

QUAID-E-AWAM UNIVERSITY OF
ENGINEERING SCIENCES &
TECHNOLOGY, NAWABSHAH

TENDER DOCUMENTS

FOR

ELECTRIFICATION WORKS

OF

CHEMICAL ENGINEERING DEPARTMENT

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I N D E X

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FOR
ELECTRICAL WORKS
OF
QUAID-E-AWAM UNIVERSITY OF ENGINEERING
SCIENCES & TECHNOLOGY, NAWABSHAH

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QUAID-E-AWAM UNIVERSITY OF ENGINEERING,
SCIENCE & TECHNOLOGY
NAWABSHAH

1. ITEM RATE TENDER AND CONTRACT FOR WORKS

1.1. General Rules And Directions For the Guidance OF Contractor

- 1.1.1. All work proposed to be executed by contract shall be notified in a form of invitation to tender posted on a board hung in the office of the Project Engineer and signed by the Project Engineer or shall be advertised or intimated to the prequalified Contractor through Consultants.
- 1.1.2. This form will state the work to be carried out, as well as the date for submitting and opening tenders, and the time allowed for carrying out the work; also the amount of earnest money to be deposited with the tender, and the amount of security deposit to be deposited from bill. It will also state whether a refund of quarry fees, specification, designs drawings, estimated rates, schedule rates and any other documents, required in connection with the work shall be signed by the Project Engineer for the purpose of identification and shall also be open for inspection by Contractor at the office of the Project Engineer and the Consultant during office hours.
- 1.1.3. In the event of the tender being submitted by a firm, it must be signed separately by each partner thereof, or in the event of the absence of any partner, it shall be signed on his behalf by a person holding a power-of-attorney authorizing him to do so. In the case of a registered Company all the documents shall be signed by the Managing Director. A copy of the article of association empowering the Managing Director to enter into the contract on behalf of the Company shall be filed with the Project Engineer incase this has not been done earlier.
- 1.1.4. All work proposed to be executed by contract shall be notified in a form of invitation to tender posted on a board hung in the office of the Project Engineer and signed by the Project Engineer or shall be advertised or intimated to the prequalified Contractor through Consultants.
- 1.1.5. No alterations or additions shall be made by the Tenderer in the Contract Documents and rates must be filled in INK or TYPED OUT, both in figures and in words, clearly and legibly in the columns provided in the Schedule of Quantities. There shall be no interlineations or erasures in the Tender Documents, except to correct errors made by the Tenderers at the time of filling in the Tenders. All such erasures and interlineations shall be initialed by the person or persons signing the Tender. Any tender which does

not comply with this condition will be liable to be summarily rejected and not taken into account when preparing comparative statement.

- 1.1.6. Any person who submits a tender shall fill up the usual printed form, stating at what percentage above or below the rates specified in Schedule, “ memorandum “ showing items of work to be carried out; he is willing to undertake the work. Only one rate of such precentage, on all the Scheduled rates shall be filled at page 3 of the tender as well as in clause 14 and any other relevant clause in the Tender documents, which proposes any alterations in the work specified in the said form of inviatio to tender, or in the time allowed for the work, which contains any other conditions, will be liable to rejection.
- 1.1.7. The Project Engineer or his duly authorized Assistant shall open tenders in the presence of contractors who have submitted tenders or their representatives who may be present at the time, and he will enter the amounts of the several tenders in a comparative statement in a suitable form. In the event of a tender accepted, the contractors shall for the purpose of identification, sign copies of the specifications and other documents mentioned in Rule 1. In the event of a tender being rejected the Project Engineer shall authorize the Accounts Officer concerned to refund the amount of the earnest money deposited, to the Contractor making the tender, on his giving receipt for the return of the money.
- 1.1.8. The Officer competent to accept the tender shall have right of rejecting all or any of the tender without assigning any reason whatsoever.
- 1.1.9. No receipt for any payment alleged to have been made by a contractor in regard to any matter relating to this tender or the contract shall be valid and binding on University unless it is signed by the Project Engineer.
- 1.1.10. The memorandum of work to be tendered for and their rates shall be filled in and completed by the office of the project Engineer or the Consultants as the case may be before the tender form is issued. If a form issued to an intending tenderer has not been so filled in and completed he shall request the said office to have this done before he completes and delivers his tender.
- 1.1.11. All work shall be measured net by standard measures and according to the rules and custom of the Sind Public Works Department without reference to any local custom.
- 1.1.12. Under no circumstances shall any contractor be entitled to claim enhanced rates for any items in this contract.

1.2. Tender For Works:-

I/We hereby tender for the executing, for the Quaid-e-Awam University of Engineering, Science & Technology, Nawabshah (therein before and hereafter referred to as “University “of the work specified in the underwritten memorandum within the time specified in such memorandum at _____ (in figures as well as in words).

On the rates entered in Schedule showing items of work and the rates thereof to be carried out and in accordance in all respects with the specifications, design, drawings and instructions in writing referred to in Rule hereof and in the annexed conditions of contract.

2. MEMORANDUM

- 2.1. General description ... As mentioned on title sheet.
- 2.2. Estimated cost. ... Rs. _____
- 2.3. Earnest Money (1%) ... Rs. _____
- (The amount of earnest money to be deposited shall be in accordance with the provisions of paras 516 & 521-A of Sind P.W.D. Manual)
- 2.4. Security Deposit - (Including Earnest Money) upon signing of Agreement (2%) ... Rs. _____
- (This deposit will be in accordance with paras 516 & 521-A of Sind P.W.D. Manual)
- 2.5. Percentage, if any, to be deducted from bills (_____ percent) ... _____ Percent.
- (This percentage where no security deposit is taken will vary from 5% to 10%, according to the requirements of the case. Where security deposit is taken, see note to Clause 1 of conditions of contract).
- 2.6. Time allowed for the work from the date of written order to commence. ... _____

Should this tender be accepted I/We hereby agree to abide by and fulfill all the terms and provisions of the conditions of contract annexed hereto so far as applicable and in default thereof to forfeit and pay to University the sums of money mentioned in the said conditions.

Call Deposit No. _____ dated _____ from
the _____ at _____ in
respect of the sums of Rs. _____
Rupees _____ only)
is herewith forwarded representing the earnest money:

- 2.7. The full value of which is to be absolutely forfeited to University should I/We not deposit the full amount of security deposit specified in the above memorandum, in accordance with Clause (1) (a) of the said conditions, otherwise the said sum of Rs. _____ Rupees _____ only) shall be retained by University on account of such security deposit as aforesaid; OR
- 2.8. Rs. _____ Rupees _____ only) the full value of which shall be retained by University on account of the security deposit specified in Clause 1 (b) of the conditions:

Dated _____ day of _____, 2015

1. For Contractor _____
(Signature of Contractor before submission of tender)

Address _____

2. For Witness (1) _____
(Signature of witness to Contractor's signature).

Address _____

Occupation _____

- 3 For Witness (2) _____
(Signature of witness to Contractor's signature).

Address _____

Occupation _____

The above tender is hereby accepted by me on behalf of the Quaid-e-Awam University of Engineering, Science & Technology, and Nawabshah.

Dated _____

PROJECT ENGINEER.

Signature of the Office by whom accepted

- a. Strike out if no security deposit is to be taken.
- b. Strike out if any; cash security deposit is to be taken.

**GENERAL CONDITIONS
OF
CONTRACT**

I N D E X
FOR
CONDITIONS OF CONTRACT

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3 CONDITIONS OF CONTRACTS

3.1 Security Deposit.

The Persons/Person whose tender may be accepted (hereinafter called the Contractor) shall , within 10 days of the receipt by him of the notice of the acceptance of his tender, deposit with the Project Engineer in cash or in Government securities, endorsed to the Project Engineer (if deposited for more than 12 months) a sum sufficient with the amount of the earnest money deposited by him with his tender to make up the full security deposit specified in the tender OR permit University at the time of making any payment to him for work done under the contract to deduct such sum as will (with the earnest money deposited by him) amount to * _____percent, of all money so payable, such deductions to be held by University by way of security deposit: PROVIDED ALWAYS that in the event of the contract or depositing a lump sum by way of security deposit as contemplated at above, then and in such case, if the sum so deposited shall not amount to ** _____percent of the total estimated cost of the work, it shall be lawful for University at the time of making any payment to the Contractor for work done under the contract to make up the full amount of _____percent by deducting a sufficient sum from every such payment as last aforesaid. All compensation or other sums of money payable by the Contractor to University under the terms of the contract may be deducted from, or paid by the sale of sufficient part of his security deposit or from the, interest arising there from, or from any sums which may be due to may become due by

* This will be the same percentage as that in the tender at 2.3 on page MM-1.

** The amount of this % (not exceeding 10% will be fixed as 8% and the security Deposit only amounts to 5% of the estimated cost of the work, then 3% should be deducted from every payment if the % is fixed at 10% and the Security Deposit only amounts to 6% should be deducted and so on.

University to the Contractor on any account whatsoever, and in the event of his security deposit being reduced by reason of any such deduction of sale as aforesaid, the Contractor shall, within ten days thereafter, make good in cash or Government securities endorsed as aforesaid any sum or sums which may have been deducted from, raised by sale of his security deposit or any part thereof. The security deposit referred to, when paid in cash may, at the cost of the depositor, be converted into interest-bearing securities provided that the depositor has expressly desired in writing.

3.1.1 Compensation for Delay

If the amount of the security deposit to be paid in a lump sum within the period specified above is not paid tender/contract already accepted shall be considered as cancelled and legal steps will be taken against the Contractor for recovery of the amounts.

The security deposit lodged by a Contractor (in cash or recovered in installments from his bills) shall be refunded to him after the expiry of six months from the date on which the work is completed. The Project Engineers, shall however, exercise his discretion to refund security deposit to the Contractor either after six months from the date of completion of work or later along with the final bill if it is prepared after that period on account of some unavoidable circumstances.

NOTE:

A work should be considered as completed for the purpose of refund of security deposit to a Contractor from the last date on which its final measurements are checked by a competent authority, if such check is necessary otherwise from the last date of recording the final measurements.

3.2 **Time of Completion**

The time allowed for carrying out the work as entered in the tender shall be strictly observed by the Contractor and shall be reckoned from the date on which the order to commence work is given to the Contractor. The work shall throughout the stipulated period of the contract be proceeded with all due diligence (time being deemed to be of the essence of the contract on the part of the Contractor) and the Contractor shall pay as compensation an amount equal to one per cent or such smaller amount as the Project Director (whose decision in written shall be final)may decide, of the amount of the estimated cost of the whole work as shown by the tender for every day that the work remains uncommenced , or unfinished, after the proper dates. And further to ensure good progress during the execution of the work, the Contractor shall be bound, in all cases in which the time allowed for any exceeds one month, to complete:

1/4 of the work in _____ of the time.

1/2 of the work in _____ of the time.

3/4 of the work in _____ of the time.

and abide by the program of detailed progress laid down by the Project Engineer.

In the event of the Contractor failing to comply with this condition he shall be liable to pay as communitation and mount equal to one per cent. or such smaller amount as the Project Director (whose decision in writing shall be final) may decide of the said estimated cost of the whole work for every day that the due quantity of work

remains incomplete; PROVIDED ALWAYS that the total amount of compensation to be paid under the provisions of this clause shall not exceed 10 percent of the estimated cost of the work as shown in the tender.

NOTE - 1.

The quantity of the work to be done within a particular time to be specified above shall be fixed and inserted in the blank space kept for the purpose by the Officer competent to accept the contracts after taking into consideration the circumstances of each case.

NOTE - 2.

For the purpose of determining stage-wise progress in this clause, it will be calculated on the actual expenditure incurred on the work at site which will include the payments made, cost of work not measured and the cost of materials brought to site and will not include the invisible expenditure including advances if any paid for labour and material, the overheads and administrative expenses etc.

3.3 Action When Whole of the Security Deposit is Forfeited:

In any case in which under any clause or clauses of this contract the Contractor shall have rendered himself liable to pay compensation amounting to the whole of his security deposit (whether paid in one sum or deducting by installment) or in the case of abandonment of the work owing to the serious illness or death of the Contractor or any other cause, the Project Engineer, on behalf of the Quaid-e-Awam University of Engineering, & Technology, Nawabshah, shall have power to adopt any of the following courses, as he may deem best suited to the interests of University.

- 3.3.1 To rescind the contract (of which rescission notice in writing to the contractor under the hand of the Project Engineer shall be conclusive evidence) and in that case the security deposit of the Contractor shall stand forfeited and absolutely at the disposal of University.
- 3.3.2 To employ labour paid by the University to carry out the work, or any part of the work, debiting the Contractor with the cost of the labour (as to the correctness of which cost and price the certificate of Project Engineer shall be final and conclusive against the Contractor) and crediting him with the value of the work done, in all respects in the same manner and at the same rates as if it had been carried out by the Contractor under the terms of his contract; and in that case the certificate of the Project Engineer as to the value of the work done shall be final and conclusive against the Contractor.
- 3.3.3 To measure up the work of the Contractor and to take such part thereof as shall be unexpected out of his hands, and to give it to another Contractor to complete it, in which case any expenses which may be incurred in excess of the sum which would have been paid to the original Contractor if the whole work had been executed by him (as to the amount of which excess expenses the certificates in writing of the

Project / Engineer shall be final and conclusive) shall be borne and paid by the original Contractor and shall be deducted from any money due to him by University under the contractor or otherwise or from his security deposit or the proceeds of sale thereof, or a sufficient part thereof.

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

3.4 **Action When the Progress of any Particular Position of the Work is Unsatisfactory:**

If the progress of any particular portion of the work is unsatisfactory, Project Engineer shall, notwithstanding that the general progress of the work is in accordance with the conditions mentioned in clause 3.2, be entitled to take action under clause 3.3.3 after giving the Contractor 10 days notice in writing. The Contractor will have no claim for compensation; for any loss sustained by him owing to such no claim for compensation, for any loss sustained by him owing to such action.

3.5 **Contractor Remains Liable To Pay Compensation If Action Not Taken Under Clause 3.3 and 3.4.**

Power To Take Possession Of Or Required Removal of or Sell Contractor's Plant

In any case in which any of the power conferred upon the project engineer by clause 3.3 and 3.4 hereof shall have become exercisable and the same shall not have been exercised the non-exercised thereof shall not constitute a waiver of any of the conditions hereof and such powers shall notwithstanding be exercisable in the event of any future case of default by the Contractor for which under any clause or clauses hereof he is declared liable to any compensation amounting if the whole of his security deposit and the liability of the Contractor for past and future compensation shall remain unaffected. In the event of the Project Engineer taking action under sub-clause (3.3.1) or (3.3.3) of clause 3.3, he may, if he so desires, take possession of all or any tools, plant, materials and stores in or upon the works, of the site thereof or belonging to the Contractor or procured by him and intended to be used for the execution of the work or any part thereof, paying or allowing for the same in account at the contract rate, or in the case of contract not being applicable, at current market rates, to be certified by the Project Engineer whose certificate thereof shall be final.

In the alternative, the Project Engineer may, after giving notice in writing to the Contractor or his clerk of the work foreman or other authorized agent, required him to remove such tools, plant materials, or stores from the premises within a time to be specified in such notice; and in the event of the Contractor is fault to comply with any such requisition, the Project Engineer may remove them 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, and the certificate of the project Engineer as to the expense of any such removal and the amount of the proceeds and expense of any such sale shall be final and conclusive against the Contractor.

3.6 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 unavoidable hindered in its execution or on any other ground, he shall apply in writing to the Project Engineer within 30 days from the date of which the execution of the work, was hindered as aforesaid or on which the ground for asking for extension arose and in any case before the date of completion of the work, and the Project Engineer may, if in his opinion, there are reasonable grounds for granting an extension, grant such extension as he thinks necessary or proper. The decision of the Project Engineer in this matter shall be final.

Provided that where the Contractor is hindered in the execution of the work on account of any act or omission on the part of the University or its authorized officers, the Project Engineer may at any time before the date of completion and on his own initiative extend the time for completion of the work for such period as he may think necessary or proper.

Where time has been extended under this or any other clause of this agreement the date for completion of the work shall be the date fixed by the order giving the extension or by the aggregate of all such orders, made under this agreement.

When time has been extended as aforesaid, it shall continue to be the essence of the contract and all clauses of the contract shall continue to be operative during the extended period.

3.7 Final Certificate

On completion of the work the Contractor shall be furnished with a certificate by the Project Engineer of such completion, but no such certificate shall be given shall the work be considered to be complete until the Contractor shall have removed from premises on which the work shall have been executed all scaffolding surplus materials and rubbish and shall have cleaned the site of work in and around the structures / works completed and shall have cleaned off the dirt from all woodwork, doors, windows, walls, floors, or other parts of any building in or upon which the work has been executed, or of which he may have had possession for the purpose of executing the work, nor until the work shall have been measured by the Project Engineers or where the measurements have been taken by his subordinate until they have received the approval of the Project Engineer, the said measurements being blinding and conclusive against the Contractor. If the Contractor shall fail to comply with the requirements of this clause as to the removal of scaffolding, surplus

materials and rubbish and shall have cleared the site of work in and around the structures/works completed and dispose of the same as he thinks fit and clean of such dirt as aforesaid; and the contracts shall have no claim in respect of any such scaffolding or surplus materials as aforesaid except for any such actually realized by the sale thereof.

**3.8 Payment Of Intermediate Certificate
To Be Regarded As Advance**

No payment shall be made for any work, estimated to cost less than rupees ten thousand till after the whole of the work shall have been completed and a certificate of completion given. But in the case of work estimated to cost more than rupees ten thousands, the Contractor shall on submitting bill therefore, as provided in Clause 3.10 be entitled to receive payment proportionate to the part of the work then approved and passed by the Project Engineer, whose certificate of such approval and passing of the sum so payable shall be final and conclusive against the Contractor. All such intermediate payments shall be regarded as payments by way of advance against the final payments only and not as payment for work actually done and completed, and shall not preclude the project Engineer from requiring any bad, unsound, imperfect or unskillful work to be removed or taken away and reconstructed, or re-erected, nor shall any such payment be considered as an admission of the due performance of the contract or any part thereof in any respect or the accruing of any claims; nor shall it conclude, determine, or affect in any other way the powers of the Project Engineer as to the final settlement and adjustment of the accounts or otherwise, or in any way vary or effect the contract. The final bill shall be submitted by the Contractor within one month of the date fixed for the completion of the work otherwise Project Engineer's certificate of the measurements and of the total amount payable for the work shall be final and binding on all parties.

**3.9 Payment at Reduced Rates of Account Of Item
of Work Not Accepted as Completed to be at
The Discretion of The Project Engineer**

The rates for several items of works estimated to cost more than Rs.1,000.00 agreed to within shall be valid only when the item concerned is accepted as having been completed fully in accordance with the sanctioned specifications. In cases where the items of work are not accepted as so completed the Project Engineer may make payment on account of such items at such reduced rates as he may consider reasonable in the preparation of final or on account bills.

3.10 Bills to be Submitted Monthly

A bill shall be submitted by the Contractor as frequently the progress of the work may justify for all the work executed and not included in any previous bill and the Engineer Incharge shall take or cause to be taken the requisite measurements for the purpose of having the same verified and the claims, as far as admissible, adjusted, if possible before the expiry of 21 days from the presentation of the bill at any time depute a subordinate to measure up the said work in the presence of the Contractor or

his authorized agent, whose counter signature to the measurement list will be sufficient warrant and the Project Engineer may prepare a bill from such list which shall be binding on the Contractor in all respects. In case the Contractor or his authorized agent is not present at the site of work at the time fixed for recording measurements, or being present, does not counter sign the measurement list, the measurements recorded by the Engineer incharge or his authorized subordinate shall be treated by the Engineer incharge or his authorized subordinate shall be treated as correct and binding on the Contractor unless the Contractor within seven days of date of recording such measurements submit to the Project Engineer a detailed letter pointing out the errors or omissions in the record measurements. In case of such disagreement, the Project Engineer shall held or cause to be hold the site investigations and give his decision. The decision of the project Engineer shall be final.

3.11 Bills To Be Printed On Forms

The Contractor shall submit all bills on his own printed forms. The bills shall be submitted to the Consultants in triplicate who will then scrutinize these bills and forward two copies to the Project Engineer and retain one copy in their office. The charges to be made in the bills shall always be entered at the rates specified in the tender or in the case of any extra work ordered in pursuance of these conditions, and not mentioned or provided for in the tender at the rates hereinafter provided for such work.

3.12 Store Supplied By University

If the specification or estimate of the work provides for the use of any special description of materials to be supplied from the store of the University or if it is required that the Contractor shall use certain stores to be provided by the Project Engineer such material and stores, and the prices to be charged therefore as hereinafter mentioned being so far as practicable for the convenience of the Contractor but not so as any way to control the meaning of effect of this contract specified in the schedule or memorandum hereto annexed, required from time to time to be used by him for the purpose of the contract only and the value of the full quantity of the materials and stores so supplied shall be sent off or deducted from any sums then due, or thereafter to become due to the Contractor under the contract, otherwise, or from the security deposits, or the proceed of sale thereof, if the security deposit as held in Government securities the same or a sufficient portion thereof shall in that case be sold for the absolute property of University and shall on no account remove from the site of the work, and shall at all times be open to inspection by the Project Engineer. Any such materials unused and in perfectly good condition at the time of completion or determination of the contracts shall be returned to the University Stores, if the Project Engineer so requires by a notice in writing under his hand, but the Contractor shall not be entitled to return any such materials except with the consent of the Project Engineer and he shall have no claim for compensation on account of any such material supplied to him as aforesaid but remaining unused by him or for, any, wastage in or damage to any such materials.

3.13 Works To Be Executed In Accordance With Specifications, Drawings, Orders Etc.

The Contractor shall execute the whole and every part of the work in the most substantial and workmanlike manner and both as regards materials and all other matters in strict accordance with the specifications lodged in the office of the Project Engineer and initialed by the parties, the said specification being a part of the contract. The contractor shall also conform exactly, fully and faithfully to the designs, drawings and instruction in writing relating to the work signed by the Project Engineer and lodged in his office and to which the Contractor shall be entitled to have access at such office or on the site of work for the purpose of inspection during office hours and the Contractor shall if he so requires, be entitled at his own expenses to make or cause to be made copies of the specifications, and of all such designs drawings and instructions as aforesaid.

3.14 Alterations In Specifications And Design, Not To Invalidate Contracts

The Project Engineer shall have power to make any alterations in, or additions to the original specifications, drawings, designs and instructions that may appear to him to be necessary or advisable during the progress of the work and the Contractor shall be bound to carry out of the work, in accordance with any instructions in this connection which may be given to him in writing by the Project Engineer and such alterations shall not invalidate the contract; and any altered or additional work which the Contractor may be directed to do in the manner above specified subject to the limit laid down in clause 3.37 below as part of the work shall be carried out by the Contractor on the same conditions in all respects on which he agreed to do the main work and at the same rate as re specified in the tender for the main work. The time for completion of the work shall be extended in the proportion that the additional work bears to the original contract work, and the certificate of the Project Engineer as to such proportion shall be conclusive. And if the altered or additional work includes any class of work for which no rate is specified in its contract, then such class of work shall be paid for at () percent below/above the rates shown for such work in the Government of Sind Schedule of rates 1980, as amended from time to time and if such last mentioned class of work is not entered in the Government of Sind Schedule of Rates 1980 as of the date of receipt by him of the order to carry out the work, inform the Project Engineer through the Consultants of the rate which it is his intention to charge for such class of work, and if the Project Engineer and the Consultants are satisfied with the rate analysis, then he shall allow him that rate, but if the Owner does not agree to this rate, he shall be notified in writing be at liberty to cancel his order to carry out such class of work, and arrange to carry it out in such manner as he may consider advisable, provided always that if the Contractor shall commence work or incur any expenditure in regard thereto before the rates shall have been determined as lastly hereinbefore mentioned then in such case he shall only be entitled to be paid in respect of the work carried out for expenditure incurred by him prior the work carried out for expenditure incurred by him prior to the date of the determination of the rate as aforesaid according to such rate or rates as shall be fined

by the Owner. In the event of a dispute, the decision of the Project Director will be final, conclusive and binding.

3.15 No Claim to Any Payment or Compensation For Alteration in or Restriction of Work

If at any time after the execution of the contract documents the Project Engineer shall for any reason whatsoever in the tender to be carried out at all or carried out in part by the Contractor, he shall give notice in writing of the fact to the Contractor, who shall thereupon have no claim to any payment of compensation whatsoever on account of any profit or advantage which he might have derived from the execution of the work in full but which he did not so derive in consequence of the full amount of the work not having been carried out, neither shall he have any claim for compensation by reason of any alterations, having been made in the original specifications, drawings, designs, and instruction, which may involve any curtailment of the work as original contemplated. Where materials have already been collected at site of the work before the receipt of the said notice to stop or curtail the work, the Contractor shall be paid for such materials at the rates determined by the Project Engineer provided they are not in excess of requirements and are of approved quality.

3.16 Time Limit For Unforeseen Claims

Under no circumstances whatsoever shall the contractor be entitled to any compensation from Authority on any account unless the Contractor shall have submitted a claim in writing to the Project Engineer within one month of the cause of such claim occurring. The Contractor shall give full details of such claim, indicating the part of the work is the subject matter of such claim, the reasons giving rise to the said claim and submit as far as possible, documentary evidence in support of the reasons and the calculations for such claim. The claim shall not be considered as valid or payable unless it has been scrutinized & accepted by the Consultant and Project Engineer & will become payable only to the extent upto which it has been accepted by the Project Director.

3.17 Action and Compensation in Case of Bad Work

If at any time before the security deposit is refunded to the Contractor, it shall appear to the Project Engineer or his subordinate-in-charge of the work, that any work has been executed with unsound, imperfect or unskilled workmanship or with materials of inferior quality, or that any materials or articles provided by him for the execution of the work are unsound, or of quality inferior to that contracted for, or are otherwise not in accordance with the contract, shall be lawful for the Project Engineer to intimate this fact in writing to the Contractor and then notwithstanding the fact that the work, materials or articles complained of any have been inadvertently passed, certified and paid for the Contractor shall be bound forthwith to rectify or remove and reconstruct the work so specified in whole or in part, as the case may require, or if so required shall remove the materials or articles, and provide other proper and suitable materials or articles at his own proper charge and cost; and in the event of his failing to do so within a period to be specified by the Project Engineer in the writing intimation aforesaid, the Contractor shall be liable to pay

compensation at the rate of one percent, on the amount of the estimate for every day not exceeding ten days, during which the failure so continues, and in the case of any such failure the Project Engineer may rectify or remove, and re-execute the work or remove and replace the materials or articles complained of as the case may be as the risk and expense in all respects of the Contractor. Should the Project Engineer consider that any such inferior work or materials as described above may be accepted or made use of it shall be within the discretion to accept the same at such reduced rates as he may fix thereof.

**3.18 Work To Be Open To Inspection
Contractor Or Responsible Agent To Be Present**

All works 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 Project Engineer or his subordinates, and the Contractor shall all times during the usual working hours, and at all other times at which reasonable notice of the intention of the Project Engineer or his subordinate to visit the work shall have been given to the Contractor, either himself be present to receive orders and instructions, or have responsible agent duly accredited in writing present for that purpose. Orders given to the Contractor's duly authorized agent shall be considered to have the same force and effect as if they had been given to the Contractor himself.

