demand draft/pay order drawn in favour of 'The Registrar, Punjab Technical University' payable at Jalandhar.

4.0 The bidders are advised not to make any corrections, additions, alterations in the downloaded tender documents. In case, any corrections, additions, alterations are made in the downloaded tender documents, such tender shall not be considered.

5.0 Eligibility Criteria:

Eligibility Criteria of the bidders shall be assessed based upon the "Qualifying Criteria" forming part of the tender documents.

6.0 Pre Bid Meeting:

For any clarifications required by the tenderers regarding this work, a pre bid conference will be held on 06.11.2013 at 1130 hours at PTU's campus at C-102B, Phase-VII, Industrial Area, Mohali . The intending bidders are requested to furnish their queries before the pre-bid meeting so that suitable reply is furnished in the pre-bid meeting. Queries can either be sent by e-mail at exeptu@gmail.com or by fax at 01822-662574. PTU may issue corrigendum/addendum based on the discussions held/agreed amendments during the pre-bid meeting and this addendum/corrigendum shall also form part of the bid document.

7.0 PTU may issue addendum(s)/corrigendum(s) to the tender documents. In such case, the addendum(s)/corrigendum(s) shall be issued and placed on PTU's website atleast three days in advance of date fixed for opening of tender. The bidders who have downloaded the tender documents from website must visit the website and ensure that such addendum(s)/corrigendum(s) (if any) is also downloaded by them. Such addendum(s)/corrigendum(s) (if any) shall also be submitted, duly stamped and signed, alongwith the submission of the tenders. Any tender submitted without addendum(s)/corrigendum(s) (if any) is liable to be rejected.

8.0 The tender documents shall be submitted in two separate sealed packets viz. Packet-I containing Technical Bid and Packet-II containing Financial Bid.

Detailed credentials as per the requirement of eligibility criteria and all tender papers except Bill of Quantities are to be submitted in "Technical Bid".

Tender documents issued by PTU or downloaded, duly stamped and signed on all pages shall also be deposited in the envelope containing Technical Bid (Packet-I). In case, any tenderer will not submit these documents alongwith the tender, his bid will be out-rightly rejected.

All DDs/cash receipts for cost of documents and DD for EMD, must be enclosed in a separate envelop alongwith Technical Bid.

Bill of Quantities with rates duly filled in are to be submitted in "Financial Bid".

9.0 Completed tender documents in two packets viz. Packet-I and Packet-II shall be sealed separately in envelopes super-scribing as Packet-I (Technical Bid) and Packet-II (Financial Bid) along with the name of the work. These two sealed envelopes and the envelop (super-scribing "Earnest Money and cost of tender documents for the work" containing the Earnest Money and cost of tender documents) in the form as prescribed in the tender documents shall further be sealed in a larger envelope super-scribing the name of the work as stated above (alongwith date and time of opening of tenders) and should be deposited in the tender box at the following address:

THE REGISTRAR,
PUNJAB TECHNICAL UNIVERSITY
JALANDHAR-KAPURTHALA HIGHWAY
PUNJAB

before **12.00 hours of 18.11.2013**. Tenders (Technical Bids only) shall be opened at **12:30** hours on the same day in the presence of the tenderers or their authorised representatives intending to attend the opening. After evaluation of the technical bids, the financial bids of only those agencies who fulfill the eligibility criteria specified in the tender documents shall be opened. The date, time and location for opening of financial bids of these shortlisted agencies will be intimated separately to enable intending agencies to attend and opening of financial bids. The decision of PTU regarding evaluation/fulfillment of eligibility criteria shall be final and binding. Any bid received later than the time and date of opening of Technical bids shall be rejected and returned to the bidder unopened.

10.0 In case, the date of submission/opening of tenders happens to be holiday, the tenders shall be received/opened on the next working day.

11.0 Tender shall be submitted as per "Instructions To The Tenderers" forming a part of the tender document.

12.0 Any tender received without Earnest Money & the cost of tender document in the form as specified in tender documents shall not be considered and shall be summarily rejected.

13.0 PTU reserves the right to cancel the tenders or postpone the tender and to accept/reject any or all tenders without assigning any reasons thereof.

14.0 Tenderers may note that they are liable to be disqualified at any time during tendering process in case any of the information furnished by them is not found to be true. EMD of such tenderer shall be forfeited. The decision of PTU in this regard shall be final and binding.

15.0 The validity of the offer shall be 90 days after the date of opening of the tender. If any bidder withdraws his tender within the validity period or makes any modifications in terms and conditions of the tender and/or rates after submission of tender which are not acceptable to PTU or does not start the work within stipulated period from the date of issue of letter of acceptance, then PTU shall without prejudice to any other right or remedy, be at liberty to forfeit the earnest money deposited by the bidder. In case of forfeiture of EMD, the tenderer shall be debarred from bidding in case of re-invitation of the tenders.

16.0 The transfer of tender documents purchased by one intending tenderer to another tenderer is not admissible. Tenderer can submit tenders only on the documents purchased/downloaded from PTU's website.

Registrar
Punjab Technical University

ELIGIBILITY CRITERIA:

The tenderers **fulfilling all the following** shall be considered as qualified for opening of financial bids:

1. The tenderer should possess the experience of having successfully completed similar works during the last five years (ending last day of the previous month to the one in which tenders are invited) which should be any of the following:-

   i. Three similar completed works each costing not less than Rs. 124.0 lacs.

   ii. Two similar completed works each costing not less than Rs. 154.0 lacs.

   iii. One similar completed works costing not less than Rs. 247.0 lacs.

   Similar works means "Construction of building works"

   The bidders should submit performance certificates issued by the Clients for having successfully completed the works.

2. The agency should have minimum average annual turnover of Rs. 232.0 lacs in the last 3 financial years.

   The financial turnover shall be judged from annual reports and/or profit and loss account statement duly signed by the Chartered Accountant. The bidders should submit these reports for the financial years 2012-13, 2011-12, 2010-2011 alongwith the bids. Alternatively, Chartered Accountant's certificate indicating the turnovers may also be submitted.

3. The bidder should not have been blacklisted or debarred from bidding or declared as a non-performer by any Govt./Semi Govt./Autonomous body. The bidders shall submit an affidavit duly attested by Notary that they have not been blacklisted or debarred from bidding or declared as a non-performer by any Govt./Semi Govt./Autonomous body.

4. The bidders should have valid PAN in the name of the bidder.

5. The bidder should be registered contractor with Govt. agencies at appropriate level.

6. The agency who has already worked/working with PTU must submit a satisfactory report from PTU failing which his bid shall not be considered and summarily rejected.

   Enclose self attested copies of the documents for S. No. 4 & 5.

SPECIAL CONDITIONS OF CONTRACT

1.0 **Date of commencement:** On 7th day after issue of "Letter of Acceptance".

2.0 **Date of completion:** All the works (Phase-I & II both) shall be completed in a phased manner within four months from the date of commencement of works. The works of Phase-I shall be completed within three months from the date of award of work.

3.0 **Tender bond (earnest money):** Rs. 6,17,500/- (Rupees Six Lac Seventeen Thousand Five Hundred only) by way of Demand Draft shall be adjusted against Security deduction from on account bills.

4.0 **Deleted**

5.0 **Security deposit:** An amount @ 10.0% of the running on-account bills/final bill will be deducted towards security deposit after adjusting earnest money deposit, which may be released against submission of Bank Guarantee on satisfactory completion of works. This Bank Guarantee shall remain valid till Defect Liability Period plus two months. No interest can be claimed for the deposit of earnest money or security money which will be lying with the Punjab Technical University.

The certificate for satisfactory completion of Defect Liability Certificate shall be issued by the Engineer-in-charge.

6.0 **Deleted**

7.0 **Mobilization Advance:** Punjab Technical University may consider payment of mobilization advance upto 10% of the awarded value to the successful bidder against submission of Bank Guarantee of equivalent advance plus interest amount of three months. This advance shall carry an interest @ 12% per annum to be calculated on monthly basis. This advance shall be recovered alongwith interest from the bills of the contractor on pro-rata basis and whole recovery shall be completed till completion of 85% of the works. The Bank Guarantee submitted by the bidder shall be released on recovery of complete mobilization advance alongwith the interest.

8.0 Deleted.

9.0 **Running Bill Value:** Only one bill shall be submitted/paid in a month.

10.0 **Defects Liability Period:** The defect liability period will be 12 months from the date of completion of works in all respects.

11.0 **Insurance and Registration:** The tenderer shall allow in their Tender for arranging the following insurances policies such as Workmen Compensation Policy and Contractors All Risk Policy in joint names of The Punjab Technical University and the Contractor with The Punjab Technical University name appearing first in the policy.

i. Comprehensive project insurance: The project shall be insured for 120% of its full Contract value till handing over;

ii. Third party insurance in respect to injury of persons and damage to property shall be as follows.

a) Public Liability: Limit for bodily injury or death not more than Rs 1.0 lacs for one person and Rs 2.0 lacs for any one accident with no limit on the number of accidents.

b) Property Damages: Limit for each accident not more than Rs 5 lacs.

The above insurance coverage shall be taken out before physical start of work and maintained by the Contractor for the duration of Contract including the extended periods, if any.

No certificate of payment shall be issued by the Engineer, if the contractor fails to arrange for total insurance cover.

Indemnity Bond: The Employer / Engineer shall not be liable for or in respect of any damages or compensation payable to any workman or other person in the employment of the Contractor or his sub-contractor or petty contractor. The contractor shall indemnify and keep indemnified the Employer / Engineer against all such damages and compensation for which the Contractor is liable. An Indemnity bond shall be furnished by the Contractor in this regard. Performa for furnishing the Indemnity Bond is forming part of the tender documents.

12.0 Submission of Policies and other documents: The original policies, receipts for premium, guarantees and certificates shall be deposited with the Engineer, and the Engineer, reserves the right to withhold any payment until all the provisions of this clause have been complied with.

13.0 Contractor will comply with payment of Wages Act, Minimum Wages Act, Employer's Liability Act and Contract labour Rules etc. and any other Statutory Act as applicable from time to time.

14.0 **Liquidated Damages**: Liquidated damages will be charged @ 0.25% of original Contract value per day subject to a maximum of 5% of the original Contract value. The Contractor may make a representation to the BOG committee to reduce the amount and BOG committee’s decision in this regard shall be final.

15.0 **Facilities**: The Employer shall not provide any facilities like water; electricity etc. at site and the contractor shall have to make his own arrangements for the same.

16.0 **Material Issue**: All materials are to be purchased by the Contractor. The same will be brought to the Site with challans in quadruplicate, to be entered at the security gate (1 copy to be given to security), stamped and submitted to the Engineer of the Site for quality control. (1 copy for Contractor record, 1 copy for Engineer).

17.0 **Tax Deductions**: All taxes like Income Tax, Sales Tax, Turnover Tax, Octroi, VAT, Labour Cess etc as applicable will be deducted and deposited with the concerned Govt. Department by the Employer and the Employer will give certificate/proof to the Contractor as per Income Tax, Sales Tax and W.C. Tax Rules. Service tax as applicable will be payable by the Contractor directly.

18.0 **E.S.I/E.P.F.**: Clearance from appropriate authority to be obtained and submitted by the Contractor otherwise suitable amount payable to E.S.I/E.P.F. will be withheld.

19.0 **Quantities in Bill of Quantities**: Quantities shown against each item are provisional and likely to increase or decrease. Some of the items may be omitted altogether. No claim whatsoever shall be entertained on this account. All other terms and conditions of the contract shall remain unaffected by such alteration.

20.0 **Temporary Work:** The areas under constructions are to be cordoned off such that no visitors are put to inconvenience. Appropriate signage of "Work under progress" is to be displayed. In addition, the Contractor shall abide by the Safety code provision as per Indian Standard Safety Code framed from time to time for all the temporary works including shuttering and scaffolding.

21.0 Deleted.

22.0 **For New Items (Non-Scheduled Items):** For items not included in the tender, the rates for these items will be derived from DSR after applying quoted percentage. If the similar item is not available in the DSR also, then the market rate analysis will be carried out in which the contractor profit, supervision and overhead is fixed at 15%. Work contract tax and VAT rate as applicable will be paid extra**.** Analysis of rates for the new items will be submitted by the Contractor and got approved from the Engineer, before execution.

23.0 **Time Schedule:** Immediately on award of contract the contractor shall furnish to the Engineer a time bound schedule of completion schedule and all related schedule resources.

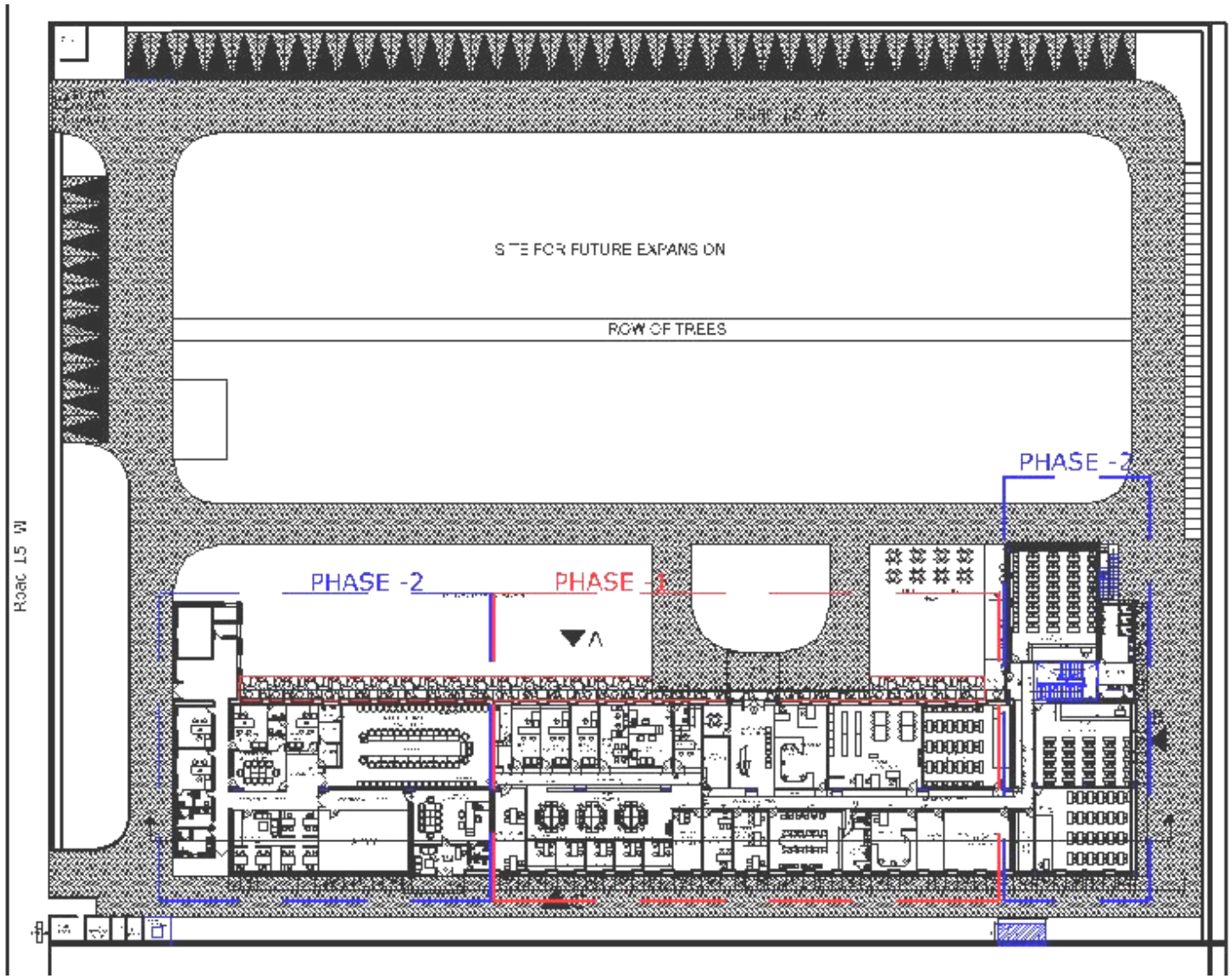
24.0 **Deleted.**

25.0 **Canvassing** in connection with the tenders is strictly prohibited and the tenders submitted by the Contractors who resort to canvassing will be liable to rejection.

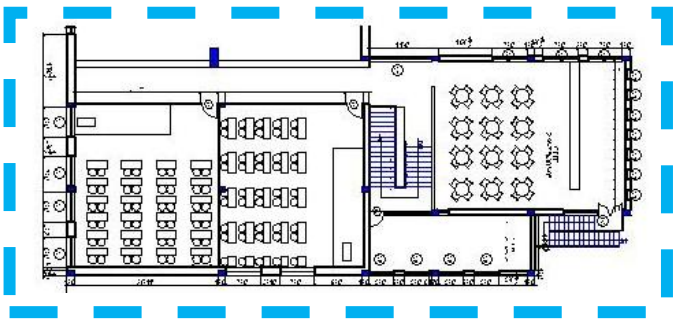
26.0 Deleted.

27.0 Scope of Work:

The scope of work is inclusive of renovation works including Civil, Structural, Roofing, Plumbing, Interiors, HVAC and Electrical (HT and LT works) etc. for the area as indicated in the sketch below. The works to be completed in Phase-I and Phase-II are also shown in the sketch:



GROUND FLOOR PLAN



FIRST FLOOR PLAN

PHASE -1-: The work need to be completed and finished in all respects to complete satisfaction of the client and the architect, which includes Civil, Structural, Roofing, Plumbing, Interiors, HVAC and Electrical (HT and LT works) etc. for the area as indicated in the sketch above and as depicted in the drawings.

PHASE -2-: The work need to be completed and finished in all respects to complete satisfaction of the client and the architect, which includes Civil, Structural, Roofing, Plumbing, Interiors, HVAC and Electrical (HT and LT works) etc. in the sketch above sketch and as depicted in the drawings. Casting of slab above Class room 1, 2 and 3 and all the external works including construction of metering room , ht panel room , platform for DG set, site development , road laying and all the landscaping will be completed in the 2nd Phase.

28.0 Approval of Source for procurement of various materials:

Before start of the work, the Contractor shall get approval of source/factory for procurement of various materials required for the works from PTU and its Architect. In the interest of timely completion of works, PTU may consider approval of more than one source. However, it will be ensured by the contractor that the materials procured from different sources will not be mixed while fixing. All materials shall be procured by the Contractor from approved source(s) only for which documentary evidences shall be submitted by the Contractor.

INSTRUCTIONS TO TENDERERS

1. Definitions

1.1 The tender documents consist of **Part I – Technical Bid :** Notice Inviting Tender, Special Conditions of Contract, Instruction to Tenderers, General Conditions of Contract, Technical Specifications, Tender forms, Tender Drawings and DDs/Cash Receipt for cost of tender documents and EMD; **Part-II – Financial Bid –** Bill of Quantities.

1.2 Definitions set forth in the general conditions of the contract for construction, or in other contract documents are applicable to the tender documents.

1.3 Addenda / Corrigenda: Graphic instruments or revised agreement or conditions issued by the Employer prior to submission of tender, which modify or interpret the tender documents by additions, deletions, clarifications or corrections.

1.4 A tender is a complete and properly signed proposal to do the work for the sums stipulated therein, submitted in accordance with the tender documents.

1.5 The base is the percentage (higher or lower) stated in the tender for which the tenderer offers to perform the work described in the tender documents, above or below the estimated cost, to which work may be added or from which work may be deleted for items stated in the tender.

1.6 A unit price is an amount stated in the tender as a price per unit of measurement for materials, equipment or services or a portion of the work as described in the tender documents.

1.7 A tenderer is a person or entity that submits a tender.

1.8 A sub-tenderer is a person or entity that submits a tender to the tenderer for materials, equipment, labour or for a portion of the work.

2. Tenderer's representations

2.1 The tenderer by making a tender shall mean that:

2.1.1 The tenderer has read and understood the tender documents and the offer is made in accordance therewith.

2.1.2 The tenderer has read and understands the tender documents or contract documents to the extent that such documentation relates to the work for which the tender is submitted, for other portions of the project, if any, being tendered concurrently or presently under construction.

2.1.3 The tenderer has visited the site, become familiar with local conditions under which the work is to be performed, has correlated the tender's personal observations with the requirements of the proposed contract documents and has made allowances in his quote for any difficulties, site conditions etc. in carrying out the work in accordance with the specifications, conditions of contract etc. even though these may not be specifically mentioned.

2.1.4 The tender is based upon the materials, equipments, labor and the systems required by the tender documents without exception.

3. Tender documents

3.1 **Copies**:

3.1.1 Tenderers may obtain complete sets of the tendering documents from the issuing office designated in the advertisement or invitation to tender or the same can be downloaded from PTU's website.

3.1.2 Tenderer's documents will not be issued directly to sub-tenderer's or others. Tenderer assumes responsibility for errors or misinterpretations resulting from the use of incomplete sets of tender documents.

3.1.3 In making copies of the tender documents available on the above terms, the Employer and Architect do so only for the purpose of obtaining tenders on the work and do not confer a license or grant permission for any other use of the Tender Documents.

3.2 Interpretation or correction of Tender documents.

3.2.1 The Tenderer shall carefully study and compare the tender documents with each other, and with other work being tendered concurrently or presently under construction to the extent that it relates to the work for which the tender is submitted, shall examine the site and local conditions, and shall report in writing to the Engineer for errors, inconsistencies or ambiguities discovered at least three days before the last date of submission of tenders.

3.2.2 Tenderers and sub-tenderer's requiring clarifications or interpretation of the tender documents shall make a written request at least seven days before the last date of submission of tenders.

3.2.3 Interpretations, corrections and changes of the tender documents will be made by the Employer by addendum / corrigendum. Interpretations, corrections and changes of the tender documents made in any other manner will not be binding, and tenders shall not rely upon them.

4 Addenda and corrigenda

4.1 Addenda and corrigenda, if any, will be mailed / faxed to all who are known by issuing office to have purchased a complete set of tender documents. The same will also be uploaded on PTU's website.

4.2 Copies of addenda and corrigenda, if any will be made available for inspection at the office of the Executive Engineer, PTU, Jalandhar.

4.3 No addenda and corrigenda will be issued later than three days prior to the date for receipt of tenders except an addendum and corrigendum withdrawing the request for tenders or one which includes postponement of the date for receipt of tenders.

4.4 Each tenderer shall ascertain prior to submitting a tender that the tenderer has received all addenda and corrigenda issued, and the tenderer shall acknowledge their receipt in the tender.

5 Tendering procedures

5.1 Form and style of tenders:

5.1.1 Tenders shall be submitted on the original forms included in the tender documents and this written data will form part of the agreement between the employer and the contractor.

5.1.2 All blanks on the tender form shall be filled in by typewriter / electronically printed or manually in ink.

5.1.3 The rates for items shall be written both in figures and words and in case of discrepancy between the amount in figure and in words, the amount written in words shall govern.

5.1.4 Interlineations, alterations and causers must be initialed by the signer of the tender.

5.1.5 Deleted

5.1.6 Submission of tenders by a Joint Venture firm or Consortium is not permitted.

5.2 Tender security/Earnest Money:

5.2.1 Each tender shall be accompanied by the tender security/Earnest Money in the form and amount required pledging that the tenderer will enter into an agreement with the Employer on the terms stated in the tender and will furnish bonds covering the faithful performance of the contract and payment of all obligations arising there under. Should the tenderer refuse to enter into such contract or fail to furnish such bonds if required, the amount of the tender security shall be forfeited to the Employer as penalty.

5.2.2 Earnest money/Tender security for an amount, as specified in Notice Inviting Tender will be submitted in the form of demand draft/Pay order only. If the tender is not awarded with in the validity period / extended validity period, the earnest money will be refunded.

5.3 Submission of tenders

5.3.1 The tender documents shall be submitted in two separate sealed packets viz. Packet-I containing Technical Bid and Packet-II containing Financial Bid. Detailed credentials as per the requirement of eligibility criteria and all tender papers except Bill of Quantities are to be submitted in "Technical Bid". Bill of Quantities with rates duly filled in are to be submitted in "Financial Bid".

