BABA FARID UNIVERSITY OF HEALTH SCIENCES
Sadiq Road, Faridkot-151203 (Pb.) INDIA Phone: 01639-256232,256236, Fax: 01639-256234
Website: www.bfuhs.ac.in

Streo (B&R) No. 28
Name of Contractor : _____

Name of Work : **Providing , Installation, Testing and Commissioning of HVAC Services (Ductable Unit) for Neurology & Neuro Surgery Ward at first floor of Super Speciality Block in GGS Medical College & Hospital, Faridkot.**

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Estimated cost : Rs **29,88,910.00**

(Form F-1)

PERCENTAGE RATE E-TENDER AND CONTRACT FOR WORKS

This agreement made this _____ day of _____ between _____ _____hereinafter called the "contractor") of the one part and [Vice Chancellor of Baba Farid University of Health Sciences, Faridkot through **The Registrar Baba Farid University of Health Sciences, Faridkot**) of the other part**:** Whereas the contractor has offered to execute the work **Providing , Installation, Testing and Commissioning of HVAC Services (Ductable Unit) for Neurology & Neuro Surgery Ward at first floor of Super Speciality Block in GGS Medical College & Hospital, Faridkot. Approx. Cost Rs. 29,88,910.00 Earnest Money Rs. 59,800/- Time Limit Four Months** and the University has accepted his tendered offer for the execution of above mentioned work.

NOW THIS AGREEMENT WITNESS AS FOLLOWS:

- In this agreement, words and expression shall have the same meanings as are respectively assigned to them as per the general conditions of contract hereinafter referred to:
- The following documents shall be deemed to form and be construed as part of this Agreement :
  - i) The "Notice inviting E-Tender"& "Instructions to tenderers" as at Annexure 'A' to this agreement.
  - ii) 'Percentage Rate/Item rate tender for works' as at annexure 'B' to this agreement.
  - iii) 'Conditions of contract' as at annexure 'C' to this agreement.
- The work will be executed strictly according to specifications & drawings relating to the work as indicated in the Notice Inviting e-Tender'. The schedule of items of work to be carried out will be as per approved 'Notice Inviting Tender'.
- All correspondence and modifications of e-tendered offer and acceptance letter will form part of this agreement.
- In considerations of the payments to be made by the University to the contractor in respect of completed work or item of work, the contractor hereby covenants with the University to execute the work in conformity in all respects with the provisions of this Agreement.
- The University hereby covenants to pay the contractor, in consideration of execution of work, the price in the manner as specified in this Agreement.

In witness there of the parties here to set their respective hands and seals on the day and year first above written.

In the presence of
Name and Address
1._____
2._____

Signature of Contractor
Address _____
_____
_____

Signed sealed &delivered by_____ in the capacity of _____

Name and Address
1._____
2._____
_____

Registrar
BFUHS, Faridkot
_____
For & on behalf of
Vice Chancellor, BFUHS, Faridkot

ANNEXURE 'A'

BABA FARID UNIVERSITY OF HEALTH SCIENCES, FARIDKOT

Notice Inviting Tender and Instructions to Tenderers

1. Online Tenders in the Prescribed form P.W.D No F-1, are hereby invited on behalf of THE Vice Chancellor, BFUHS, Faridkot for **Providing , Installation, Testing and Commissioning of HVAC Services (Ductable Unit) for Neurology & Neuro Surgery Ward at first floor of Super Speciality Block in GGS Medical College & Hospital, Faridkot. Approx. Cost ; Rs. 29,88,910.00 , Earnest Money Rs. 59,800/, Time Limit 4 Months**

1. The agency can purchase tender online on https//etender.punjabgovt.gov.in from **28-05-2020** at 9.00 am and Last date time for on-line submission of bids on **18-06-2020** upto 05.00 PM and date & time of opening of Technical bids on **19-06-2020** at 11.00 am. The opening date of financial bids of the technical qualified bidder will be informed on the university website. P**ayment through online mode only @ Rs 1,000/- (Rs. one thousands Only) each tender form (non refundable,)**

3. The time allowed for completion of the work will be 4 **Months** after the date of issuance of acceptance Letter to the contractor.

4. The Earnest money amounting to **Rs. 59,800/-** deposit must be submitted in the shape of a on-line payment**.** The bidder who will not submit the earnest money upto the last date and time fixed for the submission of tender will be considered as In-valid and his/ her bid will be rejected without any prior notice.

5. The contractor whose tender is accepted shall be required to furnish security at the rate of 5% (five percent) of the cost of the work, by deductions from the running bills (three percent of the total cost to cover liability of defects and short comings and two percent of total cost for the winding up the contract satisfactory) The earnest money if realized from the bank will be treated as part of the security deposit.

6. The offer shall remain open for Acceptance for a period of ninety days from the date of opening of the Tender. The earnest money shall be forfeited if the tenderer withdraws or modifies his offer within the validity period or fails to sign the (Formal contract) agreement after acceptance of his offer or fails to commence the work or within ten days of issue of acceptance letter. After the forfeiture of earnest money the contract shall be immediately nullified.

7. On acceptance of the tender, the contractor shall be either himself remains available at site of work or arrange the availability of an accredited representative, fully authorized in writing at the site of work to receive instructions from the Engineer-in-Charge or his representative and to ensure prompt compliance thereof.

8 . The undersigned does not bind himself to accept the lowest rate or any tender and receive instructions accepting the whole or part of the tender and tenderer shall bound to perform the same at the quoted rates.

9. Sale tax or any other tax on the material or the turnover shall be payable by the contractor and the University will not entertain any claim in this respect.

10. Before filling his tender the contractor shall visit the site and satisfy himself as to the conditions prevalent there especially regarding accessibility to the site, nature and extent of the ground working

conditions stacking of materials, installation of tools plants etc accommodation and movement of labour, supply of water and power for satisfactory completion of the work contract. No claim whatsoever on such accounts shall be entertained by the University in any circumstances.

11. The contractor shall comply with the provisions of the apprentice Act 1961 minimum wages Act 1948 Workman's compensation Act 1923 contract labour (Regulation and abolition1970). Payment of wages Act 1936. Employers liability act 1938 maternity Benefits Act 1961 and the industrial disputes 1947 as applicable and the rules and regulations issued there under form time Failure to do so shall amount to breach of the contract and the Engineer in Charge may his discretion to terminate the contract. The contractor shall also be liable for any pecuniary liability arising on account of violation by him of the provisions of the Act.

12. The tenderer shall bear all costs associated with the preparation and submission of his tender and the University shall in no case be liable for these costs.

13. Each tenderer shall submit only one tender either by himself or as in a joint venture. A tenderer who submits or participates in more than one tender will be disqualified.

14. Unless otherwise stated the contact shall be for the whole work as described in schedule of item of works and the drawings, including the contractor shall be bound to complete the whole as described in the schedule of item of works and the drawings, including the additional items if any, as per drawings and instructions. The certificate of completion as issued by the Engineer-in-Charge shall be the conclusive proof of completion of work.

15. The tender shall be either typed or hand written in indelible ink and shall be signed by the tendered. The following documents shall accompany the tenders. **(Scanned copies of all bid documents uploaded on the e-procurement portal)**

    (i) Partnership deed or Registration Certificate of the firm company as the case may be.

    (ii) EMD, Pan Number, VAT Certificate

16. **Pre requisites for the Bidders (Scanned copies of all Bid documents uploaded on the e-procurement portal)**

    1) Bidders should have at least 5 year experience in executing such HVAC work.
    2) The agency should have completed two similar nature of works with equal cost of 50% value of work or one similar nature of work with equal cost of 70% of value of work with in last three years.
    3) 3 year ITR return with profit loss statement with computation and certified by FCA/CA.

17. Tenderer should be approved contractors of Punjab PWD (B&R) or specialized agency dealing with providing "HVAC work".

18. Incomplete tender or tenders not fulfilling any of conditions specified above are liable to be rejected without assigning any reason.

ANNEXURE-B

PERCENTAGE RATE / ITEM RATE TENDER

I/We hereby offer to execute for the Vice Chancellor, BFUHS, Faridkot for the work, specified in the underwritten Memorandum within the time specified in such memorandum at F-1 percent below/ above the rate entered in the Schedule referred to in Para five of the 'Notice Inviting Tender' and annexed here to and in accordance, in all respects, with the specifications, designs drawings, and instructions in writing referred to in Para five and in clause 13 of the " Conditions of Contact" and with such material as are provided for and in all respects in accordance with such conditions so for as applicable.

Memorandum

a)	General Description	**Providing , Installation, Testing and Commissioning of HVAC Services (Ductable Unit) for Neurology & Neuro Surgery Ward at first floor of Super Speciality Block in GGS Medical College & Hospital, Faridkot.**
b)	Estimated Cost	*Rs. 29,88,910/-*
c)	Earnest money	*Rs. 59,800/-*
d)	*Performance Guaranty*	*5% Performance Guarantee in shape of bank guarantee*
e)	Percentage if any to be deducted from bills	*Security @ 5% will be deducted from all the running bills.*
f)	Time allowed for completion from the date of issue of Acceptance letter to the Contractor	*4 months (Four months)*

Should this offer be accepted in whole or, in part, I/We hereby agree to abide by all fulfill all the terms and provisions of the said conditions of contract annexed hereto and all the terms and provisions contained in the detailed "Notice Inviting Tender " and /or in default there to forfeit and pay to Baba Farid University of Health sciences, Faridkot, in office the sum of money mentioned in the said conditions.

A sum of Rs. **59,800**/- the Earnest Money Deposit must be submitted in the shape of **Online Payment**. I/We agree that the full value of Earnest money will be forfeited without prejudice to any other right or remedies to the University in office should I/we:

- Withdraw or modify my/our offer during the period of validity or
- fail to sign the contract agreement after acceptance of the after or
- fail to commence the work within ten days of the issue of acceptance of my/our offer, otherwise the said earnest money shall be retained by him towards security deposit against Clause (d) of above memorandum.

Date the_____ day of_____20_ Signature of the contractor

Witness……..

Address_____ Address_____

_____ _____

_____ _____

Occupation……. Telephone……..

The above offer is hereby accepted by me on behalf of the Governor of Punjab

Date the_____ day of_____20_ Signature of the contractor

ANNEXURE-C

CONDITIONS OF CONTRACT

Definitions:

- The “contract” means the document forming the tendered offer and acceptance thereof constituting binding contract between the Registrar, BFUHS, Faridkot and the contractor. The tender documents including the conditions, the drawings design, the specifications supplemented with instructions issued from time to time by the Engineer-in-charge and shall be binding on the parties in the stated order of precedence. All these documents taken together with the tendered offer and its acceptance shall be deemed to form the contract and shall be complementary to one another.
- The "Common Schedule of Rates" shall mean a printed document containing rates of different items of works pertaining to different branches of P.W.D. i.e. Irrigation, B&R (Buildings & Roads Branch) and the Public health branch and approved by the Committee of Direction of chief Engineers of these P.W.D. branches and the Punjab Govt.
- The "Completed works" shall mean, work completed in all respects as per laid down specifications, drawings, approved N.I.T and to the entire satisfaction of the Engineer-in-charge.
- The “Contractor” shall mean the individual or firm or company whether incorporated or not, undertaking the work and shall include the legal personal representative, or the persons comprising such firm or company or the successors of such firm or company as well as the assignees of such individual or firm or company whose tendered offer has been accepted.
- The '"completion date" is the date when the Engineer-in-charge certifies that the work can be put to use, alter receipt of an intimation from the contractor regarding its completion.
- The "Communication" between parties is the written and signed letters notices, reminders, memoranda and instructions recorded in the instructions book or book kept at site.
- The “Days & months” are calendar days and calendar months.
- The "Engineer-in-charge" means the Engineer Deputed by University, Who shall supervise the work and administer the contract with the assistance of his authorized subordinates.
- The “Department” means Baba Farid University of Health Sciences, Faridkot.
- The "Site" shall mean the land and or other places on in to or through which the work is to be executed under the contract or any adjacent land, path or street which may be allowed to be used for the purpose of carrying out the contract.
- The "Schedule of material" shall mean the list of materials which are to be used on the work will be the liability of the contractor as per Annexure-E
- The "Start Date" is the date when contract came into existence upon the issue of "Letter of Acceptance" by the Registrar, BFUHS/Engineer-in-charge.
- The “Schedule of Items of Work" shall mean the Items of Work to be executed at site of work to be executed at site of work pertaining to the work allotted to the contractor.
- The "Works or Work" shall unless the context otherwise requires, mean what the contractor is required to execute and hand over to the University Authorities.

Note:- In interpreting these ""Conditions of Contract" singular also means plural, male means female and vice versa.