3.19 Notice To Be Given Before Work Is Covered Up

The Contractor shall give not less than five days notice in writing to the Project Engineer or his subordinate-in-charge of the work before covering up or otherwise placing beyond the reach of check, inspection & measurement any work in order that the same may be verified, checked, inspected and measured, and correct dimensions thereof taken before the same is so covered up or planned beyond the reach of verification check, inspection & measurement, and shall not cover up or place beyond the reach of verification, check, inspection and measurement any work without the consent in writing of the Project Engineer or his subordinate-in-charge of the work, and if any work shall be covered up or placed beyond the reach of verification, check, inspection & measurement any work without the consent in writing of the Project Engineer or his subordinates incharge of the work, and if any work shall be covered up or placed beyond the reach of verification, check inspection & measurement without such notice having been given to consent obtained, the same shall be uncovered at the Contractor's expense, and in default thereof no payment or allowance shall be made for such work, or for the materials with which the same was executed.

3.20 Contractor Liable For Damage Done And For Imperfections For Three Months After Certificate

If the Contractor or his workmen, or servants shall break, deface, injure or destroy any part of a building in which they may be working, or any building, road, fence, enclosure or overhead or underground service lines of water supply, sewerage, electricity, telephone, gas etc. or grass land or cultivated ground continuous to the premises on which the work or any part thereof is being executed, or if any damage shall be done to the work, while it is in progress from any cause whatever or if any part thereof in being executed, or if any damage shall be done to the work, while it is in progress from any cause whatever or if any imperfections become apparent in it within three months of the grant of a certificate of completion, final or otherwise, by the Project Engineer, the Contractor shall make good the same his own expense, or in default the Project Engineer may cause the same to be made good by other workmen, and deduct the expenses of (which the certificate of the Project Engineer shall be final) from any sums that may then be due or may thereafter become due to the Contractor, or from his security deposits or the proceeds of sale thereof, or of a sufficient portion thereof or any of his dues available against other works with the University or as arrears of land revenue in case no dues are available or the amount available falls short of the total recoveries.

3.21 Contractor to Supply Plant Ladders, Scaffolding etc. And Is Liable For Damages Arising on Provision of lights, fencing etc.

The Contractor shall supply at his own cost all materials (except such special materials; if any, as may, in accordance with the contract, be supplied from the University Stores), plant, tools, appliances, implement, ladders, cordage, tackle, scaffolding and temporary work requisite or proper for the execution of the work, whether in the original, altered or substituted form, and whether included in the specification, or other documents, forming part of the contract or referred to in these conditions or not, and which may be necessary for the purpose of satisfying or complying with the requirements of the Project Engineer as to any matters as to which under these conditions he is entitled to be satisfied or which he is entitled to require together with carriage therefore to and from the work. The Contractor shall also supply without charge the requisite number of persons with the means and materials necessary for the purpose of setting out works, and counting, weighing and assisting in the measurement or examination at any time and from time to time of the work or the materials. Failing this the same may be provided by the Project Engineer at the expense of the Contractor and the expenses may be deducted from any money due to the Contractor under the contract, or from his security deposit or the proceeds of sale thereof, or of a sufficient portion thereof. The Contractor shall provide all necessary fencing and lights required to protect the public from accident, and shall also be bound to bear the expenses of defense of every suit, action or other legal proceedings, that may be brought by any person for injury sustained owing to neglect of the above precautions, and to pay any damages and costs which maybe awarded in any such, suit action or proceeding to any such person, or which may with the consent of the Contractor be paid for comprising any claim by any such person.

3.22 Measure For Prevention of Fire

The Contractor shall not set fire to any standing jungle, tees, bush-wood or grass without a written permit from the Project Engineer.

When such permit is given, and also all cases when destroying out or dug un-threes, brushwood, grass etc., by fire, the Contractor shall take necessary measures to prevent such fire spreading to otherwise damaging surrounding property.

The Contractor shall make his own arrangements at his cost and expense for providing drinking water and water for domestic use of his labour employed in connection with the execution of the works as also for the use of his labour employed in connection with the execution of the works as also for use on the works itself. However, in case the Contractor is not able to make his own arrangements for water, the same could at the discretion of the Project Engineer be supplied by the owner in which case the recovery against the water charges at 2% of the cost of these items of work on which the water is used in the construction shall be made from the bills of the Contractor.

3.23 Liability of Contractor for Any Damage Done in or Outside Work Area

Compensation for all damage done intentionally or unintentionally by Contractor's labour whether in or beyond the limits of University property including any damage, caused by the spreading of fire mentioned in clause 3.22 shall be estimated by the Project Engineer or such other officer as he may appoint and the estimates of the Project Engineer shall be final and the Contractor shall be bound to pay the amount of the assessed compensation on demand failing which the same will be recovered from the Contractor as damages in the manner prescribed in clause 1 or deducted by the Project Engineer from any sums that may be due or become due from University of the Contractor under this contract or otherwise.

The Contractor shall bear the expenses of defending any action or other legal proceedings that maybe brought by any person, party or authority for injury sustained by him owing to neglect of precaution to prevent the spread of fire and he shall pay any damages and cost that may be awarded by the court in consequence.

3.24 Employment Of Female Labour

The employment of female labours on works in the neighborhood of soldiers' barracks should be avoided as for as possible.

3.25 Work On Sunday

No work shall be done on a Sunday or a public holiday without the prior sanction in writing of the Project Engineer.

3.26 Work Not Be Sublet, Contractor May Be Rescinded & Security Deposit Forfeited For Subletting It Without Approval

The Contractor shall not be assigned or sub-let without the written approval of the Project Engineer. And if the Contractor shall assign or sublet his contract, or attempt to do, or become insolvent or make any composition with his creditors or attempt to do, the Project Engineer may, by notice in writing rescind the contract. The Contractor shall keep full and true accounts in respect of the contract works in the regular course of business and shall whenever called upon by the Project Engineer by notice in writing, produce them for inspection by him or by any officer appointed by him in that behalf. Also if any bribe, gratuity, gifts, loan, reward or advantage pecuniary or otherwise, shall either directly or indirectly be given, promised or offered by the Contractor or any of his servants or agents to any public officer or person in the employment of University in any way relating to his office or employment or if any such officer or person shall become in any way directly or indirectly interested in the contract or if the Contractor does not keep account or fails to produce them as aforesaid, the Project Engineer may be notice in writing rescind the contract. In the event of a Contract being rescinded the security deposit of the Contractor shall thereupon stand forfeited and be absolutely at the disposal of University and the same consequences shall ensure as if the contract had been rescind under clause 3.3 hereof and in addition the Contractor shall not be entitled to recover or be paid for any work therefore actually performed under the contract.

3.27 Sum Payable By Way Of Compensation To Be Considered As Reasonable Compensation Without Reference To Actual Loss.

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

3.28 Changes In The Constitution of Firm To Be Notified

In the cases of a tender by partners any change in the constitution of a firm shall be forthwith notified by the Contractor to the Project Engineer for his information.

3.29 Work To Be Under Direction Of Consultant And Project Engineer

All works to be executed under the contract shall be executed under the direction and subject to the approval in all respects of the consultant and Project Engineer for the time being, 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 on.

3.30 Decision Of Project Director To Be Final

Except where otherwise specified in the contract and subject to the powers delegated to him by authority under the Code rules then in force, the decision of the Project Director shall be final, conclusive, and binding on all parties to the contract upon all questions relating to the meaning of the specifications, design, drawings, and instructions hereinbefore mentioned and as to the quality of workmanship, or materials used on the work, or as to any other question claim, right, matter or the thing whatsoever in any way arising out of, or relating to the contract, design, drawings, specifications, estimates, instructions, orders or these conditions, or otherwise considering the works, or the execution, or failure to execute the same, whether arising, during the progress or the work, or after the completion or abandonment thereof.

3.31 Lump Sum In Estimates

When the estimate on which a tender is based includes one or more items with lump sum rates or lump sum amount the Contractor shall be entitled to payment in respect of such items on the rates entered in this contract with the detailed specifications and the analysis of the rates on which the contract price is calculated. Where part of the work is done or the specifications are altered the Contractor will submit his own rate and payment shall be controlled in the same way as if the item of work was done outside the current Government Schedule of Rates applicable in the case in accordance with the procedure laid down in Clause 3.14.

Provided always that in case of the percent Rate tenders, no premium as quoted for the main tender as also that quoted in Clause 3.14 (which will be the same premium as for the main tender) shall be payable for any items of work including the lump sum items or market rates which are outside the Current Government Schedule of Rates.

3.32 Action Where No Specification

In the case of any class of work for which there is no such specification as is mentioned in Rule I such work shall be carried out in accordance with the Sind P.W.D. specifications and in the event of there being no Sind P.W.D. specification, then in such case the work shall be carried out in all respects in accordance with the instructions and requirements of the Project Engineer. The payment for such items of work shall be made in accordance with the procedure laid down in Clause 3.14 for items of work outside the Current Government Schedule of Rates.

3.33 Definition Of Work

The expression “ Works “ or “ Work “ where used in these conditions shall, unless there be something in the subject of context repugnant to such construction be construed to mean the work or works contracted to be executed under or in virtue of the contract, whether temporary or permanent and whether original altered, substituted or additional.

3.34 Contractors Percentage Whether Applied To Net Or Gross Amount Of Bill

The percentage referred to in the tender shall be deducted from/added to the gross amount of the bill before deduction the value of any stock issued.

3.35 Refund Of Quarry Fees And Royalties

All quarry fees, royalties, octroi, dues, ground rents, local and Government taxes and Rates etc. relating directly or indirectly to the execution of the works under this contract shall be paid by the contractor as a final charge and no refund on this account shall be allowed by the University.

3.36 Compensation Under The Workmen's Compensation act.

The Contractor shall be responsible for and shall pay any compensation Act, 1923 (VIII of 1923), (hereinafter called the said Act) as amended upto date for injuries caused to the workmen. If such compensation is paid by University as principal under sub-section (1) of section 12 of the said Act on behalf of the Contractor; it shall be recoverable by University from the Contractor under sub-section (2) of the said section such, compensation shall be recovered in the manner laid down in Clause above. The contractor shall also discharge all other liabilities in relation to the current Government or local legislation with respect to the Labour Laws and other Fringe benefits like Health and Insurance cover, Old Age Benefits etc. for all his labour including the administrative and supervisory staff.

3.37 Claim For Quantities as Per Scope Of Work Shown On Drawings

The quantities of different items of work shown in the schedule B attached to this tender are only approximate. The actual quantities of different items as done at Site will be controlled by the detailed drawings and the actual requirements at site of work. No claim whatsoever will be entertained on account of excess or reduction in the scope of work as shown on the drawings.

- 3.37.1 Where due to the change of specification or scope or work or due to additions in size and quantum of the work the total cost of the work increases upto 30% at the cost as shown in the MEMORANDUM Excluding those case there the total cost the increased due to any claim of the contractor or the osculation in the rates/cost subject to its sanction) the Contractor shall be bound to carry out the same at the same rates and under the same conditions as for the same at the same rates and under the same conditions as for the main tender. In case where the total cost is likely to increase beyond 30% of the amount shown in the MEMORANDUM it will be optional for the Contractor to decline to take up the additional work provided always that no work shall be left in incomplete or in unfinished shape irrespective of the total cost of the work. Where, however, the Contractor agrees to take up the additional work, there shall be no financial limit to it and that the entire work shall be done at the same rates and under the same terms and conditions as the main tender.

3.38 Employment Of Feminine Labour

The Contractor shall employ any feminine, convict or other labour of a particular kind of class if ordered in writing to do so by the Project Engineer.

3.39 Claim For Compensation For Delay In The Execution of Work

No compensation shall be allowed for any delay caused in the starting of the work on account of acquisition of land or, in the case of clearance works on account of any delay in accordance with the sanction to estimates.

3.40 No compensation shall be allowed for any delay in the execution of the work on account of water standing in burrow pits or compartments or on the land or the approach road etc. The rates are inclusive of hard or cracked soil, excavation mud, subsoil water or water standing in burrow pits and no claim for an extra rate shall be entertained, unless otherwise expressly specified.

3.41 Entering Upon or Commencing Any Portion of Work

The Contractor shall not enter upon or commence any portion of work except with the written authority and instructions of the Project Engineer or of his subordinate-in-charge of the work. Failing such authority the contractor shall have no claim to ask for measurements of or payment for work.

3.42 Minimum Age of Persons Employed, The Employment of Donkeys or Other Animals

- (i) No contractor shall employ any person who is under the age of 12 years.
- (ii) No contractor shall employ donkeys or other animals with breaching of string or thin rope. The breaching must be at least thread should be of tape (Nawar).
- (iii) No animal suffering from sores, lemons or emaciation or which is immature shall be employed on the work.
- (iv) The Contractor shall not employ any labour who has any contagious disease or is a habitual narcotic user or is so sick and unfit for manual labour as to create a hazard for his health or life.
- (v) The Project Engineer or his Agent is authorized to remove from the work any person or animal found working which does not satisfy these conditions and no responsibility shall be accepted by the University for any delay caused in the completion of the work by such removal.

Any Contractor who does not accept these conditions shall not be allowed to tender for works and his name shall be removed from the list of Contractors.

3.43 Pakistan Timber To Be Used

As far as possible Pakistan Timbers shall be used and where for any reason this is not practicable preference shall be given to imported timber of approved origin and quality.

3.44 Certificate For Concessionaire Freight of Charges From The Railway

If any materials are required to be conveyed by rail, the Contractors will be granted certificates by the Project Engineer to the effect that the materials are required for University works thereby enabling them to have the benefit as allowed under the rules from the railway. In case, however, such a concession is withdrawn by the railway at any time, no claim shall be made against University on this account.

3.45 Recovery of Dues from Contractor As Arrears of Land Revenue

Any sum due to the University by the Contractor shall be liable for recovery as arrears of Land Revenue.

3.46 Partnership of M.L.As is Forbidden

The Contractor shall certify that no member of Legislative Assembly is in partnership with him and that University will have the right to terminate the contract at any stage if it is discovered that a member of Legislative Assembly or Parliament is a partner in the Contract.

3.47 Payment of Taxes

The contractor firmly holds himself responsible to get himself registered under Income Tax and Sales Tax Rules and to pay these and all other Government and local taxes due to him from time to time in accordance with the Government instructions.

3.48 Interest or Share of University Servant in The Work

The Contractor shall certify that no University Servant, Government servants or a servant of a Corporate Body directly controlled by the Government has directly or indirectly any share or interest in this work.

3.49 The Contractor will not be allowed to withdraw his tender and ask for the return of earnest money before expiry of the period of three months, commencing from the date of opening of the tender and that if it is withdrawn in violation of this condition earnest money shall be forfeited.

3.50 Notwithstanding anything contained in any clause of this contract and further notwithstanding the fact that the final completion Certificate has been awarded to the Contractor and his 50% Security deposit refunded, the liability of the Contractor for the purpose of “ Defect Liability” shall extend for the period of 12 months from the date of issue of the completion Certificate for removal including replacement of any defect found in the works due to construction or any other cause directly attributed to and a result of defective work or negligence in carrying out the work. The remaining 50% security deposit will be refunded after 12 months after removal of defects, if any.

3.51 The Contractor shall employ at his cost at the site of work for effective planning, supervision and control of the work, adequate, full time Engineering staff and trained and experience licensed electricians and mechanics of respective trade in addition to the usual team of following scales:

Work costing upto Rs.15.0 lacs : A Diploma holder.

Work costing over Rs.15.0 Lacs : A Professional Engineer Registered with Pakistan Engineering Council.

Such persons work on the job shall be deemed to the authorized agents at site of the Contractor and shall receive all orders and instructions of the Project Engineer / Consultants or their authorized representatives and shall also be responsible to maintain a work-order book and other registers at Site and shall forth with take actions to carry out the orders and instructions.

3.52 If any question, difference or objection whatsoever shall arise in any way contracted with or arising out of this instrument or the meaning or objections of any part thereof, the rights, duties or liabilities of either party, then save in so far as the decision of any such matter is hereinbefore provide for as has been so decided, every such matter including whether its decisions has been otherwise provided for and or regards the right of and obligations of the parties as the result of such termination shall be referred for arbitration to such person or a board with the mutual consent of the Project Engineer and the Contractor and his decision shall be final and binding and where the matter involves a claim for or the payment recovery or deduction of money, only the amount, if any awarded in such arbitration shall be payable or recoverable in respect of the matter so referred.

3.53 Force Majeure

The parties shall not be considered to be at default in the execution of their contractual obligations or any of them to the extent that the execution of such obligations or any of them is delayed or omitted by cause of force Majeure. Each part will advise the other party by written notice within 30 days of the occurrence of any such case of force Majeure employed therein shall mean acts of the Public enemy wars (whether declared or not) hostilities, reevaluations, civil disturbances, epidemics, fires, floods, earth quakes, weather causes of similarly nature which

render the performance of this agreement unfeasible and in spite of the exercise is unable to over come.

- 3.54** The Mobilization advance will be paid at the rate of 15% of the tendered cost to the contractor, without interest. This advance will be paid to the contractor against Insurance Guarantee registered with Pakistan Insurance Corp. duly recommended by the consultants & approved by the University Authorities. The Insurance guarantee shall cover the entire period till full amount of mobilization advance is recovered. This advance shall be recoverable in four equal installments starting from the contractor's second progressive bill.
- 3.55** "This price of _____(name of item as on _____(date of receipt of tenders) fixed by the _____(name of authority/manufacture) is Rs._____ per_____ should there by any change in the above price by the manufacturer during the currency of the contract, the difference will be payable to or, as the case may be, recoverable from the contract. The effect of the revision of the prices will be confined only to the quantity of the items which is actually consumed after the date of such revision".
- 3.56** The electric and water connection will be provided at one point respectively near the site of work. The Contractor will be responsible for further distribution where ever required including making complete arrangements for shortage of water. The cost of electric energy consumed as per prevailing tariff including service charges of WAPDA will be paid by the contractor. The cost of water consumed in the work will be recovered from the bills of the contractor at 2% (two percent) of the cost of these items of works on which water is used.

CONTRACTOR

PROJECT ENGINEER

CONSULTANTS

Certified that the Tender/Agreement has been prepared/executed under the supervision and we are satisfied that it has been correctly prepared/executed.

I N D E X
FOR
SPECIAL CONDITIONS OF CONTRACT

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4. SPECIAL CONDITIONS OF CONTRACT

4.1 Intent of Special Conditions of Contract and the Specifications

- 4.1.1 It is intended that the Tender documents including special conditions. Specifications, drawings and the Tender form shall form part of each equipment, material and work contract between the Employer and the successful tenderer.
- 4.1.2 In the event of any conflicts and contradictions in different sections of the Tender Documents the decisions of the consultant in respect of interpretation will be final.

4.2 Priorities

- 4.2.1 The priorities for completion of different works or part of works shall be assigned by the consultant if necessary and the contractor shall abide by all such directions without any claim for compensation in any shape and due reason whatsoever.

4.3 Progress of work

- 4.3.1 The contractor shall invariably submit to the consultant three copies of the monthly progress report regarding the works as per requirements of the consultant who reserves the right compliance. The consultant reserves the right to withhold certification of the contractor's payment till the contractor complies with this provision of the contract. This action of the Consultant shall not make the owner liable to ably loss or damage that the contractor may suffer due to non-payments as a result of non-compliance of this provision. Necessary instance by the contractor shall be given to the owner's site staff as and when an assessment of these progress reports has to be made by the owner.
- 4.3.2 During the period of shop fabrication, equipment suppliers shall submit monthly shop progress reports on formats as approved by the consultant.
- 4.3.3 When installation work commences at the site, the consultant shall provide the contractor with a standard report format which shall be filled in each month and submitted by the contractor to indicate the progress of construction and to serve a basis for making progress payments to the contractor. The progress indicated on the report each month shall be mutually agreed upon by the contractor and the consultant at the site before progress payments.
- 4.3.4 The Contractor shall further submit. as part of the monthly construction progress report described above, an anticipated progress schedule indicating his best estimate of the installation work to be performed during the ensuring three month period.

4.3.5 Commencing after the first month of construction and continuing every month till completion, the contractor shall have photograph taken, where directed by the consultant to show progress of his work, and shall submit 3 copies of the same along with the monthly progress report.

4.3.6 All progress reports and photographs shall be mailed, or submitted not later than the 15th of the month for the period covering the previous month.

4.4 Measuring Instrument

4.4.1 The contractor shall acquire and maintain on site various required measuring instruments in perfect working condition to enable the representative of the owner to check the quality and standard of all material and performance of equipments.

4.5 Site office

4.5.1 Site office with water borne sanitary facilities shall be erected and contractor shall remove the structure unless requested otherwise by the owner and clear the site without any claim for compensation.

4.6 Notice Board

4.6.1 The contractor shall provide a notice Board of dimensions not exceeding 3m x 2m in a position to be approved by the consultant. The contractor shall paint the consultants name and the name of the owner.

4.7 Release of Earnest Money

4.7.1 The Earnest Money of the unsuccessful tenders shall be released after:

4.7.1.1 The award of the contract to all the tenders rejected after such rejection. OR

After 60 days of the opening of tenders whichever is the earliest.

4.7.2 The Earnest Money of the successful tenderer shall be released after he provides the performance bond and the contract agreement is signed.

4.8 Utility Lines

4.8.1 The contractor shall conduct his operations, make necessary arrangements, take suitable precaution and perform all required work incident to the protection of and evidence of interference with power, transmission, telegraph, telephone and natural gas lines and other utilities within the areas of his operation in connection with this contract and the cost therefore shall be borne by the contractor and the cost therefore shall less and indemnify the owner and expenses whatsoever arising out of or in relation to any interference.

4.9 Secured Advance Against Non-perishable Material Brought at Site

- 4.9.1 The secured advance against non-perishable material brought at site by the contractor shall be made at not more than 50% of the price set in the contract for the material.
- 4.9.2 Secured advances shall be claimed after delivery of material on site, for which purpose the contractor shall submit claims giving complete details of the type, form, quality & quantity of the material delivered at site when required by the owner, afford all possible facility to check and measure the material delivered. Secured advance shall only be made for material to be used solely in the execution of the said works at the direction of the consultant and as per the contract.
- 4.9.3 The contractor shall make all necessary and adequate arrangements for the proper watch, safe custody and protection against all risks of the said materials and until used in construction as aforesaid the said material shall remain at the site of the said works in the contractor custody and on his own responsibility and shall any person authorized by them. In the event of any of the said materials being destroyed, stolen or damaged or being deteriorated in a greater degree than as due to reasonable use and wear thereof the contractor will forthwith repair and make good the same as required by the consultants.
- 4.9.4 Secured advance made for material delivered at site shall be treated as advance payments, and shall have acceptance of the material by the owner, who shall have the right, if the material is found defective or substandard, to ask the contractor to replace the same with good quality material and the contractor shall then be required to have the same replaced with material acceptable to the consultant within 5 days of the order having been issued.

4.10 Co-Ordination with other Contractors

- 4.10.1 The contractor shall have full co-ordination with other contractor such as civil contractor Mechanical or Lifts/Elevators and other specialist contractors. The contractor shall keep them informed about the stages of work and its schedule so that the other contractors may adjust their program accordingly.

4.11 Documents and Drawings by the Contractor

- 4.11.1 In addition to clause 7 of section 3 the following shall be applicable.
- 4.11.2 The Contractor shall submit to the Consultant for approval such documents, drawings, samples, patterns and models as are specified in the relevant clauses of the contract documents and any other documents as may be called for there in or as at Consultant may require. Within a reasonable period after receiving snuff drawings, samples, patterns and models the Consultant shall give his approval or otherwise. Copies of all drawings which require to be approved by the Consultant shall be provided in duplicate by the Contractor. The Contractor shall supply additional copies of approved drawings in accordance with the details set out in the specifications. Approval of any drawing does not absolve the Contractor of his responsibilities under the Agreement. Installation work shall not be allowed to commence unless the approved working drawings are in possession of the contractor.

- 4.11.3 The Contractor shall submit for approval to the consultant working drawings for all phases of the Electrical work and any other work related thereto and included in the contractor's scope of work or other works specified elsewhere in the specifications.
- 4.11.4 Two copies of each working drawing shall be submitted initially for approval. The consultant shall check the same and return one copy to the contractor as disapproved with comments. The contractor shall then revise the working drawing and resubmit 5 additional copies of the drawing for stepping of formal approval by the consultant and distribution to the various references.
- 4.11.5 Drawings approved as described above shall not be departed from except as provided in clause 46, section 3 (Variation).
- 4.11.6 The Consultant shall have the right at all reasonable times to inspect the site or the premises of the Contractor all drawings or any portion of the works.
- 4.11.7 Any expenses resulting from error, mistake or omission or from delay in delivery of the drawings and information mentioned in sub-clause (d) of this clause shall be borne by the Contractor.
- 4.11.8 Each working drawing submitted by the Contractor shall include a certificate by the contractor that all related conditions on site relevant to that particular installation have been checked and that no conflict exists.
- 4.11.9 All working drawings etc. shall be submitted to the Consultant sufficiently in advance of actual requirements to allow ample time for checking and approval and no claim for extension of the contract time to submit the drawings in time.
- 4.11.10 The approval by the consultant for any submitted data, working drawings, performance curves, test certificate for any items, arrangements and/or layout shall not relieve the contractor from any responsibility regarding the performance of the contractor. Such approval shall not also relieve the contractor from responsibility of any error in the submitted data and working drawings, brought to light at any time subsequent to any approvals.

4.12 Responsibility for Accuracy of Information

- 4.12.1 The contractor shall be fully responsible for the accuracy of all information necessary for successful and timely completion of the works.
- 4.12.2 The contractor shall be responsible to make all measurements and set out all the necessary dimensions and for their correctness.
- 4.12.3 The contractor shall be fully responsible for ascertaining the accuracy of the dimensions and other information given in the tender documents before carrying of the work. The contractor shall provide the complementary dimensions and communicate the same to the consultants.

- 4.12.4 It shall be responsibility of the contractor to acquire all necessary information and ascertain its accuracy for co.-ordination of the works with works of the other contractors.

4.13 Co-ordination between the Contractor, the Owner and other Contractors

- 4.13.1 The contractor shall himself be responsible for coordination of his work with the owner, other contractors and the consultants.
- 4.13.2 It is recognized that certain works necessary for the completion of the contractor's obligations under this contract shall be carried out by other contractors. For such purposes necessary instructions have already been issued to the other contractors. It possibility to bring to the notice of the consultant prior to the commencement of such work or in part thereof if the same has been omitted to be mentioned in the instructions issued to the other contractors have not been complied with. for the purpose of this clause, one copy of all drawings issued to the other contractors shall be made available to the Contractor.
- 4.13.3 The Contractor shall submit to the Consultant 3 sets of drawings showing all major holes, cavities, embedded frames and other parts of the plant to be embedded in the floor, ceiling and walls, channels in the floors, cable trenches, cement pipes or other major conduits, which are needed for the successful and timely completion of the works. The Consultant after ascertaining the accuracy of these drawings, shall return 1 (one) set of the drawings to the Contractor, within 14 days of the receipt of these drawings.
- 4.13.4 The Contractor shall also show, on the set of drawings mentioned in sub-clause (d) of this clause, the parts of the plant which are to be coordinated with the other works (specially the Electrical and sanitation layouts).