5.3.2 Completed tender documents in two packets viz. Packet-I and Packet-II shall be sealed separately in envelopes super-scribing as Packet-I (Technical Bid) and Packet-II (Financial Bid) along with the name of the work. These two sealed envelopes and the envelop (super-scribing "Earnest Money and cost of tender documents for the work" containing the Earnest Money and cost of tender documents) in the form as prescribed in the tender documents shall further be sealed in a larger envelope super-scribing the name of the work as stated above (alongwith date and time of opening of tenders) and should be deposited in the tender box at the following address:

THE REGISTRAR,
PUNJAB TECHNICAL UNIVERSITY
JALANDHAR-KAPURTHALA HIGHWAY
PUNJAB

5.3.3 The tenderer shall assume full responsibility for timely delivery at the location designated for receipt of tenders. Oral, telephonic or telegraphic tenders are invalid and will not receive consideration.

5.4 Modification or withdrawal of tender

5.4.1 A tender shall not be modified, withdrawn or cancelled by the tenderer during the stipulated time period following the time and date designated for the receipt of tenders, and each tenderer so agrees in submitting a tender. If tender is withdrawn within validity period, the tender bond (earnest money deposit) will be forfeited.

5.4.2 Tender once submitted can not be withdrawn / amended and if any contractor does so, his earnest money will be forfeited.

6 Consideration of tenders

6.1 Opening of tenders: The Employer will open all the Tenders (Technical Bids only) received (except those received late), in the presence of the Tenderers or their representatives who choose to attend the opening. In the event of the specified date of Tender opening being declared a holiday for the Employer, the Tenders will be opened at the appointed time and location on the next working day.

6.2 "Part I; Technical Bid", shall be opened first and if the same is found to be incomplete in any respect, or if the Cost of tender documents and/or Earnest Money is not found in the envelope – then the Tender shall be rejected and "Part II; Financial Bid" of the concerned Tenderer shall not be opened.

6.3 Rejection of tenders : The Employer shall have the right to reject any or all tenders for any reason whatsoever without disclosing the same including but not limited to rejecting a tender not accompanied by required tender security or by other data required by the tender documents, or reject tender which is in any way incomplete or irregular.

6.4 Acceptance of tender (award): Acceptance of Lowest tender is not obligatory and the employer reserves the right to reject any or all the tenders received without assigning any reason.

7 Post-Tender information

7.1 Submittals

7.1.1 The tenderer shall, within 3 days after notification of selection for the award of a contract, furnish the following to the employer's projects team in writing**:**

a. A designation of the work to be performed with the tenderer's own forces.

b. Name of the manufacturers, products and the suppliers of principal items or systems of materials and equipment proposed for the work.

c. Name of person or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the work.

7.2 The tenderer will be required to establish to the satisfaction of the Employer the reliability and responsibility of the persons or entities proposed to furnish and perform the work described in the tender documents.

7.3 Prior to the award of the contract, the Engineer will notify the tenderer in writing if The Employer after due investigation, has reasonable objection to a person or entity proposed by the tenderer. If The Employer has reasonable objection to proposed person or entity, the tenderer may, withdraw the Tender, or submit an acceptable substitute person or the entity with an adjustment in the base tender or alternate tender to cover the difference in cost occasioned by such substitution. The Employer's projects team may accept the adjusted tender price or disqualify the tenderer. In the event of either withdrawal or disqualification, the Tender bond will be forfeited.

7.4 Person and entities proposed by the tenderer and to whom The Employer has made no reasonable objection must be used on the work for which they were proposed and shall not be changed except with the written consent of the Employer's projects team.

8 Deleted

9 Agreement between Employer and Contractor

9.1 Once the contract has been awarded, the party shall enter into a formal agreement on the broad terms of this tender. Unless otherwise required in the tender documents, the agreement for the work will be written on "Construction Contract Agreement" between The Punjab Technical University and contractor where basis of payment is a quoted percentage of the estimated cost above or below which the contractor agrees to works . The following shall be deemed to form and be read and construed as part of the contract:

A. Part I containing:
   1. Notice Inviting Tender
   2. Special Conditions of Contract;
   3. Instruction to tenderers;
   4. General Conditions of Contract;
   5. Technical specifications,
   6. Tender Forms;
   7. Tender Drawings

B. Part II containing Priced schedule of quantities with accepted rates; and

C. All addenda and corrigenda, if any.

9.2 The Agreement shall be drawn up in quadruplicate, the original and a copy of which shall remain in the custody of the Employer and shall be produced by him as and when required either by the Engineer or by the contractor or by both. The other two copies of the Agreement may, however, be retained by the Engineer and the contractor. The contractor on signing here shall be furnished by the Employer free of cost with two sets each of blank tender copies and drawings. The contractor shall keep one copy of all drawings on the works and the Engineer or their representatives / Employer /Engineer in-charge shall at all reasonable, times have access to the same. Before the issue of the final certificate to the contractor, he shall forthwith return to the Engineer all drawings and specification.

9.3 All the costs, charges and expenses incurred in connection with the preparation and completion of this Agreement including Stamp Duty shall be paid by the contractor.

GENERAL CONDITIONS OF CONTRACT

1 Definitions

1.1 In construing the Conditions of Contract, the specifications, the tender form (Bill of Quantities) and other documents forming part of this Contract, the following words shall have the meaning herein assigned to them except where the subject or context otherwise requires unless the contrary intention appears.

1.1.1 Employer shall mean The Punjab Technical University (PTU)**.**

1.1.2 BOG : shall mean Board of Governors of PTU.

1.1.3 BOG Committee: shall mean Committee nominated by Board of Governors of PTU.

1.1.4 Building Construction Committee : shall mean a committee constituted by the Board of Governors of PTU for construction of PTU campus.

1.1.5 The VC: shall mean the Vice Chancellor of the PTU.

1.1.6 The Registrar: shall mean the Registrar of the PTU.

1.1.7 Executive Engineer: shall mean the Executive Engineer (Construction), PTU.

1.1.8 Engineer: shall mean Asstt. Executive Engineer or Asstt. Engineer , PTU, or an Agency / Person appointed by the PTU, to perform the duties of the Engineer.

1.1.9 Engineer's Representative: shall mean a person designated by the Engineer.

1.1.10 Architect shall mean Archigroup Architects (Regd.), A-14, Sector 15, Noida-201301, U.P. and their service consultants.

1.1.11 Architect's Representative shall mean a person designated by the Architect.

1.1.12 Consultants / Advisors shall mean Engineers / Experts appointed by the Employer to design and supervise architectural, structural, electrical, plumbing, and all engineering works and also to supervise installation of systems and equipment in the works.

1.1.13 Contractor shall mean the individual, firm, company, corporation, who enters into a contract with Employer/Engineer and shall include its heirs assigns, successors, legal representatives.

1.1.14 Contractor's Representative: shall mean a person designated in writing by the authorized signatory of the Contractor.

1.1.15 Contract shall mean the formal agreement signed by the Employer and contractor.

1.1.16 Defects liability period–shall mean twelve (12) months from the date of testing, commissioning certified by the employer project team.

1.1.17 Nominated sub–contractor shall mean any person or agency appointed by the Employer for the execution of any particular work or providing any services under the contract.

1.1.18 Nominated supplier shall mean any person or agency appointed by the Engineer to supply specified material equipment.

1.1.19 Sub–contractor shall mean a person or agency selected by the contractor with the written consent of the Engineer for carrying out specified part of the works under a direct agreement with the contractor.

1.1.20 Site shall mean location of the proposed works, as more particularly described in the plan annexed herewith.

1.1.21 Work or works shall mean the item of Work and activities to be carried out under the contract whether of permanent or temporary nature, and including all additional, altered substituted items for the employer.

1.1.22 Substantial Completion shall mean completion of the Works as per drawings and specifications to the entire satisfaction of the employer's projects team and particularly the securing of the virtual completion certificate from the employer.

1.1.23 Final completion shall mean the completion of the works and any necessary rectification directed to be carried out during the defects liability period, and any extension thereof granted by the Employer and the securing of such final completion certificate from the Employer's projects team, signaling the final handing over of the works to the Employer's projects team, and the acceptance of the same.

2 Documents

2.1 The intent of the contract document is that the contractor shall carry out and complete the works in accordance with the drawings, specifications, bills of quantities and other related documents and further the contractor shall provide all labour, material and management services necessary for the proper and timely executions of the works.

2.2 The contract and all documents, correspondence, inspection site records, etc shall be in English only and in accordance with Indian law, local customs and practices notwithstanding.

2.3 The contract documents, especially the drawings and specifications shall be studied by the contractor and any discrepancy there in, whether with in document or between documents shall be reported in good time to the Engineer whose decision in consultation with the consultant shall be final and binding.

2.4 Reference standards:

2.4.1 Incorporation by reference portion in all documents and publications (such as manuals, handbooks, codes, standards, Specification) issued by any technical society, trade or professional organization or association, or regulatory or governmental authority which are cited in the contract document for the purpose of establishing requirements applicable to equipment, material or workmanship under this contract, shall be deemed to be incorporated where in as fully as if printed and bound with the specifications of this contract, in accordance with the following:

a. Wherever reference is made to any such document the contractor shall comply with requirement set out in addition to specified in this contract, or if specified, the latest edition or revision there of, as well as the latest amendments or supplements there to, in effect on the date of solicitation of this project, accept as modified by, or as otherwise provided in, or as limited to type, class or grade, by the specifications of this contract.

b. No provision for any such reference document or standard shall have the effect to change the responsibilities of the Employer, the Engineer or their consultants, agents and employees from those set forth in the contract documents, nor to assign to any of them any responsibility, duty or authority for safety precautions or procedures or to supervise or direct the performance of the Work.

2.4.2 Copies to be provided by contractor: The contractor shall make available at the project site for inspection and reference by the Engineer, a copy of each manual, handbook, code, standard or specification which is incorporated by reference in the contract and which governs quality and workmanship.

2.4.3 The work shall be got executed as per latest CPWD specifications, with up-to-date correction slips for all works. The specifications mentioned in bill of quantities will prevail over these in case of any ambiguity. I.S. 1200 with up to date correction steps will be followed where the CPWD specification is silent.

2.5 Order of precedence:

2.5.1 Any inconsistence among the contract documents shall be resolved by giving precedence in the following order.

i. The executed construction contract form. (signed agreement between Employer and contractor)
ii. Solicitation instruction
iii. Construction addenda, if any

iv. Special Conditions of Contract.
v. General conditions of Contract
vii. Specifications- (i.e. technical Specification of Bill of Quantities)
viii. Drawings
ix. Bill of quantities.

2.5.2 Anything in the specifications but not in the schedule of items or the drawings, or in the drawings but not in the specification or schedule of items or in the bill of quantities and not in the specifications, drawings shall have like effect as if in all three. In case of differences between small and large-scale drawings, the latter will govern. Where the portion of the work is drawn in details and the remainder of the work is indicated in the outline the parts drawn in detail shall apply also total other like portions of the Work. Contract document in the English language shall govern in the event of conflict in other language version. In case apparent error, discrepancy or omission either in the drawings or specifications, the more stringent of the requirements, as determine by the Engineer, shall apply. Any question shall be submitted by the Contractor promptly to the Engineer for clarification. The Engineer shall review the question and submit his response in writing. If it is determined by the Engineer that there is an error, discrepancy or omission and changing it would modify the contract, a written decision from the Engineer must be obtained by the contractor. Any contract changes made by the contractor before he receives approval from the Engineer shall be at his own risk and expense.

2.6 Specifications and drawings for construction:

2.6.1 Drawings and specifications at site: The contractor shall keep on the work site a copy of the contract drawings and specifications and at all times shall give the Engineer access thereto.

2.6.2 Use of words unless otherwise expressly stated:

a. Wherever on the contract documents the words “directed” “required” “ordered” “designation” “prescribed” or words of like import are used it shall be understood that the “directions” “requirements” “order” “designation” or “prescription” of the Engineer is intended and similarly the words “approved” “acceptable” “satisfactory” or words of like more import shall mean “approved by” or “acceptable to” or “satisfactory to” the Engineer.

b. Where the words “as shown” “as indicated” “as detailed” or words of similar import are used, it shall be understood that the reference is made to the contract drawings and specifications.

c. The word “provided” used in the contract documents shall be understood to mean “provided complete in place” or “furnished and installed”.

d. Where the word "similar" or "typical" occurs on the drawings, it shall have a general meaning and not be interpreted as being identical, and all details shall be worked out in relation to their location and their connection with other parts of the work.

2.7 The Tender Drawings are for guidance only for the bidder quoting for the tender. It should be clearly understood that the final drawing can vary to accommodate employer's / vendors requirement and necessary modification or adjustment can be made by the Architect from time to time. No additional payment for such cause will be entertained by employer on this account from the contractor.

2.8 Drawings, specifications, models, if any, and all documents furnished to the contractors, except the signed contract agreement shall remains the property of the Architect and shall neither be copied, revised nor used on any other work.

2.9 The contractor shall supply to each sub-contractor copies of such drawings that pertain to specific works to be executed by them respectively.

2.10 The contractor shall accurately mark up and update progress of work on one set of drawings and specifications regularly and as the work progresses. Any and all modifications and corrections shall be reflected in these drawings and specifications from which the contractor shall prepare the final as – built drawings required to be submitted with the penultimate bill. The Engineer shall from time to time initial the marked-up drawings, the accuracy of which will be the responsibility of the contractor.

2.11 "As built" documents: After final completion of the work, but before final acceptance thereof, the contractor shall provide the complete sets of "as-built" drawings based upon the recorded set of the drawings, marks to show the details of construction, as actually accomplished and recorded shop drawings and other submittals, in the number and from as required by the contract documents.

3 **Scope of Work:**

3.1 The scope also includes, providing necessary power, fuel, supplies, labour, labour camps, materials, scaffoldings, construction equipment, tools and plants, appliances, as well as preparing detailed shop drawings including, detailed fabrication drawings, detail drawings for steel work and getting them approved by the Engineer, necessary supervision by competent supervisors and execution of all incidental items not specified or indicated but implied or required to complete the work under this scope in all respects and in strict accordance with the specifications and drawings including their revisions and amendments made from time to time.

3.2 The scope of work includes, providing drawings/catalogues, sample, etc. of all bought out items to the employer's supervisors at site or the Engineer in design office as per instruction of the Architect at no extra cost to the Employer.

3.3 The contractor shall carry out and complete the work in every respect in accordance with the contract and with the direction of and to the satisfaction of the Engineer and the Employer. The Engineer may from time to time issue further written instructions, details, directions and instructions to the contractor for construction of the said work.

4 Additional instructions

4.1 The contractor shall be responsible for seeking any clarification or additional instruction, which he may need for executing the works well in advance to avoid any delay.

4.2 Gratuities

4.2.1 Termination: The right of the contractor to proceed may be terminated by written notice if, after notice and hearing, the agent head or a designee determines that the contractor, its agent, or another representatives offered or gave a gratuity (e.g. an entertainment or gift) to an officer, official, or employee of the Employer and intended, by the gratuity, to obtain a contract or a favorable treatment under a contract.

4.2.2 Review ability: The legal jurisdiction to review the facts supporting this determination shall be of Jalandhar.

4.2.3 Damages: If this contract is terminated under paragraph 4.2.1 above, the Employer is entitled to pursue the same remedies as in a breach of a contract.

4.2.4 Rights and remedies: The rights and the remedies of the Employer provided in this clause shall not be exclusive and are in addition to other rights and remedies provided by law or under this contract.

4.3 Covenant against contingent fees / Warranty: The contractor warrants that no person or agency has been employed or retained to solicit or obtain this contract upon an agreement or understand for contingent fee, except a bonafide employee or agency. For breach or violation of this warranty, the Employer shall have the right to annul this contract without liability or, in its discretion, to deduct from the contract price or consideration, or otherwise recover, the full amount of the contingent Fee.

4.4 No claim for interest will be entertained by the employer with respect to any moneys or balances which may be in their hands owing to any dispute between themselves or the Engineer and the contractor or with respect to any delay on the part of the employer in making monthly or final payments or otherwise.

5 The Engineer

5.1 The Engineer shall be the Employer's representative during construction and until expiry of the defects liability period or any extension thereof, and shall be authorized to issue instructions on behalf of the Employer to the contractor.

5.2 All instructions in connection with the executions of the works shall be communicated to the contractor through the Engineer. All correspondence between the consultants and contractor shall be routed through the Engineer.

5.3 Interim and final bills will be checked by the Engineer after which the payments shall be made by the Employer.

5.4 Claims, disputes and other matters in question relating to the performance of the Work or the Interpretation of the Contract Documents shall be referred in writing to the Engineer, who will review the referred matter, and convey his decision to the contractor.

5.5 The Engineer shall invite the consultants and contractor as necessary for the co-ordination meetings at which the contractor shall present progress reports, plans and everything that may be required to assess the work status and related matters.

6 Time schedule and delays

6.1 Time is the essence of the contract and contractor shall undertake to complete the work within stipulated time. In the event the contractor does not complete the work the Employer shall suffer irreparable financial losses and damage which the contractor shall have to make good subject to the terms and conditions of the formal agreement.

6.4 The contractor shall have complete control of the works and shall effectively direct and supervise the work so as to ensure conformity with the contract documents and completion of the works within the time stipulated. He shall be solely responsible for construction means, and methods, techniques sequences and procedures and for coordinating various parts of the works, whether
performed by him or by any sub- contractors.

6.5 The totality of this project covered by this contract shall be completed in all respects within the stipulated time. The contractor shall guarantee completion of the works within the stipulated time, or any extension thereof pursuant to general conditions of contract.

6.6 Within 3 days of the award of the contract, the contractor shall furnish the Engineer a detailed program chart for the works. The schedule shall be reviewed by the Engineer, amended if necessary and approved for the implementation by the contactor.

6.7 The contractor shall adhere closely to the approved schedule, closely monitor progress of work, promptly report and delays and submit catch up action plans to make good such delays to the Engineer.

6.8 Any delays due to any reason whatsoever shall be the responsibility of the contractor and shall attract penalties.

6.9 Within one week of the occurrence of any of the following, which the contractor might regard as impediments in the progress of work, the contractor shall apply in writing to the Engineer for extension of time, setting out the reasons for delays sought to be condoned. The contractor shall not be entitled to extension of time if he fails to apply as above.

a. Addition, alteration or substitution ordered in the work, which could have a significant time impact and issued to the contractor an official change order only.

b. Act of god or force majure, i.e. a situation arising out of any occurrence totally beyond the control of the contractor, and explicitly excluding consequences of actions of the contractor or his staff or agents.

c. Forced closure of the works by a general political strike and unrest not related to contractor's labour or personnel.

6.10 The contractor's application for extension of time in any of the above circumstances shall be considered by the competent authority of PTU and its decision shall be final and binding. The University may consider further extension of time after granting extension of time on the basis of reasons of delays in completion of works.

6.11 The granting of any extension of time shall not entitle the contractor to claim any additional remuneration or consideration whatever for costs incurred as a result of such delays or due to cost escalation.

6.12 The contractor shall also be liable for all incidental costs and expenses incurred by the Employer on account of the delays including fees payable to the consultants for the entire overrun period until final completion.

6.13 Compensation For Delay: The time allowed for carrying out the work as entered in the Tender shall be 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 Liquidated Damages). Liquidated damages will be charged @ 0.25% of original Contract value per day subject to a maximum of 5% of the original Contract value. The Contractor may make a representation to the BOG committee to reduce the amount and BOG committee's decision in this regard shall be final.

6.14 The Contractor may make a representation to the BOG Committee to reduce the amount of penalty and its decision in this regard shall be final. Any money due to the Contractor or lying to his credit with the Employer will be adjusted from the amount of extra expenses incurred.

7 Employers right to take over work or terminate contract

7.1 The Employer shall be entitled to take possession of the site and works and to remove the contractor giving the contractor seven days notice under any of the following circumstances.

7.1.1 If in the opinion of the Engineer, the contractor has failed to proceed with the work with due diligence and failed to make such progress as would enable the works to be completed within the stipulated time.

7.1.2 The contractor has suspended the work in contravention of the conditions of the contract and failed to resume the work within seven days of receipt of such notice from the Engineer.

7.1.3 The contractor has abandoned the work.

7.1.4 The contractor has neglected or failed persistently to implement instructions of the Engineer after due written warnings.

7.1.5 The contractor has sub- let or assigned the work or any part thereof without the written consent of the Engineer.

7.1.6 The contractor has become or is adjudged to be insolvent.

7.2 The Employer shall have the right to take possession of and use any completed or partially completed portion of the work not withstanding that the time for completing the entire work may not have expired. Taking such possession and use shall not be deemed acceptance of any work completed in accordance with the terms of this contract.

7.3 Upon receipt of the take-over notice the contractor shall not remove from site any equipment, plant tools, scaffolding, materials of installations of any kind, and the same shall be used by the Employers as own property in completing the work directly or through any other agency or contractors. The contractor shall not in any manner prevent such takeover of the site and thereon by the Employers nor shall he hinder or interrupt the work taken over in any manner.

7.4 After take-over of the site and works, the Employer shall be entitled to withhold further payments to the contractor until accounts are settled as provided herein after completion of the works expiry of the defects liability period. The contractor shall not exercise his builder lien in the event the Employer has taken over the site and work.

7.5 Upon completion of his work through an agency other than the contractor, the Engineer shall by written notice inform the Contractor that it requires the contractor to remove from site any remaining material as also plant, equipment etc. belonging to the contractor. Should the contractor fail to remove his materials and equipment within fourteen days, the Employer shall be at liberty to auction or sell such materials and equipment and credit the proceeds of such sale to the account or to the contractor.

7.6 In the above circumstances the contractor shall neither claim compensation of the use of his property by the Employer or other agency completing the work, nor shall he claim any losses on account of damage to or wear and tear to his property.

7.7 Taking possession of the site and removal of contractor shall not be construed as cancellation of the contract by the Employer and this event shall in no way absolve the contractor of his remaining contractual obligations and responsibilities.

7.8 Should it become necessary for the Employer to take over the works under the above circumstances the contractor shall be liable to make good all constructions costs exceeding the agreed rates in the contract and also incidental expenditure of every nature incurred in completing the Work and duty certified by the Engineer.

7.9 The total sum payable by the contractor to the Employer by way of costs incurred in completing the works, damages, and compensation shall be deducted from amounts payable to the contractor. If the amount payable to the contractor is not sufficient to cover the sum due to the Employer, the contractor is bound to pay the difference to the Employer.

8 Foreclosure of contract in full or in part

8.1 If at any time after the award of work to the Contractor, the employer decides to abandon the work completely or reduce the scope of the work for any reason whatsoever and hence not require the whole or part of the work to be carried out, the Engineer shall give notice in writing to that effect to the Contractor.
The Contractor shall have no claim to any payment of compensation or otherwise whatsoever on account or any profit or advantage which he might have derived from the execution in full but which he did not derive in consequence of the foreclosure of the whole or part of the work.

8.2 The Contractor shall be paid at quoted percentage rates full amount for works actually executed at site or as per quantities shown in Estimates whichever is low, and, in addition, a reasonable amount as certified by the employer in consultation with the Engineer for the items hereunder mentioned which could not be utilized on the work to the full extent because of the foreclosure:

a. For any expenditure incurred on preliminary site work such as temporary access roads, temporary labour huts, staff quarters, site office, stores, workshops casting yards, fabrication platforms and water storage tanks;

b. For materials taken over or to be taken over by the employer, the employer shall pay to the Contractor cost of such materials. The cost shall however, take into account purchase price, cost of transportation and deterioration or damage which may have been caused to material white in the custody of the contractor.

c. For Contractor's material not retained by the employer, reasonable cost of transporting such materials from the site to his other works/stores or such materials may be disposed off with the approval of the University. Any loss incurred by the Contractor on this account will be reimbursed. The decision of the University regarding disposal of such materials will be final and binding. If materials are not transported or disposed off, no cost shall be payable.

8.3 If any material supplied by the employer remains surplus, the same except for normal wastage shall be returned by the contractor to the employer. Any deterioration or damage which may have been caused while the materials were in the custody of the Contractor shall have to be borne by the contractor. In addition, cost of transporting such materials from the site to the employer's store, if so required by the employer will be borne by the Contractor. However, the employer's decision as to what materials can be accepted back shall be final & binding.

8.4 The employer shall have the option to take over the contractor's materials or any part thereof either brought the site or which the Contractor is legally bound to take delivery from suppliers for incorporation on or incidental to the work, which the Contractor does not desire to retain.