CLAUSES OF CONTRACT

Clause - I PERFORMANCE GURANTEE & SECURITY

The contractor, whose tender is to be accepted shall furnish:-

- A Bank Guarantee of Schedule Bank in the prescribed form (Specimen form attached) in favour of the Registrar, BFUHS, Faridkot for an amount of 5% of the amount of contract valid up to six months beyond the date of completion (Time Limit) to cover the amount of liquidated damages and or the compensation of the breach of contract. No payment for work done of any kind shall be released till such Guarantee is furnished. The performance guarantee will be released immediately on completion of work and accepted by the Engineer in Charge as satisfied O.K. Work.
- A cash security of 5% of the amount of the contract inclusive of the Earnest money initially deposited with the bid to cover the cost that may be involved in removal of defects, imperfections, or taking remedial measures in the work, which has been executed to be progressively deducted @ 5% in all payments after affording credit for the initial Earnest money 60% of the security will be refunded after 06 months of the completion of work as certified by the Engineer-in-Charge with respect to satisfactory removal of all defects, imperfections, short comings and taking remedial measures, that may be necessary and after recording of final measurements of work done, for which the certificate of the Engineer-in-charge would be conclusive.
- The remaining amount of security shall be released after the expiry of Twelve months or one rainy season whichever is later from the date of completion of work and after removal of all defects, imperfections and shortcoming that may be noticed during this period and after satisfactory winding up of the contract as provided in clause-6A the entire satisfaction of the Engineer-in-charge.

- Where the contractor requested for first & Final bill (without any running Bill) on completion of work contractor need not furnish performance guarantee as the contract has already been performed. Clause-2.

Clause - 2 COMPENSATION FOR DELAY

The time allowed for carrying out the work shall be the essence of the contract and shall be strictly observed. It shall be reckoned from the date on which the order to commence the work is given to the contractor who shall ensure all due diligence to achieve progress of work not less than indicated below :

- On lapse of 25% contractual Time 20%
- On lapse of 50% contractual Time 50%
- On lapse of 75% contractual Time 80%
- On lapse of full contractual Time 100%

In case of default, the contractor shall not withstanding issuance of prior notice in this regard pay prospectively as liquidated damages an, amount of up to 1% of the amount of contract or such lesser amount that the Engineer-in-charge may levy, for every week that the work remains uncommented after 10 days of the issue of acceptance letter or the minimum progress of work stated above is not achieved or the work remains unfinished after the completion date. In case of continued default or shortfall in progress, The Engineer-in-charge may go on enhancing the levy of liquidated damages prospectively each time limited to 1% of the total estimated amount of work per week of further default subject to maximum unit of 5% of the amount of the contract.

Clause – 2A DISPUTE SETTELMENT

If over the works, any dispute arises between the two parties, relating to any aspects of this agreement, the parties shall first attempt to settle the dispute through mutual and amicable consultation.
In the event of agreement not being reached, the matter will be referred for arbitration by sole Arbitration not below the level of retired/ Serving Superintending Engineer of PWD (B&R) Punjab, to be appointed by the **Registrar, BFUHS, Faridkot**. The Arbitration will be conducted in accordance with the Arbitration and Conciliation Act 1996. The decision of the Arbitrator shall be final and binding on both the parties

Clause - 3 BREACH OF CONTRACT LEAVY OF DAMAGES

The Engineer-in-charge may without prejudice to other right and remedies, under the provisions of the contract or otherwise after issuing a notice in writing and getting the final bill prepared absolutely determine the contract after levying compensation for damages of five percent of the amount of the contract, if the contractor, commits breach of contract under any clause of the contractor in any of the following cases:-

- If the contractor suspends the execution of the work and inspire of having been given a notice in writing by the Engineer-in-charge fails to resume the work within ten days of the issue of the said notice.
- If the contractor, having been given a notice in writing by the Engineer-in-charge, fails to rectify, reconstruct or replace any; defective work or continues the execution or work in an inefficient, improper, un-workman like manner or not in accordance with sound Engineering practices or without complying with the directions and requirements within a period of 10 days of the issue of said notice.
- If the contractor being a company shall pass a resolution or a court shall make an order to the effect that the company shall be wound up or if a receiver or a manager on behalf of the credit or shall be appointed or if circumstances shall arise which entitle the court of creditor to appoint a receiver or manager or to make a winding up order.
- If the contractor being a company of acts or defaults mentioned in Clause 21 & 24 thereof.

Provided further, that in case action under clause 2 as aforesaid levy of liquidated damages is also taken, total amount of liquidated damages and compensation for breach of contract under both the clauses shall be limited to 7.5 percent *of* the amount of the contract or the amount available with the Deptt. Including Bank Guarantee whichever is less. The requisite amount for which the contractor may become liable shall be released by encashing the Bank Guarantee furnished by the contractor, as specified in clause I above and/or from other amount due to the contractor in respect of this work or any other work, under taken for the University Authorities.

- After the termination of the contract under this clause, the department shall be at liberty to
- Get the balance work executed through some other contractual agency or through departmental means or to
- Abandon the balance work altogether or to
- Modify the design and scope of the work in any manner. The contractor shall have no claim against the department for treating the work in any manner deemed fit.

Clause-4 LIABILITY OF CONTRACTOR AND POWERS TO TAKE OVER AND DISPOSE OFF CONTRACTOR PLANT

In any case, in which any of the powers conferred upon the Engineer-in-charge by clause-3 hereof, shall have become exercisable and shall not be exercised, the non-exercise thereof shall not constitute a waiver of any of the conditions hereof and such powers shall, not withstanding, be exercisable in the event of any future case or default on the part of the contractor, for Which by any clause or clauses, hereof, he is declared liable to pay compensation and the liability of the contractor for past and future compensation remain unaffected.

In the event of the Engineer-in-charge putting in force all or any of the powers vested in him under the proceedings clauses, he may, if he so desires, after giving a notice in writing to the contractor take possession of any or all took materials and stores in or upon the works or the site thereof belonging or produced by him or intended to be used for execution of the work in any part hereof paying or allowing for the same in account at the contract rates or in case of these not being applicable at current market rates certified by the Engineer-in-charge whose certificate there of shall be final. Otherwise, the Engineer-in-charge may, be giving a notice in writing to the contractor or his agent at the site of work, require him to remove such tools, plants materials or stores from the premises within the time specified in notice. In the event of the contractor, failing to comply with any such requisition. The Engineer-in-charge may get them removed at the contractor's expense or sell them by auction or private sale on account of the contractor and at his risk in all respects. The certificate of the Engineer-in-charge as to the expenses of any such removal and the amount of proceeds and expenses of any such sale shall be final & conclusive against the contractor.

Clause-5 EXTENSION OF TIME

If the contractor shall desire an extension of the time for completion of the work on the ground of his having been unavoidably hindered in its execution or any other ground, he shall apply in writing to the Engineer-in-charge (with corresponding time extension in Performance Bank Guarantee) within thirty days of the date of hindrance (but before the expiry of the time limit) on account of which he desires such extension as afore said and Engineer-in-charge shall, if in his opinion be necessary or proper, No application for extension of time received late or any officer other than the Registrar/Engineer-in-charge shall be considered valid if the contractor fails to apply for extension as aforesaid and the work is not completed within the time limit, the contract shall be determined absolutely after action under clause 2 and 3 above.

Clause-6 COMPLETION CERTIFICATE

Within ten days of the completion of work, the contractor shall give notice of such completion to the Engineer-in-charge and within 30 days of the receipt of such notice, The Engineer-in-charge shall inspect the work and if there is no defect in the work, shall furnish the contractor with a certificate of completion, otherwise a provisional certificate of completion indicating the defects (a) to be rectified by the contractor and or (b) for which payment will be made at reduced rates shall be issued. However, no certificate 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 material, rubbish and all huts and sanitary arrangements set up for his labour on the site and cleaned off the dirt from all wood work doors and windows, walls, floor or other parts or the building, in upon or about which the work is to be executed or of which he may have had possession for the purpose of execution thereof and not until the works shall have been measured by the Engineer-in-charge if the contractor shall fail to comply with the requirements of his clause to the removal of scaffolding, surplus material and rubbish, all huts and sanitary arrangements and cleaning off as aforesaid before the date fixed for the completion of work, the Engineer-in-charge may at the expense of the contractor get so cleared such dirt as afores and the contractor shall forth with did pay the cost of all expense so incurred shall have no claim in respect of any such scaffolding or surplus materials as aforesaid except for any sum actually released by the sale proceed thereof.

Clause -6A WINDING UP OF THE CONTRACT

On completion of the work, the contractor shall hand over the same to the Engineer-in-charge or his authorized representative free from all defects, shortcomings or imperfections. He shall clear the site of Construction of X-Ray room with brick wall, cable and earthing in additional Emergency Block and replacement of floors of Audiometric suits & class room for Audiology unit of ENT department in GGS Medical Hospital, Faridkot. all temporary works pits, godowns. offices, sanitary, scaffolding, debris, waste materials, and installations. He shall also furnish the following documents duly signed by him or his authorized representatives:-

- Completion drawings showing the work as finally constructed.
- Variation statement showing the altered items, if any, against those provided in the original drawings.
- Original site instructions book.
- Original registers for various quality control tests as specified,
- Cement consumption register.

Clause -7 PAYMENTS ON INTERMEDIATE CERTIFICATES REGARDED AS ADVANCES

No payment shall be made for a work estimated to cost less than 5% of Tender cost (Approx.), till after the whole of the work shall have been completed and a certificate of completion given. But in the case of works estimated to cost more than 5%, the contractor shall on submitting a bill there of be entitled to receive a monthly payment proportionate to the part there of the time limit that executed to the satisfaction or the Engineer-in-charge whose certificate of the sum payable Shall of final and conclusive against the contractor. But all such intermediate payments shall be regarded as payments by way of advance against the final payment only and not as payments for work actually done and completed, and shall not be preclude the requiring of bad. un-sound, imperfect or unskilled work to be removed and taken away and reconstructed or re-erected or by considered as an admission of the performance of contract or any part thereof in any respect of the accruing of any claim, nor shall it conclude, determine or effect in any way the power of the Engineer-in-charge under these conditions or any of them as so the final settlement and adjustment of the accounts otherwise or in any other way, very or affect of the contract. The final bills shall be submits by the contractor within one month of the date fixed for completion of the work, otherwise the certificate of the Engineer-in-charge as regards measurements and the total amount payable for the work shall be final and binding.

Clause-8 WORK TO BE EXECUTED IN ACCORDANCE WITH SPECIFICATIONS DRAWINGS ORDER ETC.

The contractor shall execute the whole and every part of the work in the most substantial and workman like manner both as regards materials, and labour and otherwise in every respect in strict accordance with the Punjab PWD specifications latest Edition. The contractor shall also conform exactly fully and faithfully to the designs, drawings and instructions in writing relating to the work signed by the Engineer-in-charge and lodged in his office and to which the contractor shall be entitled to have access during the office hours or on the site of work. The contract shall be furnished free of have access during the office hours or on the site of work The contract shall be furnished free of charge one copy of all such drawings and such specification as are not included in the printed Punjab P.W.D specification. He shall, if he so requires, be entitled at his own expense to make or cause to make copies of the drawings designs, specifications and instructions as aforesaid for ensuring the requisite quality of construction, the material used in works shall be subject to quality control tests for materials and workman-ship test as laid down in Punjab PWD. Specifications as amended from time to time or the relevant standards laid down by the Bureau of Indian standards/Hand Book of quality control for construction of Roads and runway I.R.C latest edition or instructions issued under the orders of the **Registrar Baba Farid University of Health Sciences, Faridkot** & by the Engineer-in-charge. The contractor shall provide all help and assistance in proceeding with required tests.

The contractor shall set up a quality control field laboratory equipped at least with the test equipment indicated in to these "Conditions of Contract" Annexure-1 and employ trained staff to carry out periodical test as per directions and procedures laid down by the Quality control cell of the PWD (B&R). The records shall be

maintained in the prescribed forms and copies thereof covering the work done each month shall be submitted with the bills.

Clause-9 ALTERATION IN SPECIFICATION AND DESIGNS

The Engineer-in-charge shall have the power to make any alterations, omissions from additions to on substitutions for the original specifications, drawings, designs and instructions that may appear to be necessary or advisable during the progress of work, and the contractor shall be bound to carry out the work in accordance with any instructions which may be given to him in writing signed by the Engineer-in-charge. Such alternations/additions or substitutions shall not invalidate the contract and any altered, additional or substituted work shall be carried out by the contractor on the same conditions in all respects on which he agreed to do the main work and at the same rates as are specified in tender for the main work. The time of completion of the work shall be extended in the proportion that the altered additional or substituted work bear to the original contract work and the certificate of the Engineer-in-charge shall be conclusive as to such proportion. The rates for such additional altered or substituted work shall be determined in accordance with the following provisions in their respective order.

- If the rate 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.
- If the rates for the additional, altered or substituted work are not specifically provided in the contract for the work, the rates will be derived from the rates for a similar class of work as are specified in the contract for the work.
- If the rates cannot be determined as provided in (i) and (ii) above, then such work shall be paid at the rates entered in common schedule of the rates minus/plus the percentage rate at which the bid has been accepted.
- If the rates for the altered, additional or substituted work cannot be determined in the manner specified in Clause (i) (ii) (iii) above, then the contractor shall within seven days of the date of receipt of the order to carry out the work in form the Engineer-in-Charge of the rate which he intends to charge for such class of work supported by analysis of the rate in support of rates/claimed. The Engineer-in-charge shall determine the rate or rates *on* the basis of prevalent market rates and pay the contractor accordingly.