4.14 Final Installation Drawings

- 4.14.1 The contractor shall deliver to the Employer complete installation drawings of the works before or at the most one month after the final inspection. The obligations of the Contractor in respect of the scope and requirements for preparation of the final drawings shall be as set out in this section and/or the specifications.

4.15 Documents Distribution

- 4.15.1 The number, type and distribution of documents shall be as directed by the consultant.
- 4.15.2 Whenever applicable all documents shall be posted via air Mail, Cables shall be confirmed immediately by a mail counterpart, (Air Mail counterpart, whenever applicable). All letters shall be numbered using a numbering system as instructed and approved by the Consultants.

4.16 Guarantees for Plant

- 4.16.1 The Contractor shall guarantee that the material and workmanship incorporated into the work are new and the best of their respective kinds of the service intended and that all items will be free from inherent defect in design, workmanship and materials, and that all equipment in its several parts will operate successfully at all capacities up to and including the maximum specified load without undue noise, heating, straining of parts, wear and vibration and that an ample factor of safety is included in every design.
- 4.16.2 Contractor's equipment warranties if they exceed the period of the Contract guarantees as defined in these Documents, shall be transferred to the Employer at the end of the Contract guarantee period.
- 4.16.3 Guarantee, when required by the specification, shall be furnished by the Contractor upon forms approved by Consultant and shall be signed by both the contractor and the sub-contractors whose work is involved.
- 4.16.4 The Contractor's liability shall be limited to the replacement of defective part that may develop in the equipment or material of his own work or manufacture of these or his sub-contractors under proper use and arising solely from faulty design, material, or workmanship provided always that such defective parts are not repairable at the site, and are not essential in the meantime for use of the equipment, are promptly returned to the Contractor's / sub-contractor's factory unless otherwise arranged.
- 4.16.5 All replacement shall be made free of cost at the site by the Contractor and the return of defective parts to the Contractor's or sub-contractor's factory shall be contractor's responsibility and shall be at his expense. The owner will however, render such assistance as necessary to expedite the same. In the case of defective parts not repairable at the site but essential in the meantime for the commercial use of the equipment the contractor shall replace free at the site the said defective parts before the defective parts are removed from the site.
- 4.16.6 If it becomes necessary for the contractor to replace or renew any defective portions of the plant under this clause the provisions of this clause will apply to the expiration of six months from the date of such replacement or until the end of the guarantee period, whichever shall be later. If any defects are not remedied within a reasonable time, the Owner may proceed with the work at the Contractor's risk and expense without prejudice to any other rights which the Owner may have against the Contractor in respect to such defects.
- 4.16.7 If the replacement or renewals are of such a character as may effect the efficiency of the plant, the Consultants shall have right to give to the Contractor within one month of such replacement or renewal, notice in such tests shall be carried as provided in these documents. Should such tests show that the guarantee of the Contract is sustained; the costs of the tests shall be borne by the Owner. Should the guarantees not be sustained, the cost of the test shall be borne by the Contractor.

4.17 Period and Extension of Guarantees

- 4.17.1 The period of guarantee on all equipment, material and workmanship shall be one year starting from the date of formal acceptance by the Owner.
- 4.17.2 If during the guarantee period the services of the Contractor's personnel are required for the rectification or replacement of any defective part or work due to defective material, design or workmanship, such services shall be made by the Contractor without charge to the owner.
- 4.17.3 The Contractor shall guarantee all plant furnished by him under this contract against all defects in design, workmanship and materials for the guarantee period subsequent to the Date of Acceptance.
- 4.17.4 Should such plant during the above guarantee period be found to be defective for the reasons stated above, the contractor shall promptly repair or remove and replace such equipment without cost to the Owner. The equipment so repaired or replaced shall be in conformity with the Specifications.
- 4.17.5 If after due notice the Contractor fails, within 15 days from the receipt of such a notice, to take prompt and adequate steps in order to repair or replace the defective part the Owner may arrange for such repair or replacement, the cost of which will be reimbursed fully by the Contractor.
- 4.17.6 The equipment to be substituted in the frame of this guarantee will remain the property of the Contractor till acceptance.
- 4.17.7 The contractor's guarantee does not cover the normal wear and tear.

4.18 Responsibility of Contractor

- 4.18.1 The Contractor shall be responsible for all equipment and material until they are erected or installed in satisfactory condition and accepted by the employer in writing, including the period of maintenance, providing the said "Taking Over" is not necessitated by the Contractor's negligence or nonperformance.
- 4.18.2 The Contractor shall be responsible for correctness of position, levels and dimensions of the work according to the drawings notwithstanding that he may have been assisted by the Consultants in setting out the same.
- 4.18.3 It is the intent of the Specification to provide for the furnishing, delivery, erection and testing of the equipment and material specifically noted, shown or called for. The omission of specific reference to any item of work that is reasonably necessary for the proper functioning of the equipment will not relieve the contractor of the responsibility to furnish all equipment, materials, transportation, and / or labor required for a completed installation.
- 4.18.4 The Contract Documents are assumed to be correct, but complete accuracy is not guaranteed. Any error or ambiguity must be reported to the Consultant before starting

the work affected. In the event of any dispute arising as to the true intended meaning of the same and his interpretation shall be accepted as final and binding upon all parties concerned.

4.19 Meeting on Site

4.19.1 Meeting on the site will be held on the notice of the Consultant. The Contractor's representative and site supervisor shall take part in these meetings.

4.20 Cleaning and Clearance

4.20.1 The Contractor shall be responsible for cleaning and clearing of all debris produced by the installations of the works. He shall also be responsible for general cleaning and clearing of the Plant Room and Air Washer rooms.

4.21 Transport Facilities Provided

4.21.1 Unless otherwise specified in other sections of the tender documents and/or the Contract Agreement, no transport facilities are to be provided to the Contractor.

4.22 Water Removal

4.22.1 The cost of water removal in the case of water collection and / or inundation, caused to the negligence or fault of the representatives, workmen or employees of the Contractor will be borne by the Contractor.

4.23 Supply of Potable Water

4.23.1 The Contractor shall provide on the site and adequate supply of drinking and other water for the use of the Contractor's staff and working peoples and for use in construction. A suitable source of water shall however be made available to the contractor.

4.24 Inspection & Testing during Manufacture

4.24.1 The Consultant shall be entitled at all responsible times during manufacture to inspect, examine and test on the Contractor's premises the materials and workmanship of all plant to be supplied under the Contract, and if part of the said plant is being manufactured on other premises the contractor shall obtain consultant's permission to inspect, examine and test as premises. Such inspections, examination or testing if made shall not release the Contractor from any obligation under the Contract.

4.24.2 The Contractor shall give the Consultant reasonable notice in writing of the date on and the place at which the plant will be ready for testing as provided in the Contract and unless the Consultant shall attend the place so named within 10 days of the date which the Contractor has stated in his notice the Contractor may proceed with the sated in his notice the Contractor may proceed with the tests, which shall be deemed

to have been made in the Consultant's presence, and shall forthwith forward to the Consultant shall give the Contractor 24 hours notice in writing of his intention to attend the tests.

- 4.24.3 Where the Contract provides for tests on the premises of the Contractor or of any sub-contractor the Contractor shall provide such assistance, labor, materials, electricity, fuel stores, apparatus and instruments as may be requisite and as may be reasonably demanded to carry out such tests efficiently.
- 4.24.4 As and when any plant shall have passed the tests referred to in this Clause the Consultants shall furnish to the Contractor a certificate in writing to that effect.

4.25 Delivery

- 4.25.1 No plant of Contractor's Equipment shall be shipped or delivered to the Site until intimation in writing has been applied for and obtained by the Contractor from the Consultant that the plant may be delivered. The Contractor shall be responsible for the reception on the Site of all plant and Contractor's Equipment delivered for the purpose of the Contract.

4.26 Rejection

If at any time before the Works are taken over the Consultants shall:-

- 4.26.1 Decide that any work done or plant supplied or materials used by the Contractor or any sub-Contractor is or are defective or not in accordance with the Contract, or that the works or any portion thereof are defective or do not fulfill the requirements of the Contract (all such matters being hereinafter in the clause called " Defects").
- 4.26.2 As soon as reasonably practicable give the contractor notice in writing of the said decision specifying particulars of the defects alleged and of where the same are alleged to exist or to have occurred;
- 4.26.3 So far as may be necessary place the plant at the Contractor's disposal; and the Contractor shall with all speed and, at his own expense, make good the defects so specified. In case the Contractor shall fail to do so the Owner may, take at the cost of the Contractor such steps as May in all circumstances be reasonable to make good such defects. All plant provided by the Owner to replace defective plant shall comply with the Contract. The Contractor shall be entitled to remove and retain all Plant that the Project Director may have replaced at the Contractor's cost.

4.27 Tests on Completion

- 4.27.1 The Contractor shall give to the Consultant in writing 21 day's notice of the date after which he will be ready to make the Tests on Completion. Unless otherwise agreed the tests shall take place within 10 days after the said date on such day or days as the Consultant shall in writing notify the Contractor.
- 4.27.2 If the Consultant fails to appoint a time after having been asked so to do or to attend at any time or place duly appointed for making the said tests, the Contractor shall be

entitled to proceed in his absence and the said tests shall be deemed to have been made in the presence of the Consultant.

- 4.27.3 If in the opinion of the Consultant the tests are being unduly delayed he may, by notice in writing call upon the Contractor to make such tests within 10 days from the receipt of the said notice, and the Contractor shall make the said tests on such day within the 10 days as the Contractor may fix and of which he shall give notice to the Consultant. If the Contractor fails to make such tests within the time aforesaid the Consultant himself will proceed to make the tests. All tests so made by Consultant shall be at the risk and expense of the Contractor.
- 4.27.4 The Owner except where otherwise specified shall provide free of charge subject to the provisions of sub-clause (e) of these clause electricity, fuel and water, as may be reasonable demanded to carry out such tests efficiently.

4.28 Storage Arrangement

- 4.28.1 The Contractor shall make adequate arrangements for the storage of the materials arranged by him or supplied by the Owner. No payment shall be made to the Contractor for arrangements whatsoever.
- 4.28.2 The location of the store area shall be within the Site premises and / or selected with the consultation and approval of the owner.

4.29 Use of Site

- 4.29.1 The sites is to be kept as clear as possible to facilitate paid progress of the work and no employees of the Contractor, unless authorized by the Owner will be permitted to live on the site.

4.30 Permits and Fees

- 4.30.1 The Contractor shall obtain and pay for all permits, license or other privileges necessary to complete the work, certificate of which shall be delivered to the Consultants and will become the property of the Owner.

4.31 Qualification of Equipment and Material Manufacturers

- 4.31.1 All equipment and all materials shall be manufactured by companies which have at least five years previous experience in the design and manufacture of equipment or materials type, capacity and operating conditions.
- 4.31.2 Where the requirements of this clause make any materials not-obtained the Owner and / or Consultant reserves the right to waive any portion or portions of it as required to obtain the intent of the Specifications.
- 4.31.3 When manufacture's product is specified by name or equivalent, it shall be the sole judgment of the Consultant to determine the acceptability of any product which is offered as an equal to that specified.

- 4.31.4 Proposals shall be based on the equipment and materials specified, and any request to substitute any time shall be so mentioned in the proposal and the amount to be added or deducted shall be given. Any request for substitution after the date of Letter of Acceptance shall likewise be accompanied with the difference in price.

4.32 Unloading and Storage at Site

- 4.32.1 The Contractor shall unload all imported equipment & material at the site from delivery vehicles as the case may be. Items for permanent installation shall be properly stored in areas designated by the Owner and shall be protected as required to prevent damage or deterioration of any type. Storage methods shall be such as to cause minimum inconvenience to others and shall be arranged to facilitate inspection.
- 4.32.2 All equipment and material storage shall be subject to the approval of the Consultant.
- 4.32.2.1 Items stores shall be blocked up at least six (6) inches off the ground.
- 4.32.2.2 The ends of all nozzles, pipes, tubes and conduits while in storage at the site shall be covered with a tube cap to save against entrance of rain water, blowing dirty, and other foreign matter. Tubing shall be shipped and stored in neat bundles.
- 4.32.2.3 Miscellaneous steel, plate work, pipes etc. shall be protected by a prime coat of paint and kept prohibit rusting unless such items are galvanized or have other corrosion proof finish.
- 4.32.3 All packing boxes, shipping containers, planking, covering etc., shall become the property of the Owner as soon as the equipment and material which is contained therein arrives at the site. The Owner, on application from the Contractor, may permit the Contractor to use some of the boxes, containers etc., without charges for equipment and material storage purposes.

4.33 Rubbish

- 4.33.1 The Contractor and any persons responsible to him shall at intervals of not less than 48 hours, remove any rubbish resulting from the execution of the work. If resulting from the execution of their work. If the contractor fails to remove rubbish within 48 hours, after being requested to do so by the Consultant, the rubbish will be removed by the others and the cost back charges to the Contractor.
- 4.33.2 Adjacent streets, roads and drive ways, shall be kept clear and unobstructed at all times. Any materials resulting from demolition and not suitable for use in the construction, work approval and shall be immediately removed from the site. Upon completion, the Contractor shall remove all rubbish, tools, forms, scaffolding, surplus material, etc., and leave the premises clean and fit for use.
- 4.33.3 No usable equipment or material purchased for the work, or construction tools and equipment shall be removed from the site without the written consent of the owner.

After completion of all work required under the contract any equipment, material or consumable supplies remaining shall become the property of the Owner except that the contractor may remove his tools and construction equipment.

4.34 Inspection of Completed Works

4.34.1 Satisfaction of the Electrical Inspector, Electrical Services Authorities and Insurance Company

The work shall be carried out in accordance with the Rules and regulations as adopted in Pakistan to satisfy the requirements of the Govt. Electrical Inspector, WAPDA/KESC as these of fire office insuring the Building equipments etc. And the work is to pass the survey of their respective inspectors.

The fee is any in obtaining the above satisfactory certificates will be paid by the contractor and will be reimbursed by the client later on.

4.34.2 At the request of either party, inspection of such sections of the work as will not be accessible after completion, or will be difficult to alter, which are to be taken into use by the Owner before the time of the final inspection, may be carried in advance. (Advance inspection).

4.34.3 An inspection is to be carried out immediately before the expiry of the guarantee period (Guarantee inspection).

4.34.4 Inspection of corrected faults of omissions noted in connection with advance, finals, or guarantee inspection is also to be done (Supplementary inspection).

4.34.5 Inspection is to be carried out by the Consultant or any other suitable and competent person appointed by the Owner.

4.34.6 The costs of Advance Inspection, Final Inspection and Guarantee Inspection are to be met by the Owner, where the inspection has been carried out by a person appointed by him. The costs of supplementary inspections and re-inspections are to be borne by the Contractor.

4.34.7 It is the responsibility of the Contractor to provide and pay for, any help or assistance necessary in connection with the inspection work.

4.34.8 The inspector is required to state in his report how far work included in the contract has not been carried out (omission) or has to been carried out in accordance with the terms of the contract (faults). If in any case any such error or omission ought not, in the opinion of the inspector, to entail any consequences for the contractor, the error or omission must still be entered in the report, and the inspector should state his reasons for considering that the contractor should not be held responsible. If any errors or omissions of a type included under Clause "Removal of improper works and Material", occur the inspector is required to appoint a sum representing any possible depreciation in value, as well as indicating the adjustments the contractor is to be responsible for making. Until such time as the matter has been finally settled between

the parties, the Owner is entitled to withhold that proportion of the contract sum as is represented by the sum estimated by the inspector.

- 4.34.9 If any special investigations are required in order to assess particular faults or omissions, and these investigations can not be carried out within the specified time, a special report may be prepared to cover these points, as soon as the necessary investigations have been carried out. The first report should contain a note of the points on which complementary reports will be forthcoming.
- 4.34.10 The inspector's decision as to what faults or omission may have occurred is binding on both sides.
- 4.34.11 The contractor is required to carry out, without delay, any improvements, alterations or additions which may be considered necessary as the result of an inspection report.
- 4.34.12 When the final inspection has taken place, the work is to be considered handed over to the owner in so far it has been found to be in the state required by the Contract, and can suitably be put into use for the purpose for which it was intended.
- 4.34.13 The Owner has the right to put into use any section/area of the work contracted and not approved at the time of the inspection, provided this can be done without jeopardizing the progress of the work, and he may use it without special compensation even before the faults or omissions have been made good.
- 4.34.14 Where special dates are specified under the Contract for the completion of different sections of the work, the provisions of this Clause are to apply to each part separately.
- 4.34.15 The inspection report required under this Clause is to be delivered in writing, and signed by the inspector, giving the date on which it is to be made available for the parties inspection. The report should cover the following points:
- 4.34.15.1 State whether the work has been approved or not.
- 4.34.15.2 State the reasons for failing to approve it, if it has not been approved.
- 4.34.15.3 State faults or omissions for which the Contractor is to be held responsible, together with the time within which they are to be made good.
- 4.34.15.4 The sum to which the Owner is entitled.
- 4.34.15.5 Date of which insurance taken out by the Contractor lapses.
- 4.34.15.6 If the work has been approved at the final inspection the date from which the guarantee period is to run and the days after which it expires.
- 4.34.15.7 Distribution of costs connected with the inspection.

4.35 Interference with Tests

- 4.35.1 If, by reasons of any act or omission of the Owner or the Consultants the Contractor shall be prevented from carrying out the Tests on completion as provided in Clause “ Tests on Completion “, then, unless in the mean time the work shall have been proved not to be substantially in accordance with the Contract, the Owner shall be deemed to have taken over the Works and the Consultant shall issue a taking over certificate accordingly, nevertheless the Contractor shall make the said tests during the Period of Maintenance as and when required by the Consultant by 14 days “ notice in writing and the Sub-Clause of Clause 4.29 “ Tests on Completion “ shall apply.

4.36 Startup, Trial Operation and Performance

- 4.36.1 After the performance tests, if the equipment supplied by the Contractor is found to meet the guarantees and any other specified requirement, and if all other work called for hereunder has been completed, the Owner’s acceptance will be forthcoming for under the terms of payment. This acceptance however, does not relieve the Contractor of his responsibility for first inspection.
- 4.36.2 Should the equipment furnished by the Contractor fail to operate as required, or in case of failure to meet any of its guarantees, the owner shall have the right to operate the equipment, using the Contractor’s right to operate the equipment, using the contractor’s supervisory operating personnel, until such defects have been remedied and guarantees met with. In the event that defects necessitate the rejection of the equipment or any part thereof, the Owner shall have the right to operate the equipment until such time as new equipment is provided to replace the rejected equipment. Such operation shall not be deemed an acceptance of any equipment.

4.37 Verification of actual Dimensions on Site

- 4.37.1 The contractor shall be solely responsible for verifications of actual site dimensions and building layout dimensions. Building layout shown on tender drawings shall not be considered to be final with regard to dimensions and layout but shall be subject to actual verification by the Contractor. All working drawings prepared by the Contractor shall incorporate actual measurements taken on site. The contractor shall ensure that all equipment can be conveniently fitted into the space allocated for this purpose.
- 4.37.2 If any space allocated for certain equipment or combination of equipments is insufficient or deficient in terms of clearance required for maintenance etc., the Contractor shall forthwith inform the consultant of the discrepancy. He shall provide all reasonable assistance to the Consultant for verification of the same and for taking remedial measures. It is understood that all tenders during tendering shall have checked that the equipment proposed to be supplied by them fits conveniently into the space allocated for this purpose. In case any space is insufficient, the tenderer shall so indicate the deficiency in his tender documents and specify the space requirements. Failure on the part of tenderer to point out any discrepancies existing in this regard shall make him liable, if his tender has been accepted, to bear the full consequences arising out of a certain equipment not fitting into a certain space allocated for the purpose.

4.37.3 If in any item during the progress of the Works any error shall appear or arise in the position, levels, dimensions, or alignment of any part of the Works the Contractor on being required to do so by the Consultant shall at his own expense rectify such error to the satisfaction of the Consultant unless such error is based on incorrect data supplied in writing by the Consultant in which case expense of rectifying the same shall be borne by the Owner. The checking of any setting out of any line or level by the Consultant shall not in any way relieve the Contractor of his responsibility for correctness thereof and the Contractor shall carefully protect and preserve all bench marks, site, rails, pegs and other things used in setting out the Works.

4.38 Inflammable Stores etc.

4.38.1 The contractor is to comply with all local regulations in respect of the safe storage of all inflammable stores, explosives and other materials involving risks to third parties and is to take all special precautions required in the transport and use of such materials. The Contractor is to submit to the Consultant for approval all drawings and documents required for the sanctioning of such storage of other accommodation and is to build all such storage to the proper requirements.

4.39 Drawing and Data

4.39.1 The Contractor shall make a complete survey of site and shall submit the four sets of shop drawings which shall be prepared by the Contractor before commencing any installation work so as to avoid any hindrance and mistakes during the works. Shop drawing shall be prepared on scale not great than 1:75 and shall include all details of installation and co.-ordination with other services as also the pertinent technical data. The Engineers approval of shop drawing is necessary before any work of installation is started by Contractor. But approval from his responsibilities and guarantee under the Contract. For the equipment which is to be supplied by the contractor, the manufacturers drawing shall be submitted by the contractor for the approval of Engineering before commencing the manufacture or fabrication. Eight sets of such drawings and data shall be submitted for obtaining the approval of the Engineer.

4.40 Photographs of Works

4.40.1 Two sets of at least 15 photographs of the size of 9" x 5" as selected by the Employer are to be submitted by the Contractor to the Employer's representative by the end of each month to show the progress of the work attached with certificate of payment and the cost shall be borne by the Contractor.

4.40.2 The Contractor may be permitted to take photographs of the works in progress or completed. The negatives of the photographs shall be the property of the Employer and no print from them shall be supplied to any person except with the written authority of the Employer. The date when each photographs was taken together with the negative thereof shall be supplied to the Engineer at the end of each month. All cost so incurred shall be borne by the Contractor.

I N D E X
FOR
SPECIFICATION OF ELECTRICAL WORKS

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5.0 **SPECIFICATIONS FOR ELECTRICAL WORKS**

A - GENERAL REQUIREMENTS

5.1 **Scope of Contract**

- 5.1.1 The item rates of the contract shall include the supply equipment and material except the equipment and material to be specifically provided by the owner, erection including all load and lift, installation, completion and testing of the individual components and finally the whole installation in accordance with the specifications and enclosed drawings. The work shall be carried out to the complete satisfaction of the Inspector.
- 5.1.2 For the materials listed as “free issue” materials in this tender, it will be the responsibility of the Contractor to take delivery of such material from the stores of the Employee supply of the necessary electrical installation including testing and commissioning.

5.2 **General Requirements**

- 5.2.1 The Contractor shall carry out all the work in accordance with this specification and in conformity with the Indian Electricity Act and Rules as adopted in Pakistan and the latest edition of the Wiring Rules of the Institute of Electrical Engineers London (hereinafter referred to as the I.E.E. Wiring Rules) but where these specifications differ from these rules, these specifications shall be followed.
- 5.2.2 Any special requirements of the Electric Inspection shall be complied with and all works shall be to the entire satisfaction of the Employer or his Representative, as provided in the contract.
- 5.2.3 The electrical works shall be carried out only by Licensed workmen authorized by the Government to undertake such class of works under the provision of the Indian Electricity Act and Rules as adopted in Pakistan under the direct supervision of whole time electrical supervisors and particulars of their licenses shall be intimated in writing to the Engineer-In-charge before the commencement of works. The works shall further be under direct supervision of whole time qualified Engineer, a Bio-data of whom shall be submitted for consideration and approval of the Employer / Consultant along with other supervisory staff. Any conflict between documents shall be brought to the attention of the employer and resolved in writing before work is performed.
- 5.2.4 If during preparation of the Tender, the Contractor finds any points that need clarification he shall raise these with the Employer accepts no responsibility for the failure of the Contractor to obtain clarification on any areas of uncertainty. Any installation not complying with the specifications shall be corrected by the Contractor with no cost to the Employer.

- 5.2.5 It is the Contractor's responsibility to protect equipment and materials from damage from the time of taking over Certificate is issued by the Employer after the plant has been commissioned.
- 5.2.6 Any deviations from these Specifications or any of the requirements of the Contract shall be clearly defined at the tender stage under Exceptions to the Contractors Specifications. Unless such exceptions are so made, the Employer will assume there are no exceptions other than those specifically included in the Employer's Construction drawings. No other exceptions will be considered after the contract has been executed. The contractor shall produce comprehensive documents of individual testing, calibration and installation together with an overall record of the state of completion of the installation Contract which is to be submitted to the Employer at regular intervals as required.
- 5.2.7 If the contractor requires clarification of any point, this must be obtained from the Employer during tender period and Employer accepts no responsibility for the Contractor's failure to obtain clarification on any areas of uncertainty.
- 5.2.8 The contractor should state his ability and willingness to comply with the enclosed Construction Program. All necessary civil and builders' works shall be under taken by others except minor civil works by the Contractor.

5.3 Electrical Equipment and Materials

- 5.3.1 Except for the items mentioned in the enclosed Free Issue list the contractor shall supply all materials, tools, plant, scoff folding, hardware, supports and fixings as necessary to provide a complete and satisfactory installation. Where any materials in the Contractor's Supply are specified on the drawings or in Bill of Quantities, the Contractor is not permitted to vary these items without the prior permission of the Employer. When the 'Free Issue' materials have been received by the Contractor he shall take full responsibility for their condition and the quantities and shall replace, at his own expense, any missing or damaged items.
- 5.3.2 In the event of any 'Free Issue' items becoming surplus to requirements the Contractor shall notify the Employer who shall issue instructions for its disposal.
- 5.3.3 The Contractors will be required to collect free issue materials from the Employer's Site Stores.
- 5.3.4 Any material supplied by the Contractor shall be new and good quality, type and standard as detailed in this specification. Where equipment, materials or articles is referred to in the specifications as "equal to" any particular standard the choice and approval.
- 5.3.5 Employer or his authorized nominee shall be final. The Contractor shall furnish to the Employer for appraisal the name of the manufacturers of material, like conduit, lighting accessories and fittings etc., which he contemplates incorporating in the work. Samples of materials shall also be submitted when so directed. Such information and samples shall be examined by the Employer/Consultant for approval.

- 5.3.6 Cost of the Samples shall be added to the contract prices unless provided for in the schedule of quantities or unless the test show that such materials are not in accordance with the contract.