8.5 If required by the Engineer, the contractor shall furnish to him books of account, wage books, time sheets and other relevant documents as may be necessary to enable him to certify the reasonable amount payable to the Contractor under these circumstances.

9 Assignment of contract

9.1 Type of contract: The contract is based on quantities & quoted percentage of the estimated cost above or below which the contractor agrees to works. The contract is payable in Indian Rupees. No additional sum would be payable on account of escalation in the cost of material, equipment or labour, or because of tenderer's failure to properly estimate or accurately predict the cost or difficulty of achieving the results required by the contract documents.

9.2 Scope of Contract:

9.2.1 The contractor shall furnish all labour materials equipments and services, supervision and management for the project described about, in strict accordance with and as described in the contract documents (including amendments and accepted alternatives, if any) and by any authorized modifications to the contract.

9.2.2 The contractor shall be responsible for doing this work in collaboration with other contractors and works of any other trades subsequently employed so as to expedite the execution of his and other contracts which are to run simultaneously. This will require the progress of site work to be synchronised and harmonised with the work of other contractors giving proper facility and security to them and to their workers. The main building contractor is also to include in his tender, charges for final surfacing to all repairs done by other trades for their fixtures, installation etc. and removal of soil arising out of these contractors. The contractor will provide adequate watching and protection of material against theft or damage with night lighting and watching. He will cover up and protect all work throughout the duration and until completion of the work.

9.3 The contractor shall not transfer, assign or sub let the contract or any part thereof except where determined otherwise by the contract and approved in writing by the Engineer.

10 Sub contractors

10.1 Where and when the appointment of specialist sub-contractors is indicated, such sub-contractors shall be appointed only with the written approval of the Engineer and on the following conditions:

10.1.1 The contractor shall enter into written agreements with sub-contractors and ensure that they perform their work in accordance with and subject to the terms and conditions of these contract documents. A copy of each such agreement shall be furnished to the Engineer.

10.1.2 The contractor shall remain fully responsible to the Employer for the performance and workmanship and all actions of all sub-contractors and persons directly or indirectly employed by them.

10.1.3 The contractor shall supply and permit all sub-contractors to avail the site facilities and services to enable them to complete their work safely, without hindrance or delay and conducive to produce the highest quality of work required.

10.1.4 The contractor shall upon receipt of instructions from the Engineer terminate and remove from site forthwith such sub-contractor whose work may be considered unsatisfactory.

10.1.5 The contractor shall make regular and prompt payment to each sub-contractor not later than one week of receipt of payment from Employer for their measured works certified by the Engineer. If the contractor fails to make payments to sub-contractors, the Employer may, with prior intimation to the contractor, make direct payments to sub-contractors, and recover such sums from the contractor. Such direct payments to sub-contractors shall be on behalf of the contractor and shall in no way relieve the contractor of his responsibilities or create a contractual relationship between the Employer and sub-contractor.

11 Nominated sub-contractor

11.1 The Employer shall be entitled to nominate to the contractor, selected sub-contractors for carrying out certain sections of the work or to replace terminated sub-contractors. Such nominated sub-contractors shall receive the same assistance and co-operation from the contractor as other sub-contractors and the contractor shall be equally responsible for their work. Nominated sub-contractors shall have direct agreements with the Employer and shall receive direct payment also. Payment for the site facilities and the services made available by the contractor at his cost to the nominated sub-contractors, including water, electricity, insurance, staging, scaffolding etc. is to be made by the nominated sub-contractor.

11.2 Nothing shall absolve the contractor, including the approval, termination or nomination of sub-contractors by the Employer of his overall responsibility under the contract to closely supervise the work, on or off the site, and to ensure adherence to the specification and schedule.

12 Separate contracts

12.1 The Employer is entitled to enter into separate contracts for items of work not included in this contract, such as the supply and installation of special material, equipment, systems, fixtures, interior decoration, furniture, fit-out, etc. for whose work the Employer shall be responsible.

12.2 The contractor shall render all assistance to separate contractors in the execution of their work.

12.3 The contractor shall in writing report to the Engineer any apparent deficiencies in the work of separate contractors, which would affect the work of this contract. Failure of the contractor to report any deficiencies shall debar him from making any claims against the Employer in respect thereof.

13 Changes in the work

13.1 In case the Engineer thinks proper at any time during the progress of the works, any alterations in or omission from the works or any alteration in the kind or quality of the materials to be used therein and shall give notice thereof in writing to the contractor shall after add to or omit from as the case may require in accordance with such notice but the contractor shall not do any work extra to or make any alterations or additions to or omissions from the works or any deviation from any of the provisions of the contract, stipulation, specification or contract drawing without the previous consent in writing from Engineer. A verbal authority or direction by the Engineer, if confirmed by the contractor in writing within seven days, be deemed to have been given in writing.

13.2 Each tender item is an item in itself and the percentage to be quoted shall take into account all aspects of the workability of that particular item including all material, labour, supervision, management costs including taxes and profit etc. Any addition or deletion in quantity of the quoted item shall not impact the percentage quoted for that particular item.

13.3 The contractor shall agree to the rate for any additional, altered or substituted work, if not already specified in the contract, with the Engineer, before proceeding with such work. For procedure to be adopted for calculation of rates of Extra / substituted items see clause 18 below and the same shall be added to or deducted from the Contract amount accordingly.

13.4 The contractor shall not claim for any delays on account of altered, substituted or additional work, nor shall he claim for loss of anticipated profits on account of variations in the nature and scope of the works, unless extension of time has been agreed to in advance and in writing at the timing of issuance of a contract modification order.

13.5 The quantities indicated in the Bill of Quantities are tentative and may vary to any extent while actual execution of works. The Contractor shall execute the works as per actual requirements of the works at the accepted rates. No compensation on account of variations in quantities shall be payable.

14 Extra work

14.1 The Engineer shall have power and authority from time to time and all times to make and issue further drawings and instructions and may make any additions alterations and omissions in the work. No allowances shall be made to the contractor for an increase in measurements or any extra work wherever except upon the written order of the Engineer.

14.2 No deviations from the contract will on any account be allowed unless an order in writing is obtained from the Engineer on alteration, omission or variation shall vitiate this contract.

14.3 The contractor shall give to the Engineer, before the 10th of every month, a statement in writing of extra work which may have been performed during the preceding month.

15 Deleted

16 Billing and payments, records and measurement

16.1 The contractor shall submit to the Engineer monthly progress bill in approved format showing detailed agreed measurements for the various items of work executed, and all support documents, calculations etc. The measurements will be jointly recorded by the representatives of the Contractor and the Engineer in the Measurement Books supplied by the contractor, in the approved format and attested by the Engineer and the abstract of the Bills shall be entered in separate Measurement Books.

16.2 Each bill shall separately show amounts of altered, additional or substituted work. Otherwise bills for executed works shall be at tendered percentage only. No extra items/subtitled work bills will be approved after the payment of final bill.

16.3 Each bill shall be checked and confirmed or corrected by the Engineer.

16.4 The contractor shall submit the final bill as above. On submission of the final bill the contractor will ensure that no extra items/new item/substituted items have been left unsettled. The final bill shall be accompanied by:

16.4.1 All technical documents on the basis of which the work was carried out including all measurement books.

16.4.2 Three sets of construction and installation drawings showing therein modifications corrections and additions signed and confirmed by the Engineer to be "as built" drawings.

16.4.3 Completion certificates for embedded and covered –up works issued by the Engineer.

16.4.4 Certificates for tests carried out for various items of work

16.4.5 Manufacturer's operating and maintenance manuals as well as guarantee papers for all equipment installed.

16.5 Payment against interim bills shall be deemed as payments by way of advances only against the final amount payable under the contract and shall not be construed to be either approval of or payment for work done. Interim payments shall in no way prejudice the rights of the Employer under the contract as to the adjustments and final settlement of accounts.

16.6 The Employer shall have a lien on and over or any money that may become due and payable to the contractor under these presents, and /or also on and over the deposit of security amount or amounts made under this contract and which may become repayable to the contractor under the conditions in that behalf herein contained, for or in respect of any debt or sum that may become due and payable to the employer by the contractor either or jointly with another, and either under this or under any other contracts or transactions of any nature whatsoever between the employer and the contractor.

16.7 Records and measurements: All works shall be measured and duly recorded in the measurement book by the Engineer and the contractor. Works are to be measured in detail in accordance with Bureau of Indian Standard Method of Measurements IS: 1200:1957 /as per latest C.P.W.D. specifications with up-to date correction slips, except, where otherwise indicated with specifications or schedule of items. In the event of any discrepancy between the Indian Standard Method of Measurement and the method indicated in the specifications of bill of quantities forming the part of the contract, the method adopted with CPWD Specification and schedule of rates shall prevail. The measurement shall be taken jointly both by the Engineer and the contractor.

16.8 If the contractor's representative fails to attend the measurements on the date notified by the Engineer, the Employer shall have power to proceed by themselves to take the measurements and in that case, these measurements shall be accepted by the contractor as final. The measurement book will be kept with the Engineer at site.

17. Certificate of completion

17.1 Within ten (10) days of the completion of the work, the contractor shall give notice of such completion to the Engineer, and within thirty (30) days of the receipt of such notice Engineer shall inspect the work and if there is no defect in the work shall furnish the contractor with a certificate of completion, after obtaining approval from the employer otherwise a provisional certificate of completion indicating defect(s) to be rectified by the contractor and/or (b) for which payment will be made at reduced rates, shall be issued but no certificate of completion provisional or otherwise, shall be issued nor shall the work be considered to be completed until the contractor shall have removed from the premises on which the work shall be executed all scaffolding, surplus materials, rubbish and all the huts and sanitary arrangements required for his/their work people on the site in connection with the execution of the works as shall have been erected or constructed by the contractor and cleaned off the dirt from all wood work, doors, windows, walls, floors or other parts of any building in upon or about with the work is to be executed, or of which he may have had possession for the purpose of the execution thereof, and not until the work shall have been measured by the Engineer. If the contractor shall fail to comply with the requirements of this clause as to removal of scaffolding, surplus materials and rubbish and all huts and sanitary

arrangements as aforesaid and cleaning off dirt on or before the date fixed for the completion of the work the Engineer may at the expense of the contractor remove such scaffolding, surplus materials and rubbish, etc. and dispose of same as he thinks fit and clean off such dirt as aforesaid and the contractor shall have no claim in respect of any such scaffolding or surplus materials as aforesaid except for any sum actually realized by the sale thereof. The work should be completed in accordance with the provisions of this contract with any authorized alterations, amendments, additions or omissions within the period stated in the tender or such extended period as may be allowed by the Employer under clause "Extension of Time" hereunder and shall not be considered as completed until the Engineer have certified in writing that it has been completed to their satisfaction.

18 Rates for extra / substituted items

18.1 The contractor shall execute the extra/substituted items as ordered by the Engineer in writing which may be required for proper completion of work. The rates of such items shall be derived/ paid in the following manner; but the payment shall be made by considering the lowest rate only as decided by the Engineer.

18.1.1 If the percentage rates of the additional, altered or substituted work are specified in the contract for the work, the contractor is bound to carry out the additional altered or substituted work at the same rates as are specified in the contract for the work.

18.1.2 If the percentage rates for additional, altered or substituted work are not specifically provided in the contract for the work, then such rates will be derived from the rates for a similar class of work as specified in the contract for the work.

18.1.3 If the altered, additional or substituted work includes any work for which no rate is specified in the contract for the work and cannot be derived from the similar class of work then such work's rates shall be derived from D.S.R. 2007 with up to date correction factor duly applied after applying appropriate index and quoted percentage.

18.1.4 If the rates for altered, additional or substituted work cannot be determined in the manner specified above in clause 18.1.1 – 18.1.3, then the rates will be settled on the basis of actual vouchers of prevailing market cost plus labour, and 15% contractor's profit, supervision and overhead charges.

18.2 Analysis of rates, for extra items are to be submitted by the contractor within 2 weeks from the date of commencement or in anticipation.

19 Taxes

19.1 The rates quoted by the contractor shall be inclusive of all the taxes and duties such as work contract tax, sales tax, excise duty, octroi, VAT, Service Tax, Labour Cess etc. The Employer shall not be responsible for any of the aforesaid taxes.

20 Laws

20.1 The contractor shall faithfully observe and implement all laws and rules applicable to the execution of the work and contract, whether prevailing or which may come into force during the operation of the contract.

20.2 The contractor shall observe and pay special attention to laws and rules pertaining to employment and labour. He shall provide, as prescribed by law, for the welfare of his staff and labour, and it shall be his sole responsibility and maintain good rapport with all personnel and labour to ensure uninterrupted progress of work.

20.3 The contractor shall maintain and keep updated all records and registers required under various laws and make such records available for inspection to concerned authorities as well as to the Engineer whenever required, including co-ordination with the concerned authorities during inspections.

20.4 In the event of the Employer having to take any action due to the failure of the contractor in the observance or implementation of any requisitions of any authorities, then such action shall be deemed to be for and on behalf of the contractor and shall be entirely at the contractor's risk as to costs and consequences.

20.5 Contactor shall abide by applicable Environmental & pollution norms

21 Indemnity

21.1 The contractor shall indemnify and hold completely harmless the Employer, Engineer, consultants their agents and employees against all claims, demands, fines, penalties, losses, costs, damages, action, suits and proceedings by any third parties, that arise out of act of commission or omission of the contractor or attributable to the actions of the contractor or any sub-contractors in the performance of the contract.

21.2 The Contractor shall fully indemnify the employer against any action claims or proceeding relating the infringement or use of any patent of design or any alleged patent or design, rights and shall pay any royalty which may be payable in respect of any article or part there of included in the contract.

21.3 Wherever any claim against the contractor for the payment of a sum of money arises out of or under the contract, the employer shall be entitled to recover such sum by appropriating in part or in whole, the security deposit of the contractor. In the event of security being in sufficient then the balance or the total sum recoverable as the case may be, shall be deducted from any sum then due or which at any time thereafter may become due to the contractor under this or any other contract with the employer. Should this sum be not sufficient to cover the full amount recoverable, the contractor shall pay to the employer on demand the balance remaining due within 10 days.

22 Insurance

22.1 The Contractor shall at his own expense, arrange for insurance policies, such as workmen compensation policy and contractor's all risk policy in the amount of the contract effective from the date of commencement of work until final completion, against all of the following risk:

22.1.1 Injuries and damage of persons, property, animals or things, within or outside the site, arising out of his operations or of any sub-contractors, nominated or otherwise, or out of any actions of his employees, agents or representatives.

22.1.2 Damage to or loss of the property, equipment and materials at site, of the Employer, contractor and all sub-contractors, as a result of natural causes such as lightning, storm, flood, rain, fire, earthquake, explosion, landslide etc.

22.1.3 Damage and injuries to persons, property and materials arising out of riot and civil commotion, theft, sabotage malicious acts, terrorist activities, etc.

22.2 The insurance policy or policies to cover risks of every nature shall be in the joint names of the Employer and contractor, and the original of such policy or policies shall be kept with the Engineer.

22.3 If the contractor fails to arrange the requisite insurance or fails to renew the policies, the Employer shall arrange for the policies and / or renew them and recover the cost of all premiums from the contractor.

22.4 No certificate of payment shall be issued by the Engineer, if the contractor fails to arrange for total insurance cover.

22.5 The contractor shall reinstate, in a manner approved by the Engineer, all damage of every sort entirely at his cost, so as to deliver up to the Employer the whole of the works complete and perfect in all respects, and so certified by the Engineer and also be make good or otherwise satisfy all claims for damage to property of third parties.

22.6 The contractor shall be responsible for anything within his control and for all risk and consequence, which are not included in the preview of the insurance policies.

22.7 The insurance shall be extended until final completion.

22.8 The contractor undertakes not to cancel any insurance policy or its scope without the written consent of the Engineer.

22.9 The contractor undertakes to file necessary insurance claims jointly with the Employer, and also to join the Employer in filing any claim the Employer chooses to.

22.10 Payment against all insurance claims shall be received in the name of the Employer and commensurate adjustments made in accounts of the Contractor.

23 Protection of persons, works and property

23.1 Accident prevention

23.1.1 General: In performing this contract, the contractor shall provide for protecting the lives and health of employees and other persons, preventing damage to or theft or loss of property, materials, supplies, and equipment, and avoiding work interruptions. For this purpose, the contractor shall provide appropriate safety barricades, signs and signal lights. Comply with the standards issued by any local governmental authority having jurisdiction over occupational health and safety. Ensure that any additional measures as required by the Engineer for this purpose are taken.

23.1.2 Records: The contractor shall maintain an accurate record of exposure data on all accident to work performed under this contract resulting in death, traumatic injury, occupational disease, or damage to or theft or loss of property, materials, supplies, or equipment. The contractor shall report this data in the manner prescribed by the Engineer.

23.1.3 Sub-contractors: The contractor shall be responsible for its sub contractor's compliance with this clause.

23.1.4 Written program: Before commencing the work, the contractor shall submit a written proposal for implementing this clause: and meet the Engineer to discuss and develop a mutual understanding relative to administration of the overall safety program.

23.2 Barricades: Contractor shall erect and maintain barricades required in connection with his operation to guard or protect.

a) Excavation of blasting work (if permitted by the concerned authority).
b) Area adjudged hazardous by Contractor or the Engineer.
c) Employer’s existing property subject to damage by Contractor's operations.
d) Contractor's employees and those of its sub-contractors shall become acquainted with CPWD barricading practice and shall respect the provisions thereof,
e) Barricade and hazardous areas adjacent to but not located, in normal routes of travel shall be marked by red flashed lanterns at nights.

23.3 Scaffolding:

23.3.1 Suitable double stage steel scaffolding should be provided for workmen for all work that cannot safely be done from the ground or from solid construction except short period work as can be done safely from ladders. When a ladder is used an extra Mazdoor shall be engaged for holding the ladder and if ladder is used for carrying materials as well, suitable footholds and handholds shall be provided on the ladder and the ladder shall be given an inclination not steeper that I in 4 (I horizontal and 4 vertical). Lights to protect the workers and staff from accidents and Contractor shall be bound to bear the expenses of defense of every suit, action or other proceeding's at law that may be brought by any person for injury sustained owing to neglect of laid down precautions and pay any damages and costs which may be awarded in any such suit or action or proceedings to any such person or which may with the consent of the contractor be paid to compromise any claim by any such person.

23.3.2 Scaffolding or staging more than 4 metres above the ground or floor swing suspended from an over-head support or erected with stationary support shall have a guard rail properly attached, bolted, braced and otherwise secured at least 3 high above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends thereof with only such openings as maybe necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.

23.3.3 Working platform gang ways and stairways should be so constructed that they should not sag unduly or unequally and if the height of the platform, of the gangway or the stairway is more than 4 metres above ground level or floor level they should be closely boarded, should have adequate width and should be suitably fastened as described above.

23.3.4 Every opening in the floor of the building or in a working platform shall be provided with suitable means to prevent the fall of persons or materials by providing suitable fencing' or railing whose minimum height shall be I meter.

23.3.5 Safe means of access shall be provided to all working platforms and other working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9 metres in length while the width between the said rails in rung ladder shall in no case be less than 30 cms for ladder upto and including 3 metres in length. For longer ladder this width should be increased at-least. 5 cms for each additional foot of length. Uniform steps spacing shall not exceed 30 cms. Adequate precautions shall be taken to prevent danger from electrical equipment. No materials on any sites of work shall be so stacked or placed to cause danger or inconvenience to any person or public. The contractor shall also provide all necessary fencing and lights to protect the workers and staff from accidents, and shall be bound to bear the expenses of defense of every suit, action or other proceedings at law that may be bought by any person for injury sustained owing to neglect of the above precautions and pay any damages and costs which may be awarded in any such suit or action or proceedings to any such person or which may with the consent of the contractor be paid to compromise any claim by any such person.

23.4 Excavation and trenching:

23.4.1 All trenches 1.2 metres or more in depth shall at all times be supplied with at least one ladder for each 50-metre length or fraction thereof.

23.4.2 Ladder shall be extended from bottom of the trench to at least I metre above other surface of the ground. The sides of the trenches which are 1.5 metres in depth shall be stepped back to give suitable slope or securely held by timber bracing. so as to avoid the danger of sides collapsing. The excavated materials shall not be placed within 1.5 metres of the edge of the trench or half of the trench width whichever is more. Cutting shall be done from top to bottom. Under no circumstances undermining or under cutting shall be done.

23.4.3 All necessary personal safety equipments considered adequate by the Engineer should be kept available for the use of persons employed on the site and maintained in condition suitable for immediate use, and the Contractor shall take adequate steps to ensure proper use of equipment by those concerned.

a) Workers employed on mixing asphaltic materials, cement and lime mortars shall be provided with protective footwear and protective gloves.

b) Those engaged in mixing or stacking of cement bags or any materials which are injurious to the eyes shall be provided with protective goggles.

c) Those engaged in welding and cutting lead joints shall be provided with protective face and eye shields, hand gloves etc.

d) Stonebreakers shall be provided with protective goggles and protective clothing and seated at sufficiently safe intervals.

e) When workers are employed in sewers and manholes, which are in use, the contractor shall ensure that the manhole covers are opened and are ventilated at least for an hour before the workers are allowed to get into the manholes and the manholes so opened shall be cordoned off with suitable tailing and provided with warning signals or board to prevent accident to the public. Proper Safety Belts shall be used by the workers going in the sewers & manholes. Further before entry presence of TOXIC gages shall be tested and presence of oxygen shall be verified.

23.4.4 The Contractor shall not employ men & women below the age of 18 years and women of any age on the work of painting with products containing lead in any form. Wherever men above the age of 18 years are employed on the work of lead painting, the following precautions should be taken:

a) No paint containing lead or lead product shall be used except in the form of paste or ready-made paint.

b) Suitable face masks should be supplied for use by the workers when paint is applied in the form of spray or surface having lead paint dry rubbed and scrapped.

c) Overalls shall be supplied by the Contractor to the workmen and adequate facilities shall be provided' to enable the working painters to wash them during and on cessation of work.

23.4.5 Use of hoisting machines and tackles including their attachments anchorage and supports shall conform to laid down standard precautions:

a) These shall be of good mechanical construction, sound materials and adequate strength and free from patent defect and shall be kept in good working order.

b) Every rope used in hoisting or lowering materials or as means of suspension shall be of durable quality and adequate strength and free from patent defects.

c) Every crane driver or hoisting appliance operator shall be properly qualified and no person under the age of 21 years should be in charge of any hoisting machine including any scaffolding winch or give signals to the operator.

d) In case hoisting machine and of every chain ring hook shackle swivel and pulley block used in hoisting or lowering or as means of suspension, the safe working load shall be ascertained by adequate means. Every hoisting machine and all gears referred to above shall be plainly marked with the safe working load of the conditions under which it is applicable which shall be clearly indicated. No part of machine or any gear referred to above in this paragraph shall be loaded beyond the safe working load except for the purpose of testing.

e) Incase of departmental machine, the safe working load shall be notified by the Engineer. As regards contractor's machines, the Contractor shall notify the safe working load of the machine to the Engineer whenever he brings any machine to site of work and get it verified by the Engineer concerned.

f) Motors gearing transmission electric wiring and other dangerous parts of hoisting appliances should be provided with efficient safeguards. Housing appliances should be provided with such means as to reduce to the minimum the accidental descent of the load, adequate pre-cautions should be taken to reduce to the minimum the risk of any part or any part of a suspended load becoming accidentally displaced, When workers are employed on electrical installations, which are already energised, insulation mats, wearing apparel, such as gloves, sleeves, and boots, as may be necessary should be provided, The workers shall not wear any rings, watches and carry keys or other materials which are good conductors of electricity.

g) All scaffolds, ladders and other safety devices mentioned or described herein shall he maintained in safe conditions and no scaffold, ladder or equipment shall be altered or removed while it is in use, Adequate washing facilities should be provided at or near places of work.

h) These safety provisions should be brought to the notice of all concerned by displaying on a notice hoard at a prominent place at the work- spot. The person responsible for compliance of the safety code shall be named therein by the Contractor.

i) To ensure effective enforcement of the rules and regulations relating to the safety precautions, the arrangements made by the Contractor shall be open to inspection by the Engineer.

j) Notwithstanding the above clauses there is nothing in these, to exempt the Contractor from the operations of any other Act or rules in force in the Republic of India, the works throughout including any temporary work shall be carried out in such a manner so as not to interfere in any way whatsoever with the traffic on any roads or footpaths at the site or in the vicinity thereto or any existing works whether the property of the Administration or of a third party.