However the Engineer-in-charge by notice in writing, will be at liberty to cancel the order given to the contract to carry out such class of work and arrange to carry out in such manner as he may consider advisable, provided always that if the contractor shall have commenced work or incurred any expenditure in regards thereto before the rate shall have been so determined, then in such case he shall be entitled to be paid in respect of the work carried out or expenditure incurred by him prior to the date of the determination to the rates of dispute, the decision of the superintending Engineer of the circle shall be final.

Clause-10 NO COMPENSATION FOR ALTERATION OR RESTRICTION IN WORKS

If at any time, after the commencement of the work the University Authority shall for any reason what-so-ever does not require the whole or part of as specified in the contract to be carried out, the Engineer-in-charge shall give notice in writing of the fact to the contractor, who shall have no claim to any payment or compensation what-so-ever on account of any profit or advantage which he might have derived from the execution of the work in full, but which he did not derive inconsequence of the full amount of the work having been made in the original specifications, drawings, designs and instructions, which shall involve any curtailment of the work originally contemplated.

Clause-11 ACTION AND COMPENSATION PAYABLE IN CASE OF BAD WORKS.

If it shall appeal to the Engineer-in-charge, or his subordinate in-charge of the work that any work has been executed with unsound, imperfect, unskillful workmanship or with materials of any inferior description or that any articles or material provided by the contractor for the execution of work are unsound or of a quality inferior to that contracted *for* or otherwise not in accordance with the contract, the contractor shall on demand in writing by the Engineer-in-charge specifying the work, materials or articles complained of, not withstanding that the same have been inadvertently passed, certified and paid for, forthwith rectify or as the case may be

remove the materials or articles so specified and provide other proper and suitable materials or articles at his own proper charge & Cost. In the event of his failing to do so, within a period so specified by the Engineer-in-charge In his demand aforesaid the contractor shall be liable to pay compensation rate of one percent of the estimated amount for every week not exceeding ten weeks, while his failure to do so shall continue and in the case of such failure, the Engineer-In-Charge may rectify or remove and execute the work or remove and replace with others, the materials or articles complained of as the case may be at the risk and expenses in all respects of the contractor.

Clause-12 WORKS TO BE OPEN TO INSPECTIONS

All work under or in course of execution or executed in pursuance of the contract shall at all times be open to the inspection and supervision of the Engineer-in-charge and his senior subordinates and The contactor shall at all times during the usual working hours or at all other times at which reasonable notice of the intention of the Engineer-in-charge or his senior subordinates to visit the work shall have been given to the contractor, other himself be present to receive orders and instructions or have a responsible agent duly accredited in writing, present for that purpose. Orders given to a contractor's agent shall be considered to have the same force as if they had been given to the contactor himself.

Clause-13 NOTICE TO BE GIVEN BEFORE WORK IS COVERED UP

The contractor shall give not less than 10 days notice in writing to the Engineer-in-charge or his subordinate-in-charge of the work before covering up or otherwise placing beyond the reach of measurement, any work in order that the same may be measured and correct dimensions thereof may be taken before the same is so covered up or placed beyond the reach of measurement and shall not cover up or place beyond the reach of measurement any work without the consent in writing of the Engineer-in-charge or his subordinates in charge of the work if any work shall be covered up or placed beyond the reach or measurement without such notice having been given or consent obtained, the sum shall be uncovered at controllers expense or in default there of no payment or allowance shall be made for such work or of the material with which the same was executed.

Clause-14 LIABILITY FOR DAMAGE AND IMPERFECTION FOR ONE YEAR

If the contractor or his workmen shall break, deface, injure or destroy any part of a building in which he may be working or any building, road, fence, enclosure or green grass land, water pipes, cables, drains, Electric or Telephone posts or wires, trees or cultivated ground continuous to the premises on which the work or any part of it is being executed or if any damage shall happen to the work, while in progress from any cause what-so-ever or any defect, imperfection or other faults appear in the work within one year from the date of completion certificate issued by the Engineer-in-charge.

the contractor shall make good at his own expense or in default, the Engineer-in-Charge may cause the same to be made good by other workmen and deduct the expenses incurred both on labour and material (for which the certificate of the Engineer-in-Charge shall be final) from any sums that may be then due or at any time thereafter may become due to the contractor form his security deposit.

Clause-15 CONTRACTORS TO SUPPLY MATERIAL PLANT SCAFFOLODINGS

The contractor shall arrange and supply at his own cost all materials (except such specific materials as may be issued from the stores of the Engineer-in-charge) plant tools, appliances, implements, ladders, cordage tackle, scaffoldings, water and power supply and temporary work requisite or proper and effective execution of the work. Whether original, altered or substituted and whether included in the specification other documents forming part of the contract or referred to these conditions or not all which may be necessary for the purpose of satisfying or complying with the requirements of the Engineer-in-Charge as to any matter which under these conditions he is entitled to be satisfied or which he is entitled to require together with the carriage there of to and from the work. The contractor shall also supply free of charge the requisite number of persons with the means and material necessary for the purpose of setting out works on counting weighing and assistance in the measurements or examination at any time or from time to time of the work or materials. Failing his so doing the same may be provided by the Engineer-in Charge at the expense of the contractor and this expense may be deducted from any amount due to the contractor under the contract or from his security deposit. The contractor shall also provide necessary fencing and lights required to or other proceeding at law that may be

brought by any person for injury sustained owing to neglect of the above precautions and to pay any damages and cost which may be awarded in any such suit, action or proceedings to any such person or which may with the consent of the contractor be paid to compromise any claim by any such person.

Clause-16 LABOUR LAWS

The contractor shall comply with all the provisions of minimum wages Act 1948. Workman's Compensation Act 1923. contract labour (Regulation and abolition) Act 1970 and the rules framed there under, the payment of wages Act 1936, Employees liability Act 1938. Maternity Benefits Act 1961. The apprentices Act 1961 and rules framed there under and the Industrial Disputes 1947. He shall also make satisfactory arrangements for labour huts, protection of health and sanitary arrangements for the workmen employed on the work.

In every case in which by virtue of provisions of the Contract Labour (Regulation and Abolition) Act 1970 and of the contract labour rules. Government is obliged to pay any amount of wages to a workman employed by the Contractor in execution *of* the works or to incure any expenditure in providing welfare and health amenities required to be provided under the above said act and the rules under PWD Contractor's labour Regulations or under the framed by the Government from, time to time, for the protection of health and sanitary arrangement for workers employed by The Approved Contractors. The Government will recover from the contractor the amount of wages so paid or the expenditure so incurred under without prejudice to the rights of the Government under section 20 sub section (2) and section 21 sub section (4) of the contract labour (Regulation and abolition) Act 1970. Government shall be at liberty to recover such amount or any part thereof the deducting it from the security deposit or from any sum due by Government to the contractor whether under this contract or otherwise. Government shall not be bound to contest any claim made against it under section 20 sub section (I) and section 21 sub section (4) of the said Act expect on the written request of the Contractor and upon his giving to the Government full security for all costs of which the Government might become liable in contesting such claim.

Clause-17 CONTRACTOR LIABLE FOR PAYMENT OF COMPENSATION TO INJURED WORKMEN OR IN CASE OF DEATH.

In every case in which by virtue of the provision of the section 12, sub section (I) of the workman's compensation Act 1922, the Government is obliged to pay compensation to a workman employed by the contractor in execution of work, the University authority will recover from the contractor the amount of compensation so paid and without prejudice to the rights of Government under section 12, sub Section (ii) of the said Act. The University authority shall be at liberty to recover such amount of any part thereof by deducting it from the security deposit or from any sums due by the University to the contractor whether under section 12 Sub Section (1) of the said Act except on the written request of the contractor and upon his giving to Government full security for the costs for which the University might become liable in consequence of contesting such claim.

Clause-I8 WORK NOT TO BE SUB LET

The contractor shall not be assigned or sub let without the written approval of the Engineer-in-charge. Employment of labour *on* piece rate basis shall, not however, be deemed sub-letting. If the contractor shall assign or sublet his contract or attempts to do so without the approval as aforesaid or become insolvent or commence any or solvency proceedings or make am composition with his creditors or attempt to do so, if any bribe, gratuity, gift, loan, perquisite, reward or advantage, pecuniary or otherwise, shall either directly or indirectly be given, promised or offered the contractor or any of his servants or agents to any public such officer or person shall become in any way directly or indirectly interested in the contract, the Engineer-in-charge may absolutely there-upon terminate the contract as specified in clause 3 and in the event the said course being adopted, the consequences specified in the said clause 3 shall ensure.

Clause-19 COMPENSATION CONSIDERED REASONABLE WITHOUT PREFERENCE TO ACTUAL LOSS.

All sum payable by way *of* compensation under any of these clauses shall be considered as reasonable competition to be applied to the use of Government without reference to the actual loss or damage sustained and whether or not any damage shall have been sustained,

Clause-20 DEDUCTIONS OF GOVT. DUES ON ANY ACCOUNT WHATSOEVER TO BE PERMISSIBLE.

Any excess payment made to the contractor inadvertently or otherwise under this contract or on any account whatsoever, and any other sum found to be due to the Government, by the contractor in respect of this contract or any other contract work on order or on any account what-so-ever may be deducted from any sum payable by the Government to the contractor either in respect of this contract or any other work order or contract or on any account by any other department of the Government.

Clause-21 CHANGE IN CONSTITUTION

Where the contractor is a partnership firm, the proir approval in writing of Engineer-in-charge shall be obtained before any change is made in the constitution of the firm where the contractor is an individual or a Hindu Undivided Family business concern, such approval as aforesaid shall likewise be obtained before the contractor enters into any partnership agreement, where under the partnership firm would have the right to carry out the work hereby undertaken by the contractor. If prior approval as aforesaid is not obtained, the contractor shall be deemed to have been assigned in contravention of clause 21 hereof and the same action may be taken and the same consequences shall ensure as provided in the said clause-21

Clause-22 DIRECTIONS OF THE ENGINEER-IN-CHARGE

All work to be executed under the contractor shall be executed under the direction and subject to the approval in all respects of Engineer-in-charge authorized by the University, who shall be entitled to direct at what point or points and in what manner they are to be commenced and from time to time carried out.

Clause-23 DISPUTES AND ARBITRATION

- If any dispute or difference of any kind what-so-ever, shall arise between the Government its authorized representative and the contractor in connection with or arising out of this contract or the execution of work there under.
- Whether before its commencement or during the progress of work or after the termination abandonment or breach of the contract, it shall, in the first instance, be referred for settlement to the Engineer-in-charge of the work and he shall with in a period of Sixty days after being requested in writing by the contractor to do so convey his decision to the contractor. Such decision in respect of every matter so referred shall subject to arbitration as hereinafter provided, be final and binding upon the contractor. In case the work is already in progress, the contractor shall proceed with the execution of the work on receipt of the decision by the Engineer-in-charge as aforesaid with all due diligence whether any of the parties requires arbitration as hereinafter provided or not.
- If the Engineer-in-charge has conveyed his decision to the contractor and no claim for arbitration has been filed by the contractor within a period of sixty days from the receipt of the letter of communicating the decision, the said decision shall be final and binding upon the contractor and will not be subject matter of arbitration at all.
- If the Engineer-in-charge fails to convey his decision within a period of sixty days after being requested as aforesaid the contractor may within further sixty days of the expiry of the final 60days from the date on which the said request was made by the contractor refer the dispute for arbitration as hereinafter provided.

- All disputes or differences in respect of which the decision is not final and conclusive shall at the request of either party made in a communication sent through registered A.D post be referred to the sole arbitration of Retired/Serving Superintending Engineer, PWD (B&R) Branch to act as an arbitrator on receipt of a request from either party.

- Registrar, BFUHS, Faridkot shall have the authority to change the arbitrator on an application by the either contractor or the Engineer-in-charge requesting change of arbitrator giving reasons thereof either before the start of the arbitration proceedings or during the cause of such proceedings. The arbitration proceedings would stand suspended as soon as an application for change of Arbitrator filed before the Registrar and a notice thereof is given by the applicant to the Arbitrator. The Registrar after hearing both the parties may pass a speaking order rejecting the application or accepting to change the Arbitrator simultaneously, appointing a technical officer not below the rank of Superintending Engineer as under the Contract. The New Arbitrator so appointed may enter upon the reference a fresh or he may continue the hearings from the point where these were suspended before the previous Arbitrator.
- The reference to the Arbitrator shall be made by the claimant party within one hundred twenty days from the date of dispute of claim arising during the execution of work. If the claim pertains to rates or recoveries introduced in the final bill the reference to the Arbitrator shall be made within six calendar months from the date of payment of the final bill to the contractor or from the date of registered notice is sent to the contractor to the effect that his final bill is ready by the Engineer-in-charge (whose decision in this respect shall be final and binding) whichever is earlier.
- It shall be an essential term of this contract that in order to avoid furious claims, the party invoking arbitration shall specify the disputes on facts and Calculations stating the amount claimed under each claim and shall furnish a "deposit-at-call" for ten percent of the amount claimed, on a scheduled bank in the name of the Arbitrator, by his official designation who shall keep the amount in deposit till the announcement of the award. In the event of an award in favour of the claimant, the deposit shall be refunded to him in proportion to the amount awarded with respect to the amount claimed and the balance, if any shall be foresaid and paid to the other party
- The provisions of the India Arbitration Act 1996 or any other statutory enactment there under or modification thereof and for time being in force shall apply to the arbitration proceedings under this clause.
- The Arbitrator shall award separately giving his award against each claim and dispute and counter claim raised by either party giving reasons for his award. Any lump-sum award enforceable shall not be legally enforceable.
- The venue of arbitration shall be such a place or places as may be fixed by the Arbitrator in his sole discretion. The work under the contract shall continue during the arbitration proceedings.
- The stamp fee due on the award shall be payable by the party as desired by the Arbitrator and in the event of such party's default, the stamp fee shall be recoverable from any other sum due to such party under this or any other contract.
- Neither party shall be entitled to bring a claim for arbitration, if it is not filed as per the time period, already specified or within six months of the following :-
    - Of the date of completion of the work as certified by the Engineer-in-charge.
    - Of the date of abandonment of the work or breach of contract under any of its clauses, or
    - Of its non-commencement or non resumption of work within 10 days of a written notice for commencement or resumption as applicable or
    - Of the cancellation, termination or withdrawal of the work from the contractor in whole or in part and/or revision or for enclosure of the contract or
    - Of receiving an intimation from Engineer-in-charge that the final payment due or recovery from the contractor has been determined, for the purpose of payment/adjustment whichever is the latest.