5.4 Program of Works

- 5.4.1 The Contractor shall within fifteen days after the acceptance of his tender submit in writing for approval of the Employer / Consultant, a program showing the order or precedence and method in which he proposes to carry out the works.
- 5.4.2 The program which the contractor is required to furnish shall be such as to allow the completion of the whole project by the date mentioned in the tender as required by Employer.
- 5.4.3 The program shall cover the full period of works from the date of the acceptance of the completion of installation, testing and handing over of the plants and installation in working orders.
- 5.4.4 The program submitted by the contractor shall be amended if any part of it is not to the satisfaction of the Employer and it shall not be carried into effect until it has been approved (in an amended form if necessary by the Employer).
- 5.4.5 The Contractor may at any time during the period of the contract submit to the Employer for his approval, proposals for amending the program of the works. Such amendments shall not be carried out into effect unless these have been approved by the Employer.
- 5.4.6 If the employer requires the Contractor to amend his program of work, the contractor shall not thereby be entitled to any adjustment in contract price or to any extension of time.
- 5.4.7 The contractor shall furnish in writing such further information concerning his arrangements for the carrying out of the works and of the constructional plant or temporarily works he intends to supply, use of construct and of his arrangements for the direction and administration of his performance of the contract as the Employer may from time to time required.
- 5.4.8 The submission to or approval by the Employer of such program or the furnishing of such particulars or information shall not relieve the Contractor of any of his duties or responsibilities under the contract.

5.5 Satisfaction of the Electrical Inspector & Insurance Company

- 5.5.1 The work shall be carried out in accordance with I.E.E. Rules and regulations as adopted in Pakistan, to satisfy the requirements of the Govt. Electrical Inspector, as well as those of fire office insuring the building furniture etc., and the work is to pass the Survey of their respective inspectors.

5.6 Alterations

5.6.1 The location of various items indicated on the drawings are presumed to be approximately correct, but it is to be understood, however, that the small scale drawings are necessarily diagrammatic and that such locations as are shown, are subject to slight revision, as the work is installed, which may be necessary to accommodate local construction conditions or interference with other services. No major changes shall be made without the approval in writing of the Consultant. The Consultant can alter the position of any point without extra charge being made provided such alteration does not involve the work being done twice. The location of outlet switches shown in the systematic wiring plans should be considered as approximately correct.

5.7 Protections

5.7.1 The Contractor shall effectively protect his own work from damage during and as may be necessary, after installation, and he shall likewise protect adjoining work of other trades from damage resulting from installation of electrical work.

5.8 Building Work

5.8.1 The information of channels, foundations brick work, bases, recessed for boards etc., will be carried out free of charge for contractor by the Civil Contractor if specifically indicated during the construction work only.

5.8.2 All necessary working drawings which may be necessary for the Civil Contractor to carry out the above referred work shall be supplied to him by the Contractor well in time. The Contractor shall however be responsible for the proper marking out of such work at site and for ensuring that all brackets and sleeves etc. are correctly built in.

5.8.3 Provision and fixing of brackets, clips, supports and stays, etc., to be fixed to wood, iron masonry or other such materials shall be the responsibility of the Contractor.

5.9 Codes and Standards

5.9.1 The latest published rules of the National Electrical Code, so far as applicable to this work, B.S.S. and I.E.E. Rules and Regulations of Local City authorities shall be considered included as part of these specifications and all requirements under them shall be fully met. All wiring shall be carried out in a loop system.

5.9.2 The entire installation shall be free from improper grounds, open and short circuit faults. Tests shall be made in accordance with section "E" of I.E.E. Regulation for the Electrical Equipment of Building "1966" Edition in presence of a representative of the Employer / Consultant. Each panel shall be tested with mains connected to the riser, branches connected lamps removed or omitted sockets and wall switches closed. Each individual power line shall be tested with the power equipment connected for proper and intended operation. In no case shall the insulation resistance be less than that allowed by the Regulations for electrical equipment of buildings. Failure shall be corrected in a manner satisfactory to the Employer / Consultant.

- 5.9.3 It shall be the responsibility of the Contractor to test all system of the entire electrical installations as well as those installations where sequence operation is required. The Electrical contractor shall test for proper sequence and he shall leave the entire electrical installation in satisfactory working condition.
- 5.9.4 The Contractor shall guarantee that the electrical systems, including all components and accessories used therein are free of all grounds, shorts and open circuit faults, defective workmanship and materials, any electrical as well as mechanical defects, non-compliance of specification in any respect and will remain so, for the period of maintenance after the date of acceptance of the work. Any defects, appearing within the aforesaid period, shall be remedied by the contractor at his own expense.
- 5.9.5 All electrical installations in "Explosion Hazardous Zones" should comply with the Institute of Petroleum Code of Safe Practice Part-I Electrical.

5.10 Operation and Maintenance Manuals

- 5.10.1 During the time of contract and before final approval of Electrical installation, the Contractor shall submit to Principal 2 (Two) copies of descriptive literature, maintenance and operation dates and part list of each item of equipment installed under this contract.

5.11 Electrical Service Connection

- 5.11.1 It shall be the contractor's responsibility to give all notices to the power supply authority for provision of any load required as a result of this work and to seek quotation for the installation, furnishing and connection of the required electrical load complete in all respect.
- 5.11.2 When the installation is complete, the Contractor shall intimate the Power Supply Authority and make such tests as required by them to demonstrate conformance with their regulation prior to their connection to the installation. The extent of work herein specified represents the minimum requirement and the extent of work shall be extended as required to include at no increase in cost all that is required by the local power supply authority for an installation of this type.
- 5.11.3 If inspection by the Government constituted body is to be carried out, the contractor shall be responsible for carrying out the same. If any fee is paid for such inspection, the same shall be reimbursed to the contractor to arrange all temporary power requirements during the construction work at his own risk and cost.

5.12 Modification to Comply with Local Standards

- 5.12.1 The electrical works in general has been designed complying to National Electrical Code, B.S.S. and I.E.E. (London) standards. The contractor shall carefully check the drawings and applicable portions of the specifications and he shall modify with local

standards and have them incorporated in the "SHOP DRAWINGS". In the event contract drawings are modified, it shall be the responsibility of the contractor to supply these modifications to all circuit work, panel boards, feeders, conduit, switch points, socket outlets, and in.

- 5.12.2 Any changes from the contract drawings and specifications due to manufacturer's requirement which may add to the cost of the electrical works shall be taken into consideration by the contractor and such additional costs, if any, shall be included in the tender at the time of submitting the tender.

5.13 Record Drawings

- 5.13.1 The Contractor shall during the progress of the work, keep a careful record of all changes where actual installation differs from that shown on the CONTRACT or SHOP DRAWINGS. Upon completion of work the contractor shall prepare completion drawings on tracing cloth in a neat and accurate manner, from the signed record of all changes and revisions of the original design, to represent true installation in the completed work. These completion drawings shall be scrutinized and finalized by the OWNER / CONSULTANTS and two sets of prints handed over to the Contractor. The original tracings shall be retained by the OWNER. Final payment shall be withheld until receipt of these completion drawings in tracing cloth and subject to general terms and other clauses of the contract.

5.14 Location of Wiring Outlets

- 5.14.1 The contractor shall coordinate his work with all trades involved so that exact locations may be obtained for all outlets, apparatus, appliances and wiring. The circuit numbers for lighting and power circuits are indicated on the drawing against the location of the outlet controls.
- 5.14.2 The contractor shall provide for all power from main distribution switch board to all power boards and thereafter to all socket and socket outlets.
- 5.14.3 The power leads to all motors shall be in conduit. Where motors have conduit terminal boxes, the feeder conduit shall be connected directly to boxes, the feeder conduit shall be connected directly into the same, except of fans and pumps which shall have at least 18 inches of armoured flexible conduit from end of rigid conduit to motor terminal box. Under no circumstances shall rigid conduit terminals be used in or be fastened to motor foundation. Armoured flexible conduit shall be installed to motors having sliding base. Provision shall also be made for the movement of Motors bolted to equipment.
- 5.14.4 The location of outlets shown on diagrammatic wiring plans shall be considered as approximate and it shall be incumbent upon the contractor, before installation of outlet boxes, to study all pertinent drawings and obtain precise information from the architectural schedules, scale drawings, large scale and full details of finished rooms, approved shop drawings of the trades etc. from the consultant.

5.14.5 In centering outlets due allowance shall be made for overhead piping, ducts, windows and door trim, variations in thickness of furring, plastering, etc., as erected, regardless of conditions which may be otherwise shown on drawings. Outlets incorrectly located shall be properly located at the contractor's expense. Local switches which are shown near doors shall be located at the strike side of the door as finally hung regardless of swing shown on the drawings.

B - SPECIFICATIONS

5.15 Switches

- 5.15.1 Switches controlling light and fan points shall be 10 Amperes or above, 250 volts, single or double pole, one way or two way, flush type as stated in Bill of Quantities. The switches shall be mounted on wall flushed steel back boxes. Where the drawing indicates two or more switches or switches and sockets side by side, they shall be mounted in a multiple gang box. If moulded case switches are specified, the combination of standard gang switches shall be used with back boxes for each gang.
- 5.15.2 Samples shall be provided to the consultants for his prior approval before purchase.

5.16 Socket Outlets

- 5.16.1 Socket outlets and plugging assembly shall be 10 Amps, 2 round pins, line-neutral, 10 Amps, 3 round pin, line-neutral-ground or 13/15 Amps, 3 pin, line-neutral-ground. These shall be made of Bakelite and shall be suitable mounting flush with wall or column or for surface mounting as called for in Bill of Quantities.
- 5.16.2 Each socket outlet shall have its control switch by the side of it on a common board, if it is not of combined type switch-socket unit.
- 5.16.3 Where the socket and switch units or switch-socket outlets are to be installed in a wet or damp area, they shall be of weather proof type.
- 5.16.4 Samples shall be provided to the consultant for his prior approval before purchase.

5.17 Outlet Boxes

- 5.17.1 Each outlet in the wire from conduit system shall be provided with an outlet box to suit the condition encountered. Where outlets boxes are exposed to the weather or in normally wet location including flush and surface or exterior masonry walls and in explosive location shall be of the cast metal type having threaded hubs. Boxes in all other location shall be either of PVC conduit or of black enamelled arsenic-coated sheet steel type. Each box shall have sufficient volume to accommodate the number requirements. Ceiling and bracket outlets boxes shall be not less than 3" square except the smaller boxes may be used where by Consultant. Recessed fixture shall be provided with separate junction boxes. Boxes to be installed in concealed locations shall with the proper type extension rings or plaster covers where required.
- 5.17.2 Boxes for use with conduit system shall not be less than 1-1/2" deep except where shallow boxes are required by structural conditions and as provided by Consultant. Switches and socket outlets boxes shall be not being less than 3" x 3". All boxes shall be concrete tight whether installed in concrete or in fluid material.

5.17.3 Pull boxes shall not less than the minimum size required by the codes and shall be constructed of galvanized cast iron or teak wood. Boxes shall be furnished with screw-fastened covers. For multiple cables passing through a common pull box, feeders shall be tagged to indicate clearly the electrical characteristics circuit number and panel designation.

5.18 Outlet Covers

5.18.1 Where not integral with the devices, the outlet plates shall be on-piece type. These shall be provided for all outlets to suit the devices installed. Bakelite, plastic or Formica sheets as specified elsewhere in the tender documents. Screws for fastening of the plates/covers shall be of non-ferrous metal with counter sunk heads. The covers sheets shall be installed with all four edges in continuous contact with finished wall surface without use of mats or similar devices. The use of sectional type outlet covers shall not be permitted.

5.19 Lighting Fixtures

5.19.1 General

5.19.1.1 The lighting fixtures types are given on the drawing and each type is specified in detail in the items of bill of quantities. Where a definite manufacturer's type and catalogue number is specified, it shall also serve as an illustration of type and if the particular type and if the particular type of fixture specified is not available approved equivalent fixture may be accepted.

5.19.1.2 The determination of quality will be based on certificate photometric data covering the coefficient of utilization average brightness data, as well as equivalent of construction, the Engineer's approval is necessary. The contractor shall submit samples of each and every lighting fixture specified and obtain approval of the Engineer before commencing installation.

5.19.2 Fluorescent Light Fixtures

5.19.2.1 The industrial type fluorescent light fixtures shall have lamps and ballast of proper type and wattage as specified in the items of Bill of Quantities. The fluorescent lamps shall be 4 ft. 40 watts. The fluorescent color shall be white, cool day-light or day-light in that order of preference. The lamps shall be Philips make or equivalent.

5.19.2.2 The lamp holders shall be rotary, lock-in type. The starter shall be Philips make or approved equivalent.

5.19.2.3 The internal wiring of the fluorescent light fixtures with heat resistance wires shall be done at the manufacture's factory. Two or more than two lamps fixtures shall be provided with power factor improvement capacitor to give a power factor of 0.9. In addition to power factor improvement capacitor, capacitor for anti-ratio interference shall be provided in each fluorescent fixture. The fluorescent light fixture shall have

white stove enamelled sheet steel reflector white stove enamelled inside and grey outside. The sheet steel shall not be thinner than 20 Gauge. Appropriate size bushed wire entry holes, fixing holes, etc. shall be provided.

5.19.3 Incandescent Light Fittings

- 5.19.3.1 The glass shade or globe of incandescent light fitting shall be of first quality glass free from any air bubbles or voids. The glass shall be opal white colour unless otherwise specified.
- 5.19.3.2 The surface mounting incandescent light fitting shall have white stove enamelled sheet body. The fixing shall match the outlet box. The wall brackets incandescent light fittings shall have back plate with holes matching those of the conduit outlet box.
- 5.19.3.3 The incandescent fittings shall have bi-pin lamp holders of brass. The lamps shall be Philips make or equivalent.

5.20 Ceiling Fans

- 5.20.1 Ceiling Fans shall be capacitor type, five speeds, suitable for 250 volts, single phase, 50 Hz. A.C. The displacement shall be 10,000 c.f.m. for 48" (1219 mm) sweep and 12,000 c.f.m. for 56" (1423 mm) sweep at maximum speed. The fan motor shall be capacitor type and bearings shall be groove type to give noiseless operation. The fan regulator shall have laminated high grade sheet steel and regulators shall be recessed mounting type. The fan and regulator shall be of Millat or National Lahore, make or approved equivalent.
- 5.20.2 The fan hook shall be made of 15.8 mm (5/8") dia mild steel rod bent to shape of approved design. It should be in the form of loop about 87.5 mm (3-1/2") long and about 50 mm (2") wide. The rod should be bent to have at least 200 mm extension on both sides for type to the reinforcement steel of the slab.
- 5.20.3 The fan hook shall be installed in the R.C.C. ceiling at the time of pouring of concrete. The fan hook extending rods shall be tied to the reinforcement steel firmly so as not to be disturbed during pouring of concrete.
- 5.20.4 The installation of fan shall include fixing of blades, down rod, clamp and fan regulator and wiring of down rod from the ceiling rose to the fan terminals, testing and commissioning the down rod shall have long threads and shall be provided with check nuts to secure it firmly with the clamp and with the body of the fan. A split pin shall be provided both at the fan body and at the clamp for safety. Any scratches on the body of the fan or fan clamp for safety. Any scratches on the body of the fan or fan rod appearing during installations shall be cleaned and painted properly with same quality paints as provided by the manufacturer.

5.21 Conduit and Wiring Accessories

- 5.21.1 Section B of the regulation for the electrical equipment of the Building, issued by the Institute of Electrical Engineers London 14th Edition (Referred hereinafter as wiring regulation) shall be complied with as far as applicable to this installation.

- 5.21.2 The conduit wherever concealed in masonry shall be of rigid PVC b-class 6 Kg/Cm² pressure manufactured by Pakistan PVC Ltd., where run clipped exposed to wall or roof, the conduit shall be rigid PVC D-Class 12 Kg/Cm² pressure. Where not permitted because of dampness of fire, steel conduit of 16 SWG shall be installed. The conduit systems shall be installed in accordance with regulation B-87-100 of the wiring relation. The conduit system shall be concealed in masonry wall, floor with required minimum concrete over it where not possible due to structural reasons; the conduit shall be exposed clipped to wall or roof.
- 5.21.3 Separate conduit shall be laid for different system, the mains, power such circuit and control wiring between control and the outlet.
- 5.21.4 The drawings indicate the suggestive runs for the various routes of the wiring as well as position of outlet. Minor change to suit actual construction shall be acceptable for which special and specific details be indicated in the shop drawing for the approval of the Principal/Consultant before drawing for the approval of the Principal/Consultant before installation. The contractor shall keep true record of all conduit layouts and submit as installed drawings before finally handing over the installation.
- 5.21.5 For the jointing of PVC conduit, PVC adhesive solution of approved make shall be applied to all joint and junction boxes to ensure proper sealing. Exposed conduit wherever utilized shall be securely fastened in place by means of approved conduit supports and fasteners. Where conduit/pipe are to be fastened to masonry walls, floor or portion use of wooden block will not be permitted. Metal saddles of approved type not more than 4' apart shall be used for fixing exposed conduit.
- 5.21.6 The conduit shall be fastened to the box coupling and lock nut and insulating bushing approved make and type.

5.22 Low Tension Cable

- 5.22.1 All the low tension cables shall be of size specified on the drawing or stated in the schedule of quantities, single core, 3 core, or 3-1/2 core as required, polyvinyl-chlorides (PVC) insulated and PVC sheathed. The cables shall be used either in floor in floor trenches or in conduit and therefore should be suitable for above conditions.
- 5.22.2 The copper used in manufacture of cables should conform to B.S.S. 10 or equivalent standard, having an electrical conductivity of not less than BSS 2004 & 2746 and should have heat stability and volume resistivity in accordance with the standard laid down by cable manufacturers association (U.K.)
- 5.22.3 All the cables should comply with the test requirements of B.S.S. 200:1961.
- 5.22.4 The low tension cables shall be four-core with reduced neutral or 3 core as described having copper conductors of stranded, annealed, electrolytic, high conductivity copper wires PVC insulated and PVC compound sheathed armoured and non-armoured and non-armoured. The voltage grade shall be 1000/600 volts. The cables shall conform to B.S. 6346: 1969 and I.E.C. standard 502-1:1978.

- 5.22.5 The copper conductor will meet the requirements of M.S. 6360:1969 and EC grade specifications of ASTM.
- 5.22.6 Core identification shall be by colours. Red, yellow and blue will indicate the three-phase and black, the neutral.
- 5.22.7 The cables shall comprise of shaped stranded copper conductor, PVC insulated, tapped bedding galvanized steel wire armour and PVC over-sheath.
- 5.22.8 The cables shall be capable of operating at a maximum continuous temperature of 70°C and short circuit temperature of 150°C. The cables shall be suitable for operation on 415 volts 4 wire 50 Hz AC system with the neutral point solidly earthed at transformer.
- 5.22.9 Technical particular of L.T. PVC/PVC cable shall be furnished for each size of the cable offered and mentioned in B.O.Q.

5.23 L.T. Cable Glands, Clips & Lugs

- 5.23.1 Cable gland shall comprise of gland body, compression ring. Armour ring (where required) gland and conduit thread.
- 5.23.2 Cable glands shall be suitable for size of cable used and shall conform to B.S. 6121:1973.
- 5.23.3 All termination of PVC insulated cable shall be in compression connectors and termination. The lugs shall be manufactured from high conductivity copper, electron tin plated to resist corrosion and give good electrical continuity. Lugs shall be fitted by compression tools made for the purpose.
- 5.23.4 Correct type of cable clamps and clips shall be used where needed. These shall be selected according to cable manufacturers' recommendations.

5.24 Distribution Panels

- 5.24.1 The Distribution panels shall be totally enclosed metal clad, safety dead front type with hinged door and built-in concealed locks. The panels shall be suitable for working voltage for which the equipment incorporated there in is designed for and tested in accordance with B.S. 116/1952.
- 5.24.2 The panels shall be constructed from 16 SWG sheet steel and shall accommodate circuit breakers, fuse switches distribution board, metering equipment, bus bars, supports, cable glands and other relevant equipment.
- 5.24.3 The panels shall be finished inside and out side the hammer light gray air drying enamel and two finishing coats shall be applied after basic coat of anti corrosive primer.

- 5.24.4 The mountings on the panel shall be earthed by means of earthing the entire panel through the two earthing terminals specifically provided for this purpose.
- 5.24.5 The panel shall be equipped with a terminal block of suitable rating and all out going connections shall be brought to that terminal block. The terminal block shall have a minimum 20% spare capacity for future use.
- 5.24.6 All Panel enclosures shall have protection class of I.P. 54 as per DIN 4050 and I.E.C. regulation.
- 5.24.7 Panel boards
- 5.24.7.1 The protective devices in the boards shall be miniature circuit breakers (MCCB) in the quantities and ratings specified in the bill of quantities / drawings. The circuits shall be connected to the respective MCBs. The MCBs shall be suitable for minimum 5 KA rupturing capacity and designed for 2000 switching operation.

5.25 Earthing

- 5.25.1 All exposed non-current carrying metallic parts of the electrical equipment, and flexible conduit switch gear shall be efficiently earthed.
- 5.25.2 The earthing shall be done to comply with the following rules,
- 5.25.2.1 Indian Electricity Rules as adopted in Pakistan.
- 5.25.2.2 Section 'D' of Part of the regulations for the electrical equipment of Buildings published by the Institution of Electrical Engineers, London, 14th Edition.
- 5.25.2.3 British Standard Code of Practice No. CP.1013: 1956.
- 5.25.3 The specifications are given here as under:
- 5.25.3.1 The earthing of the individual distribution points etc., shall be done as specified exclusively and independently of the sub-station earthing.
- 5.25.3.2 For earthing of L.T. equipment, earths shall be provided with copper plate earthing electrode. The earthing connections to the Neutral point shall bear distinct indications, 'NOT TO DISCONNECT'. Excavation of the pit in the soil of the Site, refilling the pit with earth, lime and Charcoal, watering consolidation and ramming the layers to full compactness.
- 5.25.3.3 The earth shall consist of 2x2'x1/8" copper plate as specified hereafter and buried in the ground at a depth of 15 feet or more according to the moisture in the strata. Two earthing leads of the required size (circular) pipe of the size specified straight from the earth plate up to the point in the installation to the earth. A tee shall be provided at the vertical and extended in a manhole of 12"x12" size of inject water casually.

- 5.25.3.4 The earth leads shall be of soft annealed electrolytic copper strip, size 1 1/2" x 1/4" two such leads shall be brought out from each earth plate conforming to B.S.S. No.899 and shall be run in a 4" diameter hums pipe, as far as in the ground, till it enters the trench of the sub-station, where it shall be properly fixed on saddles and support.
- 5.25.3.5 The upper end of hums pipe shall be terminated in a manhole so as to inject the water for improving the earth resistance, as and when necessary.
- 5.25.3.6 The earthing leads shall be terminated on the earthing block.
- 5.25.3.7 The connection between earth lead, earth plate or earth LR lead/earth bar shall be with 3/16" diameter bolts conforming to B.S.S. NO. CP. 326.101 of 1948. The contact surface shall be silver coated before fixing and silver soldered after fixing. The connection with earth plate shall be at two distinct suitably spaced points.
- 5.25.3.8 There shall be no joint in the earthing leads between the earthing plate and earth block.
- 5.25.3.9 The earthing bar for the sub-station earth shall be cast and machined in electrolytic copper, conforming to B.S.S.I. 400. The size of earthing block shall be least 4"x12"x5/8". The earthing block shall be suitable for interconnections of two sets of earth leads 1- 1/2"x1/8" suitable number of brass bolt terminals shall be provided for terminating the earth leads from various load points as well as sheathings of all the outgoing cables.
- 5.25.3.10 The earth leads of soft annealed, electrolytic copper strip, size 1"x1/8" conforming to B.S.S. 899 shall be used to earth all the control panels installed in the sub-station and a separate lead of 1 1/2" x 1/4" for earthing neutral point. All the other equipment shall be earthed by circular copper conductors or as specified otherwise.
- 5.25.3.11 All the joints made in the strips shall be riveted in accordance with clause No. 802 of G.P. 326 101. The surface, before riveting shall be silver plated, and soldered after riveting.
- 5.25.3.12 The ends of the circular earth conductors shall be tinned after twisting, so as to ensure the minimum contact resistance throughout its useful life.
- 5.25.3.13 The earth plates, for different earth shall be buried at least 30 feet apart so that their resistance shall not overlap.
- 5.25.3.14 The shortest route to the earth electrode shall be adopted but sharp bends and joints shall in all cases be avoided. The earthing leads shall be connected to the earthing electrodes by means of sweating sockets, brass nuts, bolts and double washers so fixed to make a permanent and positive connection with the earthing electrode.
- 5.25.3.15 The maximum continuity resistance from any point in the installation including earthing leads to the earth plate shall not exceed 1 ohm. The contractor, therefore, must ensure that the earth leads are efficiently bonded to all metal works other than the current carrying parts so that the above resistance limit is not exceeded. Contractor

shall arrange testing in the presence of the Engineer as required under 'I.E.E. WIRING REGULATIONS' and submit certified copies to the Engineer.

5.26 Telephone System

5.26.1 General

5.26.1.1 The telephone system shall comprise of a Main Telephone Distribution Board, sub-telephone Distribution Boards floor mounting type telephone socket outlets. The contractor shall be responsible for furnishing and installing all the above equipment, cables conduits back boxes etc., according the specifications described herein. The Contractor shall carry out the work in accordance with the Electrical Code of Practice CP 32.101, CP 327.102 of England, to the local applicable codes and to the entire satisfaction of Telephone Department. The Contractor shall make all necessary arrangement with Telephone and Telegraph Depart for the incoming cable(s). The Contractor shall perform all the work to the satisfaction of T&T Department. The contractor shall guarantee the proper functioning and defect free working of the system for period of one year for the date the system shall be commissioned.

5.26.2 Installation Work

5.26.2.1 The installation of non-equipment work shall include delivery, unloading, uncrossing, setting in place, fastening to walls, floor, ceiling ad other structures etc., and the completed conducting according to the specifications given in conduit installation including fixing of junction/pull boxes, pulling and connecting of cables, installation of Telephone Distribution Boards. The telephone layout drawings show the floor plan of the respective floors and the conduits shall be laid above the RCC floor slab, concealed in floor finish, unless otherwise specifically shown on the drawings.

5.26.3 Telephone Distribution Boards

5.26.3.1 The telephone distribution Boards shall be made of superior quality teak wood 10mm thick and enclosed in tight fitting in black enamelled steel outer box of 16 SWG, the two being fastened together by means of nuts and bolts. A sheet steel door o 16 SWG antitrust treated and painted, with locking arrangement shall be fixed on the box. The TDB's will be either flush or surface mounting type as specified in Bill of Quantities. In case of flush mounting type TDB's, the steel door will flush with the surface of the wall.

5.26.3.2 The door shall match the wall colour. The TDBs shall be of appropriate size to accommodate terminal strips. The terminal strips fixed in the TDBS shall be made of copper. These shall be made of Telephone Industries of Pakistan.

5.26.4 Conduit and Conduit Accessories

5.26.4.1 The contractor shall furnish and install complete conduit system with associated outlet boxes and terminal boxes, so as to be complete in all respects for installation of wires and cable. Conduits shall be 1" dia. PVC. The specifications for conduit accessories remain same as given before of these specifications. At each telephone outlet location as shown on the drawings, the Contractor shall furnish heavy gauge sheet box black

enamelled inside and out and install flush with the surface of wall suitable for mounting the telephone rosette.