23.4.6 In addition to the above, the Contractor shall abide by the Safety code provision as per Indian Standard Safety Code framed from time to time.

23.5 Protection of property

23.5.1 Vegetation, structures and equipment: The contractor shall preserve and protect all structures, equipment, and vegetation on or adjacent to the work site, which are not to be removed and which do not interfere with the work required under this contract. The contractor shall only remove trees when specifically authorized to do so, and shall avoid damaging vegetation that will remain in place.

23.5.2 Utilities and improvements: The contractor shall protect from damage all existing improvements and utilities at or near the Work Site; and on adjacent property of a third party the locations of which are made known to or should be known by the contractor - The contractor shall repair any damage to those facilities, including those that are the property of a third party, resulting from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the work. If the contractor fails or refuses to repair the damage promptly, the Engineer may have the necessary work performed and charge the cost to the contractor.

23.6 Watchmen : The contractor shall provide sufficient personnel and materials to provide adequate protection of property at the site, in transit and storage including but not limited to measures specifically required by the contract documents and any security requirements under this contract.

23.7 Corrective Action:

23.7.1 Authority to stop Work: The Engineer shall notify the contractor of any non-compliance with the safety and property protection requirements of this contract of which the Engineer becomes aware, and of the corrective action required. This notice, when delivered to the contractor or the contractor's representative at the site of the work, shall be deemed sufficient notice of non-compliance and corrective action required. After receiving the notice, the contractor shall immediately take corrective action. If the contractor fails or refuses to take corrective action promptly, the Engineer may issue an order stopping all or part of the work satisfactory corrective action has been taken. The contractor shall not base any claim or request for equitable adjustment for additional time or money on any stop work order issued under these circumstances.

23.7.2 Rectification: The contractor shall be solely responsible to make good at his cost any damage to the works, property of the Employer and adjacent property, to the satisfaction of the Engineer.

24 Site securities

24.1 The contractor shall be deemed to be in possession of the works site and shall be responsible for its total security, and shall ensure that all materials, sheds, equipment, plant tools, etc, whether his own or belonging to any sub-contractor, are well protected.

24.2 The contractor shall at his own install and maintain sufficient security fences and gates and employ full time round-the-clock, security personnel to prevent the intrusion of the public or other unauthorized persons or vehicles into the works site.

24.3 The presence of the consultants or their representatives, or the Employer's security personnel, shall in no way relieve or absolve the contractor of his responsibilities in ensuring the security and protection of the Site and everything stored or lying thereon.

25 Deleted

26 Warranty

26.1 The contractor shall be responsible for the proper performance of the works, including installations and systems.

26.2 Subject to 26.1 above, the contractor shall, at his own cost and in the shortest possible time, repair and remove any defect or deficiency in the works, which may appear prior to or during the defect liability period/warranty period, to the satisfaction of the Engineer.

26.3 Water proofing works:

26.3.1 The Contractor shall guarantee through a guarantee bond (a guarantee bond is to be executed on non judicial stamp paper of Rs. 10/- duly attested by notary public) in prescribed Performa and deposited with the Punjab Technical University (PTU) all water proofing work done by him or his subcontractors for 05 years from the date of virtual completion of the project and shall indemnify the PTU in a format approved by PTU against any defects that arise therein during the guarantee period as aforesaid. He shall immediately rectify, replace and repair any defects, leakage, seepage etc. that may occur therein, and repair all other damage occurring to any part of the structure on account of defect in water proofing treatment during the guarantee period as aforesaid, in accordance with the conditions of the said guarantee to the satisfaction of the PTU at the time of damage. In case of failure of the Contractor to rectify the defects, the same shall be got done at his risk and cost. No request to releasing cash retention against bills shall be accepted at any stages.

26.4 Deleted

27 Defects liability period

27.1 Any defects, cracks, settlement, disfiguration or other faults which may appear within the "one year from date of completion", arising in the opinion of the Engineer from materials and/or workmanship not in accordance with the contract, shall upon the directions in writing of the Engineer and within such reasonable time as shall be specified therein, be amended and made good by the contractor at his own cost, and in case of default the Employer may employ and pay other persons to amend and make good such defects, shrinkage, settlements or other faults, and all damages, loss and expenses consequent thereon or incidental thereto shall be made good and borne by the contractor and such damage, loss and expenses shall be recoverable from him by the Employer or may be deducted by the Employer upon the Engineer's certificate in writing, from any money due or that may become due to the contractor or the Employer may in lieu of such amending and making good by the contractor, recover from the contractor any expenses the Employer may have incurred in connection therewith. Should any defective work be done or materials supplied by any sub-contractor employed on the works who' has been nominated or approved by the Engineer or the Employer as provided in clause for the Engineer and "Nominated sub-contractors, the contractor shall be liable to make good in the same manner as if such work or material had been done or supplied by the contractor and been subject to the provisions of this clause and clause for "Scope of Contract" hereof. The contractor shall remain liable under the provisions of this clause notwithstanding the signing by the Engineer of any Certificate or the passing of any accounts.

28 Contractor's responsibilities and Work control

28.1 The contractor shall have complete control of the works and shall effectively direct and supervise the work so as to ensure conformity with the contract documents. He shall be solely responsible for construction means, methods, techniques, sequences and procedures, and for co-coordinating the carious parts of the work, whether carried out by him or any sub-contractor.

28.1.1 Personnel at site : The Contractor will furnish a list of qualified technical staff indicating their names, qualifications and experience, that will be employed at the site along with copies of certificates and experience. All personnel employed by the contractor at site shall have to be acceptable to, and qualified as required by, the Engineer from time to time.

28.1.2 The technical staff should be available at site constantly at all times throughout the Contract / extended duration of Contract and three months beyond the date of virtual completions to supervise the work and take instructions from the employer and or the Engineer, when the respective work is in progress. Electrical Engineer will be available at site, when electrical work starts.

28.2 Tools and Plants: The Contractor shall arrange, at his own expense, all tools plant and equipments required for the satisfactory execution of the work and in such, number or quantity as to meet the time of completion specified in the Contract and to meet the approval of the employer.

28.3 Labor camps and other temporary structures: The Contractor shall examine the site and satisfy himself regarding the space available for labour camps, workshops, cement storage, site office and storage of steel and other building materials. Any additional space required by the Contractor shall be arranged by him at his own cost. The contractor shall take all approvals if required. It will be responsibility of the contractor to follow all safety and environmental norms while making labour camps.

28.3.1 The Contractor shall prepare a plan showing location of temporary offices, stores, godowns, labour camps, material storage bins and yards, fabrication platforms in consultation with and approval of the employer, before erecting these facilities. Nothing extra shall be payable on account of preparation of plans and construction / maintenance and removal of above on completion of the work.

28.3.2 The contractor shall ensure that the labour camps are vacated on completion / termination of the contract. In case of his failure to vacate the men, the employer will be at liberty to withhold his payment and initiate legal action for eviction. The legal action will be initiated against the contractor and not against the individual labourers.

28.3.3 The contractor shall be responsible for the design, erection, operation, maintenance and removal of temporary structures and other facilities at his own cost. No approval sought, given or implied, regarding sufficiency, stability and safety of temporary staging and facilities shall in any way relieve the contractor of his responsibility.

28.4 The contractor shall study all contract documents and promptly report to the Engineer any non-conformity, discrepancy, inconsistency or omission he may discover. In the event of such discovery the contractor shall not proceed with the effected work until he has received due corrections and clearance from the Engineer.

28.5 The contractor shall be deemed to have thoroughly studied and satisfied himself regarding, contract documents and particularly all drawings before proceeding with the work should any discrepancy or error be discovered during execution of parts of the work, necessitating, demolition, repairs or reconstruction, all such remedial measures shall be carried out only with the approval of the Engineer and entirely at the contractor's cost. In such an event the contractor shall neither claim any extra payment nor extension of time for any delays.

28.6 Any instructions given to the contractor's supervisory staff by the Engineer shall be deemed to have been given to the contractor. Instructions that involve any variations in design or specifications, and which may have a time and cost impact shall be through a written change order of the Engineer and at rates and percentage agreed in writing prior to implementation.

28.7 The contractor shall, at his own cost, obtain any permits or authorization necessary for the execution of the work and obtaining any permits or approvals for the works executed by him, from all concerned authorities, government departments and statutory bodies.

28.8 The contractor shall not be entitled to claim additional sums on account of having to work overtime in order to complete an operation that cannot be interrupted, for working in extended shifts, for working in night shifts or for working on holidays.

28.9 In the event the contractor chooses to work overtime, in extended shifts, at nights or on holidays, he shall do so by obtaining prior written approval from the Engineer at least twenty-four hours in advance. The contractor, moreover, shall ensure in any of the above circumstances he maintains the full agreed strength of his supervisory staff.

28.10 The contractor shall take all necessary precautions to protect the site and works, materials, plant and equipment, whether his own or belonging to the Employer or any sub-contractors, against hazards of fire, rains, floods, landslides, underground water, accidents, etc.

28.10.1Submittals

28.10.2"Shop Drawings" means those drawings or other documents, which are specifically prepared by or on behalf of the contractor to illustrate details of construction for the purpose of fabrications or installation and are submitted to the Employer to indicate the contractor's intended method of achieving the end result required by the contract drawings and specifications.

28.10.3"Project data: Include standard drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data and similar materials furnished by the contractor to explain in details specific of the work required by the contract.

28.10.4"Samples" are physical examples, which illustrate materials, equipment or workmanship and establish standards by which the work will be judged."

28.10.5Other submittals" includes progress schedules, setting drawings, and inspection reports, and other information required by the contract documents to be submitted by the contractor for information or approval by the Employer.

28.10.6Schedules of submittal: Within two weeks after contract award the contractor shall submit to the Engineer submittal schedule showing when shop drawings, project data, samples and other submittals required by the contract documents would be submitted for approval.

28.10.7Review and approval of submittals by contractor: The contractor shall coordinate all submittals required by the contract documents, and thoroughly check them for accuracy, completeness, and compliance with contract requirements and shall indicate its approval thereon in the form required by the contract documents evidence of such co-ordination and checking. Submittals submitted to the Engineer without satisfactory evidence of the contractor's approval may be returned for resubmission. Submission of shop drawings, project data or samples shall constitute a representation that the contractor has ascertained that the assemblies, products or materials indicated therein will be available in a timely manner and in the quantities required for the project.

28.11 Submission: All submittals shall be in the English language, and any system of dimensions (i.e. English and metric) shown shall be consistent with that used in the contract documents. The contractor shall submit all submittals in the form and number required by the contract documents, within required time limits and sufficiently in advance of construction requirements to permit adequate review by the Employer for correction and resubmission if required, and approval. No extension of time shall be allowed on account of a delay by the Employer in approving such submittals if the contractor has failed to act promptly and responsively in making his submission shall be identified as required by the contract documents.

28.12 Action on submittals: The Engineer will indicate an approval or disapproval of the submittals requiring approval by the Employer and if not approval as submitted shall indicate the Employer's reasons thereof. Approval by the Engineer shall not relieve the contractor from responsibility for any errors to omissions in its submittals, nor from responsibility for complying with the requirements of this contract, except with respect to variations described by the contractor and approved in accordance with the "Variations in submittals" clause. The Employer's approval of submittals will be for general compliance with the intent of the contract document and with the information therein, and shall not be construed:

a) As permitting any departure from the /Contract requirements.

b) As believing the Contractor of responsibilities for any error, including details, dimensions, materials etc.

c) As approving departures from details appearing on Contract Drawings and specifications. Where approval of submittals is required, the Contractor shall perform the Work in accordance with such approved submittals. Any Work performed by the contractor prior to such approval shall be at the contractor's risk.

d) Variation in submittals : If submittals contain any variations from the contract requirements other than these requested on previous submittals, the contractor shall specifically describe such variations in writing and the reasons therefore, in his transmittals letter. If the approval of any such variations affects the contract price or the contract time, the Engineer shall issue an appropriate contract modification: otherwise, the variation may be approved by the Engineer, but only by specific reference thereto in writing. The contractor shall not be entitled to rely on general approval of a submittal as an approval of variations from the requirements of the contract. If the contractor fails to describe such variations he shall not be relieved from the responsibilities for executing the work in accordance with the contract, notwithstanding a general approval of such submittals, nothing herein shall relieve the contractor of the responsibility of notifying the Engineer of any part of the contract drawings or specifications which the contractor knows or reasonable should have known could result defects in construction.

e) Use of submittals: The Employer may duplicate use and disclose in any manner and for any purpose shop drawings, product data and other submittals delivered under this contract.

28.13 Placement of order: The contractor shall place orders for items requiring a sample or product data submittal promptly after receiving the written approval of the submittal by the Engineer. No such materials or products shall be ordered or used in the work until such written approval by the Engineer has been given, except at the contractor 'risk.

28.14 Use and testing of samples

28.14.1 Use: Approved samples not destroyed in testing will be sent to Engineer. Those, which are in good condition, will be marked for identification and may be used in the work. Materials and equipment incorporated in the work shall match the approved samples within any specified tolerances. Other samples not destroyed in testing or not approved will be returned of the contractor at his expenses if so requested at the time of submission.

28.14.2 Failure of samples: Failure of any materials to pass the specified tests will be sufficient cause for refusal to consider, under this contract, any further samples of the same brand or make of that material of equipment which previously has proved unsatisfactory in service.

28.14.3 Taking and testing of samples: Samples of various materials or equipment delivered on the site may be taken by the Engineer for additional testing by the Employer outside of those found not to have meet contract requirement unless the Engineer determines it to be in the Employer's interest to accept the non-confirming materials or equipment.

28.14.4 Cost of additional testing – Unless otherwise specified, when additional tests are made, the cost of which shall be borne by the contractor. Samples, which do not meet contract requirements, will be rejected.

28.14.5 A schedule of tests, which will be conducted on the material, is to be forwarded by the contractor to the Engineer, within 5 days of the letter of intent, for approval by the Engineer.

29 Workers

29.1 The contractor shall, at his own expense, arrange for the requisite workers, foremen, technical and general support staff for the timely and satisfactory execution of the works.

29.2 The contractor shall promptly pay his staff and workers their due wages, salaries and other allowances as per prevailing laws. Should the contractor fail to do so, and if the situation warrants it, the Employer may, at his unquestioned discretion, pay wages due to the workers on behalf of the contractors after prior intimation to him. Any sums so paid to employees of the contractor shall be to the account of the contractor and shall be recovered from him.

29.3 The Engineer shall have the right without assigning any reason, to the contractor to dismiss and remove from the site any worker or anybody employed by the contractor, directly or indirectly, and the contractor shall, without demur remove such person's immediately. Such dismissal shall attract no liability of any nature whatsoever to the Employer. Arrangements for replacement of such person/s removed from the site shall also be the responsibility of the contractor.

29.4 The contractor shall maintain such registers, musters, forms and employment records at site as required by law and shall make these available to concerned authorities and the Engineer whenever required. the register to be maintained are (inspection register, site order register, hindrance register, material at site register, cement register, steel register, paint and chemical register, measurement register, register of cube and master test register.

29.5 The contractor shall not remove from site any materials, equipment, temporary structures, etc. without prior written permission of the Engineer and through a gate pass.

29.6 Labour compliance:

a) The contractor shall comply with the requirements of various statutory provisions such as minimum wages act, contract labour [regulation and abolition] act, employees state insurance act, 1948, and other applicable laws in respect of its employees, and staff disputes at the site and the employer shall be, in no way, be responsible for the same. Therefore, contractor shall maintain the statutory records in these regards and shall make available to the employer, copies thereof upon request. It shall

indemnify and keep indemnified the employer, its directors, employees, agents or representative against all charges, fees, penalties, damages, costs including reasonable attorney fee arising due to any non-compliance therewith or losses, damages and other consequences arising from such non compliance, including any claims by third parties.

b) Without prejudice to the other provisions of the contract, the contractor will take out insurance policies for sufficient amounts to cover him against workman's compensation etc. and will keep the employer, its directors and employees indemnified against all such risks.

c) The contractor hereby undertakes to indemnify and keep the Punjab Technical University its directors, agents, employees indemnified against all claims, demands, costs, expenses, charges, penalties fees etc. of any kind whatsoever in including third party claim due to personnel injury or death (including reasonable attorney fee) which may arise against or incurred by the Punjab Technical University, in connection with the services rendered by /contractor and due to any act, default or negligence of contractor or otherwise arising out of any breach of any of the provisions, undertakings and covenants of contractor contained herein.

d) No employee-Employer relationship shall be deemed to be created or construed between the personnel deputed by contractor and the Punjab Technical University. Contractor shall be solely responsible for all salaries, wages, bonuses, gratuity etc. and all other fringe benefits and the Punjab Technical University shall not be liable for any such matter whatsoever.

e) The Contractor shall be bound to follow Government Rules relating to layout, water supply and sanitation, Indian Electricity Act and Fire Control Rules and Regulations in labour camps and the provision of the Materials Building Code of India 1970 in regard to constructional practices and safety.

30 Deleted

31 Site and its use

31.1 The site will be made available to the contractor in its present conditions, site organization within the site boundaries shall be his responsibility. No space other than the above site can be made available to the contractor for site office, labour camps, storage etc.

31.2 The contractor shall confine his equipment, storage of materials, and all operations at site to limits determined by the Engineer within the area defined in the contract.

31.3 The contractor shall ensure that the transportation of materials to and from the site, movement of personnel or equivalent, operations of any sub-contractor or any other activity at site does not in any way interfere with or disturb with or disturb the management and normal activities.

32 Clean up of Site

32.1 The contractor shall maintain the works and site in tidy condition and free from accumulation of waste materials and debris.

32.2 Upon substantial completion of works, the contractor shall retain at site only such materials, equipment and tools as may be required for the performance of any remaining work. The contractor shall, at his cost, remove all scrap, debris, waste materials, and temporary structures so as to leave the work and site clean and suitable for occupation by the Employer.

32.3 if the contractor fails to clean up the site and to remove his materials and equipment, as above, the Employer shall be entitled to withhold payments due to the contractor, and also to arrange for the clean-up of the site and removal of the contractor's materials and equipment, entirely at the risk and cost of the contractor, and without incurring any liability of any nature whatever.

33 Inspection and correction of Work

33.1 Access: the Employer and their authorized agents and representatives shall at all times have access to the site and at other locations, where parts of the work are under preparation.

33.2 Deleted

33.3 The contractor shall maintain an adequate inspection system and perform such inspections as will ensure that the work called for by this contract confirm to contract requirements. The contractor shall maintain complete inspection records and make them available to the Employer. All work shall be conducted under the general direction of the contractor and is subject to the Employer inspection and test at all places and at all reasonable times before final completion and acceptance to ensure strict compliance with the terms of the contract.

33.4 The Employer's inspection and tests: inspections and test conducted by or on behalf of the Employer are for the sole benefits of the Employer and do not:

a) relieve the contractor of responsibility for providing adequate quality control measures;

b) relieve the contractor of responsibility for damage to or loss of the materials before final completion and acceptance of the work;

c) constitute or imply acceptance; or

d) Affect the continuing rights of the Employer after acceptance of completed work.

33.5 Performance of inspections and tests; the contractor shall promptly furnish, without additional charge, all facilities, labour and materials reasonably needed for performing such safe and convenient inspections and test as may charge to the contractor any additional cost of inspection or testing when work is not ready at the time specified by the contactor for inspection or test, when prior rejection makes reinsertions or retesting necessary. The Employer shall perform all its inspection and test in a manner that will not unnecessarily delay the work. Special, full size and performance test shall be performed as described in the contract documents or as instructed by the Engineer from time to time.

33.6 Rejected work: the contractor shall, at no additional cost or time, promptly replace or correct work found by the Employer not to confirm to contract requirements, unless the Employer consents to accept the work with an appropriate adjustment in the contract price. The contractor shall promptly segregate and remove rejected material from the premises.

33.7 Failure to correct: If the contractor does not promptly replace or correct rejected work, the Employer may:

a) by contract or otherwise, replace and correct the work and charge the cost to the contractor.

b) Terminate for default the contractor's right to precede.

34 Materials and workmanship

34.1 The contractor shall ensure that all materials and workmanship is of the kind and quality described in the contract documents. All materials shall be new and of the best quality, and the contractor shall, at his own cost, carry out prescribed tests to ensure reliability and conformity with relevant standards.

34.2 The contractor shall, at his own cost, supply or produce samples of materials and workmanship whenever required by the Engineer and specifications well ahead of time to allow for alternative experiments.

34.3 The Employer reserves the right to instruct the contractor to purchase materials from suppliers nominated and at such rates and prices as many be agreed with such suppliers. The Employer further reserves the right to supply selected materials free of cost to the contractor. In either of the above cases payments to the contractor shall be subject to commensurate adjustments, in all events, however, the contractor shall be responsible to check and test all the materials, received from any source, to ensure satisfactory quality.

34.4 All materials shall be purchased by the contractor at his cost, save in the instances when the Employer exercises his right to supply some materials free of costs. However, if the contractor is required by the Engineer to procure materials well in advance of the approved procurement schedule, then the cost of materials so ordered shall be borne by the Employer and such costs shall be paid to the contractor as advance payments to the contractor, to be adjusted against his bills.

34.5 No materials shall be used in the works beyond its expiry date or prescribed shelf life. Any materials found to have deteriorated in quality and considered unfit by the Engineer for use in the works shall be replaced by the contractor at his own cost.

34.6 The contractor shall maintain accurate records of the receipt, usage and dispatch of materials from site, so as to present an update register of stocks of all materials whenever required by the Engineer.

34.7 The contractor shall prepare checklist of work to be carried out and approved by the Engineer for every stage or element of the work, and a review of such lists by the Engineer shall be mandatory before completion of each phase of the work.

34.8 The signing of any checklist or approval of any form of work by the Engineer shall not in any way relieve the contractor of his responsibility to ensure completion of each phase of the work of the quality and specifications required and within approved time schedule, as per contract documents.

34.9 The contractor shall be solely responsible for the protection of all finished surfaces and works so as to avoid any repairs, and shall deliver to the Employer upon final completion the works free of any blemish, defect or damage.

35 Rejected Work

35.1 The Engineer shall be authorized to reject any work, which in his opinion, does not conform to the requirements of the contractor document.

35.2 Defective work, whether due to poor workmanship, use of sub-standard materials, or damage, whether by the contractor or any sub-contractor, which may be rejected by the Engineer shall be demolished by the contractor and removed promptly from the site and replaced or re-executed expeditiously by the contractor at his own cost.

35.3 If in the opinion of the Engineer, it is not expedient to correct defective work, the Employer shall be entitled to deduct from moneys due to the contractor, the difference in value between the executed work and that required under the contract, the amount of which shall be determined by the Engineer.

36 Water

36.1 The contractor shall, at his own cost make necessary arrangements for water, its storage and distribution for construction and emergencies.

36.2 The contractor shall satisfy himself regarding the quality and suitability of the water, and if required to have the tested at his own cost.

36.3 In the event of unacceptable quality for construction, insufficiency or non-availability of water at site, the contractor shall arrange, at his cost, for delivery of water from outside. He shall provide test reports of water used by him to the Engineer for his satisfaction and acceptance.

36.4 The contractor shall permit all the sub-contractors to use his water storage and distribution facilities for their respective work. Any additional or special arrangements needed by sub-contractors shall be made by them at their own cost.

36.5 Upon completion of the work, temporary storage tanks, built or installed, shall be removed by the contractor and the site restored to its original condition.

36.6 Insufficiency or non-availability of water shall not be cited by the contractor as an excuse for delays, or deficiencies in the work or a reason for claiming extra payments.

37 Electricity

37.1 The Contractor shall make his own arrangements for electrical power for the constructions well as for general lightning and other usages.

37.2 The contractor shall at his own cost, provide approved, temporary connections, cables distribution boards and related equipment, as required by the Engineer.

37.3 The contractor shall permit and enable all sub-contractors to use his power distribution facilities to which the contractor shall recover at cost from sub-contractor.