  If the matter is not referred to arbitration within the period prescribed above all the rights and claims of either party under the contract shall be deemed to have been forfeited and absolutely barred by time for arbitration and even for civil litigation.

- No questions relating to this contract shall be brought before any civil court without first invoking and completing the arbitration proceedings, if the issue is covered by the scope of Arbitration under this contract. The pending of arbitration proceedings, shall not disentitle the Engineer-in-charge to terminate the contract and to make alternate arrangements for completion of the work.
- The arbitrator shall be deemed to have entered on the reference on the day he issues notices to the parties fixing the first date of hearing. The arbitrator may from time to time, with the consent of the parties enlarge the initial time for making and publishing the award.
- The expiry of the contractual time limit, whether originally fixed or extended, shall not invalidate the provisions of this clause.

Clause-24 EXTRA ORDINARY CLAIMS

No claim for payment of an extra-ordinary nature, such as claims for bonus, for extra labour employed in completing the work before the expiry of the contractual period at the request of Engineer-in-charge or claims for compensation where work has been temporarily brought to a stand-still though no fault of the contract shall be allowed unless and to the extent that the same shall have been expressly sanctioned by the **Baba Farid University of Health Sciences, Faridkot** Under the signature of one its Vice Chancellor.

Clause-25 LUMP SUM IN ESTIMATE

When the estimate on which a bid is made include lump sums in respect of part of the work the contractor shall be entitled to payment in respect of the items of work involved at the same rates as are payable under this contract for such items. If the part of the work in question is not, in the opinion of the Engineer-in-charge capable of measurement, the Engineer-in-charge may at his discretion pay the lump sum amount entered in the estimate and the certificate in writing from the Engineer-in-charge shall be final and conclusive against the contractor with regard to any sum or sum payable to him under provision of this clause.

Clause-26 SPECIFICATION

In the case of any class of work for which there is no specification as mentioned in clause 11, the work shall be carried out in accordance with the specifications laid down by the Bureau of Indian Standards and in the event of there being no such specification, the work shall be carried out in all respects in accordance with the instructions and requirements of the Engineer-in-Charge.

Clause-26 –A CONCRETE WORK

All the concrete work shall have to be done with mechanical mixer unless permitted otherwise by the Engineer-in-Incharge All R.C.C work shall be compacted with a mechanical vibrator driven by petrol/diesel or electricity. All R.C.C work and plain cement concrete of mix 1:3:6 (M-10), and richer mixer, only Ghaggar coarse sand or Pathankot sand having a fineness modulus between 2.5 to 3.5 shall be used. Test samples shall be taken during the execution of work as per stipulations of the Bureau of Indian Standards. The compressive strength of test samples shall meet the requirements of relevant standards laid down by the B.I.S. The contractor shall set up a field testing laboratory with necessary equipment and appointed staff for carrying out the test at his cost.

(b) CURING OF CEMENT WORK

The contractor shall ensure proper curing of all work involving use of cement strictly as per stipulation of the Punjab PWD Specifications. Since proper curing during the critical period has a direct bearing on the strength and safety of cement work, the Engineer-in-Charge shall, in the case of any default on the part of the contractor,

take prompt action to arrange adequate curing at the cost of the contractor without issue any prior notice in this respect to avoid lapse of critical period of curing. The certificate of the Engineer-in-Charge would be final and binding in this respect and the cost incurred shall be recovered from the contractor.

(c) PITS AT SITE PROHIBITED

No pits shall be dug by the contractor at or near the site of work for taking out earth for use in work. In case of default, the pits so dug shall be got filled by the department at the cost of the contractor, charging additional amount of fourteen percent towards departmental charges.

(d) CO-ORDINATION WITH OTHER AGENCIES

The contractor shall maintain close co-ordination and afford necessary facilities to other agencies executing other works like Electrification, Horticulture, Water supply, Sewerage and external service etc. No claim for additional payment on this account shall be entertained.

Clause 27 (a) STATUTORY LEVIES

The rates as offered and accepted in this contract are inclusive of all taxes and statutory levies as income fax, Octroi/Terminal Tax, Sales tax/turn over tax, royalty , contribution under Employment State Insurance and local taxes payable under the respective statutes (ESI contribution etc.)

(b) INCOME TAX

Income tax shall be deducted at source as per provisions of the Income Tax Act and a certificate such deduction made in each financial year shall be furnished to the contractor by the disbursing officer.

(c) SALES AND OTHER TAXES

Sales tax turnover tax or any other tax shall also be deducted from the bills of the contractor if so directed by the authorities concerned.

(d) LOCAL LAWS AND LEVIES

The contractor shall comply with the proper bye-laws and legal orders of the local body or public authority under the jurisdiction of which the work is executed and pay all fees and charges for which he may be liable. Nothing extra shall be payable on this account.

(e) DAILY PAYMENT IN EMERGENCY

In case of emergency, the contractor shall be required to pay his labour every day and in case of default, the requisite payment shall be made by the Government and the amount shall be recovered from the contractor.

PERFORMANCE TEST

The contractor shall give a satisfactory performance test of the entire installation as per standard specifications before the work is finally accepted and nothing extra whatsoever shall be payable to the contractor for this test.

Clause-28 ACTS OF GOD

No claim whatsoever shall be entertained for any loss or damage caused by rain, floods or any other natural causes or other acts of God.

Clausc-29 JURISDICTION

The jurisdiction of Civil Court for matter under dispute shall be on the basis of the location of the office of the Engineer-in-charge.

Clause-30

The terms and condition of the Agreement have been explained to me us and I/we certify that I/We clearly understand the same.

Clause-31

The contractor will submit five photograph of the work showing physical progress of the work every month.

FAIR WAGES CLAUSE

a) The contractor shall pay not less than fair wages to the labourers engaged by him on the work

EXPLANATION

- Fair wages means wage whether for time of piece work notified at the time of inviting tenders for the work and where such wages have not been notified the wages prescribed by the P.W.D. B&R Branch .Punjab (I) for the district in which the work is done.
- The contractor shall notwithstanding the provision of any arrangements to the contrary, cause to be paid fair wages to labourers indirectly engaged on the work, as the labourers have been directly employed by him.
- In respect of all labour directly or indirectly employed on the work for the performance of the contractor shall comply with or cause to be complied with the Punjab (1) P.W.D. Contractor's labour Regulation made by the Government from time to time in regard to payment of wages, wage period deduction from wages, recovery of wages not paid and deduction unauthorized made, maintenance of wages register, wage cards publication of wages and other terms of employment, inspection and submission of periodically returns and matters of such like nature.
- The Engineer-in-charge shall have the right to deduct from the money due to the contractor, any amount required or estimated to be required for making good the loss suffered by a worker while working by reason of non-fulfillment of the conditions of the contract for the benefit of the workers nonpayment of wages or deduction made from his or their wages, which are not justified bs the terms of the contract for non-observation of their regulation referred to in clause (c) above.
- Viz-a-Viz the Punjab (1) Government the contractor shall be primarily liable for all payment to bemade under and for the observance of the regulations aforesaid without prejudice to his right to claimindirectly from his sub-contractors.
- The regulation shall be deemed to be a part of this contract and any breach thereof shall be deemed to be a breach of this contract.

The Registrar Baba Farid University of Health Sciences, Faridkot

CONTRACTOR'S LABOUR REGULATIONS

- **Short Titles:**
  The regulations may be called Punjab (1) Public Works Department Contractor's Labour Regulations.
- **Definitions:**
  In the regulations, unless otherwise expressed or indicated, the following words and expressions shall have the meaning hereby assigned to them respectively that is to say :

- "Labour" means workers employed by Punjab (1) Public Works Department Contractor directly or indirectly through sub contractor or other person or by an agent on his behalf.

- "Fair Wages" means wages whether for time or piece works notified at the time of inviting tenders for the work and where such wages have not been so notified, the wages prescribed by the Punjab(l) Public Works Department for the district in which the work is done.

- “Contractor" shall include every person whether a sub contractor or headman or agent employing labour on the work taken on contract.

- "Wages" shall have the same meaning as defined in the payment of wages Act, 1936 and include time
- and piece rate wages.

- **Display of notice regarding wages etc.:**
  The contractor shall, before the commence his work on contract, display and correctly maintain, and continue, to display and correctly maintain, in a clean and legible condition at conspicuous place on the work, notice in English and in the local Indian language spoken by the majority of the workers, giving the fair wages notified or prescribed by the Punjab (1) Public Works Department and the hours of the work for which such wages are earned.

- **Payment of Wages :**

  Wages due To every worker shall be paid to him direct.
  All wages shall be paid in current coin or currency or in both.

5. Fixation of Wages Period :

- The Contractor shall fix wage periods in respect of which the wages shall be payable.

- No wage period shall exceed one month.

- Wages of every workman employed on the contract shall be paid before expiry often days after the last day of the wage period in respect of which the wages are payable.

- When the employment of any worker is terminated by or on behalf of the contractor, the wages earned by him shall be paid before the expiry of the day succeeding the one on which the employment is terminated.

- All payments of wages shall be made on a working day.

6. Wage Book and wages slips etc :

The contractor shall maintain a wage book of each worker in such form as may be convenient, but the same shall include the following particulars.

a) Rate of daily or monthly wages.

b) Nature of work on which employed.

c) Total amount payable for the work during each wage period

d) Total amount payable for the work during each wage period

e) All deductions made from the wages-with an indication in each of the ground for which the deduction is made.

f) Wage actually paid for each wage period.

(i) The contractor shall maintain a wage slip for each worker employed on the work

(ii) The authority competent to accept the contract may grant exemption from the maintenance of wage Book and wage slip to a contractor who, in his opinion may not directly or indirectly employ more than 100 persons on the work.

7. Fines and deductions which may be made from wages :

(i) The wages of the worker shall be paid to him without any deduction of any kind expect the following

a) Fines

b) Deduction for absence from duty i.e. from the place from which the place of his employment he is required to work. The amount of deductions shall in proportion to the period for which he was absent.

c) Deduction for damage to or loss of goods expressly entrusted to the employed person for custody, or for loss of money he is required to account, where such damage or missing is directly attributes to his neglect or default.

d) Any other deductions which the University may from time to time allow.

- No fine shall be imposed on a worker and no deduction for damage or loss shall be made from his made until the worker has been given an opportunity showing cause against such fines or deductions.
- The total amount of fines which may be imposed in any one wage period on a worker shall not exceed an amount equable to half an anna in a rupee of the wage payable to him in respect of that period.
- No fine imposed on any worker shall be recovered from him by installments, or after the expiry of 60 days from the date on which it was imposed.

8. Register of fines etc.

- The contractor shall maintain register of fines and of all deductions for damages or loss made.
- The contractor shall maintain a list, in English and in the local Indian Language clearly defining acts and omissions for which penalty or fines can be imposed. He shall display such list and maintain it in a clean and legible condition in conspicuous place on the work.
-

9. Preservation of books :

The wage book, the wage slips and the register under these regulations shall be preserved for 12 months after the date of last entry made in them.

10.Powers of Labour Welfare Offers to made investigation or enquiry.

The Labour Welfare Officers or any other person authorized of Punjab (1) Government on their behalf shall be have to make enquires with a view to **a** ascertaining and enforcing due and proper observances of the wages clause and the provisions of these regulations. He shall investigate into any compliant regarding the default made by the contractor or sub contractor in regard such provision.

11. Report of Labour Welfare Officer.

The labour welfare officer or any other person authorized a aforesaid shall submit a report of the results of his investigations or enquiry to Engineer-in-charge, indicating the extent if any, to which the default has been committed and the amount of the recoverable in respect of the acts of omission and commission of the labour with a note that necessary deduction from the contractor's bill be made and the wages and the other dues be paid to the labour concerned.