5.27 Sound System

- 5.27.1 The intent of this specification is to provide a complete and satisfactory operating system for the pickup, amplification, distribution and reproduction of voice and/or other audio program material. All equipment and installation material required to fulfill the above shall be furnished whether or not specifically enumerated herein or on the drawings. All necessary hookups and installation shall be by a factory approved representatives. The installation supervisor shall also instruct the personnel designated by the owner as to the correct operation of the system.
- 5.27.2 The system shall be guaranteed for a period of one (1) year from the date of acceptance, against defective materials, design, workmanship and improper adjustment.
- 5.27.3 The contractor, if requested to do so by the engineer, shall be prepared to show by "proof of performance" test that the equipment being furnished "on-the-job" is equal to or better than the equipment specifications listed herein. This proof shall be shown by actual tests and not by printed sales literature. To this end, the contractor shall provide qualified audio technicians and such tests equipment as required to perform this function.
- 5.27.4 The system of room equalization used shall be the product of a manufacturer or manufacturers who shall be properly licensed to manufacture this type of equipment and defend the contractor and owner against any patent in fragment suits.
- 5.27.5 The work herein specified shall be performed by fully competent workmen, in a thorough manner. All materials furnished by the contractor shall be new, and all work shall be completed to the satisfaction of the engineer.
- 5.27.6 At the time of submittal, the contractor shall submit a complete and accurate listing of all major items of equipment to be used in assembling the system, including all items of equipment listed under these specifications, as well as contractor's block diagrams indicating the proposed interconnection of all equipment to be furnished. A detailed listing of all proposed deviations from specifications shall be included. All modifications of standard equipment necessary to meet specifications shall be explained fully and must be accompanied by schematic diagrams.
- 5.27.7 All equipment, except portable equipment, shall be held firmly in place. This shall include loudspeakers, amplification.
- 5.27.8 All precautions shall be taken to prevent against electromagnetic and electrostatic hum, to supply adequate ventilation, and to install the equipment so as to provide maximum safety to the person who operates it
- 5.27.9 Care shall be exercised in wiring so as to avoid damage to the cables and to the equipment. All joints and connections shall be made with rosin core solder or with

mechanical connectors approved by the engineer. All wiring shall be executed strict adherence to standard broadcast practices.

- 5.27.10 The contractor shall submit to the engineer a “certificate of completion “to assure that the system has passed all the tests required in subsequent parts of this specification and is in proper operating condition. Final tests shall be made in the presence of the engineer.

SPECIFICATIONS
OF
INSTALLATION

I N D E X
FOR
SPECIFICATION OF INSTALLATION

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6. SPECIFICATION FOR INSTALLATION

6.1 General Instructions for Installation

- 6.1.1 The Contractor shall furnish all labor and materials, tools and equipment required to install, connect, test and commission all electrical equipment specified in the BOQ, whether or not such equipment is furnished by him or others. The equipment and materials to be supplied by the Owner and to be installed by the contractor shall be issued to the contractor from the site store. It shall be the complete responsibility of the contractor to check the equipment at the time of delivery from the site store, and to transport, load and lift it; and his rates shall cover all expenses for labor and equipment required.
- 6.1.2 For all the equipment to be installed by the contractor, the Contractor shall supply and install all installation materials such as foundation bolts, levelling steel, shims clamps, cable sockets, lugs, solder, wall plugs, washers, nuts and bolts etc., as required and without any additional cost.
- 6.1.3 The Contractor shall set out the works as per specifications and drawings and shall properly position the equipment on given foundation/locations. In general the manufacturers' instructions for installation shall be followed. Any defect of faulty operation of equipment due to the contractor not following the manufacturer's instruction shall be corrected and repaired by the contractor at his own cost. For any departures from the working drawings that are deemed necessary by the contractor due to site conditions, the contractor shall submit the details and obtain the Engineer's approval before starting such work.

6.2 Workmanship

- 6.2.1 A high standard of workmanship for installation is essential and all work must be carried out to the satisfaction of the Consultant / Engineer. It shall be the responsibility of the Contractor to rectify, at his own expense, any work or materials found faulty or not to the satisfaction of the Consultant / Engineer.
- 6.2.2 Particular attention shall be paid to the following:
- 6.2.2.1 General appearance and neatness of work.
- 6.2.2.2 Accessibility for maintenance.
- 6.2.2.3 No fixing shall be made to any pipeline vessel or steel work without prior permission of the Consultant / Engineer, except where shown on drawings.
- 6.2.2.4 A clearance of not less than 150mm is required between any hot surface and any cable.
- 6.2.2.5 Any unused entries on equipment shall be sealed with screwed stopper plugs.

- 6.2.2.6 All Flame proof installation and intrinsically safe circuits are to comply with VDE 0171.
- 6.2.3 Particular attention shall be paid to the location of light fittings and small electrical equipment for ease of maintenance. When it is obvious from the site conditions, that it is not possible to locate the equipment in accordance with the drawings, then reasonable adjustment may be made, subject to agreement with the Consultant / Engineer.

6.3 Concealed Conduit Runs

- 6.3.1 The conduits runs shall be concealed in ceiling, floor, slabs, column, wall et. Change in direction of conduit runs shall be made with seep bends using bending tools. Standard conduit elbows and bends may e used to facilitate installations and where conduit turn out of thin slabs Where conduit to be concealed in RCC work, the laying of conduit shall be completed in all respect before pouring of concrete. The conduit shall be laid above the bottom reinforcement steel of the slab, and shall be firmly secured by tying to the reinforcing steel in order to avoid being disturbed during he pouring of concrete. After pouring of concrete the concealed conduit shall have covering of 1-1/2: TO @” including finishing plaster.
- 6.3.2 Junction boxes pull boxes, outlet boxes et. Shall be held firmly and shall be flush with the soft of the slab or beam, et shall be appropriate.
- 6.3.3 Crossing of conduits in the slab is to be avoided as for as practicable. However, where this is impossible, the crossing shall be restored by giving a smooth bridging in the thinner of the pipes or in situation, where the site of the conduits of the two is the same the bridge shall be provided in the conduit carrying lesser number of wires..
- 6.3.4 The termination of conduits at or near the switch equipment etc. shall be coordinated with the switchgear, panel board and other equipment to be installed. Any extension of conduit near the equipment, switch etc. to suit the filed condition shall be made without any extra cost.
- 6.3.5 All conduit termination shall conform with the type of equipment enclosure to which the conduit connection are to be made. Conduit ends pointing upward or down words shall be properly plugged, in order to prevent foreign matters entering it. All opining through which concrete may leak shall be carefully plugged and boxes themselves shall be suitably protected against filling with concrete. all ends of conduits shall utilize bushed of soft material to prevent sharp edges of conduit ends from cutting or damaging the wires or cables to be pulled through them. Steel drawing in wires of 16 SWG shall amiably be provided in the entire length of conduit.
- 6.3.6 Conduit crossing expansion joints in concrete slabs shall be provided with expansion fittings to compensate the building expansion or contraction.
- 6.3.7 Where conduits have to be concealed in RCC work after pouring of concrete or in brick work, changes shall be first made with appropriate tools not to dig unduly deeper than required and not to disturb or cut the ain reinforcement steel. The conduit shall be firmly fixed into the recesses made previously and them it shall be

covered to have at least 1” cover before plastering. The work of cutting in the RCC work or brick work shall be coordinated with the civil work and Contractor shall get approval of the Consultant for the route etc. to suit the site conditions before starting chasing and cutting. Where conduit passes through the wall, holes just enough to pass the conduit shall be made with special tools.

6.4 Cleaning

6.4.1 The entire conduit system shall be tested for continuity and obstructions. Any obstruction found shall be cleared by use of cutting mandrel or other approved device, and the conduit run be cleaned out before the installation of cables.

6.5 Wire and Cable Installation

6.5.1 Every type of wiring system shall in general comply with the relevant requirements of Regulation B 1-78 of I.E.E. wiring Regulation.

6.5.2 The contractor shall furnish all material and labour to install wires and cables as listed in the schedule of quantities and as shown on Drawings. Apart from the material specified under heading Material Specification, the contractor shall provide, without any extra cost, material for terminating the wires and cables such as filling compound. Identification tags, earthing cables such as straps shall likewise be furnished for a complete wiring installation in accordance with best latest practice.

6.5.3 All wires and cable shall be arranged to provide bends of reasonably large radius, whether they are run in conduit, with radius not less than specified in Table B-1 of I.E.E. Wiring Regulation. Wiring shall be continuous between termination and use of connectors or joints will not be allowed. Looping in system shall be followed throughout.

6.5.4 Cores of the cable beyond the metallic enclosure for the purpose of termination in an outlet etc. shall be enclosed suitably as defined in Regulation B-69 of I.E.E. Wiring Regulations. No portion of the cable shall thus remain exposed.

6.5.5 Where joints in cable conductors and bare conductors are required, they shall be mechanically and electrically sound and, except in cables buried underground they shall be accessible for inspection. Joints in non-flexible cables shall be made either by soldering or by means of mechanical clamps or compression type socket which shall securely retain all the wires of the conductors.

6.5.6 Every joint in cable shall be provided with insulation not less effective than that of the cable cores. Soldering fluxes which remain acidic or corrosive at the completion of the soldering operation shall not be used.

6.5.7 Any joint in a flexible cable or flexible cord shall be affected by means of a cable coupler.

6.5.8 Cable couplers and connectors shall be mechanically and electrically sound and shrouded either in metal which can be earthed in accordance with Section D of I.E.E.

Wiring Regulations or incombustible insulating material. Where the apparatus to be connected requires earthing, every cable coupler and connector shall have adequate provision for maintaining earth continuity.

- 6.5.9 Cables of A.C. circuits installed in steel conduit shall always be so bunched that the cables of all phases and the neutral conductor (if any) are contained in the same conduit.

6.6 Exposed Wiring

- 6.6.1 The Contractor shall provide and install all cables and wires of the sizes called for in the Bill of Quantities or on Drawings as required for a complete wiring system.

- 6.6.2 Special plugs such as Raw Plugs, Phil Plugs or wooden plugs must be used for fixing wooden batten on the surfaces of walls. The wooden plugs shall be cemented into the wall to within one-fourth inches of the surface and the remainder being finished according to the nature for attaching battens to plugs. The link clips tinned brass to attach wires on battens shall be fixed at 4" interval both in the case of horizontal and vertical runs.

- 6.6.3 When passing through the walls or floors, wires or cables shall be enclosed in heavy gauge steel conduit, extending six inches above the floor and flush with the ceiling, in the case of passing through the floors. For passing through the walls, the conduit should extent 1" straight; and to be flush with the wall if the wiring run is at right angles to the wall.

- 6.6.4 All surface wiring below the switch boards or up to 6' from the floor shall be provided with suitable covering to provide effective safety against mechanical damage.

6.7 Conduit Wiring

- 6.7.1 The installation of wires and cables in conduit or G.I. pipes shall be done with care to prevent damaging the cables. To facilitate pulling cable, lubrication, only as recommended by the cable manufacturer, may be used for decreasing friction. Under no circumstances shall soap or oil of any kind be used. The cable manufacturers' specifications for minimum bending radius, pulling speed and maximum pulling tension on cables shall govern the cable pulling operations. Where several cables or wires are to occupy the same conduit, they shall be pulled together.

- 6.7.2 Additional pull boxes shall be installed in conduit runs, wherever required to limit the pulling length of cable within the recommended limits.

6.8 Cable Termination

- 6.8.1 Cables shall be terminated in a safe, neat and approved manner at the associated equipment, including that erected by others.

- 6.8.2 Compression type connectors shall be of the correct size and approved type for the conductor concerned for power, control instrument cables.

- 6.8.3 Compression tools shall be supplied for specific use on the connectors used, and shall be maintained in good order.
- 6.8.4 After compression the conductor and terminal shall form a solid mass ensuring good conducting properties and mechanical strength.
- 6.8.5 The compression jointing system used throughout the installation must be approved by the Consultant / Engineer before use.
- 6.8.6 The Contractor shall be responsible for all drilling and, if necessary, tapping entries where these have not been provided by others.
- 6.8.7 When preparing cables, prior to fitting of glands, the gland manufacturer's instructions for cable preparation shall be observed. In all cases where armored cables are used, care shall be taken to ensure that the layer of the armor is maintained after the gland is completely fitted.
- 6.8.8 Cables ends, which are not terminated immediately after cutting, shall be sealed effectively to prevent ingress of moisture and shall be protected from damage until termination.
- 6.8.9 For all cables above 6mm² in section if a substantial mechanical clamp is not provided a compression type lug or socket shall be provided.
- 6.8.10 At all equipment, including motors, cables shall be installed and terminated so that no strain is imposed on the cable or gland and due allowance made to counter the effect of vibration.
- 6.8.11 At all terminations, an ample length of 'tail' shall be left.
- 6.8.12 At the switchboard and motor starter cubicle, cable glands shall be connected to the gland plate and the under armor sheath shall be retained for the run within the cubicle from the gland to where the cable enters the switchgear or starter.
- 6.8.13 Where joints in cable conductors and bare conductors are required, they shall be mechanically and electrically sound and, except in cables buried underground, they shall be accessible for inspection. Joints in non-flexible cables shall be made either by soldering or by means of mechanical clamps or compression type socket which shall securely retain all the wires of the conductors.
- 6.8.14 Any joint in a flexible cable or flexible cord shall be affected by means of a cable coupler.
- 6.8.15 Cable couplers and connectors shall be mechanically and electrically sound and shrouded either in metal which can be earthed in accordance with Section D of I.E.E. Wiring Regulations or incombustible insulating material. Where the apparatus to be connected requires earthing, every cable coupler and connector shall have adequate provision for maintaining earth continuity.

- 6.8.16 Cables of A.C. Circuits installed in steel conduit shall always be so bunched that the cables of all phases and the neutral conductor (if any) are contained in the same conduit.

6.9 Conduit Installation

6.9.1 Conduit System – General

- 6.9.1.1 Conduit shall be heavy gauge steel or galvanize as specified in B.O.Q. or drawing. The minimum size of conduit shall be 20 mm.
- 6.9.1.2 The use of solid or inspection elbows bends or tees will not be permitted and 120 bends shall be limited to one between any two drawn-in boxes.
- 6.9.1.3 Conduit coupling joints shall not be used where conduits enter spout entry conduit boxes.
- 6.9.1.4 Conduit running joints shall not be used where conduits enter conduit boxes or spout entry boxes.
- 6.9.1.5 Equipment that is required to be removed for maintenance shall be provided with conduit unions in all conduits that enter such equipment.
- 6.9.1.6 The use of conduit nipples shall be avoided as far as practicable.
- 6.9.1.7 All conduits shall be cut square and reamed at the end. All conduit ends and the inside of conduits shall be clean and free from burrs.
- 6.9.1.8 Where bushed spouts or tapped holes are not provided at conduit termination, the conduit shall be terminated in a flanged socket and a smooth bore brass hexagon bush, with a lead washer fitted between the flanged socket and the equipment or box.
- 6.9.1.9 All exposed threads and parts where the galvanizing has become damaged shall be thoroughly cleaned and painted with galvanized paint. The exposed conduit ends shall be capped to protect threads from being damaged before installing cables.
- 6.9.1.10 Repair painting shall take place before any making good work on site is carried out.
- 6.9.1.11 The lids of all boxes, including motor terminal boxes, etc., which rely on machined face metal to metal joints, shall be lightly smeared and greased to prevent corrosion and to ensure water-tightness.
- 6.9.1.12 Joints in underground conduits shall be avoided or reduced to the absolute minimum.
- 6.9.1.13 Where adjustable threading die are used, they shall be so adjusted that threads cut with them shall be the same depth as machine made threads.

6.9.2 Fixing Conduits and Fitting

- 6.9.2.1 Conduits in process units and on steelworks shall be fixed with “U” bolt type fixings.
- 6.9.2.2 Conduits in buildings shall be fixed with galvanized distance saddles.
- 6.9.2.3 Where a number of conduits follow a single route they may be fixed on mild steel brackets.
- 6.9.2.4 Conduits shall be supported on both vertical and horizontal runs as follows.
- Conduit sizes 20mm and 25mm maximum spacing of fixing 1200mm.
 - Conduit sizes larger than 25mm maximum spacing of fixing 1800mm.
- 6.9.2.5 All conduit boxes that support fittings shall be securely fixed.
- 6.9.2.6 All conduits shall be fixed 150mm before and after every right angle or off set.
- 6.9.2.7 All conduit fittings and equipment shall be fixed true and lineable.
- 6.9.2.8 All conduit bends shall be made with an approved conduit bending machine or hickey. The radius of curvature of the inner edge of any bend shall not be less than, as per the following table:

<u>Conduit Size</u>	<u>Radius</u>
20mm (3/4’’)	Not less than 130mm
25 mm (1’’)	Not less than 150 mm
36mm (1-1/4’’)	Not less than 200mm
42mm (1-1/2’’)	Not less than 255 mm
54mm (2’’)	Not less than 305 mm
70 mm (2-1/2’’)	Not less than 380 mm
82mm (3’’)	Not less than 460 mm
100mm (4’’)	Not less than 610 mm

- 6.9.2.9 Underground conduit stud-up or kick pipe through concrete envelop shall be extended a minimum of 150mm above grade and adequately braced to prevent shifting during concrete pouring work. The concrete envelop shall extend at least 76mm above grade.

6.9.3 Location of Conduits and Fittings:

- 6.9.3.1 Before conduits are installed, confirmation shall be obtained that the conduit may be installed in that position.
- 6.9.3.2 Particular attention shall be given to the location of conduits to prevent the infringement of headroom and access ways.
- 6.9.3.3 Conduits shall be located to avoid obstructions, furnaces, hot lines and other places of high temperature.
- 6.9.3.4 Conduit shall not be located closer than 150mm (6") where it runs parallel to or crosses hot surfaces.
- 6.9.3.5 Underground conduit runs shall be kept to a minimum in both number and length.
- 6.9.3.6 Conduits shall not be recessed in fair face brick work.
- 6.9.3.7 Draw boxes shall be so positioned to enable the cables to be drawn in easily and boxes shall not be located in the corners or other such locations and shall be positioned to avoid tight bends, bending and cable tanks.
- 6.9.3.8 Conduits shall not generally be installed having a greater length than 12,000mm (40 feet) between drawn in boxes.
- 6.9.3.9 Conduit entries shall wherever possible be located in the bottom of boxes and equipment etc.

6.10 Light Fitting Installation

- 6.10.1 Luminaires shall be of the type specified in the drawings and BOQ.
- 6.10.2 The mounting heights and location of the luminaires are to be as shown on the drawings but the Contractor shall allow for and make any small variations in position as required by site conditions. Large changes in position must be approved by the Consultant / Engineer.
- 6.10.3 No luminaires shall be installed directly above a moving machine.
- 6.10.4 Glasses and reflectors must be in a clean condition after installation and the correct type and wattage of lamp fitted.
- 6.10.5 The Contractor is to manufacture, place in position and erect all lighting supports and brackets, and connect feeder cables, and install fittings as shown on the drawings.
- 6.10.6 Where conduits are used for the lighting installation they shall conform with the stated requirements for conduits and accessories.

- 6.10.7 Special attention is required for the final positioning of lighting fittings to allow for ease of maintenance in the future.
- 6.10.8 All light fittings shall be earthed by an earth wire connected to the earth terminal in the fitting. This wire shall be included in the lighting circuit cable which is to be earthed to the nearest earthing point.
- 6.10.9 Self-contained emergency light fittings shall take power from the socket outlet adjacent to the light fittings or as shown in the drawing.

6.11 Installation of Panels Boards

- 6.11.1 Floor mounting type panels shall be installed at places indicated on drawings.
- 6.11.2 All labour, equipment, tools as well as all shims of steel required to set the switchgear in level are to be provided.
- 6.11.3 The panel shall be fixed firmly on the floor according to the manufacturers recommendations.
- 6.11.4 All outgoing and incoming cable connections shall be made and special care should be taken in fixing cable boxes and lead connections so as to have no danger of leakage during operation.
- 6.11.5 Surface and recessed mounting type panel boards shall be installed at 6' height from finished floor level unless otherwise shown on drawings.
- 6.11.6 Appropriate conduit entry holes shall be made in the panels and when the incoming and outgoing conduits enter the panel boards, metal, rubber, PVC or wooden bushes shall be fixed to avoid danger to pulling cables.
- 6.11.7 All cable connections to circuit breakers, switches, etc., shall be made neatly and firmly to ensure good contact.
- 6.11.8 The Panel shall be painted after applying anti-corrosive base paint and finished in enamel paint of high grade in light grey shade or as desired by the Engineer.

6.12 Earthing Installation

6.12.1 General

- 6.12.1.1 A complete earthing system as shown on drawing shall be installed by the Contractor. The system shall give earth resistance, including the resistance of soil, earth leads and E.C.C. equal to or less than 1 ohm.
- 6.12.1.2 The Contractor shall supply and install all installation material such as sockets, thimbles, lamps, saddle, pins, nuts, bolts, washers, copper brazing etc, without and

addition to At all connection of earth continuity conductor to body of transformer, switch board, cable end boxes or any other metallic body, proper size copper or brass sockets, thimble or lug shall be used to which the copper wire shall be welded by copper brazing. Soldering of copper wire at joins or termination shall not be allowed. At main earth loop copper conductor all tee-off connections shall be copper brazing. After brazing the joint surface shall be protected by oxide inhibiting compound of low electrical resistance. For connection to metallic body the surface shall be thoroughly cleaned to the bright metal surface before bolting the lug or socket. Transformer body, switchboard body, bus-duct cover etc. shall be connected at least two points by two independent earth wires tapped from the main loop or from the earth connecting point.

6.12.1.3 The copper earth wire shall be generally run exposed on the surface of wall, cable trench or cable trays. For under floor runs these shall be installed in steel conduit of appropriate sizes except where laid along under ground cables.

6.12.2 Earth Electrode:

6.12.2.1 For installation of earth electrode, a pit of 1500 mm. diameter and up to the depth of 4.5 meters or as decided at site shall be first executed in the bare ground.

6.12.2.2 The earth electrode shall be installed upright in the pit and shall be surrounded by charcoal and sand in 3:1 ratio in 1500 mm diameter around the pipe & electrode up to 3000 mm depth of the pit and packed hard.

6.12.2.3 The remaining pit shall be back filled with excavated earth rammed and tamped in layers. At the ground level an inspection chamber of 1:2:4 cement concrete as shown on the drawing shall be constructed. The inspection chamber shall be covered with heavy duty R.C.C.C cover to finish flush with the general ground level.

6.12.3 Earth Continuity Conductor

6.12.3.1 The earth continuity conductor of sizes shown on the drawing shall be installed all along the cable trenches, cable runs on overhead trays and in steel conduits. This shall be connected to switch boards body at ends. The E.C.C. when installed in under floor R.C.C. cable trench or cable trays shall be fixed within the power cable.

6.13 LT. Switch Gear Installation

6.13.1 The L.T. switchgear shall be installed in the Distribution Station location shown on the drawings. The cable trenches and cement concrete supports shall be constructed by the civil contractor. This contractor shall provide foundation bolts and route them in cement concrete floor as required. All installation material for physically erecting the switch board such as bolts, nut, washers, supporting steel etc., shall be provided and installed upright and in level and shall be firmly and rigidly bolted on the floor and concrete supports.

6.13.2 The switch board shall be completely assembled and erected as per manufacturer's instructions and as approved by the Engineer. Loose parts dispatched by the manufacturer's shall be installed and connected as per assembly drawing provided by

the manufacturer. Any safety locking of meters, etc provided by the manufacturer for safe transport shall be released only after the switch board is erected in position.

- 6.13.3 The connection of bus bar on the incoming side of Air Circuit breakers shall be made and checked for tightness before bus duct cover are installed. The outgoing cable shall be connected as shown on drawings.
- 6.13.4 The switch board body shall be connected to earth as per instruction given in section “ Earthing “ of these specifications.
- 6.13.5 The L.T. switchgear shall be The switch board shall be tested and commissioned in the presence of the Engineer. The test must be carried out s specified.

SPECIFICATIONS

FOR

TESTING

I N D E X
FOR
SPECIFICATION OF TESTING

<u>Articles</u>	<u>Description</u>	<u>Page</u>
7.1	General	TES-1
7.2	Insulation Resistance Tests	TES-1
7.3	Erthing Resistance Tests	TES-2
7.4	Switches	TES-2
7.5	Protective Relays	TES-2
7.6	Completed Tests	TES-2

7. SPECIFICATION FOR TESTING

7.1 General

- 7.1.1 Upon completion of the installation, the contractor shall perform field tests on all equipment, materials and systems. All tests shall be conducted in the presence of the Engineer for the purpose of demonstrating equipment or system compliance with specifications.
- 7.1.2 The Contractor shall furnish, install and maintain all tools instruments, test equipment, materials, etc., and furnish all personnel including supervision and “Stand by” labor required for the testing, setting and adjustment of all electrical facilities and their components parts, including putting the same in operation.
- 7.1.3 All tests shall be made with proper regard for the protection of the equipment and the Contractor shall be responsible for adequate protection to all personnel during such tests.
- 7.1.4 The Contractor shall record all test values of the tests made by him on all equipment, giving both “as found” and “as left” conditions. Three (3) copies of all tests data shall be given to the Engineer for record purposes. The witnessing of any tests by the Engineer does not relieve the contractor of his guarantees for materials, equipment and workmanship as specified in the condition of contract.

7.2 Insulation Resistance Tests

- 7.2.1 Insulation resistance tests shall be made on all electrical equipment by a meager of 1000 volts.
- 7.2.2 The insulation resistance values of cables, transformers and switchgear, etc., shall be as per B.S.S. and Pakistan Electricity Rules.
- 7.2.3 Before making connections at the ends of each cable run, the insulation resistance measurement tests of each cable shall be made. Each conductor of a multi-core cable shall be tested individually with each other conductor of the group and also the earth. If insulation resistance test readings are found to be less than the specified minimum in any conductor, the entire cable shall be replaced and the new cable tested.
- 7.2.4 All transformers and switchgears shall be given an insulation resistance measurement tests to ground after insulation but before any wiring is connected. Insulation test shall be made between open contacts of circuit breakers, switches and between each phase and earth. If the insulation resistance of the circuit under test is less than that specified above, the cause of the low reading shall be determined and removed. Corrective measures shall include dry-out procedure by means of heaters if measures become necessary and the insulation resistance readings become necessary and the insulation resistance readings taken after the correction has been made, satisfy the requirements specified herein, repeated insulation resistance measurements shall be

made twice and at least 12 hours apart. The maximum range for each reading in the three successive tests shall exceed 20% of the average value. After all tests have been the equipment shall be reconnected.

7.3 Earthing Resistance Tests

- 7.3.1 Earth resistance tests shall be made by the Contractor on the earthing system, separating and reconnecting each earth connecting as may be required by the Engineer.
- 7.3.2 If it is indicated at solid treatment or other corrective measures are required to lower the ground resistance values, the Engineer will determine the extent of such corrective measures.
- 7.3.3 The electrical resistance of the E.C.C. together with the resistance of the earthing load measured from the connection with earth electrode to any other position in the completed installation shall not exceed one ohm.
- 7.3.4 Earth resistance tests shall be performed as per electric Inspector's requirements, where more earthing sets than one are installed, the earth resistance tests between two sets shall be measured by means of Resistance Bridge Instrument. The earth resistance between two sets shall not exceed one ohm.