37.4 The contractor shall, at his own cost and in order to prevent interruption of his work in the event of power failures, provide for a stand-by diesel generator of sufficient capacity to supply adequate electricity for the works and other uses.

37.5 Disruptions in power supply, whether due to power failures, load shedding, generator breakdown, or any other reason, shall not be accepted as a valid reason for delays and deficiencies in the work or for claims for additional payments.

38 Telephone

38.1 The contractor shall at his own expense, arrange and provide for separate and independent telephone and fax connection at his site office.

38.2 The Employer shall not permit the use of his telephone or fax facilities by the contractor for any purpose whatsoever.

39 Approvals and permits

39.1 The contractor shall be completely responsible, at his own cost, for obtaining any and all approvals, permits, no objection certificates or any other required clearance from any statutory body for any part of the work under this contract whether initially, during the progress of work or finally.

40 Registers to be maintained by the Contractor at site

40.1 The contractor shall maintain at site a site order register in which he shall daily register detailed particulars of activities at site and progress of work. The format of such work diary shall be approved by the Engineer.

40.2 In addition, the contractor shall maintain daily works register, stage passing order, sample approval register, material test-result register, material at site register etc. at site and make relevant entries in these registers in the format approved by the Engineer.

40.3 The contractor shall submit to the Engineer copies of the duly filled and update site order register every day for their study and comments.

40.4 Any observations or objections made by the Engineers shall be clarified or explained within 48 hours by the contractor, otherwise such observations shall be deemed to be confirmed by the contractor.

40.5 Neither the submission of the registers to the Engineer nor their perusal nor endorsements shall prejudice the rights of the Employer or in any manner relieve the contractor of his responsibilities under the contract.

41 Deleted

42 Appointment of Apprentices as per Apprentice Act

42.1 The contractor shall during the currency of the contract when called upon by the Punjab Technical University engage and also ensure engagement by sub-contractor and other employed by the contractor in connection with the works such number of apprentices in the categories as directed, and for such periods as may be required under the Institute of Architects. The contractor shall train them as required under the apprentices Act, 1961 and' the rules made there-under from time to time and shall be responsible for all obligations of the Employer under the said act including the liability to make payments to apprentices as required under the said Act.

43 Technical Audit

43.1 The Employer reserves the right to carry out post payment audit and technical examination of the works and final bill, including all supporting vouchers, abstracts etc., the employer further reserves the right to carry out the aforesaid examination and enforce recovery detected, not withstanding the fact that the amount of final bill may have been included by one of the parties as an item of dispute before an arbitrator appointed under the arbitration clause of the contract and notwithstanding the fact that the amount of the final bill figures in the Arbitrator's Award.

43.2 If as a result of such audit and technical examination, over payment is discovered in respect of the work done under the contract, the contractor shall on demand make a payment of a sum equal to the amount of overpayment or agree for effecting necessary adjustments from any amounts due to him by the employer. If however, he refuses or neglects to make the payment on demand or does not agree to effecting adjustment from any amount due to him, the employer shall be entitled to take actions in sub-para above. If as a result of such audit & technical examination an under payment is discovered, the amount of underpayment shall be duly paid to the contractor by the employer.

44 Resolution of Disputes/Arbitration

44.1 The Employer and the Contractor shall make every effort to resolve amicably by direct informal negotiations any disagreement or dispute arising between them under or in connection with the contract.

44.2 All disputes and differences arising out of or in connection with, touching or concerning this work shall be referred to the sole Arbitrator appointed for the purpose by Vice Chancellor of Punjab Technical University (Employer). The decision of the Arbitrator shall be final and binding on both the parties subject to the provisions of the Indian Reconciliation and Arbitration Act of 1996 or any statutory modifications or reenactment thereof and the rules made thereunder and for the time being in force shall apply to the arbitration proceedings under this clause.

44.3 Venue of the arbitration proceedings shall be Kapurthala.

45 Miscellaneous

45.1 This contract has been made on an arms length basis. There is no relationship existing between the contractor and Employer prior to the execution of the contractor.

FORM OF TENDER

To

The Executive Engineer,
Punjab Technical University
Jalandhar-Kapurthala Road,
Kapurthala.

Sir,

I/We do hereby offer to execute the works comprised in the tender documents for the completion of _____ (Name of the work) in strict accordance with the drawings, specifications, schedules of quantities and upon the terms set out there-in.

I/We undertake to complete the whole work as scheduled in the Special Conditions of Contract from the date on which the order to commence the work is given to us by the Punjab Technical University.

I/We send herewith the sum of Rs……(Rupees..... only) as a deposit of Earnest Money, in bank draft or pay order drawn on …… (name of Bank) as proof of my/our willingness to enter into the contract if my/our tender is accepted in full or in part.

In the event of my/our tender being accepted, we also agree to enter into a contract in the form annexed hereto with such alterations or additions thereto which may be necessary to give effect to the acceptance of this tender and such contract shall contain and give full effect to Instructions to Tenderers, the Specification, Schedule of Quantities and rates schedule of materials and Estimates to be supplied by the Punjab Technical University and the drawings attached to the tender/supplied by PTU.

Witness:
Address:
Date:

Tenderer's Signature
Address:
Date:

STAMP RS.I00/

AGREEMENT

This Contract / Agreement is made on the …….day of ……200
BETWEEN
Punjab Technical University-Jalandhar, hereinafter called the "the PTU (which expression shall, wherever the context so demands or requires, includes their successors and assignee) of the one part
AND
M/s…… "
hereinafter called "the Contractor" (which expression shall, wherever the context so demands or requires, include his/ their legal successor and assignee) of the other part.

WHEREAS

A) The PTU is desirous that _____ (Name of the work) be executed as mentioned, enumerated or referred to in the Tender Documents including Quantities, Estimates, Agreed Variations and other document as called for in the Tender.

B) The Contractor has inspected the site and surroundings of work specified in the Tender Documents and has satisfied himself by careful examination before submitting his tender as to the nature of surface, strata, and ground, the form and nature of Site and local conditions, the quantities, nature, and magnitude of the work, availability of labour and materials necessary for the execution of work, the means of access to site, the supply of power and water thereto and the accommodation he may require and has made local and independent enquiries and obtained complete information as to the matters and things referred to or and obtained complete information as to the matters and things referred to, or implied in the Tender Document or having any connection therewith, and has considered the nature and extent of all probable and possible situations, delays, hindrances, (except any Archeological Monuments/ Structures or unforeseen underground Service) or interference to or with the execution and completion of work to be carried out under the contract and has examined and considered all other matters, conditions and things and probable and possible contingencies, and generally all matters incidental thereto and auxiliary thereof affecting the execution and completion of work as per the terms and conditions of the contract and which might have influenced him in making his bid. However the contractor shall be entitled to extra payment for any extra work not incorporated in the bill of quantities as per mutually agreed terms/ rates if the said work is allotted to the contractor.

AND WHEREAS

The PTU has accepted the tender for _____ (Name of the work) and conveyed vide letter No. …….. dated at the percentage as quoted in the schedule of Quantities for the work and accepted by the PTU upon the terms and subject to the conditions of the contract.

NOW THIS AGREEMENT WITNESSETH AND IT IS HEREBY AGREED AND DECLARED AS FOLLOWS

1. The following documents in conjunction with addendum/corrigendum to Tender Documents shall be deemed to *form* and be read and construed as part of this Agreement, viz

   (a) This Contract Agreement
   (b) All documents forming part of the tender document.
   (c) Any other document, as felt necessary

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

3. The work shall be strictly executed in accordance with the conditions of the Contract set forth in the documents mentioned in para 1.

4. In consideration of the payment to be made to the contractor for the work to be executed by him, the Contractor hereby covenants with PTU that the Contractor shall and will duly provide, execute and complete the said work and shall do and perform all other acts and things in the Contract, mentioned or described or which are to be implied there from or may be reasonably necessary for the completion of the said work and at the times and in the manner and subject to the terms and conditions or stipulations mentioned in The Contract.

5. In consideration of the due provision, execution and completion of the said work, the PTU does hereby agree with the contractor that the PTU will pay to the contractor in respect of the amounts for the work actually done by him and approved by the Architect/Executive Engineer PTU at the quoted percentage of the estimates and other sums payable to the Contractor under provisions of the Contract, such payment to be made at such time and in such manner as provided for in The Contract.

AND

In consideration of the due provision, execution and completion of the said work, the Contractor does hereby agree to pay such sums as may be due to the PTU as per the terms and conditions set forth in the said contract, and such other sums as may become

payable to the PTU towards loss, damage to the PTU's equipment, materials, construction plant and machinery, such payments to be made at such time and in such manner as is provided in the contract.

It shall be specified and distinctly understood and agreed between the PTU and contractor that the contractor shall have no right, title or interest in the site made available by the PTU for the execution of the work or in the building, structure or the work executed in the said site or in the goods, articles or materials etc. brought to the said site (unless the same specifically belong to the contractor) and the contractor shall not have or deem to have any lien or whatsoever charge for unpaid bill and on this account will not be entitled to assume or retain possession or control of site or structures or materials or equipment and the PTU shall have an absolute right to take full possession of the site and to remove the Contractor, their servants, agents, representatives, materials etc. belonging to the Contractor and lying on the site. The agreement is being executed in quadruplicate for facility of reference.

IN WITNESS WHEREOF the parties have executed these presents in the day and the year first above written.

Signed and delivered for and on behalf of the PTU	Signed and delivered for and on behalf the Contractor.
Dated	Date
Place	Place

IN PRESENCE OF TWO WITNESS

1.	1.
2.	2.

STAMP Rs. 50/

INDENTURE FOR THE SECURED MATERIAL ADVANCES

This INDENTURE made the day of between M/s Company (hereinafter called the Contractor which expression shall, where the context so admits or implies, be deemed to include his executors administrators and assigns) of the one part and The Punjab Technical University, Jalandhar (hereinafter called the PTU which expression shall, when the context so admits or implies, be deemed to include his successors in the office and assigns) of the other part.

WHEREAS by an agreement dated (hereinafter called the said agreement) the Contractor has agreed for _____ (Name of the work)

AND WHEREAS THE Contractor has applied to the PTU , that he may be allowed advances on the security of materials absolutely belonging to him and brought by him to the site of the works the subject of the said agreement for use in the construction of such of the works as he has undertaken to execute at rates fixed for the finished work (inclusive of the cost of materials and labour and other charges).

AND WHEREAS the PTU has agreed to advance to the contractor the Sum of Rupees (Rs.) only on the security of materials the quantities and other particulars of which are:

Detailed in Secured Advance Bill No.for the said works singed by the Contractor on…….. and the PTU, has reserved to itself the option of making any further advance or advances on the security of other materials brought by the Contractor to the site works. NOW THIS INDENTURE WITHIINESSETII that in pursuance of the said agreement and in consideration of the sum of Rs. ……..
on or before the execution of these presents paid to the contractor by the PTU, (the receipt whereof the Contractor both hereby acknowledge) and of such further advances (if any) as may be made to him as aforesaid the Contractor doth hereby covenant and agree with the PTU, and declare as follows :

1. That the said sum of Rs so advanced by PTU to the Contractor as aforesaid and all or any further sum or sums advanced as aforesaid shall be employed by the Contractor in or towards expediting the execution of the said works and for no other purpose whatsoever.

2. That the materials detailed in the said Secured Advance Bill No. which have been offered to and accepted by the PTD, as security are absolutely the Contractors own property and free from encumbrances of any kind and the Contractor will not make any application for or receive a further advance on the security of the materials which are not absolutely his own property and free from encumbrances of any respect of which an advance has been made to him as aforesaid.

3. That the materials detailed in the said Secured Advance Bill No. and all other materials on the security of which any further advance or advances may hereafter be made as aforesaid (hereinafter called the said materials) shall be used by the Contractor solely in the execution of the said words in accordance with the directions of the Executive Engineer, PTU (hereinafter called the Executive Engineer) and in the terms for the said agreement.

4. That the Contractor shall make at his own cost all necessary and adequate arrangements for the proper watch, safe custody and protection against all risks of the said materials and that until used in construction as aforesaid the said materials shall remain at the site of the said works in the contractors custody and on his own responsibility an shall all times be open to inspection by the Executive Engineer or any officer authorized by him. In the event of said materials or any part thereof being stolen, destroyed or damaged or becoming deteriorated in the greater degree than is due to reasonable use and wear thereof the Contractor will forthwith replace the same with other materials of like quality or repair and make good the same as required by the Executive Engineer.

5. That the said materials shall not on any account be removed from the site of the said works except with the written permission of the Executive Engineer or an officer authorized by him on that behalf.

6. That the advances shall be repayable in full when or before the contractor receives payment from pro, of the price payable to him for the said works under the terms and provisions of the said agreement: Provided that if any intermediate payments are made to the contractor on account of work done then on the occasion of each payment the PTU will be at liberty to make a recovery from the contractors bill for such payment by deducting there from the value of the said materials when actually used in the construction and in respect of which recovery has not been made previously, the value for this purpose being determined in respect of each description of materials at the rates at which the amounts of the advances made under these presents were calculated.

7. That if the Contractor shall at any time make any default in the performance or observance in any respect of any of the terms and provisions of the said agreement or of these presents the total amount of the advance or advances that may still be owing to the PTU shall immediately on the happening of such default be repayable by the contractor to the PTU together with interest thereon at twelve percent per annum from the date or respective dates of such advance or advances to the date of repayment and with all costs, charges, damages and expenses incurred by the PTU, in or for recovery thereof or the enforcement of this security or otherwise by reason of the default of the contractor and the Contractor hereby covenants and agrees with the PTU, to repay and pay the same respectively to it accordingly.

8. That the Contractor hereby charges all the said materials with the repayment to PTU of the said sum of Rupees and any further sum or sums / advances as aforesaid and all costs charges, damages and expenses payable under these presents: PROVIDED AL WAYS and it is hereby agreed and declared that not withstanding anything in the said agreement and without prejudice to the powers contained therein if and whenever the covenant for payment and repayment herein before contained shall become enforceable and the money owing shall not be paid in accordance therewith, PTU may at any time thereafter adopt all or any of following courses as he may deem best :

a) Seize and utilize the said materials or any part there of in the completion of the said works on behalf of the contractor in accordance with the provisions in that behalf contained in the said agreement debiting the Contractor with the actual cost of effecting such completion and the amount due in respect of advances under these presents and crediting the Contractor with the value of work done as if he had carried it out in accordance with the said agreement and at the rates thereby provided: if the balance is against the Contractor he is to pay the same to the PTU on demand.

b) Remove and sell by public auction the seized materials or any part thereof if any out of the moneys arising from the sale retain all the sums aforesaid repayable or payable to the PTU, under these presents and pay over the surplus (if any) to the Contractor.

c)Deduct all or any part of moneys owing out of the security deposit or any sum due to M/s the Contractor under the said agreement.

9. That except in the event of such default on the part of the Contractor as aforesaid interest on the said advance shall not be payable.

10. That in the event of any conflict between the provisions of these presents and the said agreement the provisions of these presents shall prevail and in the event of any dispute or difference arriving over the construction or effect of these presents the settlement of which has not been herein - before expressly provided for the same shall be settled as per terms and conditions of the said agreement.

Signed, sealed and delivered by ……. the said contractor in the presence of :

(Contractor)

Witness:

Witness:

INDEMNITY BOND

(To be executed on Stamp Paper of Rs. 100 duly notarised)

KNOW all men by these presents that l/We…….do hereby execute Indemnity Bond in favour of the Punjab Technical University, Jallandhar, on this …… day of …….

WHEREAS the Punjab Technical University, Jallandhar have appointed M/s ……. as the Contractors for their _____ (Name of the work).

THIS DEED WITNESS AS FOLLOWS:

I/We……. hereby do Indemnify and save harmless the Punjab Technical University, Jallandhar against and from:.

1. Any third party claims, civil or criminal complaints / liabilities, site mishaps and other accidents or
disputes and/or damages occurring or arising out of any mishaps at the site due to faulty work negligence, faulty construction and/or for violating any law, rules and regulations in force, for the time being while executing/executed works by me/us.

2. Any damages, loss or expenses due to or resulting from any negligence or breach of duty on the part of me /us or my sub contactor's if any, servants or agents.

3. Any claim by an employee of mine/ours or of sub contractors if any, under the Workmen's Compensation Act, 1939 or any other law, rules and regulations in force for the time being and any Acts rcplacl11g and/or amending the same or any of the same as may be in force at the time and under all any law in respect of injuries to persons or property arising out of and in the course of the execution of the contract work and/or arising out of and in the course of employment of any workman/employee.

4. Any act or omission of mine/ours of sub-contractor/s if any, our/their servants or agents which may involve any loss, damage, liability civil or criminal action.

WITNESS WHEREOF THE …….. has set his/their hand on this day of ……
2005.

SIGNED AND DELIVERED BY THE AFORESAID

(name and address of the contractor)

IN THE PRESENCE OF WITNESSES:

1. 2. .

TECHNICAL SPECIFICATIONS

All the works shall be executed, measured and paid as per latest Punjab PWD specifications. In case, any item(s) is/are not covered under Punjab PWD specifications, latest CPWD specifications shall be followed.

In the absence of any specifications in the above manual, the following specifications will be followed.

A standard PEB building is made of primary members, secondary members, Connections, roof sheeting, wall sheeting, sheeting fasteners, sealer, closures ridge cover, flashing and trims & Eave curves with specification of each component as specified herein.

A. **PRIMARY MEMBERS**

Primary structural framing shall include the transverse rigid frames, lean-to-rafters and columns, canopy rafters, interior columns (beam and column frames), bearing frame rafters and corner columns and end wall wind columns.

B. **SECONDARY MEMBERS**

Secondary structural framing shall include the purlins, grits, eave struts, wind bracing, flange bracing, base angles clips and other miscellaneous structural members.

C**. PAINT ON STRUCTURAL MEMBERS:**

All structural members shall be cleaned by wire brushing to remove dirt, grease oil and loose mill scale and given one or more shop coat of red oxide. All Structural members shall have first paint coat applied at the factory itself. Second coat shall be at site only touch-up painting to be done after erection of the structure. The color for enamel paint to be specified by Architects.

D. **CONNECTIONS:**

All field connections shall be bolted (Unless otherwise noted) Primary bolted connections shall be furnished with high strength bolts conforming to the physical specifications of ASTM A325 (or equivalent). Secondary bolted connections shall be furnished with machine bolts conform to the physical Specifications on ASTM A307 (or equivalent).

E. PHYSICAL SPECIFICATIONS OF STRUCTURAL MEMBERS:

Members fabricated from plate or bar stock shall have flanges and webs joined on one side of the web by a continuous welding process and will conform to the physical specifications of ASTM A570 (Grade 50) / equivalent and having a minimum yield strength of 50,000 P.S.I (345 Mpa) or of ASTM A572 (Grade 36) / equivalent and having a minimum yield strength of 36,000 P.S.I (250 Mpa) with members satisfying the minimum design strength criteria for particular type of steel used.

Members fabricated by cold forming process shall conform to the physical specifications of ASTM A570 (Grade 50) / equivalent and having a minimum yield strength of 50,000 P.S.I (345 Mpa) or of ASTM A572 (Grade 36) / equivalent and having a minimum yield strength of 36,000 P.S.I (250 Mpa) with members satisfying the minimum design strength criteria for particular type of steel used.

Members fabricated from hot rolled structural shapes shall conform to the physical specifications of ASTM A572 (Grade 36) or equivalent and having a minimum yield strength of 36,000 P.S.I (250 Mpa).

Rod and angle bracing shall conform to the physical specifications of ASTM A 36 (or equivalent) and having a minimum yield strength of 36,000 P.S.I (250 Mpa)

Roof and wall cladding shall conform to the physical specifications of ASTM A653 Grade 50 (or equivalent and having minimum yield strength of 50,000 P.S.I 345 Mpa)

All other miscellaneous secondary members shall have a minimum yield strength of 36, 00 P.S.I. 250 Mpa)

F. ROOF SHEETING /WALL SHEETING:

Roof panels shall be of 300MPA/250GSM (AZ150) profiled galvalume color coated steel sheeting.

In case of pre-painted galvalume panels, the exterior is pre-painted with 5 microns of primer and 20 microns of thick factory applied polyester paint. The interior face is pre-painted with 5 microns thick factory applied polyester paint.

Each panel shall provide one meter coverage

The material shall conform to ASTM-A792 and the galvalume coating to ASTM-A792 – AZ150. The yield strength of material shall be 345 MPa (minimum).

G. **SHEETING FASTENERS:**

Screws : Xylan Coated or Grade 3 Coating with 20 year rust free guarantee (Conforming to Salt Spay Test of 1000 Hours)

Standard fasteners shall be No-14 Type A. self tapping sheet metal screws with metal and neoprene washers. All screws shall have hexagonal heads, be color coated to match roof and wall sheeting . Fastners must be equally spaced for uniform look.

H. **SEALER / ROPE SEAL:**

This is to be applied at all side overlaps and end overlaps of roof panels and around self flashing windows. Sealer shall be 6mm wide x 5mm thick, asbestos fiber filled, pressure sensitive butyl tape. The sealer shall be non asphalted, non shrinking, non drying and non toxic and shall have superior adhesion to metals, plastics and painted surfaces at temperatures from - 51o C to + 104o C.

I. **RIDGE COVER**:

A formed panel matching the material color, slope and profile of adjoining PEB Rib roof panels.

K. **FLASHING AND TRIM**

Flashing and/ or trim shall be furnished at the rake, corners eaves, framed openings and wherever necessary to provide weather tightness and finished appearance. Color shall match with sheeting. Material shall be 0.5mm thick conforming to the physical specifications of ASTM A446, Grade C of equivalent and having minimum yield strength of 40,000 P.S.I. (275 Mpa).

L. **GUTTERS**

Color shall match with sheeting. Material shall be 0.6mm thick conforming to the physical specifications of ASTM A446. Size of profile gutter and spacing of downpipes suitable for rainfall area of the region and drainage calculation
to be proved by vendor

M. **SPECIFICATION OF ACOUSTIC PANEL FOR CEILING & WALLS**

The description of item for acoustic panels is self-explanatory with regard to specification of the same. If any equivalent items is selected or decided then full set of specification along with description of item has to be approved by Client, full set of methodology/design for carrying out the work is to be submitted by the contractor for approval of client.

SPECIFICATION OF FALSE CEILING

The tiles should have Humidity Resistance (RH) of 99%, NRC 0.5, Light Reflectance >83%, Thermal Conductivity k = 0.052- 0.057 w/m K, Color White, Fire Performance A2-s1.d0 in module size of 600 X 600 X 16 mm with Bio Block coating, suitable for Green Building application, with Recycled content of 63%. The tile shall be laid on grid of "Armstrong" or equivalent make with Silhouette Black Reveal 15mm wide T - section flanges color white having rotary stitching on all T-sections. Web height of grid should be 44/45mm. The T Sections have a Galvanizing of 120 grams per m2 & passed through 500 hrs of Salt test.

INSTALLATION:

To comprise main runner spaced at 1200mm centers securely fixed to the structural soffit using approved hanger 1200mm maximum centre & not more than 150mm from spliced joints. The First/Last Armstrong suspension system at the end of each main runner should not be greater than 600mm from the adjacent wall. 1200mm long cross tees to be inter locked between main runners at 300mm centre to form 1200 x 300 mm module. Cut cross tees longer than 600mm require independent support. Perimeter trim to be Armstrong or equivalent wall angles, secured to walls at 450 mm maximum centers.

THE SUSPENSION SYSTEM:

Accessories manufactured and supplied by Armstrong World Industries or equivalent consist of M6 Anchor Fasteners with Vertical Hangers made of Galvanized steel. A pre Straightened Hanger wire of dia – 2.68 mm of 1.83 m length, along with Adjustable hook clips of 0.8mm thick, galvanized spring steel for 2.68 mm. The adjustable clip also consists of a 3.5 mm aquiline wire to be used with the main runner. In case of other than Armstrong make, material accessories for false ceiling, the manufacturer's has to submit the full detail of specification for approval by Client.