12. Appeal against the decision of Labour Welfare Officer:

Any person aggrieved by the decision and recommendations of the Labour Welfare Officer or other person so authorized may appeal against such decision to the Labour Commissioner but subject to such appeal, the decision of the officer shall be final and biding upon the contractor.

12(a). No party shall be allowed to be represented by a lawyer during any investigations, enquiry. A appeal or any other proceedings under these regulations.

13. Inspection of Registers:

The contractor shall allow inspection of the wage book and slips to any of his workers or to his agents at a convenient time and place after due notice is received or to the Labour Welfare Officer or any other person authorized by the Punjab (I) Government in this behalf.

14. Submission of returns

The contractors shall submit periodical returns as may be specified from time to time.

15. Amendments

The Punjab (1) Government may, from time to time, add or amend these regulations and on, any question as to the application, interpretation or effects of these regulations, the decision of the Labour Commissioner to Punjab (1) Government, *or* any other person authorized by the Punjab Government in that behalf shall be final.

16. Registration of work

The contractor shall require registration of workers in the building and other construction workers (RECS) act 1996 and extension of benefits to such workers under the act.

ADDITIONAL CONDITIONS:-

1. The Contractor shall quote the overall excess or below or at par the NIT amount. Item rate will not be accepted. For payment purpose the quoted percentage shall be applicable uniformly to the rates of items described in the bill of quantity.

2. The prime Civil contractor will engage/identify his sub contractor for execution of Mettaled Road work, internal Public Health works, internal Electrical works having valid enlistment for executing the road work/water supply/sanitary engineering works, electrical works and he should have satisfactorily qualification criteria of similar nature of work as per contractor data. An undertaking will be given by the prime contractor in this regard as per Annexure-F

3. The description of all the above items is subject to all notes and clarification included in the Common Schedule of Rates-2010 and of Pb. PWD specification latest edition corrected up to date.

4. Agenda & Corrigendum issued by the Chief Engineer Pb. PWD B& R from time to time upto date will be applicable for the purpose of measurement/Payment.

5. The payment will be made after deducting Income Tax, VAT, Labour Cess as applicable by the rules.

6. The contractor shall carryout the mixed design if required for the relevant item of concrete from a reputed institution/laboratories as approved by the Engineer at his own expenses. Prior approval of Engineer is to be taken before the samples (Cement, Coarse & Fine Aggregates) sent to the institution/laboratories for mix design. The design mix required may be with or without admixtures. The decision of Engineer-In-Charge final and binding above. Nothing extra will be paid on this account.

7. Cost of binding wire, wastage of steel is included in the rate and shall not be paid separately.

8. The material will be arranged by the contractor

9. Amount/Quantity of any item can be increased or any item can be omitted or Substituted as per actual requirement at site of work as per approval of the Engineer-In – Charge. No claim in this regard will be entertained.

10. Nothing extra will be paid due to loss/damages caused by rains, floods, war, epidemic strike of the department officials or any other Act of God or any other cause what so ever.

11. The quantities given against respective item are arbitrary subject to actual as per approved designs/Drawings.

12. The work is required to be completed strictly as per the scope of NIT approved drawing irrespective of Qty, and amount of agreement as desired by the Engineer-In-charge.

13. No claim on account of paucity of funds, change in Priority or any other causes what so ever will be entertained and the Contractor/firm will have no right to go on for Arbitration on this account.

TECHNICAL SPECIFICATIONS

A. Building work:

1. The work shall be executed as per Punjab PWD specifications amended up to date supplemented with relevant Indian Standard Code of Practice relating to building works shall be followed for the execution of the building works as per details in architectural drawings, structural drawings and details of finishing items included therein.
2. For RCC work steel shuttering or any plate Shuttering should be used.
3. The Joinery-work will be got executed as per detailed drawings supplied by the Architect engaged by the University and instructions issued by the Engineer-In-charge, Nothing extra on this account will be entertained.
4. The rubbing and polishing shall be done to granolithic granite finish.
5. (a) The contractor will have to set up fully equipped quality control laboratory duly equipped with necessary laboratory equipment at his own cost near the site of work /plant site and the tests required for quality control will be got done at the cost of contractor conforming to the tests mentioned in the quality control hand book/ specifications relating to each item of work.

   (b) The quality control will be exercised/ observed by the Contractor /Engineer as per guidelines stipulated in hand book of quality control for construction of road and runways published by IRC (latest edition on the day of tenders) or in specifications.

   (c) Four tests for quantity of bitumen in mixed materials shall be carried out in each kilometer length of material laid.

B. Concrete Roads & parking

1. The work will be executed as per PWD Specifications/IRC Code of Practice, Guidelines and Standards and instructions issued from time to time including layout plans, levels, gradient and slopes described in the drawings as and where required as per site conditions. The materials and workmanship of best quality are to be employed for execution of the work and instructions of the Engineer are to be complied with. The latest edition of the Specifications/Standards 30 days prior to date of submission of bid shall be followed.

2. (a) The payment of earth work shall be made on the basis of cross section which should be signed by the tenderer before the commencement of work.

   (b) The final X-sections shall be measured in the presence of the tenderer and signed in token of acceptance on completion of work.

D. Electrical works:

1. The electrical works will be executed as per Punjab PWD specifications amended up to date supplemented with relevant Indian Standards and Code of Practice relating to internal electrical services, fittings, external lighting etc. as per detailed drawings and details included in items as per bill of quantities.
2. The work shall be carried out strictly in accordance with in the Punjab PWD Specifications amendment upto date for electrical works and also according to the instructions of the Engineer of the work. It any item is not available in Punjab PWD Specification, relevant ISI specifications shall be followed. Latest edition of ISI shall be applicable where ever ISI standards have been mentioned.
3. Any material desired to be got tested by department shall be supplied free cost by agency. In case the material fails to meet required specifications, testing charges will be borne by agency.
4. Power supply and water supply required for work, shall be arranged by the agency for installation and testing of the equipment at the site of work. All tools and tackles required for handling of equipment and material at the site of work as well for their assembly and erection including necessary test instruments shall be arranged by the agency.
5. The contractor will be responsible for any damage cause to P&T or Electricity cable or any other Estate services during execution of work. The debt/claim raised by P&T and Electricity department for such damages will be recoverable from him.
6. 6 pin 15 Amps sockets shall be used in all power plug controls in place of 3 pin sockets and nothing extra shall be payable on this account.
7. Contractor shall be required to provide suitable thimbles or turned sockets or glands at ends of P.V.C cables where the same are to be fitted in switches, motor plates, bus bar chamber if so required without any addition of cost. Rates given in the attached schedule are inclusive of this work.
8. The contractor where ever necessary, will have to provide deep type semi recessed/recessed surface inspection boxes, as the case maybe, so that both recessed and on surface pipes could run straight as they come and terminate in box/main switch/ B.D.Bs so as to ensure neat finish. For this no extra payment shall be made.
9. The connection to the main switches /B.D.Bs/Bus bar chamber should be with pipe nipples instead of flexible pipe for which neither any extra payment nor any deduction will be made. However the flexible pipe will be allowed to be used with prior approval of the Engineer.
10. Original self attested copies of Bills, Challan, Test Certificates from manufacturers, valid ISI license etc. of material to be used by the agency, shall be supplied at the time of receipt of material at site before it is used.
11. The connection of earth wire with iron clad switch and iron clad branch distribution fuse board or other metallic cases shall be according to the Indian Electricity Act and the Rules there –under and made by means of suitable cables, sockets soldered at the end of the earth wire. Rates given in the schedule are inclusive of this work.
12. The suitable series of M.C.B's shall be used for light load, power load and motor wiring purpose and nothing shall be deducted or paid extra to the contractor on this account.
13. The contractor will arrange to provide all switches and B.D.Bs of the same make in each premises., An exception to this, in case of non-availability of some particular number/size of the switches of a particular make being used/intended to be used, can be made with prior approval of the Engineer.

14. The Iron clad switches/B.D.B's/M.C.B.'s etc. will have be of Havells , L&T make only.

15. The wires/cables will have to be of Finolex or Havells make only and all piano type accessories should be of make Fine, Anchor or any other ISI marked make approved by the Engineer.

16. G.I. pipe should be B-Class of TATA, Jindal make. However the choice of make shall rest with the Engineer.

17. The breaking up and making good of walls, ceiling and floor etc. shall be done by the contractor at his own cost and to the entire-satisfaction of the Engineer of the work. All the cases and holes made for wiring or other purposes shall be filled in properly and neatly and brought to the original finish according to the entire satisfaction of the Engineer. No extra payment for the same will be made.

18. The rates for the wiring light, fan, call bell plug points etc. given in the attached schedule are irrespective of length of the points.

19. Looping in system of wiring shall be adopted for all sub-circuit wiring.

20. All the pipe work sheet-metal/ iron clad switches branch distribution fuse boards, conduit or strip for light ,fan and plug points ,T.W. board blocks etc shall be painted/varnished both from inside and out side as the case may be with two coats of approved paint/varnish. Rates given in the attached schedule are inclusive of this work.

21. The connection of earth wire with Sheet-Metal/iron clad switch and branch distribution fuse boards or other metallic cases shall be according to the Indian Electricity Rules and made by means of suitable cable socket soldered at the end of the earth wire. Rates given in the attached schedule are inclusive of this work.

22. The size of branch distribution boards are designed on the basis of eight points (light, fan, Call bell and light plug) connected to one way of branch distribution boards and in cases of 10/15 Amp. power plug points are to be connected to one way of 32 Amp. B.D.B or one point per way 16 Amp. B.D.Bs. this practice should strictly be followed for connecting points to the ways of B.D.Bs.

23. G.I. pipe for earthing purposes only for protection of earthing wires may be of Class 'A' water quality.

24. Where-ever saddle clamps are used for fixing pipe, same be of 3 mm thick iron sheet width of which shall not be less than the outer diameter of the pipe. Alternatively, suitable size holder bats may be used if desired by the Engineer. Neither any deduction nor any extra payment for the same will be made if the holder bats are used.

25. Before energizing the system, the following tests should be given by the contractor, so as to find out the installation conforming to the relevant rules/regulations:

    1. Earth resistance test.
    2. Earth continuity test of conduit pipe or other iron clad system etc.
    3. Insulation test.
    4. Polarity test

26. All shutters for covering the switches & B.D.Bs should be as per approved drawings.

27. The control switch should not installed at a height less than 20 Cm from floor level.

28. The body of all the branch distribution fuse boards should be of machine made with 1.60mm thick mild steel sheet.

29. Grip fuse units of sheet metal/I.C switches and branch distribution fuse boards should be H.C type so as to have the facility of inter charge ability. Sheet metal/I.C switch should be rewireable type below 200A. rating and H.R.C type for 200A and onward rating. Moreover the sheet metal/I.C switches (rewireable and H.R.C types) shall be one of the following makes.

30. (i) Crystal (ii) L & T (iii) Standard (iv) Havells.
a) P.V.C insulated, unsheathed copper conductor shall be one of the following makes.

(i) Plaza (ii) Shalimar (iii) Ecko (iv) Finolex (v) Havells

b) P.V.C insulated, inner sheathed armoured and unarmoured cables shall be of the following makes:

i) S.W.I.C.A ii) Reliance iii) Plaza (iv) Havells (v) Ecko (vi) Finolex

31. Brass screws to fix brown bakelite/white glazed or translucent backside painted sheet cover 3 mm thick. This sheet should be fixed by means of flat heads brass machine screws with brass ring washers underneath.

32. Welded conduit pipe (Screw type) made from 1.60 mm thick steel sheet as stipulated in the schedule enameled both from inside and outside shall be used. The length of conduit pipe shall be joined by means of screwed sockets so that it shall be electrically continuous throughout. The threads shall be free from grease oil etc. and material of the nature should be allowed to come in contract with the conduits. Sharp edges should not be allowed to remain due to which insulation of conductor is likely to be damaged.

33. All the conduit pipe to be used on the work shall be of heavy gauge welded screwed type(ISI marked), conduit pipe upto 32mm dia made of 1.6mm thick M.S sheet and more than 32 mm dia. 2.00 mm thick sheet. For the purpose of checking the gauge of the sheet the under noted weight of various sizes of conduit shall be considered as standard weight and conduit used by the contractor must to these weight.

Nominal size outside diameter of conduit	Tolerance on outside diameter.	Minimum Outside Dia meter	Minimum wall thickness	Gauge	Weight per meter (gms)
1	2	3	4	5	6
20	0.3	19.7	1.6	16	735
25	0.4	24.6	1.6	16	935
32	0.4	31.6	1.6	16	1215
40	0.4	39.6	2.0	14	1910
50	0.5	49.5	2.0	14	2660
63	05	62.5	2.0	14	3340

34. All conduit used in the work shall be adequately bushed with PVC bushes to prevent a bression of insulation of conductor shall also be bonded to earth. This clause however does

not apply to small conduit cases installed in the partition wall in PVC individually and PVC sheathed system of wiring were teak wood bushes can be installed and bonding to earth is not necessary.

35. 34. Healthy gauge welded conduit pipe less than 20mm dia and higher than 25mm dia shall not be used in such circuit wiring.