7.4 Switchgears

- 7.4.1 Each circuit breaker shall be operated electrically and mechanically, ascertaining that handle mechanisms are operating. All inter lock control circuits shall be checked for proper connections in accordance with the wiring diagrams given by the manufacturers.
- 7.4.2 The contractor shall identify the phase of all switch-gear and power cables by stenciling the switchgear and tagging the cables so that the phases can be identified for connection to give proper phase sequence.

7.5 Protective Relays

- 7.5.1 Protective relays shall be set and calibrated and tests points recorded. Trip circuit shall be tested for proper operation. C.T. secondary circuit shall be energized and operation of the relays observed.

7.6 Completed Tests

- 7.6.1 After any equipment has been tests, checked for operation etc., and is accepted by the Engineer, the Contractor shall be responsible for the proper protection of the equipment so that subsequent testing of other equipment of system does not disturb the completed work.

BILL OF QUANTITIES

I N D E X**OF****MISC. LISTS AND BILL OF QUANTITIES**

<u>SL.NO.</u>	<u>DESCRIPTION</u>	<u>PAGE</u>
1.	List 'A' - Special Notes	LT-1 to LT-1
2.	List 'B' - List of approved Materials	LT-2 to LT-2
3.	List 'C' - List of Drawings	LT-3 to LT-3
4.	Bill of Quantities FOR Internal Electrification Works	
	Section 'A' Internal Electrification	Page-1/16
	Section 'B' Lighting, Fitting and Fixtures	Page-2/16
	Section 'C' Distribution Boards	Page-2/16
	Section 'D' Earthing	Page-4/16
	Section 'E' Telephone System	Page-4/16
	Section 'F' Call Bell System	Page-5/16
	Summary of Cost	Page-6/16
5.	Bill of Quantities FOR External Electrification Works	
	Section 'A' External Electrification	Page-7/16
	Section 'A' Distribution Boards & Feeder	Page-8/16
	Section 'B' Main Feeder Cables	Page-8/16
	Summary of Cost	Page-9/16
6.	Bill of Quantities FOR Computer Networking	
	Section 'A' Installation & Wiring of Multi Outlet Boxes	Page-10/16
	Section 'B' Distribution Boards & Feeders	Page-11/16
	Summary of Cost	Page-12/16

LT-1

LIST -A**SPECIAL NOTES**

1. All works shall be carried out as per Public Works Department Handbook, specifications as currently adopted by Government of Sindh or as directed by and to satisfy the requirement of the Government Electrical Inspector.
2. Rates quoted shall include clearance of Site (prior to commencement of works) and at its work under all respect and hold good work under all conditions at Site.
3. Contractors shall quote rates on item rates (non-schedule items) giving rates in figures and words and giving total according to estimated quantity for each item and total works.
4. The rates shall include charges for cartage to and from any distance. No claim shall be entertained or increase of rates allowed on this account.
5. The equipment and material to be used by the Contractor to be specified and approved by the Consultant.
6. All the quantities related with cables given in Bill of Quantities are approximate. It is the responsibility of the Contractor to determine the actual quantities. Payment shall be made against the quantities actually used at site and according to measurements.
7. The Contractor will place the order for all the material to be used at site and in his scope of works well in tie so that delivery of these materials should not effect the schedule of completion of works. No excuse for the late delivery of the materials by other manufacturers shall be accepted in this regard.
8. The Contractor shall include in his rate the cost of cable accessories such as copper lugs, glands, cable end box etc., wherever required. Increase in rate(s), will not be possible after approval of rate(s) and during excavation of work.
9. For extra works carried out according to instructions of the Owners and/or Consultants, or their representatives, the rates claimed for these works will be approved by the Owner/Consultants after mutual discussion with the Contractor.
10. For extra works carried out according to instruction of the Owners and/or Consultants, or their representatives, the rates claimed for these works will be approved by the Owner/Consultants after mutual discussions with the Contractor.
11. Contractors are advised to visit and understand the quantum of work unvalued in existing areas before filling the B.O.Q.

LT-2

LIST -B**LIST OF APPROVED MATERIALS**

<u>S.No.</u>	<u>Description</u>	<u>Manufacturer/Brand Name</u>
1.	Cable	Pakistan Cables / Pioneer Cables / AGE / Newage.
2.	Wires.	Pakistan Cables / Pioneer Cables / AGE / Newage.
3.	Conduit:	
	(a) Steel Conduit	Hilal Ind. Ltd. / I.I. L / Steelex.
	(b) PVC Conduit	Galco / Civic / Jedah Polymer
4.	Pipes	
	(a) G.I. Pipe	Karachi Pipe Mills Ltd. / I.I.L
5.	Switches	P.P.I. / Switchkid
6.	Switch-socket outlet	P.P.I. / Switchkid
7.	Circuit Breakers	Terasaki / Schneider Electric / Siemens / Fuji / ABB / LS / Himmel / Chint
8.	Light Fittings	Philips Ind. / Sunlight / Pierlite
9.	Lighting /Power Distribution Boards	Siemens / Schneider Electric / Libra / Sunbeam / Elmetec / Hussain & Co. / Baber Brothers
10.	Bus bar	99.99% pure copper, 100% IACS rated
11.	Fans	Millat / Asia / Pak Fan (Gujrat)
12.	Sound System	Bosch / Toa
13.	Telephone Cable	Clipsal / Pony (Japan) / Pakistan Cable / 3 M
14.	CAT Cable	Clipsal / 3 M / Panduit / Vivanco
15.	Data outlet	Clipsal / 3 M / MK / Panduit / Vivanco

LT-3

LIST -C

LIST OF DRAWINGS

<u>S. NO.</u>	<u>DRG NO</u>	<u>DESCRIPTION</u>
1.	E-01	Legend, General Notes, & Earthing Details (Rev. 1)
2.	E-02	Lighting Layouts for Ground Floor (Rev. 4)
3.	E-03	Lighting Layouts for First Floor. (Rev. 4)
4.	E-04	General Power Layouts for Ground Floor. (Rev. 2)
5.	E-05	General Power Layouts for First Floor. (Rev. 2)
6.	E-06	Computer Power Layouts for Ground Floor. (Rev. 2)
7.	E-07	Computer Power Layouts for First Floor. (Rev. 2)
8.	E-08	Computer Data Layouts for Ground Floor. (Rev. 2)
9.	E-09	Computer Data Layouts for First Floor. (Rev. 2)
10.	E-12	Telephone Layouts. (Rev. 1)
11.	E-14	Sound System Layouts (Rev. 1)
12.	E-15	Main Feeder Layouts (Rev. 2)
13.	Sc-E-01	Schematic Diagram for Chemical Engg. Dept. (Rev. 1)
14.	Sc-E-02	Schematic Diagram for Chemical Engg. Dept. (Rev. 1)

**BILLS OF QUANTITIES FOR
INTERNAL ELECTRICAL WORKS OF
CHEMICAL ENGINEERING DEPARTMENT
QUEST, NAWABSHAH**

Section "A" Internal Electrification

S.No.	ITEM DESCRIPTION	QTY	UNIT	UNIT RATE (Rs)	TOTAL AMOUNT (Rs)
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Part I : Items based on Schedule Rates 2012

				S/R	
1.	Supply & Wiring for Main or Sub-Main with 3-2.5mmsq. (3-7/.029) S/C, PVC insulated, Cu cables in 3/4" dia PVC conduit recessed in the wall or column as required. Complete in all respect with all accessories. (Lighting Circuit) (SI#24 Page # 04)	1450	Mtrs.	294.00	426,300.00
2.	Supply & Wiring for Main or Sub-Main with 3-4mmsq. (3-7/.036) S/C, PVC insulated, Cu cables in 3/4" dia PVC conduit recessed in the wall or column as required. Complete in all respect with all accessories. (Power Circuit) (SI#25 Page # 04)	2000	Mtrs.	338.00	676,000.00
3.	Supply & Wiring for light or fan point with 2-1.5mmsq. (2-3/.029) PVC insulated wire in 20mm (3/4") PVC conduit recessed in the wall or column as required. Complete in all respect with all accessories (SI#124 Page # 15)	730	Nos.	1,130.00	824,900.00
4.	Providing & fixing one way, S.P., 5A flush type Switch on a given prepared board. Complete in all respect with all accessories including back-box and face-plate. (SI# 219 Page#33)	730	Nos.	54.00	39,420.00
5.	Providing and fixing of flush type, three pin, 5 Amps, S.P., plug socket, switch and shoe unit. Complete in all respect with all accessories including face-plate and back-box. (SI # 226 Page # 33)	130	Nos.	151.00	19,630.00
6.	Providing, fixing and connecting of flush type, 3 pin, 10/15A, S.P., plug socket, switch and shoe unit. Complete in all respect with all accessories including face-plate and back-box. (SI # 227 Page # 33)	30	Nos.	162.00	4,860.00
7.	Supply & Wiring for Main or Sub-Main with 2-6mmsq. (2-7/.044) S/C, PVC insulated, Cu cables + 1-6mmsq. Insulated ECC in 3/4" dia PVC conduit recessed in the wall or column as required. Complete in all respect with all accessories. (Power Circuit) (SI#11 Page # 02)	1150	Mtrs.	341.00	392,150.00

Note:

For any Variation arising between the above stated BOQ items and its respective Schedule Rate items (as per Government of Sindh), the same is to be adjusted accordingly in the "Premium on Schedule Rate".

COST OF PART "I"	(Rs.)		2,383,260.00
PREMIUM ON SCHEDULE RATE	(Rs.)	(@ _____)	_____
TOTAL COST OF PART 'I'	(Rs.)		=====

Part II : Items based on Non-Schedule Rates

8.	Providing & Fixing of Back Boxes for switches & socket outlets. To be complete in all respect with all accessories.	950	Nos.		_____
9.	Providing & fixing of 20A, DP, Safety Breaker / Isolator for A/C.	50	Nos.		_____
TOTAL COST OF PART 'II'				(Rs.)	_____
TOTAL COST OF SECTION "A" (PART I +PART II)				(Rs.)	=====

Section "B" Light Fittings & Fixtures

S.No.	ITEM DESCRIPTION	QTY.	UNIT	UNIT RATE (Rs)	TOTAL AMOUNT (Rs)
1.	Providing, installing, fixing and connecting of following light fixtures with lamps, chokes, starters, capacitors etc., complete with all internal connections and all fixing and mounting accessories. Jobs includes rod and wiring as given in drawing.				
1.1	Philips make or equivalent light fitting TMS-228 with 2x28 W 'T5' fluorescent lamps having high frequency and high efficiency electronic ballast, complete in respect with all accessories.	300	Nos.		
1.2	Philips make or equivalent light fitting TMS-128 with 1x28 W 'T5' fluorescent lamp having high frequency and high efficiency electronic ballast, complete in respect with all accessories.	20	Nos.		
1.3	Philips make or equivalent light fitting TMS-114 with 1x14 W 'T5' fluorescent lamp (for mirror light) having high frequency and high efficiency electronic ballast, complete in respect with all accessories.	30	Nos.		
1.4	Philips make or equivalent Surface-Mounted Downlighter FCS-120 with 11W CFL lamp having diecast aluminium housing with glass cover. To be approved by Client.	40	Nos.		
1.5	Philips make or equivalent Surface-Mounted Downlighter FCS-145 with 1x24W CFL lamp having diecast aluminium body. To be approved by Client.	100	Nos.		
1.6	Philips make or equivalent Fancy Wall bracket light fixture with 1x24 W CFL lamp. To be approved by Client.	5	Nos.		
1.7	Philips make or equivalent false ceiling type LED Downlighter "Green Space" BBS-181 with 15W LED Lamps, complete in all respect with all accessories. To be approved by Client.	65	Nos.		
1.8	Philips make or equivalent false ceiling type LED Downlighter "Green Space" BBS-180 with 9W LED Lamps, complete in all respect with all accessories. To be approved by Client.	20	Nos.		
2.	Providing, installing and connecting of following fans:				
2.1	Millat make or equivalent 56" sweep ceiling fan complete with fan dimmer, canopy, down rod, etc. including fixing of fan dimmers and making holes on both sides of down rod and wiring it with 1.5mm ² twin core., 450/750V grade PVC/PVC + 1-1.5mm ² ECC cable, etc. and also providing of 16mm dia mild steel fan hook on RCC roof or beam as required, complete in all respects with all accessories.	160	Nos.		
2.2	Millat make or equivalent 18" Wall Bracket fan, complete in all respect with all accessories including repairing good the damages.	45	Nos.		
2.3	Millat make or equivalent 12" sweep exhaust fan, complete with capacitors including making of hole in wall to accommodate the fan & repairing good the damages.	15	Nos.		
TOTAL COST OF SECTION "B"			(Rs.)		

Section "C" Distribution Boards & Feeders

S.No.	ITEM DESCRIPTION	QTY.	UNIT	UNIT RATE (Rs)	TOTAL AMOUNT (Rs)
1.	Providing, installing, connecting & commissioning of the following Distribution Boards (DBs) fabricated of 14 SWG steel clad, cubical design with hinged door cover, wall (recessed) mounted, factory assembled, suitable for 3 phase, 4 wire, 500 volts, 50 Hz A.C. Power Supply complete with copper cable lugs, glands, neutral link, earth block, terminal block etc., & having following configurations. (All equipment rated to 5 kA short circuit rating and 50°C ambient temperature at 415V). Panel enclosure to comply with min. IP-44.				

Section "C" Distribution Boards & Feeders

S.No.	ITEM DESCRIPTION	QTY.	UNIT	UNIT RATE (Rs)	TOTAL AMOUNT (Rs)
1.1	<u>LDB - G1 (GROUND FLOOR)</u> Short Circuit Rating 7.5kA (Ics) @ 400V Incoming 1 - 30 A, T.P., M.C.C.B 3 - Phase (R.Y.B) indication lamps. Outgoing 12 - 10 A, S.P., M.C.B.s 12 - 15 A, S.P., M.C.B.s	1	No.		_____
1.2	<u>LDB - G2, - G3 (GROUND FLOOR)</u> Short Circuit Rating 7.5kA (Ics) @ 400V Incoming 1 - 80 A, T.P., M.C.C.B 3 - Phase (R.Y.B) indication lamps. Outgoing 12 - 10 A, S.P., M.C.B.s 06 - 15 A, S.P., M.C.B.s 12 - 20 A, S.P., M.C.B.s	2	Nos.		_____
1.3	<u>LDB - G4 (GROUND FLOOR)</u> Short Circuit Rating 7.5kA (Ics) @ 400V Incoming 1 - 80 A, T.P., M.C.C.B 3 - Phase (R.Y.B) indication lamps. Outgoing 09 - 10 A, S.P., M.C.B.s 15 - 15 A, S.P., M.C.B.s 09 - 20 A, S.P., M.C.B.s	1	No.		_____
1.4	<u>LDB - F1 (FIRST FLOOR)</u> Short Circuit Rating 7.5kA (Ics) @ 400V Incoming 1 - 30 A, T.P., M.C.C.B 3 - Phase (R.Y.B) indication lamps. Outgoing 12 - 10 A, S.P., M.C.B.s 12 - 15 A, S.P., M.C.B.s	1	No.		_____
1.5	<u>LDB - F2, - F3 (FIRST FLOOR)</u> Short Circuit Rating 7.5kA (Ics) @ 400V Incoming 1 - 80 A, T.P., M.C.C.B 3 - Phase (R.Y.B) indication lamps. Outgoing 12 - 10 A, S.P., M.C.B.s 06 - 15 A, S.P., M.C.B.s 12 - 20 A, S.P., M.C.B.s	2	Nos.		_____
1.6	<u>LDB - F4 (FIRST FLOOR)</u> Short Circuit Rating 7.5kA (Ics) @ 400V Incoming 1 - 30 A, T.P., M.C.C.B 3 - Phase (R.Y.B) indication lamps. Outgoing 06 - 10 A, S.P., M.C.B.s 06 - 15 A, S.P., M.C.B.s 06 - 20 A, S.P., M.C.B.s	1	No.		_____
1.7	<u>LDB - F5 (FIRST FLOOR)</u> Short Circuit Rating 7.5kA (Ics) @ 400V Incoming 1 - 30 A, T.P., M.C.C.B 3 - Phase (R.Y.B) indication lamps. Outgoing 09 - 10 A, S.P., M.C.B.s 15 - 15 A, S.P., M.C.B.s	1	No.		_____

Section "C" Distribution Boards & Feeders

S.No.	ITEM DESCRIPTION	QTY.	UNIT	UNIT RATE (Rs)	TOTAL AMOUNT (Rs)
2.	Providing, laying & connecting of PVC/PVC 600/1000V grade copper conductor cable from LT Panel to the respective Distribution Boards (DBs), recessed in the RCC or on surface / concealed in wall or column as required, complete in all respect with all fixing and termination accessories and entire satisfaction of Consultant / Owner.				
2.1	6mm ² , 4Core, PVC/PVC + 2-6mm ² ECC in 38mm dia rigid PVC conduit in ground / floor as required from LT Panel.	55	Mtr.		
2.2	10mm ² , 4Core, PVC/PVC + 2-10mm ² ECC in 38mm dia rigid PVC conduit in ground / floor as required from LT Panel.	35	Mtr.		
2.3	16mm ² , 4Core, PVC/PVC + 2-16mm ² ECC in 38mm dia rigid PVC conduit in ground / floor as required from LT Panel.	165	Mtr.		
2.4	25mm ² , 3.5Core, PVC/PVC + 2-16mm ² ECC in 50mm dia rigid PVC conduit in ground / floor as required from LT Panel.	55	Mtr.		
TOTAL COST OF SECTION "C"			(Rs.)		

Section "D" Earthing

S.No.	ITEM DESCRIPTION	QTY.	UNIT	UNIT RATE (Rs)	TOTAL AMOUNT (Rs)
1.	Providing, making and testing of earth points with 2' x 2' x 1/8" thick copper plate buried 5 meter deep or to the depth of permanent water level whichever is less covered with charcoal and lime in specified ratio confirming to specification and drawing.	2	Job		
2.	Providing, drawing, connecting & testing of 2-70mm ² bare copper conductor as earthing leads in 32mm dia G.I. pipe buried in ground or connected in R.C.C. or masonry as required from Panel Board to the earth plate including making of 18"x18" cement concrete chamber duly plastered and cover with R.C.C. Slab, including, providing & fixing of plug for watering, complete with all accessories and fasteners and as per drawing & specifications.	2	Job		
3.	Providing, fixing and connecting of 200 x 200 x 5 mm thick copper earth terminal blocks.	1	Job		
4.	Providing, drawing, connecting & testing of 2-70mm ² insulated copper conductor as earthing leads in 32mm dia PVC pipe buried in ground or connected in R.C.C. or masonry as required from Earth Terminal Block to the Main Distribution Board, complete with all accessories and fasteners and as per drawing & specifications.	20	Mtr.		
5.	Supply & Wiring of Earthing Copper Conductor (ECC) for light or fan point with 1-1.5mmsq. (1-3/.029) PVC insulated wire in 20mm (3/4") PVC conduit recessed in the wall or column as required. Complete in all respect with all accessories.	4500	Mtr.		
TOTAL COST OF SECTION "D"			(Rs.)		

Section "E" Telephone System

S.No.	ITEM DESCRIPTION	QTY.	UNIT	UNIT RATE (Rs)	TOTAL AMOUNT (Rs)
1.	Providing, installing and connecting of one pin telephone socket outlet with back box recessed on wall complete with all accessories.	40	Nos.		
2.	Providing & wiring of telephone outlets with 1-3 pair telephone wire in 25mm dia, rigid PVC conduit concealed in R.C.C. or masonry as required, complete in all respects with all accessories.	800	Mtrs		

Section "E" Telephone System

S.No.	ITEM DESCRIPTION	QTY.	UNIT	UNIT RATE (Rs)	TOTAL AMOUNT (Rs)
3.	Providing, installing and connecting and testing of the following size approved telephone junction box up of 18 SWG sheet steel, with hinged door cover with locking arrangement, with inner lining of 12mm thick teak wood. Complete in all respects.				
3.1	15 pair TJB-G1 on Ground Floor.	1	No.		_____
3.2	10 pair TJB-F1 on First Floor.	1	No.		_____
3.3	50 pair MTJB on Ground Floor.	1	No.		_____
4.	Providing, installing and connecting of following multi-core, telephone cable in 25mm dia in rigid PVC conduit / G.I. pipe concealed in R.C.C. or masonry or buried in ground as per required, complete in all respects with all accessories.				
4.1	20 pair Multicore cable	20	Mtrs		_____
4.2	15 pair Multicore cable	25	Mtrs		_____
4.3	10 pair Multicore cable	35	Mtrs		_____
TOTAL COST OF SECTION "E"			(Rs.)		=====

Section "F" Call Bell System

S.No.	ITEM DESCRIPTION	QTY	UNIT	UNIT RATE (Rs)	TOTAL AMOUNT (Rs)
Part I : Items based on Schedule Rates 2012					
				S/R	
1.	Supply & Wiring for call bell point with 2-1.5mmsq. (2-3/029) PVC insulated wire in 20mm (3/4") PVC conduit recessed in the wall or column as required. Complete in all respect with all accessories (SI#128 Page # 15)	19	Nos.	1,764.00	33,516.00
Note: For any Variation arising between the above stated BOQ items and its respective Schedule Rate items (as per Government of Sindh), the same is to be adjusted accordingly in the "Premium on Schedule Rate".					
COST OF PART "I"			(Rs.)		33,516.00
PREMIUM ON SCHEDULE RATE			(Rs.)	(@ _____)	_____
TOTAL COST OF PART 'I'			(Rs.)		=====
Part II : Items based on Non-Schedule Rates					
9.	Providing & Fixing of Call Point for Call Bell System. To be complete in all respect with all accessories.	19	Nos.		_____
10.	Providing & Fixing of Call Bell for Call Bell System. To be complete in all respect with all accessories.	19	Nos.		_____
TOTAL COST OF PART 'II'			(Rs.)		_____
TOTAL COST OF SECTION "F" (PART I +PART II)			(Rs.)		=====

**SUMMARY OF BILLS OF QUANTITIES FOR
INTERNAL ELECTRICAL WORKS OF
CHEMICAL ENGINEERING DEPARTMENT
QUEST, NAWABSHAH**

S.No.	Section	Description	Amount (Rs.)
1.	A	<i>Internal Electrification</i>	Rs. _____
2.	B	<i>Light fittings and Fixtures</i>	Rs. _____
3.	C	<i>Distribution Boards & Feeders</i>	Rs. _____
4.	D	Earthing	Rs. _____
5.	E	<i>Telephone System</i>	Rs. _____
		Total Cost	Rs. _____

**BILLS OF QUANTITIES FOR
ELECTRICAL WORKS OF
CHEMICAL ENGINEERING DEPARTMENT
QUEST, NAWABSHAH**

Section "A": ELECTRIFICATION WORKS

S.No.	ITEM DESCRIPTION	QTY	UNIT	UNIT RATE (Rs)	TOTAL AMOUNT (Rs)
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Part I : Items based on Schedule Rates 2012

S/R

1.	Wiring for 2 HP pump with 2-6mm ² S/C, PVC insulated copper cable + 1-6mm ² copper ECC in 38mm (1.5") dia PVC conduit recessed in the wall or as required. Complete in all respects with all accessories required.	80	Mtrs.	341.00	27,280.00
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Note:

For any Variation arising between the above stated BOQ items and its respective Schedule Rate items (as per Government of Sindh), the same is to be adjusted accordingly in the "Premium on Schedule Rate".

COST OF PART "A"	(Rs.)			27,280.00
PREMIUM ON SCHEDULE RATE	(Rs.)	(@ _____)		
TOTAL COST OF PART 'I'	(Rs.)			

Part II : Items based on Non-Schedule Rates

2.	Providing, installing and connecting of Motor starter suitable for 2hp Motor and rated for 1-phase, 240 volts, 50Hz, AC Power supply. Complete with bimetal and instantaneous magnetic trip auxiliary contacts, push buttons, single phase protection with metallic insulated enclosure with one insulated terminal for earth, surface mounting type, complete in all respects with all accessories required.	2	Nos.		
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3.	Providing, installing and connecting of 20Amps, Double Pole, 240 volts, MPCB as Main Disconnect switch for Pump Motors on 18 SWG sheet steel surface mounted box, anti-rust treated and painted, complete with 'ON' and 'OFF' indication lamps and all other accessories required.	2	Nos.		
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TOTAL COST OF PART 'II'	(Rs.)			
TOTAL COST OF SECTION "A" (PART I +PART II)	(Rs.)			

Section "B": Distribution Boards & Feeders

S.No.	ITEM DESCRIPTION	QTY	UNIT	UNIT RATE (Rs)	TOTAL AMOUNT (Rs)
1.	Providing of Main LT Panels fabricated of 14 SWG sheet steel clad, free standing, floor mounting type for 3 phase, 500 volts, 50 Hz, A.C. Power supply and having the following configurations. (All equipment to be rated minimum 25 kA short circuit rating and 50°C ambient temperature at 415V). Panel enclosure to comply with IP-50.				
1.1	<u>MAIN DISTRIBUTION BOARD (MDB)</u> Short Circuit Rating 25kA Incoming 1 - 400 A, T.P., M.C.C.B 3 - Current Transformers 400/5A 1 - Ammeter (0-400 A) with Ammeter Selector Switch (ASS). 1 - Voltmeter (0-500 V) with Voltmeter Selector 2 - ON/OFF indication lamps. NOTE: -i- All M.C.C.Bs, listed above shall have adjustable thermal & magnetic release Outgoing 4 - 80 A, T.P., M.C.C.B 2 - 60 A, T.P., M.C.C.B 2 - 50 A, T.P., M.C.C.B 7 - 30 A, T.P., M.C.C.B 3 - 20 A, S.P., M.C.B	1	No.		
	TOTAL COST OF SECTION "B"			(Rs.)	

Section "C": Main Feeder Cables

S.No.	ITEM DESCRIPTION	QTY.	UNIT	UNIT RATE (Rs)	TOTAL AMOUNT (Rs)
1.	Providing, laying & connecting of 3-95 mmsq., 3.5 Core, PVC/SWA/PVC from Nearest Substation to MDB laid in ground in RCC pipe including digging of earth and making of CC Manholes with covers at required distances for pulling of cables. Job also involves refilling of Earth and providing cable markers for route of LT cable as per specifications.	100	Mtr.		
	TOTAL COST OF SECTION "C"			(Rs.)	

**SUMMARY OF BILLS OF QUANTITIES FOR
ELECTRICAL WORKS OF
CHEMICAL ENGINEERING DEPARTMENT
QUEST, NAWABSHAH**

S.No.	Section	Description	Amount (Rs.)
1.	A	Electrification Works	Rs. _____
2.	B	Distribution Boards & Feeders	Rs. _____
3.	C	Main Feeder Cables	Rs. _____
TOTAL COST			=====

**BILLS OF QUANTITIES FOR COMPUTER NETWORKING OF
CHEMICAL ENGINEERING DEPARTMENT
QUEST, NAWABSHAH**

Section "A": Installation & Wiring of Multi-Outlet Boxes

S.No.	ITEM DESCRIPTION	QTY	UNIT	UNIT RATE (Rs)	TOTAL AMOUNT (Rs)
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Part I : Items based on Schedule Rates 2012

				S/R	
1.	Supply & Wiring for Main or Sub-Main with 3-4mmsq. (3-7/.036) S/C, PVC insulated, Cu cables in 3/4" dia PVC conduit recessed in the wall or column as required. Complete in all respect with all accessories. (Power Circuit) (SI#25 Page # 04)	500	Mtr.	338.00	169,000.00

Note:

For any Variation arising between the above stated BOQ items and its respective Schedule Rate items (as per Government of Sindh), the same is to be adjusted accordingly in the "Premium on Schedule Rate".