N. **SPECIFICATION FOR ARMSTRONG "METAL LAY-IN PERFORATED TILES WITH ARMSTRONG SILHOUETTE EXPOSED GRID" SYSTEM**

Providing & Fixing of Armstrong Orcal Lay in Perforated metal ceiling System consisting of 600x600mm Lay in tiles of pre coated galvanised steel in 0.4/0.5 m m thickness in white color with standard perforation of 2.5mm dia & open area of 16% and Freudenberg Soundtex acoustical fleece glued to the back of the tile to be laid on Armstrong Silhouette grid systems with color and white/black reveal white having rotary stitching on the Main Runner, 1200 mm & 600 mm Cross Tees.

The tiles should have Humidity Resistance (RH) of 100%, NRC of 0.70, Fire Performance A2-s1.d0 in module size of 600 X 600 mm, suitable for Green Building application, with Recycled content of 25%.

The tile shall be laid on Armstrong Silhouette profile grid system with 15mm white flanges incorporating a 6mm central reveal in white/black color and with a web height of 45mm and a load carrying capacity of minimum 15.68 Kgs/M2. Silhouette, Main Runners & Cross Tees to have mitred ends & "birdsmouth" notches to provide mitred cruciform junctions. The T Sections have a Galvanizing of 120 grams per M2 & passed through 500 hrs of Salt test.

The Tile & Grid system used together should carry a 15 year warrantee.

INSTALLATION:

1200mm long cross tees to be interlocked between main runners at 600mm centre to form 1200 x 600 mm module. Cut cross tees longer than 600mm require independent support. 600 x 600mm modules to be formed by fitting 600mm long cross tees centrally between the 1200 mm cross tees. The 1200mm cross tees to have central "birdsmouth" notches to facilitate fitting of 600mm cross tees. Perimeter trim to be Armstrong shadow wall molding (dimensions: 19x7x7x14mm), secured to walls at 450 mm maximum centres.

ARMSTRONG SUSPENSION SYSTEM accessories manufactured and supplied by Armstrong World Industries consisting of M6 Anchor Fasteners with Vertical Hangers made of Galvanised steel of size 26 x 26 x 25 x 1.2mm with a Galvanised Thickness of 80gsm, A pre Straightened Hanger wire of dia – 2.68 mm of 1.83 m length., thickness of 80gsm and a tensile strength of 344-413 MPa, along with Adjustable hook clips of 0.8mm thick, galvanised spring steel for 2.68 mm with a minimum pull strength of 110 kg. The adjustable clip also consists of a 3.5 mm aquiline wire to be used with the main runner.

DESIGN PARAMETRS

Given blow are some design parameters which should be followed in addition to those given in various sections of technical specifications enclosed

DUCTING WORK

a) Method of Duct Design : Equal friction method / constant friction method

b) Maximum Air Velocity in supply air duct : 450.00

c) Maximum Air Velocity in return air duct : 305.00

d) Friction loss in duct (max) MM wg in 100 Mt run : 10

e) Maximum Velocity at supply air grill outlet MPM: 150.00

INSULATION

Maximum temperature rise in the supply air duct from Air Handlers outlet to farthest outlet 1.1Deg C

TERMS AND DEFINITIONS

The following terms have been used in the tender specifications and drawings etc.

ISI	Bureau of Indian standards
ASHRAE	American society of Heating Refrigeration and Air-Conditioning Engineers
ASME	American Society of Mechanical Engineers
BS	British Standard
CMH	Cubic Meter per hour
USGPM	US gallons per Minute
RPM	Rotations per minute
BTU/Hr.	British Thermal unit per hour
Kcal/ Hr	Kilo calories per hour
SAG	Supply air Grill
RAG	Return Air Grill
FD	Fire damper
FAD	Fresh air damper
DP	Drain Point
SAD	Supply air diffuser
RAD	Return air Diffuser.

INSPECTION AND TESTING PROCEDURES

All major equipments such as chillers, Air handling units, panels, fans shall be got inspected by the engineer in charge / customer at works by the AC contractor, if he so desires at tenderer's cost. All routine and Type tests shall be carried out and the test reports shall be submitted for approval before dispatch. The engineer in charge is free to witness any or all tests. In any case the OEM test certificates shall be submitted to the engineer in charge for verification of the same before the payments for the same can be processed. The AC contractor shall inform the engineer in charge well in time about the date of readiness of the equipment for inspection and testing. The inspection process shall be as under:

Ducting

- The GI sheet to be used shall be physically checked for gauge as per IS 277. The bend test shall be performed at site. Randomly one sample of each gauge shall be checked chemically for composition and galvanizing by a reputed lab and report shall be submitted before starting work at site.

Insulation

- All type of insulation material shall be physically checked for quality, thickness as per tender specification.

- The samples shall be checked for density at site. The same shall be correlated with the OEM test certificates.

- The material shall be having required thermal conductivity which will be verified from TC.

Final Inspection

After completion of entire installation as per specifications in all respects, the AC contractor shall demonstrate trouble free operation of the entire installation simultaneously for a period of 96 hours spread over a period of 6 days continuous. The test readings shall be recorded in a mutually acceptable format. All tests shall be carried out by the AC contractor at his own expenses. However necessary utilities such as power and water shall be provided by the owner free of cost. The tests shall include but will not be limited to the following:

- Clean all equipment to remove foreign material and construction dirt and dust with Vacuum cleaner.
- Verify that the equipment is secure on mounting and supporting devices and that connections for piping, ductwork and electrical are complete.

- Verify proper thermal overload protection is installed in motors, starters, and disconnects.
- Perform cleaning and adjusting specified as per OEM.
- Check proper motor rotation direction and verify fan wheel / pump free rotation and smooth bearing operations.
- Reconnect drive system and align belts.
- Lubricate bearings, pulleys, belts, and other moving parts with factory recommended lubricants.
- Set outside-air / supply air dampers to minimum outside-air setting.
- Verify manual and automatic volume control, and fire dampers in connected ductwork system are in the full-open position.
- Cooling / heating capacity of various fan coil units shall be computed from the measurements of air flow and dry and wet bulb temperatures of air entering and leaving the coil. Flow measurements shall be by a calibrated rotating vane anemometer and temperature measurements by accurately calibrated mercury-in-glass thermometers. Computed ratings shall conform to the specified capacities and quoted ratings. Power consumption shall be computed from measurements of incoming voltage and input current, whereas, noise level at various locations within the conditioned spaces shall be measured by a sound pressure level meter.

NOTE:

- All measuring instruments such as thermometer, Psychrometer, Pressure gauges, anemometers, Flowmeter, dB Meter, Tong tester, etc or any other necessary instrument shall be arranged by the AC contractor at his own expense.
- The instruments shall be new and shall have a valid calibration certificate from a renowned test lab.
- The plant shall be run initially and all equipments shall be adjusted to give desired results as per contract. Thereafter the plant shall be test run for 96 hours as described above and the readings shall be demonstrated in the required format. The test shall be witnessed by the owners and engineer in charges representative. In case the conditions are not achieved during the initial run test the plant shall be readjusted and the new dates for tests shall be determined. The entire test shall be repeated and satisfactory results shall have to be obtained. Only after satisfactory test the installation shall be taken over by the customer and warranty period for one year shall commence.
- In addition to the above test 1 additional test for 3 days during summer/monsoon shall be done for demonstrating the design parameters shall be conducted by the AC contractor. These dates shall be mutually discussed.
- The test readings shall be suitably adjusted for the absence of Peak ambient conditions, fouling factor, and available load.

- The snag list prepared jointly after initial test shall be attended to by the vendor during a maximum of 30 days from the start of warranty period. Failure to do so shall result in corresponding increase of warranty period.

SPECIFICATION FOR FANS & BLOWERS

1. SCOPE

- The scope of this section comprises the supply, installation, testing and commissioning of centrifugal fans, inline fans and axial flow fans conforming to these specifications and in accordance with the requirement of drawings and 'Schedule of Quantities'.

2. TYPE

- The blowers / fans shall be of type as indicated in drawings and 'Schedule of Quantities'

3 GENERAL REQUIREMENTS.

- Static, dynamic balancing and vibration: the individual fan impeller, blades, motor shall be statically and dynamically balanced independently. After assembly the entire fan motor unit shall not give rise to any vibrations. The balancing shall be as per ISO: 1940 GR 6.3.

4 **NOISE LEVEL**:

- The tendered shall indicate the noise level generated by the fan / motor unit in terms of decibel units to be measured at 3M from the unit. This shall fall in line with best engineering standard.

5. INLINE FAN

- Inline fan shall incorporate SISW direct driven centrifugal fan with TEFC (IP-44) motor. The fan assembly shall be enclosed in a sheet metal housing of 22 gauge GSS and with necessary inspection cover with proper gasket assembly. The fan material shall be galvanized sheet steel. Flanges shall be provided on both sides of inline fan to facilitate easy connection. Flexible anti-vibration joints shall be provided to arrest vibration being transferred to other equipment connected to inline fan. Motor shall be single phase/three phase as per duty conditions.

- All single-phase fans shall be provided with speed regulators while all three phase fans shall be provided with opposed blade dampers in GSS construction at fan outlet for air balancing.

6. PROPELLER FANS

- Propeller fans shall be direct driven, three or four blade type mounted on a steel mounting plate with orifice ring.

- Mounting plate shall be of steel construction, square with streamlined venturi inlet coated with baked enamel paint. Mounting plate shall be of standard size, constructed of 12 to 16 gauge steel sheet depending upon the fan size. Orifice ring shall be correctly formed by spinning or stamping to provide easy passage of air without turbulence and to direct the air stream.

- Fan blades shall be constructed of aluminum or glass reinforced polypropylene. Fan hub shall be of heavy welded steel construction with blades bolted to the hub fan blades and assembly shall be statically and dynamically balanced

- Shaft shall be of steel accurately ground and shall not pass through first critical speed through entire range of specified fan speed.

- Motor shall be standard permanent split capacitor of shaded pole for small sizes, totally enclosed with pre-lubricated sleeve or ball bearings, designed for a quiet operation with a maximum speed of 1000 RPM for fans 60 cm dia or larger and 1440 RPM for fans 45 cm dia and smaller. Motors for larger fans shall be suitable for 415 ± 6% volts. 50 cycle 3-phase power supply and for smaller fans shall be suitable for 220 ± 6% volts, 50 cycles single-phase power supply. Motors shall be suitable for horizontal or vertical service as indicated in drawings and Schedule of Quantities.

- Propeller fans shall be provided with following accessories: -

- Wire guard and bird-screen
- Gravity louvers at outlet
- Regulator for controlling fan speed for single-phase fan motor.
- Single-phase preventions for 3 phase fans.
- Wiring between regulator and fan motor including termination at both ends.

7 TECHNICAL DATA

- The firm shall submit the technical data and performance characteristics with operating points duly marked for approval prior to fabrication. The supplier shall supply the test certificates of all the fans.

8. PAINTING

- All fans and their accessories shall be painted with two coats of suitable enamel paint after one coat of Red Oxide primer.

9. PACKING

- The fans shall be dispatched in packed condition to avoid damage during transportation to site. Transit insurance for the fans shall be included in this offer.

10. INSPECTION & TESTING.

- All fans shall be subjected to inspection and testing requirements as given below. The contactor shall be responsible for providing all inspection facilities and for conducting all tests at works and at site after erection. Test certificates for all fans shall be submitted, some fans at the discretion of Client may be tested at the factory in his presence.
- The performance of the fan motor unit shall be tested by operating at design conditions. The following parameters will be tested vis-à-vis the approved performance curves
- Airflow capacity.

  Static head developed

  BHP requirement

  Vibration and noise level

11. PERFORMANCE DATA

- All fans shall be selected for the lowest operating noise level. Capacity rating, power consumption with operating points clearly indicated shall be submitted and verified at the time of testing and commissioning of installation.

12. TESTING

- Capacity of all fans shall be measured by an anemometer. Measured airflow capacities shall conform to the specified capacities and quoted ratings, power consumption shall be computed from measurements of incoming voltage and incoming current.

SPECIFICATIONS FOR AUTOMATIC CONTROLS AND INSTRUMENTS

1. SCOPE

- The scope of this section comprises the supply, installation, testing and commissioning of automatic controls and instruments conforming to these specifications and in accordance with requirement of drawings and 'Schedule of Quantities'

2. PRODUCTS

2.1 Thermostats shall be electrical mode, fixed differential type with sensing element located in the return air stream.

3. INSTRUMENTS

3.1 **Thermometer**: Thermometers shall be dial type 100 mm dia or V form industrial type. Body shall be aluminum alloy, anodized gold colored surface. The casing shall be adjustable side ways for reading from the front. The glass capillary shall be triangular in shape with blue mercury filled in glass for better visibility. Scale of reading shall be of the range 0 deg C TO 60 deg C & +32 deg F to 150 deg F. Graduation of scale shall be 1 deg in both readings. Ranges of scales shall be 30-90 degrees F (0-50 deg C) for all conditioning applications of cooling only.

Thermometer shall be suitable for 15mm connection. Thermometer for chilled water shall be with long stem so that thermometer is removable without damaging the insulation ms socket to be welded on pipes shall be provided with thermometer. Thermometer shall be installed of chilled water supply and return at each air handling unit, supply and return of each chiller, condenser.

3.2 **Pressure gauge**: shall be installed on suction header and at discharge side of each pump in the chilled water supply and return at each air handling unit, at inlet and outlet of each chiller. Suction side gauge at pump suction header shall be compound gauge with 150 MM dia, range 75 cm vacuum to 10 kg pressure. Discharge side gauge at pumps and at all other locations shall be 150mm range 0-10 kg per sq cm (0-150 PSI) Pressure

SPECIFICATIONS FOR SHEET METAL WORKS

1. SCOPE

- The scope of this section includes supply, fabrication, installation & testing of all sheet metal ducts as per specifications & drawings. Except as otherwise specified all ductwork and related items shall be in accordance with these specifications. Duct work shall mean all ducts, casings, dampers, access doors, joints, stiffeners, hangers & all accessories.

2. DUCT MATERIALS

2.1 The ducts shall be fabricated from galvanized steel sheets class VIII - Light coating of Zinc conforming to ISS: 277-1962 (REVISED) with accompanying Mill test Certificates. Galvanizing shall be of 120gms/sq.m. (total coating on both sides). In addition, if deemed necessary, samples of raw material, selected at random by owner's site representative shall be subject to approval and tested for thickness and zinc coating at contractor's expense.

- Only new, fresh, clean (unsoiled) and bright GI / Aluminum sheets shall be used. The Owner / Consultants reserve the right to summarily reject the sheets not meeting these requirements. Fabrication of ducts shall be through Lock forming machines.

- In case of factory fabricated duct the G.I. raw material should be used in coil-form (instead of sheets) so as to limit the longitudinal joints at the edges only irrespective of cross-section dimensions

3 SPECIFICATIONS FOR SITE FABRICATED DUCING

- All duct work, sheet metal fabrication unless otherwise directed, shall strictly meet requirements, as described in IS:655-1963 with Amendment-I (1971 Edition)

Longer size of Duct	Sheet Thickness GI(MM)	Type of Joints	Bracing
Up to 750	0.63	GI Flange	-
751-1000	0.80	25x25x3 mm angle iron frame with 8 mm Dia nuts & bolts	25X25X3 MM @ 1M
1001-1500	0.80	40x40x5 mm angle iron frame with 8 mm Dia nuts & bolts	40x40x5 MM @1M
1501-2250	1.00	50x50x5 mm angle iron frame with 10 mm Dia nuts & bolts at 125 mm center	40x40x3 mm @ 1.2m to be braced diagonally.
2251 & above	1.25	50x50x6 mm angle iron frame with 10 mm Dia nuts & bolts at 125 mm center	40x40x3 mm @ 1.6m diagonally braced

- Ducts larger than 450 mm shall be cross broken, duct sections up to 1200 mm length may be used with bracing angles omitted.

- Changes in section of ductwork shall be affected by tapering the ducts with as long a taper as possible. All branches shall be taken off at not more than 45 Deg. Angle from the axis of the main duct unless otherwise approved by the Engineer-in-Charge.

- All ducts shall be supported from the ceiling/slab by means of M.S. rods of 10 MM Dia with M.S. angle at the bottom of size 40 mm x 40 mm x 6 mm for sizes up to 1500 mm at 3 m intervals. Above size 1500 mm upto 2250, support shall be provided with 10 mm dia. MS rod and MS angle size 50 mm x 50 mm at bottom at 2.5 m intervals. Above size 2250 mm support shall be provided with 12 mm dia MS rod and MS angle size 50 mm x 50 mm at bottom

3. INSTALLATION

- All ducts shall be fabricated and installed in workman like manner, generally conforming to relevant BIS codes. Round exposed ducts shall be die formed for achieving perfect circle configuration

- Ducts so identified on the drawing shall be acoustically lined and thermally insulated as described in the section 'Insulation' and as indicated in 'Schedule of Quantities. Duct dimensions shown in drawings are overall sheet metal dimensions inclusive of the acoustic lining where required and indicated in 'Schedule of Quantities'.

- Ducts shall be straight and smooth on the inside with neatly finished joints. All joints shall be made airtight.

- All exposed ducts upto 60 cm width within conditioned spaces shall have slip joints. The
- internal ends of the slip joints shall be in the direction of airflow. Ducts and accessories within ceiling spaces visible from air-conditioned areas shall be provided with two coats of matt black finish paint.

- Change in dimensions and shape of ducts shall be gradual. Air turns shall be installed in all vanes arranged to permit the air to make the turn without appreciable turbulence.

- Ducts shall be fabricated as per details shown on drawings. All ducts shall be rigid and shall be adequately supported and braced where required with standing seams, tees of ample size to keep the ducts true to shape and to prevent buckling, vibration or breaking.

- All sheets metal connections, partitions and plenums required to confine the flow of air to/ through the filters and fans shall be constructed of 18 Gauge GSS thoroughly stiffened with 25mm x 25mm x 3mm angle iron braces and fitted with all necessary inspection doors as required to give access to all parts of the apparatus. Doors shall be not less than 45cm X 45cm in size.

- Plenums shall be panel type and assembled at site. Fixing of MS angle iron flanges of duct pieces shall be with rivet heads inside i.e. Towards G.S. sheet and riveting shall be done from outside.

- Rubber gasket 3 mm thick shall be used between duct flanges and between duct and duct supports instead of felt in all ducting installation for complete sealing.

- During the construction, the Contractor shall temporarily close duct openings with sheet metal covers to prevent debris-entering ducts and to maintain opening straight and square, as per direction of Engineer-in-Charge.

- Great care should be taken to ensure that the ductwork does not extend outside and beyond height limits as noted on the drawings.
- All duct work shall be of high quality approved galvanized sheet steel guaranteed not to crack or peel on bending or fabrication of ducts. All joints shall be tight and shall be made in the direction of airflow.

- The ducts shall be reinforced where necessary, and must be secured in place so as to avoid vibration of the duct on its support.

- All air turns of 45 degrees or more shall include curved metal blades or vanes arranged so as to permit the air to make the abrupt turns without an appreciable turbulence. Turning vanes shall be securely fastened to prevent noise or vibration. All ducts shall be fabricated and installed in accordance with modern design practice. The sheet metal gauges and fabrication procedures as given in I.S. specifications shall be adhered to and shall be considered as an integral part of these specifications.

- The ductwork shall be varied in shape and position to fit actual conditions at building. All changes shall be in accordance with accepted duct design and subject to the approval of the engineer-in-charge. The Contractor shall verify all measurements at building and shall notify the Engineer-in-Charge of any difficulty in carrying out his work before fabrication.

- Sponge rubber or approved equal gaskets shall be installed between all connections of sheet metal ducts to walls. Sheet metal connections shall be made to walls and floors by means of galvanized steel angles anchored to the building structure with anchor bolts and with the sheet bolted to the angles. Sheet metal connections shall be as shown in the drawings or as directed by Engineer-in-Charge.

- All ductwork shall be independently supported from building construction. All horizontal ducts shall be rigidly and securely supported, in an approved manner, with trapeze hangers formed of galvanized steel rods and galvanized steel angel/channel under ducts. All vertical ductwork shall be supported by structural members on each floor slab. Duct supports may be through galvanized steel insert plates left in slab at the time of slab casting. Galvanized steel cleat with a hole for passing the hanger rods shall be welded to the plates. Trapeze hanger formed of galvanized steel rods and angles / channels shall be hung through these cleats. Wherever use of metal insert plates is not

feasible, duct support shall be through dash / anchor fastener driven into the concrete slab by electrically operated gun. Hanger rods shall then hang through the cleats.

- Where ducts pass through brick or masonry openings, it shall be provided with 25 mm thick TF quality thermo Cole around the duct prior to sealing of the opening.

- All ducts shall be totally free from vibration under all conditions of operation. Whenever ductwork is connected to fans, air handling units or blower coil units that may cause vibration in the ducts, ducts shall be provided with a flexible connection, located at the unit discharge. Flexible connections shall be constructed of fire retarding flexible heavy canvas sleeve at least 100 mm long but not more than 200 mm, securely bonded and bolted on both sides. Sleeve shall be made smooth and the connecting ductwork rigidly held by independent supports on both sides of the flexible connection. The flexible connection shall be suitable for pressure at the point of installation.

- Flanges and supports are to be black, mild steel and are to be primer coated on all surfaces before erection and painted with aluminum thereafter. Accessories such as damper blades and access panels are to be of materials of appropriate thickness and the finish similar to the adjacent ducting, as specified.

- The ductwork should be carried out in a manner and at such time as not to hinder or delay the work of the other agencies especially the boxing or false ceiling Contractors.

4. SPECIFICATIONS FOR FACTORY FABRICATED DUCTING

- Unless otherwise specified here, the construction, erection, testing and performance of the ducting system shall conform to the SMACNA-1995 standards ("HVAC Duct Construction Standards-Metal and Flexible-Second Edition-1995" SMACNA)

4.1 Duct Connectors and Accessories

- All transverse duct connectors (flanges / cleats) and accessories/related hardware are such as support system shall be zinc-coated (galvanized).

4.2 **FABRICATION STANDARDS**

4.2.1 All ductwork including straight sections, tapers, elbows, branches, show pieces, collars, terminal boxes and other transformation pieces must be factory-fabricated. Equivalency will require fabrication by utilizing the following machines and processes to provide the requisite quality of ducts and speed of supply.

Coil lines to ensure location of longitudinal seams at comes / folded edges only to obtain the required duct rigidity and low leakage characteristics. No longitudinal seams permitted along any face side of the duct. All ducts, transformation pieces and fittings to be made on CNC profile cutlers for required accuracy of dimensions, location and dimensions of notches at the folding lines. All edges to be machine treated using lock formers, flanges and roller for fuming up edges. Sealant dispensing equipment for applying built-in sealant in Pittsburgh lock where sealing of longitudinal joints are specified will be used.

5. **SELECTION OF G.I. GAUGE AND TRANSVERSE CONNECTORS**

- Duct Construction shall be in compliance with 2" (500Pa) w.g. static norms as per SMACNA. All transverse connectors shall be similar to Rolamate 4-bolt slip-on flange system or equivalent of similar 4-bolt systems with built-in sealant if any to avoid any leakage additional sealant to be used. The specific class of transverse connector and duct gauge for a given duct dimensions will be 1"(250 Pa) pressure class. Non-toxic, AC -applications grade P.E. or PVC Casketing is required between all mating flanged joints. Gasket sizes should conform to flange manufacturer's specification.

6. **DUCT CONSTRUCTION**

6.1. The fabricated duct dimensions should be as per approved drawings and all connecting sections are dimensionally matched to avoid any gaps.

6.2 Dimensional Tolerances: All fabricated dimensions will be within ± 1.0 mm of specified dimension. To obtain required perpendicularity, permissible diagonal tolerances shall be ± 1.0 mm per meter.

6.3 Each and every duct pieces should be identified by color coded sticker which shows specific part numbers, job name, drawing number, duct sizes and gauge.

6.4 Ducts shall be straight and smooth on the inside Longitudinal seams shall be airtight and at comers only, which shall be either Pittsburgh or Snap Button Punch as per SMACNA practice, to ensure air tightness.

6.5 Changes in dimensions and shape of ducts shall be gradual (between 1:4 and 1:7). Turning vanes or air splitters shall be installed in all bends and duct collars designed to permit the air to make the tum without appreciable turbulence.