36. Not more than 4 and 8 wires of 1.5 mm sq.PVC cables shall be encased in 20 mm and 25 mm dia conduit pipe respectively except with the special permission of the Engineer.

37. All cover plates whether of inspection boxes or outlet boxes shall be fixed with round head oxidized brass screws. All cast iron inspection boxes and outlet boxes for housing/accessories shall be of threaded type of suitable sizes as approved by the Engineer. Cover plats of round inspection boxes shall be of 1.2 mm thick M.S sheet painted white and 6mm bigger than the outler dia, of the inspection boxes. Cover plates of rectangular and inspection boxes shall be of 1.58 mm thick iron sheet and outlet boxes of 5mm thick bakelite brown/white glazed of translucent back side painted sheet as approved by engineer.

Ceiling roses of semi-recessed type shall only be used in case of conduit pipes and they shall be so fixed-in-such a manner so that canopy fan can effectively cover the same.

38. The whole system of conduit in a building shall be erected and the inside of it thoroughly dried of all sweating or dampness by means of drawing in a cloth fixed to steel fish wire through it before the conductors are put into it further before putting conductors in the conduit pipe the earth continuity test of whole the system should be taken by the Engineer. It would the responsibility of the contractor to arrange and give such tests

39. Conduit pipe where already laid for wiring of light, fan call bell and plug points as well as for plug control will be delivered to the contractor, responsibility for erecting the wiring in works in absolutely cleaned condition with painted round inspection boxes and cover and the whole system is handed over to the contractor (later) the responsibility to whom wiring work is allotted.

40. Bonding of third pin of socket outlet shall be carried out by mean of 4 mm. dia. G.I wires, 2.24mm.dia aluminum wire and 4sq.mm G.I stranded wire, in case of casing and capping P.V.C sheathed recessed conduit pipe and surface conduit wiring respectively with suitable wall socket.

FORMAT

AFFIDAVIT/UNDERTAKING*

1. I/we, the undersigned, do hereby certify that all the statements made in the required attachments are true and correct.

2. The undersigned also hereby certifies that neither our firm M/s _____ have abandoned any work under Government of India or Govt. of Punjab nor any contract awarded to us for such works have been rescinded, during last five years prior to the date of this bid.

3. The undersigned hereby authorize(s) and request(s) any bank, person, firm or corporation to furnish pertinent information deemed necessary and requested by the Department to verify this statement or regarding my (our) competence and general reputation.

4. The undersigned understand(s) and agree(s) that further qualifying information may be requested, and agrees to furnish any such information at the request of the Department / Project/Work implementing agency.

5. The undersigned binds himself with all the stipulations of the Bidding Document including period of completion, provision of adequate equipment, personnel and other resources required for completion within the stipulated completion period and agrees to augment them, if found necessary for timely completion of the Project/Work, as desired by the Engineer/Employer.

6. Affidavit/undertaking of not having been black-listed by any Govt. /Semi Govt. Organization/Corporation at any stage and/or debarred by the department of Punjab PWD (B&R).

7. The undersigned has never been convicted by any court of law for any of the offences under any Indian/ foreign laws.

_____(Signed by an Authorized Officer of the Firm)

Title of Office_____

Name of Firm _____

DATE_____

* To be executed on a non-judicial stamp paper .

SPECIAL CONDITIONS OF CONTRACT

1 The general character and the scope of work to be carried out under this contract are illustrated in Drawings, Specifications and Schedule of Quantities. The Contractor shall carry out and complete the said work under this contract in every respect in conformity with the contract documents and with the direction of and to the satisfaction of the Engineer-in-charge/Architect/Consultant. The contractor shall furnish all labour, materials and equipment as listed under Schedule of Quantities and specified otherwise, transportation and incidental necessary for supply, installation, testing and commissioning of the complete air conditioning system as described in the Specifications and as shown on the drawings. This also includes any material, equipment, appliances and incidental work not specifically mentioned herein or noted on the Drawings / Documents as being furnished or installed, but which are necessary and customary to be performed under this contract. The central Heating, Ventilation and Air-Conditioning (HVAC) system shall comprise of following:

a. Air cooled ductable units /split units.
b. Refrigerant & drain piping inclusive of all fittings.
c. Sheet metal ducts inclusive of external insulation, acoustic lining, canvas connections, volume control dampers and smoke dampers as required,
d. Supply and return air registers and diffusers.
e. Vibration isolators for all HVAC equipment.
f. Automatic controls and instruments.
g. Wiring and earthing from MCC panels to various refrigeration, air conditioning and mechanical ventilation equipment, control wiring and interlocking.
h. Balancing, testing and commissioning of the entire HVAC and mechanical ventilation installation.
i. Test reports, list of recommended spares, as-installed drawings, operation and maintenance manual for the entire HVAC installation.

2. Performance Guarantee: The contractor shall carry out the work in accordance with the Drawings, Specifications, Schedule of Quantities and other documents forming part of the Contract.

The contractor shall be fully responsible for the performance of the selected equipment (installed by him) at the specified parameters and for the efficiency of the installation to deliver the required end result.

The contractor shall guarantee for One year that the HVAC system as installed shall maintain the inside conditions in the air-conditioned spaces as described under “Basis of Design” in the specifications.

Complete set of drawings is available in the Owner / Architect / Consultant office and reference may be made to same for any details or information. The contractor shall also guarantee that the performance of various equipment individually, shall not be less than the quoted capacity; also actual power consumption shall not exceed the quoted rating, during testing and commissioning, handing over and guarantee period.

3. Bye-Laws and Regulations: The installation shall be in conformity with the Bye-laws, Regulations and Standards of the local authorities concerned, in so far as these become applicable to the installation. But if these Specifications and Drawings call for a higher standard of materials and / or workmanship than those required by any of the above regulations and standards, then these Specifications and Drawings shall take precedence over the said regulations and standards. However, if the Drawings and specifications require something which violates the Bye-laws and Regulations, then the Bye-laws and Regulations shall govern the requirement of this installation.

4. Fees and Permits: The contractor shall obtain all permits / licenses and pay for any and all fees required for the inspection, approval and commissioning of their installation.

5. Drawings: The HVAC Drawings issued with tenders, are diagrammatic only and indicate arrangement of various systems and the extent of work covered in the contract. These Drawings indicate the points of supply and of termination of services and broadly suggest the routes to be followed. Under no circumstances shall dimensions be scaled from these Drawings. The interiors drawings and details shall be examined for exact location of equipment, controls, grilles and diffusers. The contractor shall follow the tender drawings in preparation of his shop drawings, and for subsequent installation work. He shall check the drawings of other trades to verify spaces in which his work will be installed. Maximum headroom and space conditions shall be maintained at all points. Where headroom appears inadequate, the contractor shall notify the Owner / Architect / Consultant before proceeding with the installation. In case installation is carried out without notifying, the work shall be rejected and contractor shall rectify the same at his own cost. The contractor shall examine all interior, structural, plumbing, and electrical and other services drawings and check the as-built works before starting the work report to the Owner / Architect / Consultant any discrepancies and obtain clarification. Any changes found essential to coordinate installation of his work with other services and trades, shall be made with prior approval of the Owner / Architect / consultant without additional cost to the Owner. The data given in the Drawings and Specifications is as exact as could be procured, but its accuracy is not guaranteed.

6 Technical Data: Each tenderer shall submit along with his tender, the technical data for all items. Failure to furnish complete technical data with tenders may result in summary rejection of the tender.

7. Shop Drawings:

7.1 All the shop drawings shall be prepared on computer through AutoCAD System based on Drawings, site measurements and Interior Designer's Drawings. All heat load calculations shall be done using latest software. Within one week of the award of the contract, contractor shall furnish, for the approval of the Owner / Architect / Consultant, two sets of detailed shop drawings of all equipment and materials including layouts for Plant room, AHU rooms, fan rooms, fan coil units, ventilation fans; CFD analysis report for jet fans detailed ducting drawings showing exact location of supports, flanges, bends, tee connections, reducers, guide vanes, silencers, distribution grids, volume control dampers, collars, grilles, diffusers; detailed piping drawings showing exact location and type of supports, valves, fittings etc; acoustic lining and external insulation details for ducts, pipe insulation etc; electrical panels inside / outside views, power and control wiring schematics, cable trays, supports and terminations. These shop drawings shall contain all information required to complete the Project as per specifications and as required by the Owner / Architect / consultant. These Drawings shall contain details of construction, size, arrangement, operating clearances, performance characteristics and capacity of all items of equipment, also the details of all related items of work by other contractors. Each shop drawing shall contain tabulation of all measurable items of equipment / materials / works and progressive cumulative totals from other related drawings to arrive at a variation-in-quantity statement at the completion of all shop drawings. Minimum 6 sets of drawings shall be submitted after final approval along with softcopy.

Each item of equipment / material proposed shall be a standard catalogue product of an established manufacturer strictly from the manufacturers given in list of makes and quoted by the tenderer in technical data part.

When the Owner / Architect / Consultant makes any amendments in the above drawings, the contractor shall supply two fresh sets of drawings with the amendments duly incorporated alongwith check prints, for approval. The contractor shall submit further six sets of shop drawings to the Owner / Architect / Consultant for the exclusive use by the Owner / Architect / Consultant and all other agencies. No material or equipment may be delivered or installed at the job site until the contractor has in his possession, the approved shop drawing for the particular material / equipment / installation.

7.2 Shop drawings shall be submitted for approval four weeks in advance of planned delivery and installation of any material to allow Owner / Architect / Consultant ample time for scrutiny. No claims for extension of time shall be entertained because of any delay in the work due to his failure to produce shop drawings at the right time, in accordance with the approved program.

7.3 Manufacturers drawings, catalogues, pamphlets and other documents submitted for approval shall be in four sets. Each item in each set shall be properly labeled, indicating the specific services for which material or equipment is to be used, giving

reference to the governing section and clause number and clearly identifying in ink the items and the operating characteristics. Data of general nature shall not be accepted.

7.4 Samples of all materials like grilles, diffusers, controls, insulation, pre-moulded pipe section, control wires etc shall be submitted to the Owner / Architect / Consultant prior to procurement. These will be submitted in two sets for approval and retention by Owner / Architect / Consultant and shall be kept in their site office for reference and verification till the completion of the Project. Wherever directed a mockup or sample installation shall be carried out for approval before proceeding for further installation.

7.5 Approval of shop drawings shall not be considered as a guarantee of measurements or of building dimensions. Where drawings are approved, said approval does not mean that the drawings supersede the contract requirements, nor does it in any way relieve the contractor of the responsibility or requirement to furnish material and perform work as required by the contract.

7.6 Where the contractor proposes to use an item of equipment, other than that specified or detailed on the drawings, which requires any redesign of the structure, partitions, foundation, piping, wiring or any other part of the mechanical, electrical layouts; all such re-design, and all new drawings and detailing required therefore, shall be prepared by the contractor at his own expense and gotten approved by the Owner / Architect / Consultant. Any delay on such account shall be at the cost of and consequence of the Contractor.

Where the work of the contractor has to be installed in close proximity to, or will interfere with work of other trades, he shall assist in working out space conditions to make a satisfactory adjustment. If so directed by the Owner/Architect/Consultant, the contractor shall prepare composite working drawings and sections at a suitable scale, not less than 1:100, clearly showing how his work is to be installed in relation to the work of other trades. If the Contractor installs his work before coordinating with other trades, or so as to cause any interference with work of other trades, he shall make all the necessary changes without extra cost to the Owner.

7.7 Within two weeks of approval of all the relevant shop drawings, the contractor shall submit four copies of a comprehensive variation in quantity statement, and itemized price list of recommended (by manufacturers) imported and local spare parts and tools, covering all equipment and materials in this contract. The Owner / Architect / Consultant shall make recommendation for acceptance of anticipated variation in contract amounts.

8. Quiet Operation and Vibration Isolation: All equipment shall operate under all conditions of load without any sound or vibration which is objectionable in the opinion of the Owner / Architect / Consultant. In case of rotating machinery sound or vibration noticeable outside the room in which it is installed, or annoyingly noticeable inside its own room, shall be considered objectionable. Such conditions

shall be corrected by the Contractor at his own expense. The contractor shall guarantee that the equipment installed shall maintain the specified NC levels.

9. Accessibility: The Contractor shall verify the sufficiency of the size of the shaft openings, clearances in cavity walls and suspended ceilings for proper installation of his ducting and piping. His failure to communicate insufficiency of any of the above, shall constitute his acceptance of sufficiency of the same. The Contractor shall locate all equipment which must be serviced, operated or maintained in fully accessible positions. The exact location and size of all access panels, required for each concealed control damper, valve or other devices requiring attendance, shall be finalized and communicated in sufficient time, to be provided in the normal course of work. Failing this, the Contractor shall make all the necessary repairs and changes at his own expense. Access panel shall be standardised for each piece of equipment / device / accessory and shall be clearly marked.

10. Materials and Equipment: All materials and equipment shall conform to the relevant Indian Standards and shall be of the approved make and design. Makes shall be strictly in conformity with list of approved manufacturers as per attached list.