COST OF PART "A"	(Rs.)		169,000.00
PREMIUM ON SCHEDULE RATE	(Rs.)	(@ _____)	
TOTAL COST OF PART 'I'	(Rs.)		

Part II : Items based on Non-Schedule Rates

2.	Supply and installation of CAT-6 (AT&T / IBM Compatible) cable in already laid PVC conduit from Switch / Patch Panel to the respective outlet boxes, complete in all respect.	2500	Mtrs		
3.	Providing and lying of the following 25mm dia PVC conduits concealed in wall / ceiling as required from the Switch / Patch panel to computer outlets. Complete in all respect with all required accessories.				
3.1	25mm dia Rigid PVC Conduits	2000	Mtrs		
4.	Providing and installing of Multioutlet boxes on Wall / Furniture of appropriate size for Power, Telephone and Computer Data outlets, fabricated of 18 SWG sheet steel boxes as shown in drawings.	120	Nos.		
5.	Supply and installation of RJ-45 socket outlets in all ready provided multi-outlet box including termination of CAT-6 cables.	120	Nos.		
6.	Supply and installation of 13A, 3-pin flat, switched power socket outlet including termination of cable in all ready provided multi-outlet box.	240	Nos.		
	TOTAL COST OF PART 'II'			(Rs.)	
	TOTAL COST OF SECTION "A" (PART I +PART II)			(Rs.)	

Section "B" Distribution Boards & Feeders

S.No.	ITEM DESCRIPTION	QTY.	UNIT	UNIT RATE (Rs)	TOTAL AMOUNT (Rs)
1.	Providing, installing, connecting & commissioning of the following Distribution Boards (DBs) fabricated of 14 SWG steel clad, cubical design with hinged door cover, wall (recessed) mounted, factory assembled, suitable for 3 phase, 4 wire, 500 volts, 50 Hz A.C. Power Supply complete with copper cable lugs, glands, neutral link, earth block, terminal block etc., & having following configurations. (All equipment rated to 5 kA short circuit rating and 50°C ambient temperature at 415V). Panel enclosure to comply with IP-44.				
1.1	<u>PDB - F2 (FIRST FLOOR)</u> Short Circuit Rating 7.5kA (Ics) @ 400V Incoming 1 - 50 A, T.P., M.C.C.B 3 - Phase (R.Y.B) indication lamps. Outgoing 18 - 15 A, S.P., M.C.B.s	1	No.		_____
2.	Providing, laying & connecting of PVC/PVC 600/1000V grade copper conductor cable from LT Panel to the respective Distribution Boards (DBs), recessed in the RCC or on surface / concealed in wall or column as required, complete in all respect with all fixing and termination accessories and entire satisfaction of Consultant / Owner.				
2.1	16mm ² , 4Core, PVC/PVC +2-16mm ² ECC in 38mm dia rigid PVC conduit in ground / floor as required from LT Panel.	40	Mtr.		_____
	TOTAL COST OF SECTION "B"		(Rs.)		=====

**SUMMARY OF BILLS OF QUANTITIES FOR COMPUTER NETWORKING OF
INTERNAL ELECTRICAL WORKS OF
CHEMICAL ENGINEERING DEPARTMENT
QUEST, NAWABSHAH**

S.No.	Section	Description	Amount
1.	A	Installation & Wiring of Multi Outlet Boxes	Rs. _____
2.	B	Distribution Boards & Feeders	Rs. _____
		Total Cost	Rs. _____

**BILLS OF QUANTITIES FOR
LABORATORY ELECTRICAL WORKS OF
CHEMICAL ENGINEERING DEPARTMENT
QUEST, NAWABSHAH**

Section "A" Internal Electrification

S.No.	ITEM DESCRIPTION	QTY	UNIT	UNIT RATE (Rs)	TOTAL AMOUNT (Rs)
-------	------------------	-----	------	----------------	-------------------

Part I : Items based on Schedule Rates 2012

S/R

1.	Supply & Wiring for Main or Sub-Main with 3-4mmsq. (3-7/036) S/C, PVC insulated, Cu cables in 3/4" dia PVC conduit recessed in the wall or column as required. Complete in all respect with all accessories. (Power Circuit) (SI#25 Page # 04)	600	Mtr.	338.00	202,800.00
2.	Providing, fixing and connecting of flush type, 3 pin, 10/15A, S.P., plug socket, switch and shoe unit. Complete in all respect with all accessories including face-plate and back-box. (SI # 227 Page # 33)	70	Nos.	162.00	11,340.00

Note:

For any Variation arising between the above stated BOQ items and its respective Schedule Rate items (as per Government of Sindh), the same is to be adjusted accordingly in the "Premium on Schedule Rate".

COST OF PART "A" (Rs.) **214,140.00**

PREMIUM ON SCHEDULE RATE (Rs.) (@ _____) _____

TOTAL COST OF PART 'I' (Rs.) _____

Part II : Items based on Non-Schedule Rates

2.	Providing & Fixing of Back Boxes for switches & socket outlets. To be complete in all respect with all accessories.	70	Nos.	250.00	_____
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TOTAL COST OF PART 'II' (Rs.) _____

TOTAL COST OF SECTION "A" (PART I +PART II) (Rs.) _____

Section "B" Distribution Boards & Feeders

S.No.	ITEM DESCRIPTION	QTY.	UNIT	UNIT RATE (Rs)	TOTAL AMOUNT (Rs)
-------	------------------	------	------	----------------	-------------------

- | | | | | | |
|----|--|--|--|--|--|
| 1. | Providing, installing, connecting & commissioning of the following Distribution Boards (DBs) fabricated of 14 SWG steel clad, cubical design with hinged door cover, wall (recessed) mounted, factory assembled, suitable for 3 phase, 4 wire, 500 volts, 50 Hz A.C. Power Supply complete with copper cable lugs, glands, neutral link, earth block, terminal block etc., & having following configurations. (All equipment rated to 5 kA short circuit rating and 50°C ambient temperature at 415V). Panel enclosure to comply with IP-50. | | | | |
|----|--|--|--|--|--|

Section "B" Distribution Boards & Feeders

S.No.	ITEM DESCRIPTION	QTY.	UNIT	UNIT RATE (Rs)	TOTAL AMOUNT (Rs)
1.1	<u>PDB -G1 (GROUND FLOOR)</u> Short Circuit Rating 7.5kA (Ics) @ 400V Incoming 1 - 30 A, T.P., M.C.C.B 3 - Phase (R.Y.B) indication lamps. Outgoing 21 - 16 A, S.P., M.C.B.s	1	No.		_____
1.2	<u>PDB -F1 (FIRST FLOOR)</u> Short Circuit Rating 7.5kA (Ics) @ 400V Incoming 1 - 30 A, T.P., M.C.C.B 3 - Phase (R.Y.B) indication lamps. Outgoing 18 - 16 A, S.P., M.C.B.s	1	No.		_____
2.	Providing, laying & connecting of PVC/PVC 600/1000V grade copper conductor cable from LT Panel to the respective Distribution Boards (DBs), recessed in the RCC or on surface / concealed in wall or column as required, complete in all respect with all fixing and termination accessories and entire satisfaction of Consultant / Owner.				
2.1	16mm ² , 4Core, PVC/PVC +2-16mm ² ECC in 38mm dia rigid PVC conduit in ground / floor as required from LT Panel.	75	Mtr.		_____
TOTAL COST OF SECTION "B"				(Rs.)	=====

**SUMMARY OF BILLS OF QUANTITIES FOR
LABORATORY ELECTRICAL WORKS OF
CHEMICAL ENGINEERING DEPARTMENT
QUEST, NAWABSHAH**

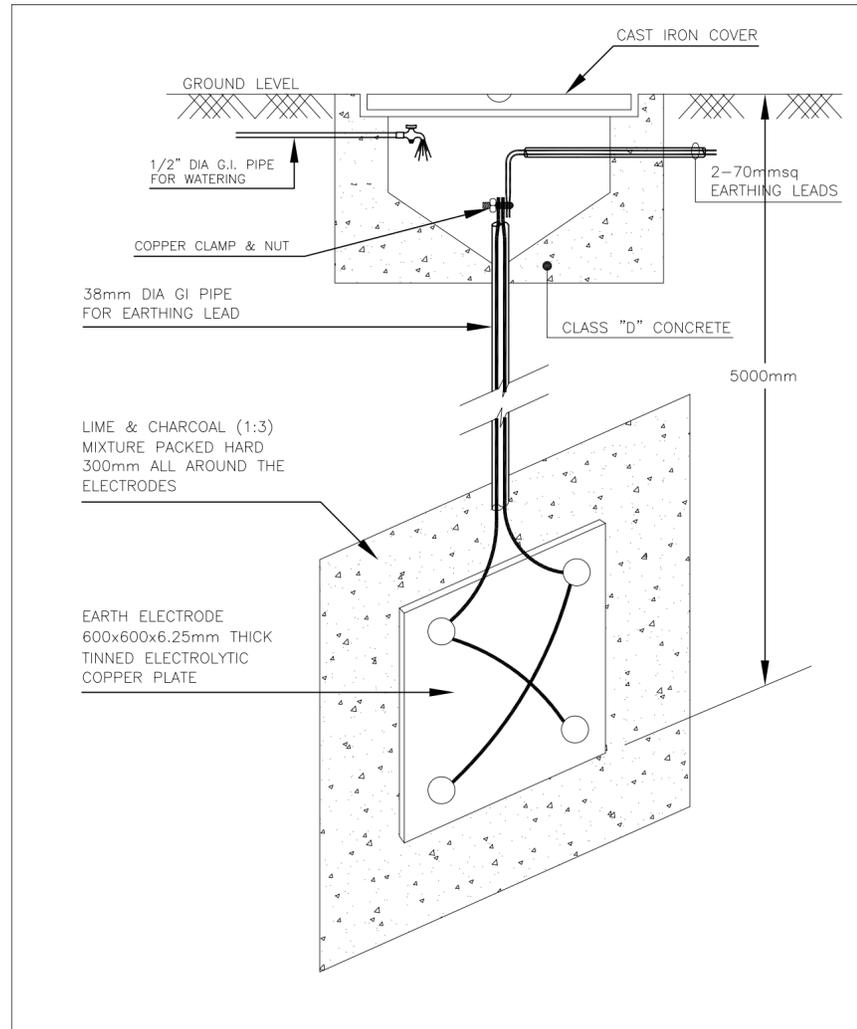
S.No.	Section	Description	Amount (Rs.)
1.	A	<i>Internal Electrification</i>	Rs. _____
2.	B	<i>Distribution Boards & Feeders</i>	Rs. _____
		Total Cost	Rs. _____

**OVERALL SUMMARY OF BILLS OF QUANTITIES FOR
ELECTRICAL WORKS OF
CHEMICAL ENGINEERING DEPARTMENT
QUEST, NAWABSHAH**

S. No.	Description	Total Amount (Rs.)
1.	<i>Internal Electrification</i>	Rs. _____
2.	<i>Electrification Works</i>	Rs. _____
3.	<i>Computer Works</i>	Rs. _____
4.	<i>Laboratory Works</i>	Rs. _____
	TOTAL	=====

LEGEND

SYMBOLS	DESCRIPTION
	2x28W T5 FLUORESCENT LIGHT TYPE TMS-228
	1x28W T5 FLOURESCENT LIGHT TYPE TMS-128
	1x14W T5 FLOURESCENT FIXTURE (MIRROR LIGHT)
	DOWNLIGHTER WITH 24W PLC LAMP
	PHILIPS MAKE DOWNLIGHTER WITH 11W PLC LAMP HAVING DICAST ALUMINIUM HOUSING WITH GLASS COVER
	WALL BRACKET LIGHT
	9W LED DOWNLIGHTER
	15W LED DOWNLIGHTER
	CEILING FAN 56" SWEEP WITH DIMMER
	CEILING FAN 48" SWEEP WITH DIMMER
	EXHAUST FAN 12" SWEEP
	10A, ONE-WAY SWITCH / TWO-WAY SWITCH
	CALL BELL / BELL PUSH BUTTON
	15A, 3 PIN SWITCH SOCKET OUTLET
	15A, 3-PIN INTERNATIONAL SCKT OUTLET
	2x10A, 3-PIN SWITCH SOCKET OUTLETS
	GENERAL POWER WIRING PULL BOX
	DATA WIRING PULL BOX
	TELEPHONE OUTLET
	TELEPHONE JUNCTION BOX (TJB)
	MAIN TELEPHONE JUNCTION BOX (MTJB)
	FAST ETHERNET SWITCH (HUB)
	MULTI OUTLET BOX
	INDOOR A/C UNIT WITH 20A DOUBLE POLE ISOLATOR
	OUTDOOR CONDENSING UNIT WITH BRACKET
	LIGHTING DISTRIBUTION BOARD (LDB)
	POWER DISTRIBUTION BOARD (PDB)
	MAIN DISTRIBUTION BOARD (MDB)



EARTHING DETAIL WITH PLATE

GENERAL NOTES.

1) MINIMUM PVC CONDUIT SIZE OF 20mm DIA WILL BE USED (UTILIZATION AS PER IEE REGULATION).

PVC/STEEL CONDUIT CAPACITY SHALL BE AS FOLLOWS:

CONDUITS	CABLES						
	1.5mm ²	2.5mm ²	4mm ²	6mm ²	10mm ²	16mm ²	25mm ²
20mm DIA	10	8	5	4	2	-	-
25mm DIA	18	11	8	6	4	3	2
32mm DIA	26	17	13	10	6	4	3

2) MAIN CIRCUIT FOR EACH DB SHALL RUN IN SEPARATE CONDUIT.

3) ALL WIRING CABLES SHALL BE OF 300/500 VOLTS GRADE MINIMUM, INSULATED EARTH WIRE SHALL RUN ALONG MAINS.

4) POINT WIRING SHALL BE WITH 1.5mmsq CABLES

5) LIGHT CIRCUIT WIRING SHALL BE WITH 2.5mmsq CABLES OR AS INDICATED IN SCHEMATIC OF D.B.

6) ECC SHALL BE OF THE SIZE OF MAIN CONDUCTOR OR AS INDICATED IN SCHEMATIC OF D.B.

7) EACH LIGHT AND POWER CIRCUIT SHALL BE LAID IN SEPARATE CONDUIT.

8) CAREFULLY CO-ORDINATE DOWNS AND RISERS WITH WALL POSITIONS & HAVE THE SAME CONFIRMED WITH THE CIVIL CONTRACTOR.

9) NO CHISELING AND CUTTING OF STRUCTURE IS TO BE CARRIED OUT WITHOUT PRIOR WRITTEN PERMISSION OBTAINED FROM THE ARCHITECT/ENGINEERS.

10) TELEPHONE WIRE 2 PAIR SHALL RUN IN 1" DIA PVC CONDUIT

MARK	DATE	REVISION
2	31-03-15	ARCH. LAYOUTS REVISED
1	23-09-14	ISSUED FOR TENDER
0	10-09-14	ISSUED FOR APPROVAL

TITLE
LEGEND, GENERAL NOTES AND EARTHING DETAIL FOR CHEMICAL ENGG. DEPT.

PROJECT
QUAID-E-AWAM UNIVERSITY OF ENGINEERING, SCIENCES & TECHNOLOGY, NAWABSHAH.

DRAWN BY R. A. KHAN	PROJECT NO. 626/2014
CHECKED BY M.SAFWAN ALI	

SCALE: N.T.S	DRAWING NO. E-01
DATE: 02-09-2014	

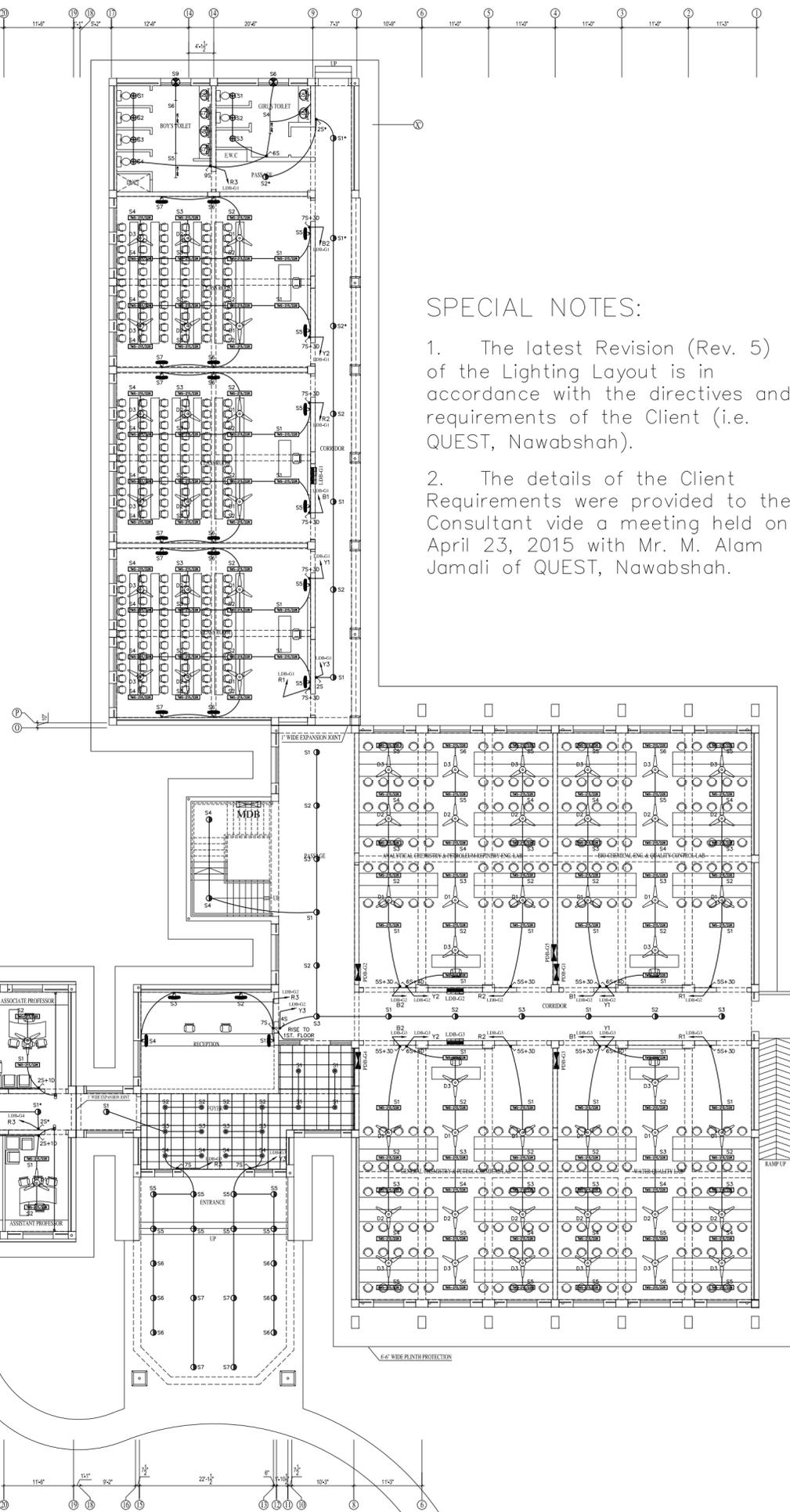
ARCHITECTS
NAQVI AND SIDDIQUIE
 INC. ARCHITECTS AND ENGINEERS
 BLOCK NO 18, 1ST FLOOR, MASJID SUPER MARKET MARKAZ F-6, ISLAMABAD.

CONSULTANTS
ATCONS
ASSOCIATED TECHNICAL CONSULTANTS
 ELECTRICAL, MECHANICAL AND AIRCONDITIONING CONSULTANTS

505, AMBER ESTATE, SHAHRAH-E-FAISAL, KARACHI. PHONE NO. 4545560-61

LEGEND

SYMBOLS	DESCRIPTION
	2x28W T5 FLUORESCENT LIGHT TYPE TMS-228
	1x28W T5 FLOURESCENT LIGHT TYPE TMS-128
	1x14W T5 FLOURESCENT FIXTURE (MIRROR LIGHT)
	DOWNLIGHTER WITH 24W PLC LAMP
	PHILIPS MAKE DOWNLIGHTER WITH 11W PLC LAMP HAVING DICAST ALUMINIUM HOUSING WITH GLASS COVER
	WALL BRACKET LIGHT
	9W LED DOWNLIGHTER
	15W LED DOWNLIGHTER
	CEILING FAN 56" SWEEP WITH DIMMER
	CEILING FAN 48" SWEEP WITH DIMMER
	EXHAUST FAN 12" SWEEP
	10A, ONE-WAY SWITCH / TWO-WAY SWITCH
	CALL BELL / BELL PUSH BUTTON
	LIGHTING DISTRIBUTION BOARD (LDB)
	POWER DISTRIBUTION BOARD (PDB)
	MAIN DISTRIBUTION BOARD (MDB)

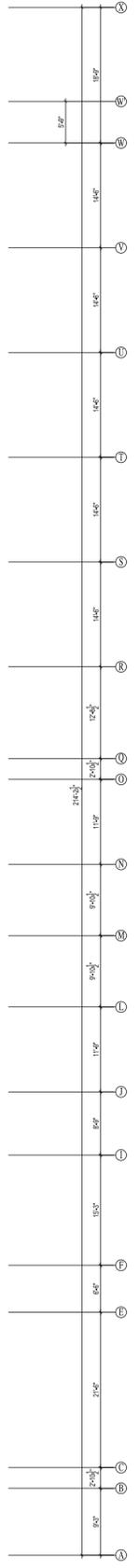


SPECIAL NOTES:

- The latest Revision (Rev. 5) of the Lighting Layout is in accordance with the directives and requirements of the Client (i.e. QUEST, Nawabshah).
- The details of the Client Requirements were provided to the Consultant vide a meeting held on April 23, 2015 with Mr. M. Alam Jamali of QUEST, Nawabshah.

NOTES:

- This Drawing should be read in conjunction with the respective Architectural and Structural Layouts.
- In case of any discrepancies in the Architectural and/or Structural features shown in the Drawing, the Architectural Consultant's and Structural Consultant's Layouts are to be considered Final.
- All conduiting works to be via 1" OR 3/4" dia Conduits as per the following:
 - Masonry / R.C.C. - PVC "D-Class" Conduits
 - Surface / Cable Trays - uPVC Electric Conduits
 - Furniture - PVC Flexible Conduits
- NO Light Fixtures and/or Power Outlets are to be used as Junction Boxes for Circuit Wiring or Cable Pulling. For all cable pulling, pull boxes are to be used and provided.
- All Electrical Equipments shown on drawings are 'Not to Scale'.
- All fixtures and cables are to be tagged appropriately as per their circuit identifications as indicated in the drawings.



MARK	DATE	REVISION
5	25-05-15	LAYOUT REV. AS PER CLIENT
4	28-04-15	STRUCTURE LAYOUTS REVISED
3	31-03-15	ARCH. LAYOUTS REVISED
2	07-11-14	CEILING FAN ADDED IN LABS.
1	23-09-14	ISSUED FOR TENDER
0	10-09-14	ISSUED FOR APPROVAL

TITLE
**LIGHTING LAYOUT FOR
 CHEMICAL ENGG. DEPT.
 GROUND FLOOR**

PROJECT
**QUAID-E-AWAM UNIVERSITY OF
 ENGINEERING, SCIENCES & TECHNOLOGY,
 NAWABSHAH.**

DRAWN BY: R. A. KHAN
 CHECKED BY: M.SAFWAN ALI
 PROJECT NO. **626/2014**

SCALE: N.T.S.
 DATE: 02-09-2014
 DRAWING NO. **E-02**

ARCHITECTS
NAQVI AND SIDDIQUIE
 INC. ARCHITECTS AND ENGINEERS
 BLOCK NO 18, 1 ST. FLOOR MASJID
 SUPER MARKET MARKAZ F-6,
 ISLAMABAD.

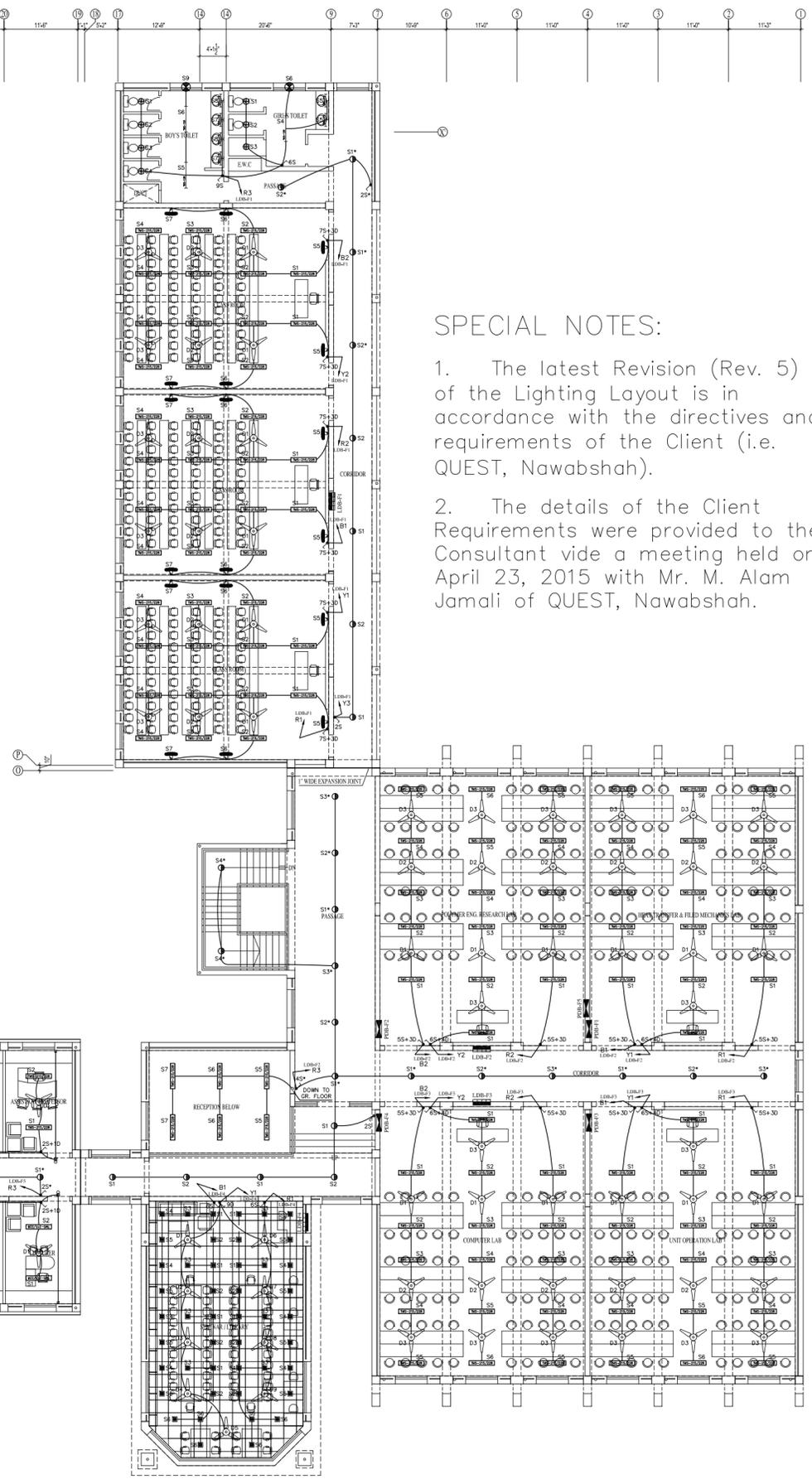
CONSULTANTS
ATCONS
ASSOCIATED TECHNICAL CONSULTANTS
 ELECTRICAL, MECHANICAL AND AIRCONDITIONING CONSULTANTS
 505, AMBER ESTATE,
 SHAHRAH-E-FAISAL,
 KARACHI.
 PHONE NO. 4545560-61

THIS PRINT SUPERSEDES ALL
 PRINTS BEARING ALOWER NO.