6.6 Plenums shall be shop/factory fabricated panel type and assembled at site.

6.7 FACTORY FABRICATED RECTANGULAR GSS DUCTING.

All ducts shall be fabricated from galvanized steel / aluminum of the following thickness, as indicated as below:

Rectangular Ducts G. S.	**External Pressure 500 Pa**		
	Duct Section Length 1.2 m (4 ft)		
Maximum Duct Size	**Gauge**	**Joint Type**	**Bracing Spacing**
1–600 mm	24	C & SS	Nil
601-750 mm	24	4 Bolt Transverse Duct Connector-E (TDC) with built in sealant	Nil
751-1000 mm	22	4 Bolt TDC-E	Nil
1001-1200 mm	22	4 Bolt TDC-H	Nil
1201-1300 mm	20	4 Bolt TDC-J	Nil
1301-1500 mm	18	4 Bolt TDC-J	Nil
1501-1800 mm	18	4 Bolt TDC-J	Nil
1801-2100 mm	18	4 Bolt TDC-J	Nil
2101-2250 mm	18	4 Bolt TDC-J	Nil
2251-2400 mm	18	4 Bolt TDC-J	Nil
2401-2700 mm	18	4 Bolt TDC-J	600

'C'-cleat; 'S'-S cleat; 'SS'-Standing S cleat; 'AI' -Angle Iron in mm
*Distance of reinforcement/bracing from each joint. Bracing material to be same as of material used for joining of duct sections.

NOTE:

a) DUCT USING LOCK FORMER MACHINE AT SITE SHALL NOT BE ACCEPTED.
b) MS FLANGES SHALL BE USED FOR DUCTS FOR THE AHU HAVING HEPA FILTERS.

6.7.1 Fabrication Standard: All duct construction and installation shall be in accordance with SMACNA standards. In addition ducts shall be factory fabricated utilizing the machines to provide the requisite quality of ducts. Coil lines to facilitate location of longitudinal seams at corners/folded edges only, for required duct rigidity and leakage free characteristics. No longitudinal seams permitted along any face side of the duct. All ducts, transformation pieces and fittings to be made on CNC profile cutter for requisite accuracy of dimensions, location and dimensions of notches at the folding lines. All edges to be machine treated.

6.7.2 Duct Construction: All ducts shall be fabricated and installed in workmanlike manner, conforming to relevant SMACNA codes. Ducts so identified on the Drawings shall be insulated from outside as described in the section “Insulation” and as indicated in schedule of Quantities. Duct dimensions shown on drawings, are overall sheet metal dimensions inclusive of the acoustic lining where required and indicated in Schedule of quantities. The fabricated duct dimensions should be as per approved drawings and care should be taken to ensure that all connecting sections are dimensionally matched to avoid any gaps. Ducts shall be straight and smooth on the inside with longitudinal seams shall be airtight and at corners only which shall be either Pittsburgh or snap button as per SMACNA practice, to ensure air tightness. All ducts up to 75cms width within conditioned spaces shall have slip and drive (C & S/SS) joints. The internal ends of slip joints shall be in the direction of airflow. Care should be taken to ensure that S/SS Cleats are mounted on the longer side of the duct and Cleats on the shorter side. Ducts and accessories within ceiling spaces, visible from air-conditioned areas shall be provided with two coats of mat black finish paint. Changes in dimensions and shape of ducts shall be gradual (between 1:4 and 1:7). Air-turns (vanes) shall be installed in all bends and duct collars designed to permit the air to make the turn without appreciable turbulence. Ducts shall be fabricated as per details shown on Drawings. All ducts shall be rigid and shall be adequately supported and braced where required with standing seams, tees, or angles, of ample size to keep the ducts true to shape and to prevent buckling, vibration or breathing. All sheet metal connection, partitions

and plenums, required to confine the flow of air to and through the filters and fans, shall be constructed of 18 gauge GSS / 16gauge aluminum, thoroughly stiffened with 25mm x 25mm x 3mm galvanized steel angle braces and fitted with all necessary inspection doors as required, to give access to all parts of the apparatus. Access doors shall be not less than 45cm x 45cm in size. Plenums shall be shop/factory fabricated panel type and assembled at site. Fixing of galvanized angle flanges on duct pieces shall be with rivets heads inside i.e. towards GS sheet and riveting shall be done from outside. Self adhesive Neoprene rubber / UV resistant PVC foam lining 5mm nominal thickness instead of felt, shall be used between duct flanges and between duct supports in all ducting installation.

7. INSTALLATION

7.1 During the construction, the contractor shall temporarily close duct openings with sheet metal covers to prevent debris entering ducts and to maintain opening straight and square, as per direction of Engineer-In-Charge.

7.2 Great care shall be taken to ensure that the duct work does not extend outside and beyond height limits as noted on the drawings.

7.3 All duct work shall be of high quality approved galvanized sheet steel guaranteed not to crack or peel on bending or fabrication of ducts. All joints shall be air tight and shall be made in the direction of air flow.

7.4 The ducts shall be re-in forced with structured members where necessary, and must be secured in place so as to avoid vibration of the duct on its support.

7.5 All air turns of 45 degrees or more shall include curved metal blades or vanes arranged so as to permit the air to make the abrupt turns without an appreciable turbulence. Turning vanes shall be securely fastened to prevent noise or vibration. The duct work shall be varied in shape and position to fit actual conditions at building site. All changes shall be subjected to the approval of the Engineer-In-Charge. The contractor shall verify all measurements at site and shall notify the Engineer-In-Charge of any difficulty in carrying out his work before fabrication.

7.6 Sponge rubber or approved equal gaskets of 6 MM maximum thickness shall be installed between duct flanges as well as between all connections of sheet metal ducts to walls, floor columns, heater casings and filter casings. Sheet metal connections shall be made to walls and floors by means of wooden member anchored to the building structure with anchor bolts and with the sheet screwed to them.

7.7 Flanges bracings and supports are to be sourced from the duct manufacturer. Accessories such as damper blades and access panels are to be of materials of appropriate thickness and the finish similar to the adjacent ducting, as specified.

7.8 Joints, seams, sleeves, splitters, branches, takeoffs and supports are to be as per duct details as specified, or as decided by Engineer-In-Charge.

7.9 Joints requiring bolting or riveting may be fixed by Hexagon nuts and bolts, stove bolts or buck bolts, rivets or closed centre top rivets or spot welding. Self tapping screws must not be used. All jointing material must have a finish such as cadmium plating or Galvanized as appropriate.

7.10 Fire retarding flexible joints is to be fitted to the suction and delivery of all fans. The material is to be normally double heavy canvass or as directed by Engineer-In-Charge. On all circular spigots the flexible materials are to be screwed or clip band with adjustable screws or toggle fitting. For rectangular ducts the material is to be flanged and bolted with a backing flat or bolted to mating flange with backing flat.

7.11 The flexible joints are to be not less than 75 MM and not more than 250 MM between faces. The duct work should be carried out in a manner and at such time as not to hinder or delay the work of the other agencies especially the boxing or false ceiling contractors.

Duct passing through brick or masonary, wooden frame work shall be provided within the opening. Crossing duct shall have heavy flanges, collars on each side of wooden frame to make the duct leak proof.

7.12 The work shall meet with the approval of Consultant/customer in charge in all its parts and details All necessary allowances and provisions shall be made by the Contractor for beams, pipes, or other obstructions in the building, whether or not the same are shown on the drawings. Where necessary to avoid beams or other structural work, plumbing or other pipes, and conduits, the ducts shall be transformed, divided or curved to one side (the required cross sectional area being maintained) all as per the site requirement. If a duct cannot be run as shown on the drawings, the contractor shall install the duct between the required points by any path available in accordance with other services and as per approval of consultant/customer in charge.

7.13 All ductwork shall be independently supported from building construction. All horizontal ducts shall be rigidly and securely supported, in an approved manner, with trapeze hangers formed of galvanized steel rods and galvanized steel angle / channel or a pair of

brackets, connected by galvanized steel rod under ducts. The spacing between supports should be not greater than 2.0 meter. All vertical ductwork shall be supported by structural members on each floor slab. Duct supports may be through galvanized steel insert plates left in slab at the time of slab casting. Galvanized steel cleat with a hole for passing the hanger rods shall be welded to the plates. Trapeze hanger formed of galvanized steel rods shall be hung through these cleats. Wherever use of metal insert plates is not feasible, duct support shall be through dash/anchor fastener driven into the concrete slab by electrically operated gun. Hanger rods shall then hang through the cleats or fully threaded galvanized rods can be screwed into the anchor fasteners. Ducting over furred ceiling shall be supported from the slab above or from beams after obtaining approval of Consultant / customer in charge. In no case shall any duct be supported from false ceiling hangers or be permitted to rest on false ceiling. All metal work in dead or furred down spaces shall be erected in time to occasion no delay to other contractor's work in the building. All ducts shall be totally free from vibration under all conditions of operation. Whenever ductwork is connected to fans, air handling units or blower coil units that may cause vibration in the ducts, ducts shall be provided with a flexible connection, located at the unit discharge. Flexible connections shall be constructed of fire retarding flexible heavy canvas sleeve at least 10cm long securely bonded and bolted on both sides. Sleeve shall be made smooth and the connecting ductwork rigidly held by independent supports on both sides of the flexible connection. The flexible connection shall be suitable for pressure at the point of installation. Duct shall not rest on false ceiling and shall be in level from bottom. Taper pieces shall taper from top.

8. DOCUMENTATION TO MEASUREMENTS

For each drawing, all supply of ductwork must be accompanied by computer-generated detailed bill of material indicating all relevant duct sizes, dimensions and quantities. In addition, summary sheets are also to be provided showing duct areas by gauge and duct size range as applicable.

Measurement sheet covering each fabricated duct piece showing dimensions and external surface area along with summary of external surface area of duct gauge-wise.

All duct pieces to have a part number, which should correspond to the serial number, assigned to it in the measurement sheet. The above system will ensure speedy and proper site measurement, verification and approvals.

9. **TESTING**

After duct installation, a part of duct section (approximately 5% of total ductwork) may be selected at random and tested for leakage. The procedure for leak testing should be followed as per SMACNA- "HVAC Air Duct Leakage Test Manual: (First Edition). All duct supports, flanges, hangers and damper boxes etc shall be given 2 coats of red oxide paint before installation and one coat of aluminum paint after the erection, at no extra cost. All angle iron flanges are to be welded electrically and holes to be drilled. All the angle iron flanges are to be connected to the GSS ducts by rivets at 100 mm centers.

After completion, all duct system shall be tested for air leakage.

The entire air distribution system shall be balanced to supply the air quantity as required in various areas and the final balance of air quantity through each outlet shall be submitted to the engineer-in-charge for approval. Measured air quantities at fan discharge and at various outlets shall be identical to or less than 5% in excess of those specified and quoted. Branch duct adjustments shall be permanently marked after air balancing is completed so that these can be restored to their correct position if disturbed at any time.

SPECIFICATIONS FOR AIR TERMINALS

1 **SCOPE**

The scope of this section comprises the supply, installation, testing and commissioning of air terminals and dampers conforming to these specifications and in accordance with the requirement of drawings and 'Schedule of Quantities'.

2. TYPE

The terminals shall be of type as indicated in drawings and 'Schedule of Quantities'

3. DAMPERS

At the junction of each branch duct with main duct and split of main duct, volume control dampers must be provided. Dampers shall be rigid in construction to the passage of air.

The volume dampers shall be of an approved type, lever operated and complete with suitable level links & quadrants, locking devices, which will permit the dampers to be adjusted and locked in any position.

The dampers shall be of opposed blade or louver type. The damper blade shall not be less than 1.25 mm (18) gauge and shall not be over

225 mm wide. Automatic and manual volume opposed blade dampers shall be complete with frames and bronze bearings as per drawings. Damper frames shall be constructed of 16 gauge steel.

After completion of the ductwork, dampers are to be adjusted and set to deliver the required amount of air as specified in the drawings.

4 ACCESS PANEL

A hinged and gasket access panel shall be provided on ductwork before each control device that may be located inside the ductwork. Doors shall be provided with neoprene rubber gaskets. Angle joints shall be provided with neoprene rubber gaskets for leak tightness of the joints. Access door/panels shall be provided: -

Near each smoke sensor

Any other place specifically mentioned in the drawing or if asked by Owner / Consultants during execution stage.

5. SUPPLY AND RETURN AIR DIFFUSERS

Supply and return air diffusers shall be made of extruded aluminum section as specified in BOQ. The diffusers shall be powder coated in finish. Supply air diffusers shall be provided with screw operated opposed blade volume control devices of GSS in black mat finish. The diffusers shall be suitable for concealed fixing arrangement and as approved by Architect/Consultant.

The diffusers shall be provided with removable central core.

All diffusers shall be selected as per selection curves and in consultation with Architect / Consultant. All diffusers shall have soft continuous rubber/foam gasket between the periphery of the diffusers and the surface on which it has to be mounted.

6. LINEAR GRILLS:

Linear continuous supply or return air grills shall be extruded aluminum construction with fixed horizontal bars at 0 / 15 ^{0} inclination with flanges on both sides. The thickness of fixed bar louvers shall be 3mm in front and the flange shall be 20mm wide with round edges. The grille shall be suitable for concealed fixing and horizontal bars of the grille shall be mechanically crimped from the back to hold them.
Volume control device of GSS construction in black mat finish shall be provided in S.A. duct collars.

7. DOUBLE ADJUSTABLE LOUVERED SUPPLY / RETURN AIR GRILLS WITH HORIZONTAL/VERTICAL OR VERTICAL/ HORIZONTAL LOUVER ARRANGEMENT:

The grille shall be adjustable as each louver shall be pivoted to provide pattern with 00 to plus or minus 150 ARC upto 300 deflection down towards. The louvers shall hold deflection settings under all conditions of velocity and pressure. The rear louver of the register shall be in black shade.

Volume control device of GSS construction with black mat finish shall be provided in S.A. grills.

8. EXHAUST AIR REGISTER:

Exhaust air register shall be made of extruded aluminum with fixed horizontal louvers at 40 degree angle setting on a 20 mm louvers pitch. The register shall have 20 mm wide flange with round edges all around. The register shall be suitable for front screw fixing.

Volume control device of GSS construction with black mat finish shall be provided.

9. MULTI SLOT CEILING DIFFUSERS:

Multi slot ceiling diffuser shall be made of extruded aluminum with various slot width and air pattern deflectors. Deflectors in each slot provide an adjustable air pattern of 180 degree full. A special plenum shall be provided for each supply air diffuser. The linear diffuser shall have alignment strips to give straight look while installation.

Hit & miss type volume control damper of extruded aluminum construction with mill finish shall be with multi-slot supply air diffuser.

10. LINEAR CEILING MOUNTED DIFFUSERS:

Linear ceiling mounted air terminals shall be made of extruded aluminum surface mounted one way or two way pattern. The linear terminal shall have alignment strips to give straight look while installation. Volume control device of GSS construction in black matt finish shall be provided in S.A. diffuser.

11. FRESH AIR INTAKE LOUVERS:

Fresh air intake louvers 50 mm deep (minimum) wherever required as per shop drawing will be made of extruded aluminum construction duly anodized or powder coated. Bird/insect screen will be provided with the intake louvers. The blades are inclined at 45^0 on a 40 mm blade pitch to minimize water ingress. The lowest blade of the assembly shall extend out slightly to facilitate disposal of rainwater without falling in door/wall on which it is mounted.

Wherever specified, the intake louvers shall be provided with factory fitted all aluminum construction volume control dampers in black anodized finish.

12. MOTORIZED COMBINED SMOKE & FIRE DAMPERS – SPRING RETURN

The HVAC contractor shall supply UL classified Fire/smoke Dampers meeting or exceeding the specifications as described below. Fire/smoke Dampers shall be

furnished and installed at locations shown in Drawings and as described in Schedule of quantities. The dampers shall meet the requirements of NFPA90A, 92A and 92B. Dampers shall have a fire rating of 1.5 Hrs. in accordance with latest edition of UL555 and shall be classified as Leakage Class1 in case of airofoil or class2 in case of 3-v groove design blade smoke damper in accordance with latest version of UL555S. Each fire/smoke damper shall be AMCA licensed and bear the AMCA seal for air Performance. Pressure drop shall not exceed 7.5Pa for airfoil design blade and 18Pa for 3-v groove design blade when tested at 300m/min face velocity on 600x600mm size damper.

Damper and its actuator shall also UL555 and UL555S classified and rated for 90minutes fire rating. Electric Actuator of suitable Torque and as approved by UL shall be factory mounted and tested. The actuator shall be suitable for 24V AC supply. In addition actuator shall have elevated temperature rating of 250 deg.C. unless higher rating specified in BOQ. Electric Actuator shall have been energized hold open tested for a period of at least one year with no spring return failure. Each fire/smoke damper shall be equipped with a heat actuated release device which shall allow controlled closure of damper rather than instantaneous to prevent accident. (Electrical fusible link).The EFL shall allow the damper to reopen automatically after a test, smoke detection or power failure condition. The damper shall be equipped with a device to indicate OPEN and CLOSE position of Damper blades through a link mounted on the damper blade.

Damper Frame shall be a roll formed structural hat channel, reinforced at corners, formed from a single piece of 1.6mm galvanized steel. Damper blades shall be roll formed 3-v groove (1.6mmthick) or airfoil shaped (equivalent to 2.3mm thickness strength) roll formed using 0.8mm thick single piece of galvanized sheet. Bearings shall be of stainless steel fitted in an extruded hole in the damper frame. Blade edge seals shall be silicone rubber and galvanized steel mechanically locked in to the blade edge (adhesive type seals are not acceptable). Side Jam seals of stainless steel and Top and bottom seals of galvanized steel shall be provided. All galvanized steel used shall be with minimum 180GSM Zinc coating bigger size Dampers shall be supplied in Multiple modules of sizes not exceeding in dimensions of certified module, jack shafted together. Multiple actuators shall be provided for large dampers with higher torque requirements as prescribed in UL.

Each damper shall be supplied with factory mounted sleeve of galvanized steel of thickness as per SMACNA and of minimum 430mm long or as specified in schedule of quantities depending up on the wall thickness. The damper shall be fitted in to sleeve either using welding or self tapping screws not projecting out of duct sleeve. All welded joints shall be finished using heat resistance steel paint. UL listed and approved Silicon sealant shall be applied at all corners as well as at joints between damper frame and sleeve.

All wiring and connections to various accessories including actuator shall be encased in a UL certified metallic flexible /rigid conduit along with fittings.

Each Fire cum smoke damper shall be supplied with Control panel to be supplied loose along with damper and installed at site near the Fire and smoke damper at easily accessible location. Electrical connection between control panel and Actuator and other accessories mounted on fire and smoke damper shall be carried out by HVAC contractor as per manufacturer recommendation. Each control panel shall have following minimum features;

220V/ 24V Transformer of suitable rating to supply power to all the actuators.
Open / close indication lights.
Test button
220 V auxiliary contacts to interlock AHU motor.
24V auxiliary contacts for remote indication of Open/close status.
24V Auxiliary contacts to receive signal from dedicated smoke detector/ central fire control panel and also to supply power to dedicated smoke detector.

Fire and smoke damper shall be installed as per manufacturer installation Instructions.

13 MISCELLANEOUS

Sponge rubber gaskets also to be provided behind the flange of all grills. Each shoot from the duct, leading to a grille, shall be provided with an air deflector to divert the air into the grille through the shoot. Inspection doors measuring at least 450 mm x 450 mm are to be provided in each system at an appropriate location, as directed by Engineer-in-Charge.

Diverting vanes must be provided at the bends exceeding 600 mm and at branches connected into the main duct without a neck. Proper hangers and supports should be provided to hold the duct rigidly, to keep them straight and to avoid vibrations. Additional supports are to be provided where required for rigidity or as directed by Engineer-in-Charge. All duct work joints are to be true right angle and with all sharp edges removed.

14 PAINTING

All grilles, and diffusers shall be powder coated in color as approved by Architect / Consultant before installation.

All ducts immediately behind the grilles / diffusers etc. Are to be given two coats of black paint in Matt finish. The return air and dummy portion of all linear grilles shall be provided with a vision barrier made of 24 gauge galvanised sheets. The vision barrier shall be fixed to the false ceiling frame with self tapping screws and shall be given two coats of black paint in matt finish. Care shall be taken to ensure that the return air path is not obstructed.

21 INSULATION

21.1 The materials for duct insulation shall be resin bonded fibre glass, conforming to I.S. 8183 of 1976. The density of insulation shall not be less than 24 kg./cubm. And material shall be in the form of blankets/rolls of uniform thickness. The 'K' value at 10□C. shall not be less than 0.03 W/mK. It shall be factory faced with aluminium foil on one side reinforced with kraft paper and fused to the insulation material.

Insulation material for **Duct Acoustic Lining** shall be resin bonded fibre glass. The thermal conductivity shall not exceed 0.034K Cal/(hr-sq.m-deg C/meter) or 0.23 BTU/(hr.sq.ft.-deg F)/inch) at 32 deg C (90 deg F) mean temperature and density shall be not less than 32 Kg / Cum. Thickness of the insulation shall be as specified for the individual application. Each lot of insulation material delivered at site shall be accompanied with manufacturer test certificate for thermal conductivity values and density. Samples of insulation material from each lot delivered at site may be selected by Engineer in charge and gotten tested for thermal conductivity and density at Contractor's cost All joints shall be sealed properly with adhesive, which shall provide similar vapour barrier as the original insulating material.

21.2 DUCT ACOUSTIC LINING: Material shall be resin bonded fibre glass. Thickness of the material shall be as specified for the individual application. Ducts so identified and marked on drawings and included in Schedule of Quantities shall be provided with acoustic lining of thermal insulation material for a distance of minimum 5 meters as follows:

The inside surface for the ducts shall be cleaned, and provided with 22 gauge GI Channels 25 x 25 mm screwed back to back and fixed on the inside of duct, spaced not more than 60 cm center to form a frame work of 60 x 60 cms square. Cut panels 60 x 60 cms of fiber 25 mm thick shall be fitted in the squares. The insulation panels shall be fired to the sheet metal with cold setting adhesive compound and covered with fibre glass tissue paper.

The inner most surfaces shall be covered with 28 gage perforated aluminium sheet having atleast 15 percent perforations. The aluminium sheet shall be screwed to GI channels using cup washer and neatly finished to give true inside surface.

21.3 Duct Insulation External thermal insulation shall be provided as follows: The thickness of insulation shall be as shown on drawing or identified in the schedule of quantity. Following procedure shall be adhered to:

- Clean the surface with a wire brush and make it free from rust and oil.
- Apply two coats of cold adhesive compound to the surface.
- Wrap the duct with insulation blankets of the thickness mentioned above and covered with 0.63 mm/19 mm wire mesh netting on the outside.

- The joints shall be sealed with 50 mm thick self adhesive aluminium tape before covering with wire netting.

- The Ducts in areas exposed to the weather shall be additionally covered with one layer of tar felt B.H. The tar felt shall be stuck with bitumen R 85/40 or 80/25.

21.4. FIRE BREAKS INSULATION

Firebreaks shall be provided in all ducts for internal lining/external thermal insulation after a run of 10 m center to center. There shall be a discontinuity of the insulating material in the form of MS angle of a minimum of 50 mm x 50 mm x 3 mm size. At the interface of the MS angle and insulating material, proper care of tucking in of the insulating material shall be taken so as to prevent erosion.

PREAMBLE TO MODE OF MEASUREMENT

1 All equipment described hereafter shall be in accordance with the specifications. All equipment shall be selected and installed for the lowest Operating noise level.

2 Supply of various equipment shall include all expenses for correspondence with manufacturers, submission of shop drawings, documents and their approval by the Consulting Engineer, procurement of equipment, transportation, shipping, payment of all taxes and levies, storage, supply of equipment at the point of installation, furnishing all technical literature required, replacement of defective components, and warranty obligations for the individual equipment.

3 Installation of various equipment shall include all material and labour associated with hoisting and lowering of equipment in position, insulation of the components and vibration isolation as required, grouting and anchoring or suspension arrangements and all incidentals associated with the installation as per the specifications and manufacturer's recommendation.

4 Vibration isolators as specified or as recommended by the manufacturer shall be installed with each component. Performance ratings, power consumption and power data for each component shall be verified at the time of testing and commissioning of the installation, against the data submitted with the tenders.