11. Manufacturers Instructions: Where manufacturer has furnished specific instructions, relating to the material and equipment used in this project, covering points not specifically mentioned in these documents, such instructions shall be followed in all cases.

12. Electrical Installation: The electrical work related to air conditioning services, shall be carried out in full knowledge of, and with the complete coordination of the contractor. The electrical installation shall be in total conformity with the control wiring drawings prepared by the contractor and approved by the Owner / Architect / Consultant. All air conditioning equipment shall be connected and tested in the presence of an authorized representative of the contractor. The system shall be commissioned only after the contractor has certified in writing that the electrical installation work for air cooling services has been thoroughly checked, tested and found to be totally satisfactory and in full conformity with the contract Drawings, Specifications and manufacturer's instructions. It is to be clearly understood that the final responsibility for the sufficiency, adequacy and conformity to the contract requirements, of the electrical installation work for air conditioning services, lies solely with the contractor.

13. Completion Certificate: On completion of the Electrical installation for air conditioning, a certificate shall be furnished by the contractor, counter signed by the licensed supervisor, under whose direct supervision the installation was carried out. This certificate shall be in the prescribed form as required by the local authority.

    The contractor shall be responsible for getting the entire electrical installation for air conditioning system duly approved by the local authorities concerned, and shall bear expenses if any, in connection with the same.

14. Balancing, Testing And Commissioning : Balancing of all air and water systems and all tests as called for the Specifications shall be carried out by the contractor through a specialist group, in accordance with the Specifications and ASHRAE Guide lines and Standards. Performance test shall consist of three days of 10 hour each operation of system for each season. Cost of performance witness test of major equipment such as chillers, at factory with two personnel from Owners / Consultant shall be included. The results for summer, monsoon and winter air conditioning in quadruplicate shall be submitted for scrutiny. Four copies of the certified manufacturer performance curves for each piece of equipment, high lighting operational parameters for the project, shall be submitted along with the test certificates. Contractor shall also provide four copies of record of all safety and automatic control settings for the entire installation. The installation shall be tested again after removal of defects and shall be commissioned only after approval by the Owner / Architect / Consultant. All tests shall be carried out in the presence of the representatives of the Owner / Architect / Consultant.

15. As Built Drawings: Contractor shall submit as built drawings as and when work in all respects is completed in a particular area. These drawings shall be submitted in the form of two sets of CD's and four portfolios (300 x 450 mm) each containing complete set of drawings on approved scale indicating the work as - installed. These drawings shall clearly indicate complete plant room layouts, ducting and piping layouts, location of wiring and sequencing of automatic controls, location of all concealed piping, valves, controls, dampers, wiring and other services. Each portfolio shall also contain consolidated control diagrams and technical literature on all controls. The contractor shall frame under glass, in the air-conditioning plant room, one set of these consolidated control diagrams.

16. Operating Instruction & Maintenance Manual: Upon completion and commissioning of system the contractor shall submit a draft copy of comprehensive operating instructions, maintenance schedule and log sheets for all systems and equipment included in this contract. This shall be supplementary to manufacturer's operating and maintenance manuals. Upon approval of the draft, the contractor shall submit four (4) complete bound sets of typewritten operating instructions and maintenance manuals; one each for retention by Consultant and Owner / Architect / Consultant and two for Owners Operating Personnel. These manuals shall also include basis of design, detailed technical data for each piece of equipment as installed, spare parts manual and recommended spares for 4 year period of maintenance of each equipment.

17. On Site Training: Upon completion of all work and all tests, the Contractor shall furnish necessary operators, labor and helpers for operating the entire installation for a period of fifteen (15) working days of ten (10) hours each, to enable the Owner's staff to get aquatinted with the operation of the system. During this period, the contractor shall train the Owner's personnel in the operation, adjustment and maintenance of all equipment installed.

18. Maintenance during Defects Liability Period

18.1 Complaints: The Contractor shall receive calls for any and all problems experienced in the operation of the system under this contract, attend to these within 10 hours of receiving the complaints and shall take steps to immediately correct any deficiencies that may exist.

18.2 Repairs: All equipment that requires repairing shall be immediately serviced and repaired. Since the period of Mechanical Maintenance runs concurrently with the defects liability period, all replacement parts and labour shall be supplied promptly free-of-charge to the Owner.

19. Uptime Guarantee: The contractor shall guarantee for the installed system an uptime of 98%. In case of shortfall in any month during the defects liability period, the Defects Liability period shall get extended by a month for every month having shortfall. In case of shortfall beyond the defects liability period, the contract for Operation and Maintenance shall get extended by a month for every month having the shortfall and no reimbursement shall be made for the extended period.

The Contractor shall provide log in the form of CD and bound printed comprehensive log book containing tables for daily record of all temperatures, pressures, humidity, and power consumption, starting and stopping times for various equipment, daily services rendered for the system alarms, maintenance and record of unusual observations etc. Contractor shall also submit preventive maintenance schedule.

Each tenderer shall submit along with the tender, a detailed operation assistance proposal for the Owner / Architect / Consultants review. This shall include the type of service planned to be offered during Defects Liability Period and beyond. The operation assistance proposal shall give the details of the proposed monthly reports to the Management.

The tenderer shall include a list of other projects where such an Operation Assistance has been provided.

20. Soft Water and Power Requirement: The contractor shall submit with their tender, their requirement of soft make-up water and power at each of their equipment / system wise / floor wise / section wise.

3. **SYSTEM DESCRIPTION**

The proposed air conditioning system shall consist of a combination of Aircooled ductable units and individual split/ cassette units. These units shall suitable capacity indoor units The outdoor units shall be connected with Indoor units thru heavy grade Refrigerant piping adequately sized. All motors for air-conditioning system shall be energy efficient type, suitable for 415 $\pm$ 10% / 220$\pm$ 6% volts incoming power supply.

Condensing units shall be placed on epoxy coated MS frames and provided with anti-vibratory supports. All foundations shall be protected from mechanical damage by providing epoxy coated angle nosing.

All ducts shall be fabricated out of galvanized sheet steel (GSS) for long life and as per fire norms. The conditioned air shall be distributed thru air registers and diffusers as shown in the drawings. All ducts shall be insulated with closed cell nitrile rubber. AC units shall also be tripped in case of emergency thru fire panel.

DESIGN PARAMETRS

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

DUCTABLES

a) Maximum Face Velocity across cooling coil MPM	:	152.43
b) Maximum Face Velocity across Pre filters MPM	:	152.43
c) Maximum water pressure drop across coil in Mt	:	4.6
d) Maximum water velocity through coil in MPS	:	2.5
e) Fan outlet velocity (maximum) MPS	:	9.5
f) Maximum fan speed (forward curved)	:	1000 RPM
g) Maximum fan motor speed	:	1450 RPM

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

1.1.2 INSULATION

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

TECHINAL SPECIFICATIONS

APPLICABLE STANDARDS AND CODES

TERMS AND DEFINATIONS

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.

LIST OF BUREAU OF INDIAN STANDARDS CODES

Following relevant IS codes shall apply read in concurrence with there latest amendments.

IS:226-1975	Specification for structural steel
IS:277-1992	Specification for galvanised sheet (plain and corrugated)
IS:325-1978	Specification for three phase induction motors
IS:655-1963	Specification for metal duct
IS 659-1964 (1991)	Safety code for air-conditioning (resived)
IS:660-1963 (1991)	Safety code for mechanical refrigeration
IS:800-1984	Code of practice for general construction in steel
IS:808-1964	Specification for rolled steel beam channel and angle section
IS:816-1969	Code of practice for metal arc welding for general purpose in mild steel
IS:823-1964	Code of procedure for manual metal arc welding of mild steel
IS:1554-(Part 1) –1976	Specs for PVC insulated (heavy duty electrical cables)
IS:2253-1974	Designation for types of construction and mounting arrangement of rotating electric machine.

IS:2312-1967	Specs for propeller type AC ventilating fans
IS:2379 - 1963	Colour code for the identification of pipelines
IS : 3103-1975	Code of practice for Industrial Ventilation
IS 4064 - (Part -II) 1978	Specific requirements for the direct switching of individual motors.
IS: 4736 - 1968	Hot-dip zinc coatings on steel tubes
IS: 4894-1987	Test Code for Centrifugal Fan.
IS : 7240-1981	Application & Finishing of thermal insulation material
IS:8544 (Part-I to IV)1979	Starters
IS:9224 (Part II) - 1979	HRC cartridge fuse links upto 650 volts.
IS:3069-1965	Glossary of terms, symbols and unit relating to thermal insulation material
IS:3346-1980	Method for the determination of thermal conductivity thermal I insulation materal (two slab, guarded hot plate method)
IS:3588-1966	Specification for electric axial flow fans
IS:3724-1966	Specs for cartridge type heating elements (non embedded type)
IS:4158-1967	Specs for solid embedded type electric heating elements
IS:4691-1984	Degree of protection provided by enclosure for rotating electrical machine
IS:4722-1968	Specs for rotating electrical machine
IS:4729-1968	Measurement and evaluation of vibration of rotating electrical machine.
IS:4831-1968:	Recommendation on units and symbols for Refrigeration
IS:4894-1987	Specs for centrifugal fans
IS:5111 -1993	Testing of Refrigerating compressors.
IS:6272-1971:	Specs of industrial cooling fans
IS:7616-1975	Method of testing panel type air filters for air conditioning and ventilation purposes
IS;8623 1977	Specs of factory built switch / control section.
IS:8623(Part3) 1993:	Specs for low voltage switchgear and control gear assemblies
IS: 8789- 1978	Values of performance characteristics for three phase induction motor
IS-13947 (Part-1)1993	Specs for low voltage switchgear and control gear.

In case of any revision in above BIS code the REVISED one shall only be applicable.

GENERAL MECHANICAL REQUIREMENTS

1 This chapter deals with the general mechanical requirements specifically applicable to HVAC. The additional requirement given in any chapter is in addition to the bare minimum stated in this chapter and shall be complied with.

2 SUBMITTALS

Under provisions of the NIT sample approval for all major items like grills, diffusers, valves, insulation, sheet etc is necessary before the commencement of the project. The products mentioned in the Approved list of manufacturers shall only be acceptable. In case of any alternate make is required to be used the same will have to be approved by the customer/engineer in charge with proper quality and rate justification as per the mode of approval mentioned in the list. Shop drawings and product data grouped to include complete submittals of related Systems, products, and accessories in a single submittal. Shop Drawings shall be based on the actual duct routes after the site survey, details of concrete pads and foundations for the various equipments, Layout of the AHU including dimensions of the room / boxing with inspection window dimensions, the foundations and the sizes and all necessary construction details required on site, location of the allied equipments and the requirements from other agencies, trench locations if any, Sump location and size, sleeve location if any, fresh air / exhaust air locations, location of wall mounted equipment (If any) and any structural inputs.

3 BROCHURES

Submit manufacturer's product data and brochure including complete description of the item with illustrations, rating charts, accessories, dimensional data, capacities stated in the terms specified in the NIT and Performance curves, wherever applicable like fans and pumps.

4 REGULATORY REQUIREMENTS

Liaison / Approvals from the bodies mentioned below (or any other), if required shall be taken by the contractor on behalf of the client and at his own cost. BIS / Local Fire Authority / LOCAL CODES .

5 PROJECT / SITE CONDITIONS

- Mechanical layouts indicated on drawings are diagrammatical. Co-ordination (final) shall be required with other trades prior to installation. Install all works as shown on the drawings, unless prevented by project conditions.

- Prepare drawings showing proposed rearrangement of work to meet the project conditions. Obtain permission from of engineer in charge before proceeding.
- Place anchors, sleeves and supports prior to pouring concrete on installation of masonry works.
- Keep roads and site clear of debris and scrap.

6 GENERAL INSTALLATION FEATURES

- Piping / ducting installation requirements are specified in other section. The Drawings indicate the general arrangement of piping, valves, fittings, ducts and specialties. The following are specific connection requirements:
- Arrange piping installations adjacent to units to allow unit servicing and maintenance.
- Connect piping to all equipment with flanges enabling easy removal of the coil.
- Connect condensate drain pans using drain pipe and extend to nearest floor drain. Construct deep trap connection to drain pan and install cleanouts at changes in direction.
- Make final duct connections with flexible connections.

AIR COOLED SPLIT AIRCONDITIONER UNITS:

1 SCOPE

The section comprises the supply, installation, commissioning and testing of Air Cooled Ductable Air Conditioners confirming to the specifications and Bill of Quantities and equipment schedule.

2 CASING

The casing for outdoor unit of air conditioner shall be of heavy gauge mild steel sheet sufficient to withstand load of equipment installed therein and designed to provide convenient access to the machinery for routine maintenance and checking. The housing shall be epoxy painted. The fan coil and drain section of indoor unit shall be insulated with expanded polystyrene / polyethylene sheet.

3 COMPRESSOR

The compressor shall be preferably serviceable hermetic/ semi sealed **scroll** type suitable for 415-440V, 3 phase, 50 HZ electric supply. It shall be mounted on spring / ribbed type vibrations isolators to avoid transmission of vibration to the body of the unit. It shall be provided with necessary safety devices. All units except for 8.5 TR or below capacity shall have **minimum 2** compressors for capacity optimization.

4 AIR COOLED CONDENSER UNIT

The outdoor unit shall be factory assembled, weather proof casing, constructed from heavy gauge mild steel panels and coated with baked enamel finish. The unit should be completely factory wired tested with all necessary controls. The outdoor unit shall have minimum 2 scroll compressors and be able to operate even in case of breakdown of one of compressors. The Condenser coil shall be of copper tube and extended aluminium fins. Tubes shall be arranged in a staggered design for better efficiency. The condenser coil shall have whether protection coating to enhance the life of the coil. Adequately sized direct driven fans to operate quietly and to provide enough air quantity to keep condensing temperature low should be provided.

5 INDOOR UNIT

Indoor units shall be ceiling mounted ductable type. Each unit shall have preferably electronic expansion valve or normal thermostatic expansion valve.

The blower shall be forward curved dual suction multi blade type fabricated with aluminium / mild steel sheet of heavy gauge sufficient to deliver design quantity and static pressure. The blower shall be statically and dynamically balanced to ensure low noise and vibration free operation. The fan shall be direct driven type / belt driven as per the OEM design. The blower shall be driven by TEFC type motor.

The cooling coil shall be made out of seamless copper tubes and have continuous aluminum fins. The fins shall be spaced by collars forming an integral part. The tubes shall be staggered in the direction of airflow. The tubes shall be hydraulically/ mechanically expanded for minimum thermal contact resistance with fins. Each coil shall be factory tested. There shall be minimum 4-5 fins/cm (11-13 FPI). The coil will be minimum 3/4 rows deep complete with refrigerant distributor, section headed and other accessories. The velocity across the coil should not exceed beyond 152 mpm (500 FPM).

The filter shall be easily serviceable. The air filters shall be 3 ply HDPE washable type fitted within aluminium frame. The efficiency of filters shall be 90% down to particle size of 15-20 microns.

7 CONTROL BOX

Electrical control box shall contain capacitor / contactors for fan, compressor, and blower motor with non-recycling control relay and high & low-pressure cutouts. A separate control box containing selector switch for convenient operation directly from within a room may be provided.

The electrical wiring between the evaporator / condensing units and control boxes to be carried out by the vendor.

8 REFRIGERANT:

The air cooled ductable units shall be suitable for R-410A or any other environmental friendly refrigerant.

SPECIFICATIONS FOR PIPING

1 Scope: All piping work shall conform to quality standards and shall be carried out as per specifications and details given hereunder :-

2. **Piping :**

2.1 **Drain Piping: PPRC Pipes**

2.1.1 The drain piping shall be PN16 grade PPRC and laid in continuous slope.

2.1.2 The fittings shall be of PN25 grade of equal forged connections.

2.1.3 Pipe crosses shall be provided at bends, to permit easy cleaning of drain line.

2.1.4 The drain line shall be provided upto the nearest drain trap and pitched towards the trap.

2.1.5 Drain lines shall be provided at all the lowest points in the system, as well as at equipment, where leakage of water is likely to occur, or to remove condensate and water from pump glands.

2.3 **Copper Piping :**

2.3.1 Seamless soft copper tubing, type L shall be used to make connections to equipment, wherever required or specified.

2.3.2 Flare fittings e.g. flare nuts, tees, elbows, reducers etc. shall all be of brass.

2.4 **Refrigerant Piping :**

All refrigerant piping for the air conditioning system shall be constructed from soft seamless upto 19.1mm and hard drawn copper refrigerant pipes for above 19.1mm with copper fittings and silver-soldered joints. The refrigerant piping arrangements shall be in accordance with good practice within the air conditioning industry, and are to include charging connections, suction line insulation and all other items normally forming part of proper refrigerant circuits.

All joints in copper piping shall be sweat joints using low temperature brazing and or silver solder. Before jointing any copper pipe or fittings, its interiors shall be thoroughly cleaned by passing a clean cloth via wire or cable through its entire length. The piping shall be continuously kept clean of dirt etc. while constructing the joints. Subsequently, it shall be thoroughly blown out using nitrogen.

After the refrigerant piping installation has been completed, the refrigerant piping system shall be pressure tested using nitrogen at pressure of 20Kg per sq.cm and 10 Kg per sq.cm (lowside). Pressure shall be maintained in the system for 24 hours. The system shall then be evacuated to minimum vacuum if 700mm hg and held for 24 hours.

The air-conditioning system supplier shall be design sizes and erect proper interconnections of the complete refrigerant circuit.

The thickness of copper piping shall not be less than mentioned below:

Pipe Size in mm(OD)	**Wall Thickness in mm**
54.1	1.5
41.3 – 34.9	1.3
28.6 – 25.4	1.2
22.2 – 15.9	1.0
12.7 - 6.4	0.8

The suction line pipe size and the liquid line pipe size shall be selected according to the manufacturers specified outside diameter. All refrigerant pipes shall be properly supported and anchored to the building structure using steel hangers, anchors, brackets and supports which shall be fixed to the building structure by means of inserts or expansion shields of adequate size and number to support the load imposed thereon.

3. **Pipe Insulation :**

a. Refrigerant Pipe Insulation

The whole of the liquid and suction refrigerant lines including all fittings, valves and strainer bodies, etc. shall be insulated with 19mm /13 mm thick elastomeric nitrile rubber Class I as specified in BOQ.

b. Drain Pipe Insulation

Drain pipes carrying condensate water shall be insulated with 6 mm thick elastomeric nitrile rubber insulation.

For proper drainage of condensate, U Trap shall be provided in the drain piping (wherever required). All pipe supports shall be of pre fabricated & pre painted slotted angle supports, properly installed with clamps etc.

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	Thickness GI (MM)	Type of Joints	Bracing
Up to 750	0.63	GI Flange	-
751-1000	0.80	25x3 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	40x40x3mm@ 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	40x40x3mm @ 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.

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. 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.

5. 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.

6. 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.

7 **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.

SPECIFICATIONS FOR INSULATION

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 MATERIAL

Insulation material for **Duct insulation** shall be Closed Cell Elastomeric Nitrile Rubber. Thermal conductivity of elastomeric nitrile rubber shall not exceed 0.038 W/m^oK or 0.313 Kcal/M hr^oC or 0.212 BTU/(Hr-ft^2-°F/inch) at an average temperature of 30°C. The product shall have temperature range of –40°C to 105°C. Density of material shall not be less than 0.06 gm/cm^3. The insulation shall have fire performance such that it passes minimum CLASS O as per BS476 part 7 for surface spread of flame. Water vapour permeability shall not exceed 0.024 per inch (3×10^{-14} Kgs/m.sec.Pa). The material shall have approval from the Chief Fire Officer.

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.

3 APPLICATION

3.1 Duct acoustic Lining: 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 gauge perforated aluminium sheet having at least 15 percent perforations. The aluminium sheet shall be screwed to GI channels using cup washer and neatly finished to give true inside surface.

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

- Duct surfaces shall be cleaned to remove all grease, oil, dirt, etc. prior to carrying out insulation work. Measurement of surface dimensions shall be taken properly to cut closed cell elastomeric rubber sheets to size with sufficient allowance in dimension.

- Material shall be fitted under compression and no stretching of material shall be permitted.

- A thin film of adhesive shall be applied on the back of the insulating material sheet and then on to the metal surface. When adhesive is tack dry, insulating material sheet shall be placed in position and pressed firmly to achieve a good bond.

- All longitudinal and transverse joints shall be sealed with adhesive SR 998 or equivalent.

- 26 G GI Chicken wire mesh shall than be wrapped on the insulated duct to hold the insulation.

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.

MODE OF MEASUREMENT

1 Measurement of Equipment:

- Ductable unit – to include compressor, condenser, controls, motor etc on skid mounted platform complete factory assembled including chiller insulation and standard accessories as supplied by the OEM. – Unit nos.
- Indoor units and cassette type FCU – to include blower with motor, casing, Unit nos.

2 Measurements for Ducting: All ducts fabricated and installed should be accompanied and supported by proper documentation. Bill of material / Packing list for every duct section supplied. Measurement sheet covering each fabricated duct piece showing dimensions and external surface area along with summary of external surface area of duct gauge-wise. Each and every duct piece to have a tag 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 and verification. Unless otherwise specified, measurements for ducting for the project shall be on the basis of centerline measurements described herewith. Ductwork 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 area 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 a 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 between large and small diameter shall be adopted, the length of tapered duct section shall be the centerline 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 5mm thick between duct and

support, vibration isolator suspension where specified or required. The following accessories will be part of ducting and shall NOT be separately measured nor paid for

- inspection chamber / access panel,
- splitter damper with quadrant and lever for position indication,
- turning vanes,
- straightening vanes
- all other accessories required to complete the duct installation as per the specifications.

3 Air Distribution accessories shall be measured by the cross-section area perpendicular to air flow, as identified herewith:

- Grilles and registers - width multiplied by height, excluding flanges.
- Volume control dampers - width multiplied by height, excluding flanges
- Diffusers - cross section area for air flow at discharge area, excluding flanges.
- Fire dampers - shall be measured by their cross sectional area perpendicular to the direction of air flow. Quoted rates shall include the necessary collars and flanges for mounting, inspection pieces with access door, electrical actuators and panel. No special allowance shall be payable for extension of cross section outside the air stream.
- Flexible connection - shall be measured by their cross sectional area perpendicular to the direction of air flow. Quoted rates shall include the necessary mounting arrangement, flanges, nuts and bolts and treated-for-fire requisite length of canvas cloth.
- Motorised Volume control damper - width multiplied by height, excluding flanges.
- Exhaust air / Fresh air Louvers - shall be measured by their cross sectional area perpendicular to the direction of air flow.

4 Measurement of Duct Insulation: Unless otherwise specified measurement for duct insulation for the project shall be on the basis of centre line measurements described herewith Duct Insulation shall be measured on the basis of surface area along the centre line of insulation thickness. Thus the surface area of externally thermally insulated or acoustically lined be based on the perimeter comprising centre line (of thickness of insulation)width and depth of the cross section of insulated or lined duct, multiplied by the centre-line length including tapered pieces, bends, tees, branches, etc. as measured for bare ducting.

1.2 5 Measurement For Piping: Unless specified otherwise, measurement for piping for the project shall be on the basis of centre line measurements described herewith Piping shall be measured in units of length along the centre line of installed pipes including all pipe fittings, flanges (with gaskets, nuts, and bolts for jointing),

unions, bends, elbows, tees, concentric and / or eccentric reducers, inspection pieces, expansion loops etc. The above accessories shall be measured as part of piping length along the centre line of installed pipes, and no special multiples of pipe lengths for accessories shall be permitted. The quoted rates for centre line linear measurements of piping shall include all wastage allowances, pipe supports including hangers, MS channel, PUF supports, nuts, check nuts, vibration isolator suspension where specified or required, and any other item required to complete the piping installation as per the Specifications. None of these items will be separately measured nor paid for. However, all valves (gate / globe / check / balancing / purge / butterfly / drain etc), strainers, thermometers, pressure gages shall be separately counted and paid as per their individual unit rates, which shall also include their insulation as per Specifications. Piping measurements shall be taken before application of the insulation. Contractor shall get pressure testing of pipes / measurements etc verified by the representative of Engineer in charge at site.

6 Measurement of Pipe Insulation: Pipe Insulation shall be measured in units of length along the centre line of the installed pipe, strictly on the same basis as the piping measurements described earlier. The linear measurements shall be taken before the application of the insulation. It may be noted that for piping measurement, all valves, orifice plates and strainers are separately measurable by their number and size. It is to be clearly understood that for the insulation measurements, all these accessories including cladding, valves, orifice plates and strainers shall be considered strictly by linear measurements along the centre line of pipes and no special rate shall be applicable for insulation of any accessories, fixtures or fittings whatsoever.

7 Measurement of cabling: All power cabling, control cabling and earthing the same shall be measured for actual length and paid as per the unit rates available in the tender quotes.

APPROVED MAKES OF EQUIPMENT & MATERIALS

S No	Equipment / Material	*Approved Makes*
1	Air Cooled Ductable units	Carrier / Hitachi / Daikin.
2	Cassette Units (cooling)	Carrier / Hitachi / Daikin.
3	Split Air Conditioners (Cooling option only)	Carrier / Hitachi / Daikin.
4	Propeller fan	Alstom/ khaitan/ Crompton
5	Grilles/ Diffusers	Caryaire / Ravistar / Airflow
6	G.I. Sheet Metal Duct	SAIL/ Tata
7	Hessian (Fire treated)	Navair/ Pyroguard
8	VCD / Gravity louvers / Exhaust& fresh air louvers	Caryaire / Ravistar / airflow
9	Filters	AAF/ Purolater/ Thermadyne
10	*PVC Pipe*	*Prince / Supreme.*
11	Copper Pipe	*Totaline / Rajco/ Mandev*
12	Closed cell Nitrile Rubber	Armacell / K flex / vido flex
13	Aluminium Tape	Johnson/ Birla 3M
14	Fibre Glass	UP twiga / Owen corning
15	Anchor Fastners	Hilti /fishner
16	Paints	ICI/ Asian/ Narolac/ 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.

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.