5. Shop coats of paint that have become marred during shipment or erection shall be cleaned off with mineral spirit, wire brushed and spot primed over the affected areas, then coated with enamel paint to match the finish over the adjoining shop painted surfaces.

6. Testing and commissioning shall include furnishing all labour, materials, equipments, instruments, and incidentals necessary for complete testing of each component as per the specifications and manufacturer's recommendations, submission of test results to the Consulting Engineer and obtaining their approval and submission of necessary documents and completion drawings.

7 All ducts shall be fabricated and installed conforming to the relevant Indian standards, approved shop drawings and the specifications.

8. Duct installation shall include fabricating and installing the ducts, splitter dampers, turning vanes, and distribution grids within the ducts in position, and providing, installing and making air tight all joints with slips, bonded felt insertions, nuts, bolts and screws as required. In addition multi-louvered manually adjustable dampers shall be provided in various branch ducts as required or shown on drawings for proper balancing of air flows.

9 All registers and diffusers shall be provided with a soft continuous rubber gasket between their periphery and the surface on which these have to be mounted.

10 Registers and diffusers shall be given, at the factory, a rust resistant primer coat and enamel paint finish of approved colour.

11 After completion of the installation, the entire air distribution system shall be tested for air leaks and balanced in accordance with the specifications.

MODES OF MEASUREMENTS

1. **UNIT PRICES IN THE SCHEDULE OF QUANTITIES**

The item description in the 'Schedule of Quantities' is in the form of a condensed resume. The unit price shall be held to include everything necessary to complete the work covered by this item in accordance with the specifications and drawings. The sum total of all the individual item prices shall represent the total price of the installation ready to be handed over.

THE UNIT PRICE OF THE VARIOUS ITEMS SHALL INCLUDE THE FOLLOWING:

All equipment, machinery, apparatus and materials required as well as the cost of any tests which the Consultant may request in addition to the tests generally required to prove quality and performance of the equipment.

- All the labour required supplying and installing the complete installation in accordance with the specifications.
- Use of any tools, equipment, machinery, lifting tackle, scaffolding, ladders etc. Required by the Contractor to carry out his work.
- All the necessary measures to prevent the transmission of vibration.
- The necessary material to isolate equipment foundations from the building structure, wherever necessary.
- Storage and insurance of all equipment apparatus and materials.
- The Contractor's unit price shall include all equipment, apparatus, material and labour indicated in the drawings and/or specifications in conjunction with the item in question, as well as all additional equipment, apparatus, material and labour usual and necessary to make in question on its own (and within the system as a whole) complete even though not specifically shown, described or otherwise referred to.

2. MEASUREMENTS OF SHEET METAL DUCTS, GRILLES/DIFFUSERS:

Duct Work shall be measured on the basis of external surface area of ducts. Duct measurements shall be taken before application of the insulation. The external surface areas shall be calculated by measuring the perimeter comprising overall width and depth, including the corner joints, in the center of each duct section, multiplying with the overall length from flange face to flange face of each duct section and adding up areas of all duct sections. Plenums shall also be measured in similar manner. For tapered rectangular ducts, the average width and depth shall be considered for perimeter, whereas for tapered circular ducts, the diameter of the section midway large and small diameter shall be adopted, the length of tapered duct section shall be the center line distance between the flanges of the duct section. For special pieces like

bends, tees, reducers, branches and collars, mode of measurement shall be identical to that described above using the length along the centerline. The quoted unit rate for external surface of ducts shall include all wastage allowances, flanges and gaskets for joints, nuts and bolts, hangers and angles with double nuts for supports, rubber strip 3 mm thick between duct and support, vibration isolator suspension where specified or required, inspection chamber / access panel. Splitter damper with quadrant and lever for position indication, turning vanes, straightening vanes, and all other accessories required to complete the duct installation as per the Specifications. These accessories shall NOT be separately measured nor paid for.

PREAMBLE TO SCHEDULE OF QUANTITIES

1 All items of work under this Contract shall be executed strictly to fulfill the requirement laid down under" Basis of Design" in the specifications. Type of equipment, material, specification, methods of installation and testing and type of control shall be In accordance with the specification, approved shop drawing and relevant Indian Standards, however capacity of each component and their quantities shall as fulfill the above mentioned requirement.

2 The unit rate for all equipment's or materials cost in RUPEES for equipment and material including all taxes and duties and also including forwarding, freight, insurance and transport into Contractor's store at site storage' installation 'testing balancing ' commissioning and other work required.

3 The rate for each item of work included in the Schedule of Quantities shall' unless expressly stated otherwise, include cost of:

- All materials. Fixing materials. Accessories, appliances tools, plants, equipment transport, labour and incidentals required in preparation for and in the full and entire execution as per Specification and Drawings.
- Wastage on materials and labour.
- Loading, transporting, unloading, handling/double, hoisting to all levels. Setting, fitting, and fixing in position, protecting, disposal of debris and other labour necessary in and for the full and entire execution and for the job in accordance with the contract documents, good practice and recognize principals.
- Liabilities, obligations, and risks arising out of Conditions of Contract.

4 All requirements of Specification, whether such requirements are mentioned in the item or not. The Specification and Drawing where available, are to be read as complimentary to and part of the Schedule of Quantities and any work called for in one shall be taken as required for all.

5 In the event of conflict between Schedule of Quantities and other documents including the Specification, the most stringent shall apply. The interpretation of the Engineer in charge shall be final and binding.

6 All equipment, quantities, and technical data indicated in this Schedule are for Contractor's guidance only; these are based on the documents prepared by the Consultant. This schedule must be read in conjunction with other documents. The Contractor shall be paid for the actual quantity of work executed by him in accordance with the approved Shop Drawing at the contract rates.

7 This Schedule shall be fully priced and the extensions and totals duly checked. The rates for all items shall be filled in INK including NIL items.

8 No alteration whatsoever is to be made to the text or quantities of this schedule unless Consultant authorizes such alteration in writing. Any such alterations, cuts or additions shall unless authorized in writing, be disregarded when tender documents are considered.

9 In the event of an error occurring in the amount of the Schedule, as a result of wrong extension of the unit rate and quantity, the unit rate quoted by the tenderer shall be regarded as firm and the extensions shall be amended on the basis of rates.

10 Any error totaling the amount column and in carrying forward total shall be corrected, any error, in description or in quantity, omission of items from this Schedule shall not vitiate this corrected but shall corrected and deemed to be variation required by the engineer in charge.

11 The Contractor shall procure and bring Materials/ Equipment to the site only on the basis of drawing approved for construction and shop drawings and not on the Contractor's requisition for Engineer in charge supplied materials.

LIST OF APPROVED MAKES IF NOT SPECIFIED ELSEWHERE

1.0 CIVIL WORKS

1. **Reinforcement Steel :**

    a. TATA, SAIL, RINL, RATHI

2. **RMC**

    a. Lafarge (L&T)
    b. Ultratech,
    c. ACC

3. **Chemical to be used for anti termite treatment - Chlorophyerophos 20% EC**

    a. HIL -Hiban 20 EC
    b. Piramid
    c. Dursban

4. **Waterproofing compound as admixtures in concrete (wherever required)**

    a. Roffe
    b. M.C Bauchmie
    c. CICO by structural waterproofing Co.
    d. PIDILITE
    e. Sika
    f. Kryton

5. **Bitumen**

    a. Indian Oil
    b. Hindustan Petroleum

6. **PVC Strips, PVC Nosing, PVC water stops, PVC hand rail.**

    a. Fixopan
    b. Finoilex
    c. Caliplast
    d. EMCO
    e. Supreme
    f. Phoel
    g. Wavin

7. **Ordinary Portland Cement (as per IS:269)OPC 33 & 43 Grade only)**
    a. L&T
    b. Vikram
    c. Tata
    d. Ambuja
    e. JP
    f. ACC

8. **White Portland Cement**
    a. Birla White
    b. JK White
    c. Nihon White

9. **Reinforcement bar/structural Steel (As per IS:1786, IS:226)**
    a. Tata
    b. Sail
    c. Rathi
    d. RINL

10. **Distemper**
    a. Jenson & Nicholson
    b. Berger Paints
    c. ICI
    d. Asian Paints
    e. Shalimar
    f. Nerolac
    g. Duluex

11. **Waterproofing Cement Paint**
    a. Asian Paint
    b. Snowcem India Ltd.
    c. Berger Paints
    d. MC Bauchemie (India)

12. **Epoxy Paint**
    a. Asian Paint
    b. Roffe
    c. Sika
    d. MC Bouchemie (India)

13. **Synthetic Enamel Paint**
    a. Berger Paint
    b. Asian Paints
    c. Shalimar Paint
    d. Jenson & Nicholson

14. ACC Sheet

a. Everest-L.G.
b. Charminar

15. Marble Chips

a. Dehradun
b. Chhota Udaipur
c. Nathdwara

16. Precast Terrazo Tiles

a. NITCO
b. NIMCO
c. Eurocon
d. Modern
e. GEM
f. DD Refractories
g. Keramic

17. Ceramic Tiles & Glazed Tiles,Vitrified Tiles,Rectified Tiles

a. Johnson
b. Bell Ceramic
c. Regency
d. RAK
e. Somany
f. Kajaria
g. Orient.
h. Nitco
i. Asian

18. Chequered Cement Concrete Tiles

a. Eurocon
b. Modern
c. Nimco
d. Prefab
e. GEM
f. NTC
g. Hindustan

19. Interlocking Cement Concrete Paving Blocks

a. NIMCO Prefab
b. Eurocon.

20. Anodised Aluminum Hardware Fittings

a. ARKAY
b. ESSEL
c. EVERITE

21. Locks

a. Godrej
b. Harrison
c. Golden
d. Secure Bolt
e. AMCE
f. Link
g. Dorma
h. Ozone

22. Sheet Glass for Windows

a. IAG Glass
b. Triveni Sheet Glass
c. Modi
d. Hindustan Plinkington
e. ATIL
f. Indo Asahi Glass
g. HSG

23. Float Glass

a. Modi Guard
b. Asahi
c. Saint Gobaina

24. Reflective Glass

a. ST Gobain
b. Glaverbal
c. Asahi

25. Insulated Double Glazing

a. Gold Plus
b. Gurind

26. Commercial Board, Ply, Teak Ply, Commercial Ply

a. Duroply
b. Bhutan Board
c. Century
d. Green Ply
e. Kitply
f. National
g. Glunz

27. Board

a. Indian Gypsum
b. Eternit

28. Mineral Fibre Board False Ceiling

a. ARMSTRONG
b. OWA ACOUSTICS
c. USG
d. Eternit
e. Dieken

29. Factory made Flush Door Shutters

a. Delhi Doors
b. Sitapur Ply wood c)Century
c. Green Ply
d. Kitply Industries Ltd.
e. Sharda Ply
f. National

30. HDF door shutters

a. Durian
b. Godrej
c. Shree
d. Masonite

31. Aluminium doors, Windows, Ventilators, Fixed Glazing (except for curtain glazing)

a. Alkarma
b. Mahavir
c. Shivalco
d. Hindalco

32. Aluminium Curtain Glazing

a. Alkarma
b. SP Fabricators
c. Alumilite

33. Expansion Bolts

a. Hilti
b. Fischer

34. Glazing Sealant

a. Dow Corning
b. GE Sealant
c. Wacker

35. Aluminium flush Door

a. AGV Aluminium Pvt. Ltd.
b. Shivalco.

36. Floor spring for Aluminium Doors (Normal and Concealed type)

a. ECIE
b. Everite
c. Prabhat
d. Door King
e. Indus
f. Garnish
g. Dorma

37. Aluminium Strip False Ceiling

a. Interarch
b. Armstrong
c. Vista Levlor
d. Cannon

38. Venatian Blinds

a. Interarch
b. ALPS
c. Vista Levlor
d. MAC

39. Press Steel Door Frame

a. Vardman Steel
b. TATA
c. Satji Engg. Inds.
d. Anand
e. Raymus
f. KIRBY

40. Profile Steel Windows

a. Ahmedabad Steel
b. Grover

41. PVC Tiles

a. Krishna Vinyl
b. Premier Vinyl
c. Bhor
d. Armstrong
e. Lg

42. Impregnated Fibre Board

a. Shalitex by Shalimar Tar product.
b. TWIGA

43. Polysulphide Sealant for Expansion Joints and Water Proofing.

a. Choksey Chemical
b. Roffe
c. Sika
d. Structural Waterproofing Co.
e. Shalimar Tar Product.

44. Polymer Modified Concrete

a. MS Bauchemie
b. FOSROC
c. Roffe
d. Sika

45. Chemical Impregnated Water Proofing /Brick Coba Water Proofing.

a. Dynamic Waterproofing
b. PIDILITE
c. Jayson Engtek
d. Structural Waterproofing Co.
e. Sika
f. Hindustan Waterproofing
g. Roffe
h. Indian Waterproofing Co
i. Impex Waterproofing Co

46. Polyurethene Insulation

a. Lloyd Insulations
b. TWIGA
c. Shalimar Tar Products.
d. Hammer & Forts
e. Metecno

47. PVC Pipe and Fittings PVC fitings and fixtures.

a. Lakshmi
b. Prince
c. Prakash
d. Prayag
e. Supreme
f. Astral
g. Polymers

48. Fire Proof Steel Doors

a. Shakti Met-Dor
b. Sukri's
c. ALBA
d. EUREKA FORBES
e. MINIMAX

49. Polycarbonate Skylinght

a. Coxwell Domes, New Delhi
b. GE Plastic
c. ACROS Baroda

50. HDPE Film

a. IPCL
b. GE Plastic
c. Reliance

51. Mild Steelk Pipes, Plates, Flats, Angles, Chequered Plate, Beams, Strips etc.

a. TISCO
b. TATA
c. SAIL
d. IISCO

52. Stainless Steel Pipe

a. TATA or as approved

53. Welding Electrode

a. Advani Oerlikon
b. ICI

54. Resin Based Adhesive

a. FEVICOL
b. VAMICOL

55. Welded Mesh

a. Shakti weld mesh
b. URC
c. Multiweld Wire Co.

56. Non Metallic Mineral Based Floor Hardner

a. "DRESHAKE' by MC Bauchmie

57. Autoclaved Aerated Blocks

a. BILT
b. SIPOREX
c. SIKA

58. Lime

a. Satna Lime Works

59. Putty

a. Shalimar or as approved
b. Birla white

60. Fire Retardent Paint

a. Navair
b. Viper

61. Textured Paint

a. Spectrum
b. British Paint
c. Killick Nixon

62. Veneer

a. HANSOOR
b. TURWOOD
c. Sharda Plywood

63. Brass/Power Coated Hardware.

a. Earlbihari
b. Parmar
c. Palladium

64. Door Closer

a. Everite
b. Door King
c. Dorma
d. Hafelle
e. Dline

65. GI Pipes

a. TATA or as approved
b. JINDAL-Hissar

66. Stainless Steel Pipe

a. SALEM Stainless Steel (SAIL)

67. PVC over head Water tank

a. Sintex or as Approved

2.0 INTERIORS WORKS

1. **COMMERCIAL Board/PLY/DOORS**
   a. KITPLY
   b. GREEN PLY
   c. CENTURY

2. **LAMINATE**
   a. GREENLAM
   b. CENTURY
   c. FORMICA
   d. BLOOM

3. **PAINTS**
   a. ICI DULUX
   b. ASIAN
   c. NEROLAC

4. **LOCKS**
   a. GODREJ
   b. HARRISON
   c. PLAZA

5. **ADHESIVE**
   a. FEVICOL

6. **GLASS**
   a. SAINT GOBAIN
   b. FLOAT
   c. ASAHI

7. **PVC FLOORING**
   a. ARMSTRONG

8. **VITRIFIED TILE**
   a. NITCO
   b. KAJARIA
   c. JOHNSON
   d. ASIAN
   e. RAK

9. **FURNITURE HARDWARE**
   a. HAFELLE
   b. HETICH
   c. BLUM

10. **GYPSUM BOARD & FRAMEWORK**
    a. INDIA GYPSUM
    b. BORAL

11. MINERAL FIBER TILE & FRAMEWORK

a. ARMSTORNG
b. DEXUNE

12. CERAMIC TILES

a. NITCO
b. ASIAN
c. RAK
d. KAJARIA
e. ORIENT
f. SOMANY

13. ADHESIVE

a. BAL ENDURA
b. LATICRETE
c. WEBER

14. POLYCARBONATE

a. GE
b. DAMPALON

15. TEXTURE PAINTS

a. OIKOS
b. SPECTRUM
c. HERITAGE

16. WATERPFOOFING COMPOUNDS

a. SIKA
b. FOSROC
c. PIDILITE

17. GI PIPE

a. TATA
b. JINDAL (HISSAR)

18. VINEER

a. GREENLAM
b. EURO
c. CENTURY
d. TUREWOOD

19. METALLIC LAMINATES

a. METLAM

20. CEMENT

a. AMBUJA
b. ULTRATECH
c. ACC

21. STEEL

a. KAMDHENU
b. ELEGANT
c. SAIL

22. CEMENT PUTTY

a. JK

23. EPOXY FLOORING

a. FOSROC

24. ARCHITECTURAL HARDWARE / AUTO DOORS

a. DORMA

25. ALUMINIUM

a. JINDAL
b. HINDALCO
c. VALCO

26. CEMENT BOARD

a. BISON BOARD

27. WRITING BOARD

a. WRITEMARK

3.0 PLUMBING WORKS

1. Vitreous China Wares

a. Hindware
b. Cera
c. Parryware(ROCA)
d. Kohler

2. C.P.Fittings

a. Jacquar
b. Kohler
c. Ess Ess

3. SOIL WASTE & VENT PIPES FITTINGS:

Sand Cast iron S&S

a. NECO
b. RIF
c. NIF

CI S&S Pipes (Class 'A')

a. Kesoram
b. Electro
c. Steel

4.. G.I. Pipes/M.S. Pipes

a. Jindal-Hissar
b. TATA
c. Surya Roshni

5.. G.I. Fittings (Malleable Cast Iron)

a. Unik
b. Kent
c. 'R' Brand

6.. Gun Metal Valves (Full Way Check and Globe Valves)

a. Zoloto
b. Leader
c. Audco

7. Ball Valves

a. Zoloto
b. Leader
c. Audco

8. Butterfly Valves

a. IVC
b. Geeta
c. Kirloskar

9. Stone Ware Pipes & Gully Trap.

a. Perfect
b. Burn
c. OCR

10. RCC Pipes

a. Jain
b. JK

11. CI Manhole Covers and CI Grating

a. NECO
b. RIF
c. B.C.

12. Hot Water Insulation

a. Lloyd Insulation
b. U.P. Twiga

13. Stainless Steel Sink

a. Neelkanth
b. Jayna
c. Franke
d. Nirali

14. Vitreous China Sink

a. Hindustan
b. CERA
c. Parry Ware

15. Flush Valve

a. AOS
b. ENCON

16. Sump Pumps

a. KSB
b. NOCCHI

17. UPVC Pipes & Fittings

a. Polypack
b. Supreme
c. Finilox

18. PE-AL-PE Pipes

a. Kitec

4.0 ELECTRICAL WORKS

1. **Wires**
   a. Finolex
   b. Polycab
   c. Havells
   d. Skyline
   e. Pyemen

2. **Copper/Aluminium power cables**
   a. Ecko
   b. Havells
   c. Polycab
   d. Skyline
   e. Pyemen

3. **Telephone cables**
   a. Delta
   b. Finolex
   c. Polycab

4. **PVC Conduits**
   a. ISI Marked

5. **M.S. Conduits**
   a. ISI Marked

6. **G.I. Pipes**
   a. ISI Marked

7. **Switches/Sockets (Modular) & Floor boxes**
   a. Anchor/Crabtree
   b. North-West
   c. M.K.

8. **Switches/Sockets (Piano type)**
   a. Anchor
   b. SSK
   c. Fine

9. **Raceways**
   a. M.K
   b. North-West

10. Data Cabking-Cat-5

a. LUCENT
b. HCL
c. IBM
d. AMP
e. KRONE.DLINK
f. MOLEX

11. Information Outlets

a. LUCENT/HCL
b. IBM
c. AMP
d. KRONE
e. DLINK
f. MOLEX

12. Jack Panel

a. LUCENT
b. HCL
c. IBM
d. AMP
e. KRONE
f. DLINK
g. MOLEX

13. Network Switches

Unmanaged

a. 3COM/INTEL
b. COMPAX
c. SMC
d. DLINK
e. LANBIT
f. DIGILINK

Managed

a. CISCO
b. HP
c. ENTERASYS
d. LUCENT
e. NORTEL

Main Panel/Distribution Boards/Switches etc.

1. **ELCB/RCB**
   a. MDS
   b. NAPTUNE
   c. HPL
   d. GE
   e. HAVELLS
   f. INDO ASIAN

2. **MCB and distribution Boards, Metal Clad Sockets and MCBs**
   a. M.D.S
   b. Standard
   c. Indo Kopp
   d. Havells
   e. HPL

3. **MCCBs**
   a. L&T
   b. ABB
   c. GE
4. **Switch Fuse Unit/Fuse Switch Unit**
   a. L&T
   b. C&S
   c. GE
5. **Rewireable switch**
   a. Havells
   b. Standard
   c. HPL
6. **Change over Switch**
   a. Havells
   b. Standard/HPL
   c. C&S
7. **Kit Kats**
   a. Havells
   b. Standard
   c. GECO
8. **Ammeter/Voltmeter**
   a. Automatic Electric
   b. Rishab
   c. Essma
9. **C/T's**
   a. Automatic Electric
   b. Rishab
   c. Essma

10. **LED Indicators**
    a. L&T
    b. C&S
11. **Cable glands**
    a. HMI
    b. BBI
    c. Commet

12. **Lugs/Ferruls**
    a. Esscon
    b. .Jainson

13. **Capacitors for P.F. improvement**
    a. Asian
    b. Epcos

Electrical Fixtures

1. **Light fittings**
   i. 2'x2'- Light fittings with CFL
   ii. 4' - Light fittings with T-5 lamps
   iii. Downlighter
   a. Philips
   b. Crompton
   c. Bajaj
   d. Wipro

2. **Ceiling fans**
   i. General Purpose
   ii. Energy Efficient ceiling fans
   a. Crompton
   b. Usha
   c. Bajaj
   d. Khaitan

3. **Wall Fans/Pedestal Fans**
   a. Khaitan
   b. Crompton
   c. Bajaj
   d. Usha

5.0 HVAC WORKS:

1. **Propeller fan**
   a. Alstom
   b. khaitan
   c. Crompton
2. **In-Line fan**
   a. Systemair
   b. Kruger
   c. Otsberg
3. **Grilles/ Diffusers**
   a. Airflow
   b. coolwings
   c. Tristar
   d. Opella
4. **Fire Dampers UL listed**
   a. Airflow
   b. coolwings
   c. Tristar
   d. Opella
5. **Fire Dampers motors**
   a. Belimo
   b. Seimens
6. **G.I. Sheet Metal Duct**
   a. SAIL
   b. Tata
7. **Factory fabricated duct**
   a. Zeco
   b. Ecoduct
   c. Rolastar
   d. Ductofab
8. **Duct flange**
   a. Zeco
   b. Ecoduct
   c. Rolastar
   d. Ductofab
9. **Hessian (Fire treated)**
   a. Navair
   b. Pyroguard
10. **Stick Pins**
    a. Prima Seal
    b. Air Flow

11. **VCD / Gravity louvers / Exhaust& fresh air louvers**
    a. Airflow
    b. coolwings
    c. Tristar
    d. Opella

12. **GI pipe Medium Class**
    a. Jindal Hissar
    b. TATA
13. **Pressure Gauges**
    a. H.Guru
    b. Fiebig
    c. Dwyer
14. **Thermometers (with brass encasing)**
    a. Taylor
    b. H Guru
    c. D S Engg
15. **Automatic Air Vent**
    a. Rapid Control
    b. Anergy
16. **Filters**
    a. AAF
    b. Purolater
    c. Thermadyne
17. **Fiber glass**
    a. UP Twiga
    b. Owen corning
18. **Anchor fasteners**
    a. Hilti
    b. fishner
19. **Paints**
    a. ICI
    b. Asian
    c. Narolac
    d. Berger

Note: For any other item required for successful completion, but not included in the above list the Contractor shall take prior written approval from the Consultant/ Owner.