REV. NOS.	1	2	3	4	5

LEGEND

SYMBOLS	DESCRIPTION
	2x28W T5 FLUORESCENT LIGHT TYPE TMS-228
	1x28W T5 FLOURESCENT LIGHT TYPE TMS-128
	1x14W T5 FLOURESCENT FIXTURE (MIRROR LIGHT)
	DOWNLIGHTER WITH 24W PLC LAMP
	PHILIPS MAKE DOWNLIGHTER WITH 11W PLC LAMP HAVING DICAST ALUMINIUM HOUSING WITH GLASS COVER
	WALL BRACKET LIGHT
	9W LED DOWNLIGHTER
	15W LED DOWNLIGHTER
	CEILING FAN 56" SWEEP WITH DIMMER
	CEILING FAN 48" SWEEP WITH DIMMER
	EXHAUST FAN 12" SWEEP
	10A, ONE-WAY SWITCH / TWO-WAY SWITCH
	CALL BELL / BELL PUSH BUTTON
	LIGHTING DISTRIBUTION BOARD (LDB)
	POWER DISTRIBUTION BOARD (PDB)
	MAIN DISTRIBUTION BOARD (MDB)

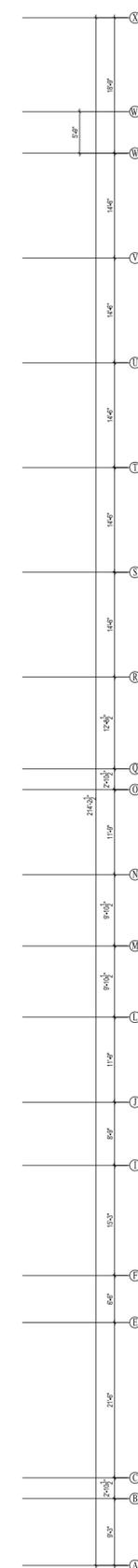


SPECIAL NOTES:

- The latest Revision (Rev. 5) of the Lighting Layout is in accordance with the directives and requirements of the Client (i.e. QUEST, Nawabshah).
- The details of the Client Requirements were provided to the Consultant vide a meeting held on April 23, 2015 with Mr. M. Alam Jamali of QUEST, Nawabshah.

NOTES:

- This Drawing should be read in conjunction with the respective Architectural and Structural Layouts.
- In case of any discrepancies in the Architectural and/or Structural features shown in the Drawing, the Architectural Consultant's and Structural Consultant's Layouts are to be considered Final.
- All conduiting works to be via 1" OR 3/4" dia Conduits as per the following:
 - Masonry / R.C.C. - PVC "D-Class" Conduits
 - Surface / Cable Trays - uPVC Electric Conduits
 - Furniture - PVC Flexible Conduits
- NO Light Fixtures and/or Power Outlets are to be used as Junction Boxes for Circuit Wiring or Cable Pulling. For all cable pulling, pull boxes are to be used and provided.
- All Electrical Equipments shown on drawings are 'Not to Scale'.
- All fixtures and cables are to be tagged appropriately as per their circuit identifications as indicated in the drawings.



MARK	DATE	REVISION
5	25-05-15	LAYOUT REV. AS PER CLIENT
4	28-04-15	STRUCTURE LAYOUTS REVISED
3	31-03-15	ARCH. LAYOUTS REVISED
2	07-11-14	CEILING FAN ADDED IN LABS.
1	23-09-14	ISSUED FOR TENDER
0	10-09-14	ISSUED FOR APPROVAL

TITLE
**LIGHTING LAYOUT FOR
 CHEMICAL ENGG. DEPT.
 FIRST FLOOR**

PROJECT
**QUAID-E-AWAM UNIVERSITY OF
 ENGINEERING, SCIENCES & TECHNOLOGY,
 NAWABSHAH.**

DRAWN BY: R. A. KHAN
 CHECKED BY: M.SAFWAN ALI
 PROJECT NO. **626/2014**

SCALE: N.T.S.
 DATE: 02-09-2014
 DRAWING NO. **E-03**

ARCHITECTS
NAQVI AND SIDDIQUIE
 INC. ARCHITECTS AND ENGINEERS
 BLOCK NO 18, 1ST FLOOR MASJID
 SUPER MARKET MARKAZ F-6,
 ISLAMABAD.

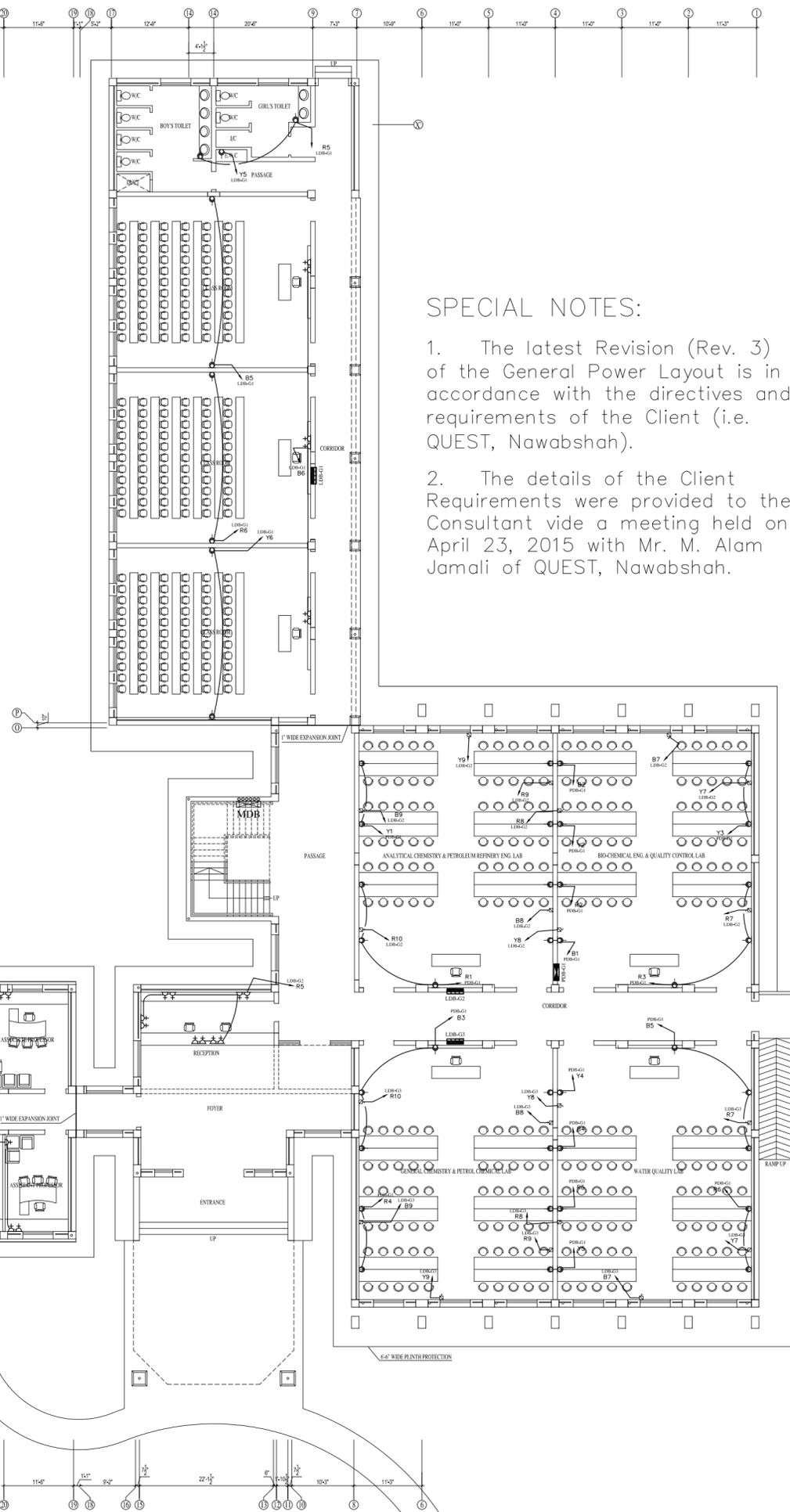
CONSULTANTS
ATCONS
ASSOCIATED TECHNICAL CONSULTANTS
 ELECTRICAL, MECHANICAL AND AIRCONDITIONING CONSULTANTS
 505, AMBER ESTATE,
 SHAHRAH-E-FAISAL,
 KARACHI.
 PHONE NO. 4545560-61

THIS PRINT SUPERSEDES ALL
 PRINTS BEARING ALOWER NO.

REV. NOS.	1	2	3	4	5

LEGEND

SYMBOLS	DESCRIPTION
	15A, 3 PIN SWITCH SOCKET OUTLET
	15A, 3-PIN INTERNATIONAL SCKT OUTLET
	INDOOR A/C UNIT WITH 20A DOUBLE POLE ISOLATOR
	LIGHTING DISTRIBUTION BOARD (LDB)
	POWER DISTRIBUTION BOARD (PDB)
	MAIN DISTRIBUTION BOARD (MDB)

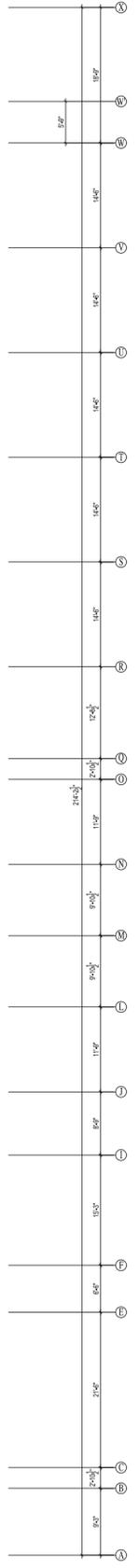


SPECIAL NOTES:

- The latest Revision (Rev. 3) of the General Power Layout is in accordance with the directives and requirements of the Client (i.e. QUEST, Nawabshah).
- The details of the Client Requirements were provided to the Consultant vide a meeting held on April 23, 2015 with Mr. M. Alam Jamali of QUEST, Nawabshah.

NOTES:

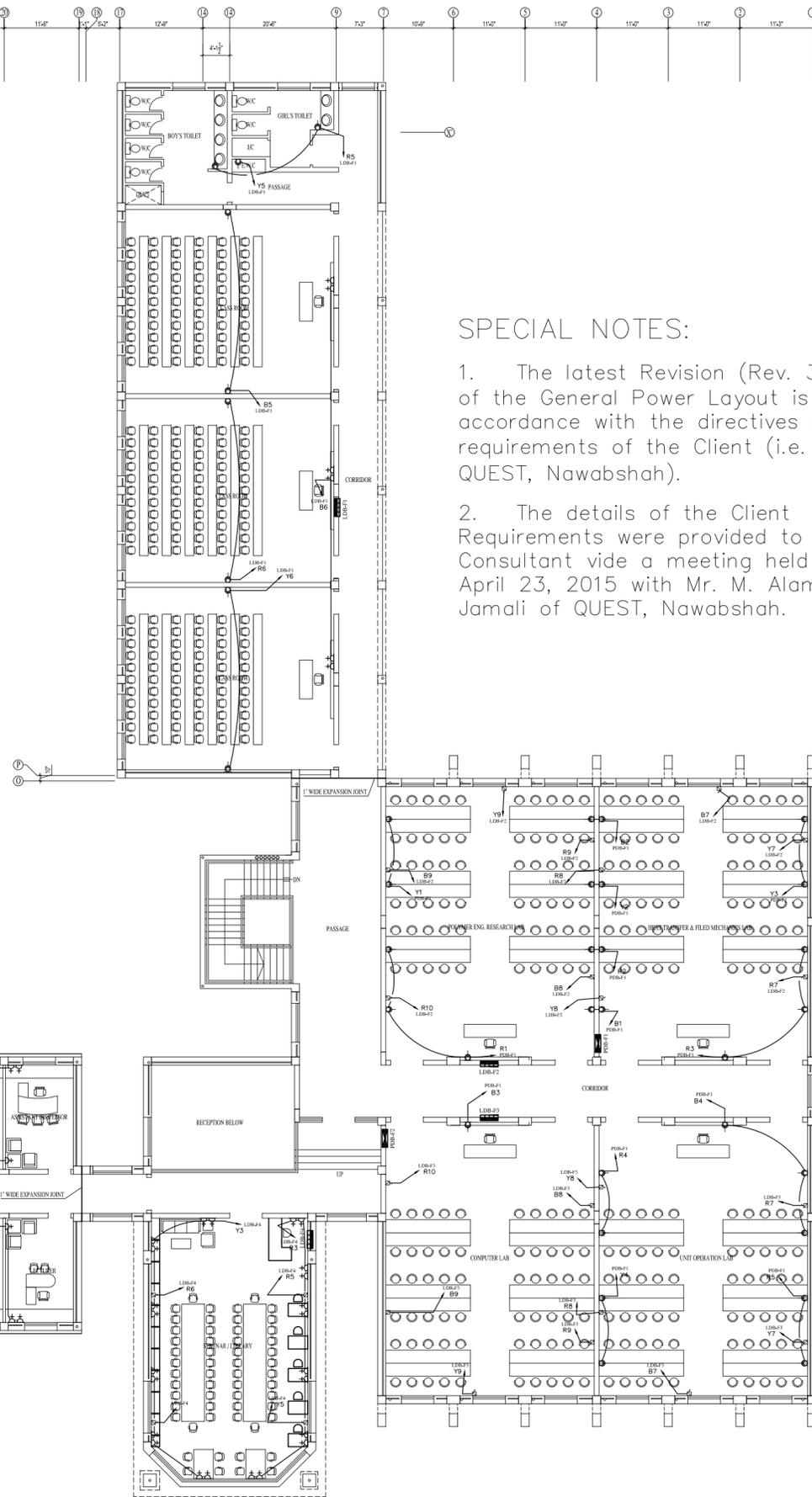
- This Drawing should be read in conjunction with the respective Architectural and Structural Layouts.
- In case of any discrepancies in the Architectural and/or Structural features shown in the Drawing, the Architectural Consultant's and Structural Consultant's Layouts are to be considered Final.
- All conduiting works to be via 1" OR 3/4" dia Conduits as per the following:
 - Masonry / R.C.C. – PVC "D-Class" Conduits
 - Surface / Cable Trays – uPVC Electric Conduits
 - Furniture – PVC Flexible Conduits
- NO Light Fixtures and/or Power Outlets are to be used as Junction Boxes for Circuit Wiring or Cable Pulling. For all cable pulling, pull boxes are to be used and provided.
- All Electrical Equipments shown on drawings are 'Not to Scale'.
- All fixtures and cables are to be tagged appropriately as per their circuit identifications as indicated in the drawings.



3	05-05-15	REVISED AS PER CLIENT
2	31-03-15	ARCH. LAYOUTS REVISED
1	23-09-14	ISSUED FOR TENDER
0	10-09-14	ISSUED FOR APPROVAL
MARK	DATE	REVISION
TITLE		
GENERAL POWER LAYOUT FOR CHEMICAL ENGG. DEPT. GROUND FLOOR		
PROJECT		
QUAID-E-AWAM UNIVERSITY OF ENGINEERING, SCIENCES & TECHNOLOGY, NAWABSHAH.		
DRAWN BY	R. A. KHAN	PROJECT NO.
CHECKED BY	M.SAFWAN ALI	626/2014
SCALE:	N.T.S	DRAWING NO.
DATE:	02-09-2014	E-04
ARCHITECTS		
NAQVI AND SIDDIQUIE INC. ARCHITECTS AND ENGINEERS BLOCK NO 18, 1 ST. FLOOR, MASJID SUPER MARKET MARKAZ F-6, ISLAMABAD.		
CONSULTANTS		
ATCONS ASSOCIATED TECHNICAL CONSULTANTS ELECTRICAL, MECHANICAL AND AIRCONDITIONING CONSULTANTS		

LEGEND

SYMBOLS	DESCRIPTION
	15A, 3 PIN SWITCH SOCKET OUTLET
	15A, 3-PIN INTERNATIONAL SCKT OUTLET
	INDOOR A/C UNIT WITH 20A DOUBLE POLE ISOLATOR
	LIGHTING DISTRIBUTION BOARD (LDB)
	POWER DISTRIBUTION BOARD (PDB)
	MAIN DISTRIBUTION BOARD (MDB)

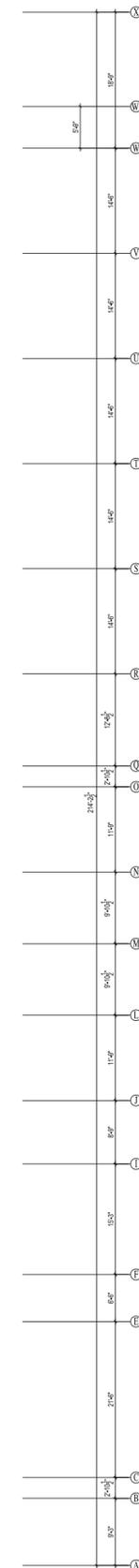


SPECIAL NOTES:

- The latest Revision (Rev. 3) of the General Power Layout is in accordance with the directives and requirements of the Client (i.e. QUEST, Nawabshah).
- The details of the Client Requirements were provided to the Consultant vide a meeting held on April 23, 2015 with Mr. M. Alam Jamali of QUEST, Nawabshah.

NOTES:

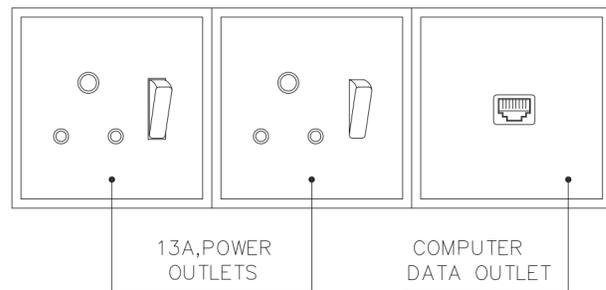
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 - Surface / Cable Trays - uPVC Electric Conduits
 - Furniture - PVC Flexible Conduits
- NO Light Fixtures and/or Power Outlets are to be used as Junction Boxes for Circuit Wiring or Cable Pulling. For all cable pulling, pull boxes are to be used and provided.
- All Electrical Equipments shown on drawings are 'Not to Scale'.
- All fixtures and cables are to be tagged appropriately as per their circuit identifications as indicated in the drawings.



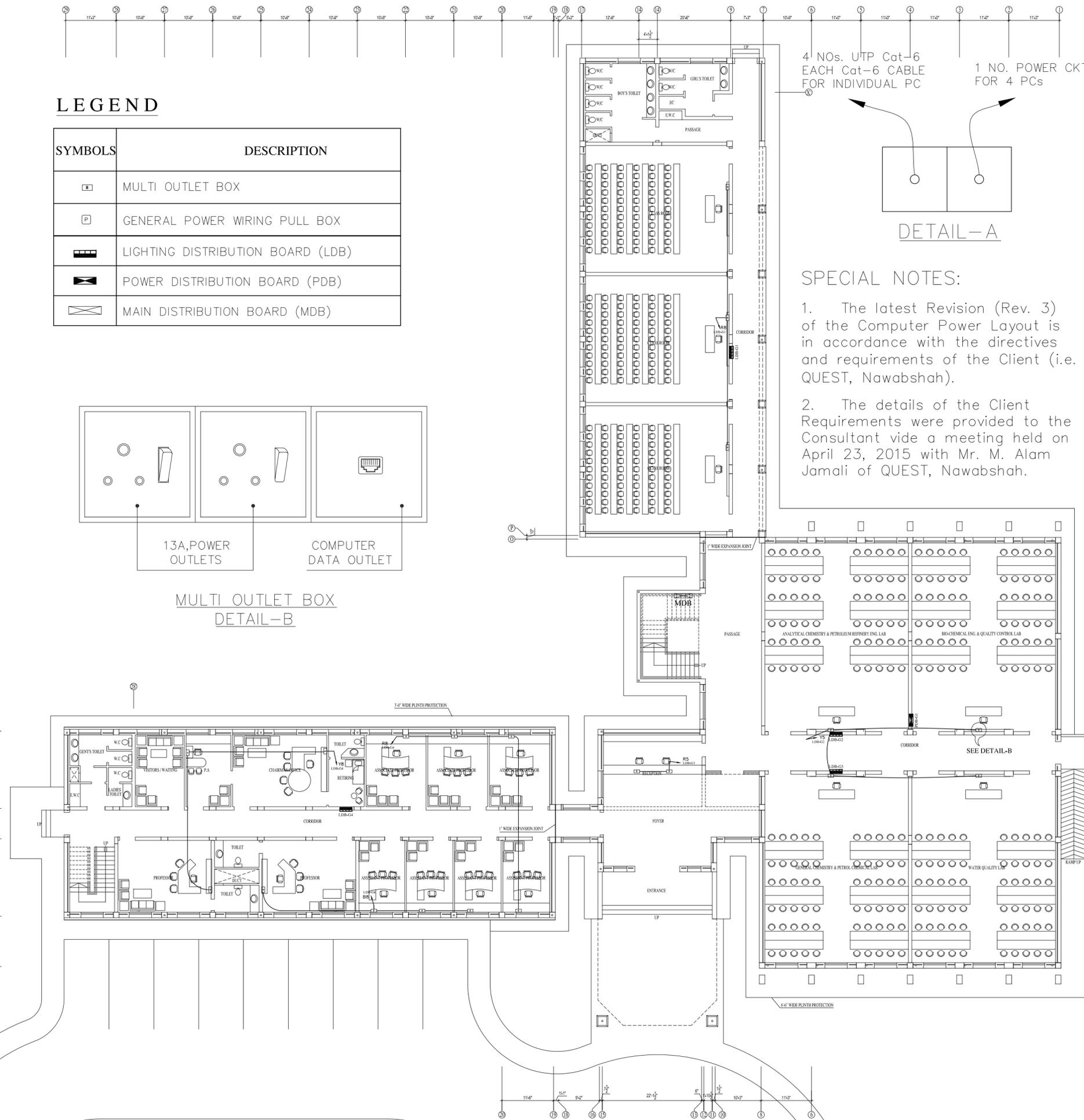
3	05-05-15	REVISED AS PER CLIENT
2	31-03-15	ARCH. LAYOUTS REVISED
1	23-09-14	ISSUED FOR TENDER
0	10-09-14	ISSUED FOR APPROVAL
MARK	DATE	REVISION
TITLE		
GENERAL POWER LAYOUT FOR CHEMICAL ENGG. DEPT. FIRST FLOOR		
PROJECT		
QUAID-E-AWAM UNIVERSITY OF ENGINEERING, SCIENCES & TECHNOLOGY, NAWABSHAH.		
DRAWN BY	R. A. KHAN	PROJECT NO.
CHECKED BY	M.SAFWAN ALI	626/2014
SCALE:	N.T.S	DRAWING NO.
DATE:	02-09-2014	E-05
ARCHITECTS		
NAQVI AND SIDDIQUIE INC. ARCHITECTS AND ENGINEERS BLOCK NO 18, 1 ST. FLOOR MASJID SUPER MARKET MARKAZ F-6, ISLAMABAD.		
CONSULTANTS		
ATCONS ASSOCIATED TECHNICAL CONSULTANTS ELECTRICAL, MECHANICAL AND AIRCONDITIONING CONSULTANTS		

LEGEND

SYMBOLS	DESCRIPTION
	MULTI OUTLET BOX
	GENERAL POWER WIRING PULL BOX
	LIGHTING DISTRIBUTION BOARD (LDB)
	POWER DISTRIBUTION BOARD (PDB)
	MAIN DISTRIBUTION BOARD (MDB)

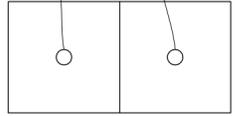


MULTI OUTLET BOX
DETAIL-B



4 NOS. UTP Cat-6
EACH Cat-6 CABLE
FOR INDIVIDUAL PC

1 NO. POWER CKT.
FOR 4 PCs



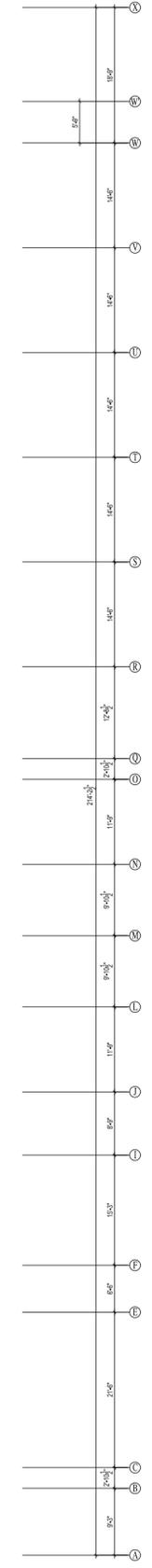
DETAIL-A

SPECIAL NOTES:

- The latest Revision (Rev. 3) of the Computer Power Layout is in accordance with the directives and requirements of the Client (i.e. QUEST, Nawabshah).
- The details of the Client Requirements were provided to the Consultant vide a meeting held on April 23, 2015 with Mr. M. Alam Jamali of QUEST, Nawabshah.

NOTES:

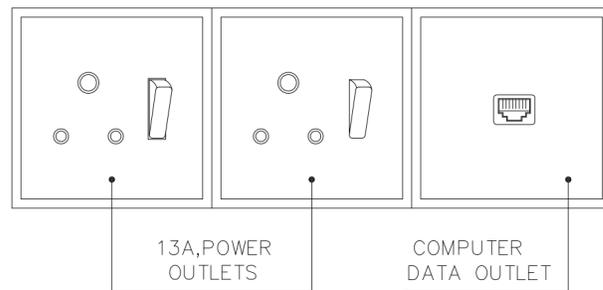
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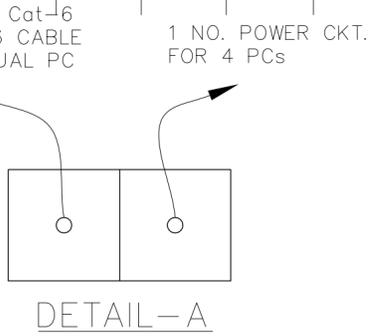
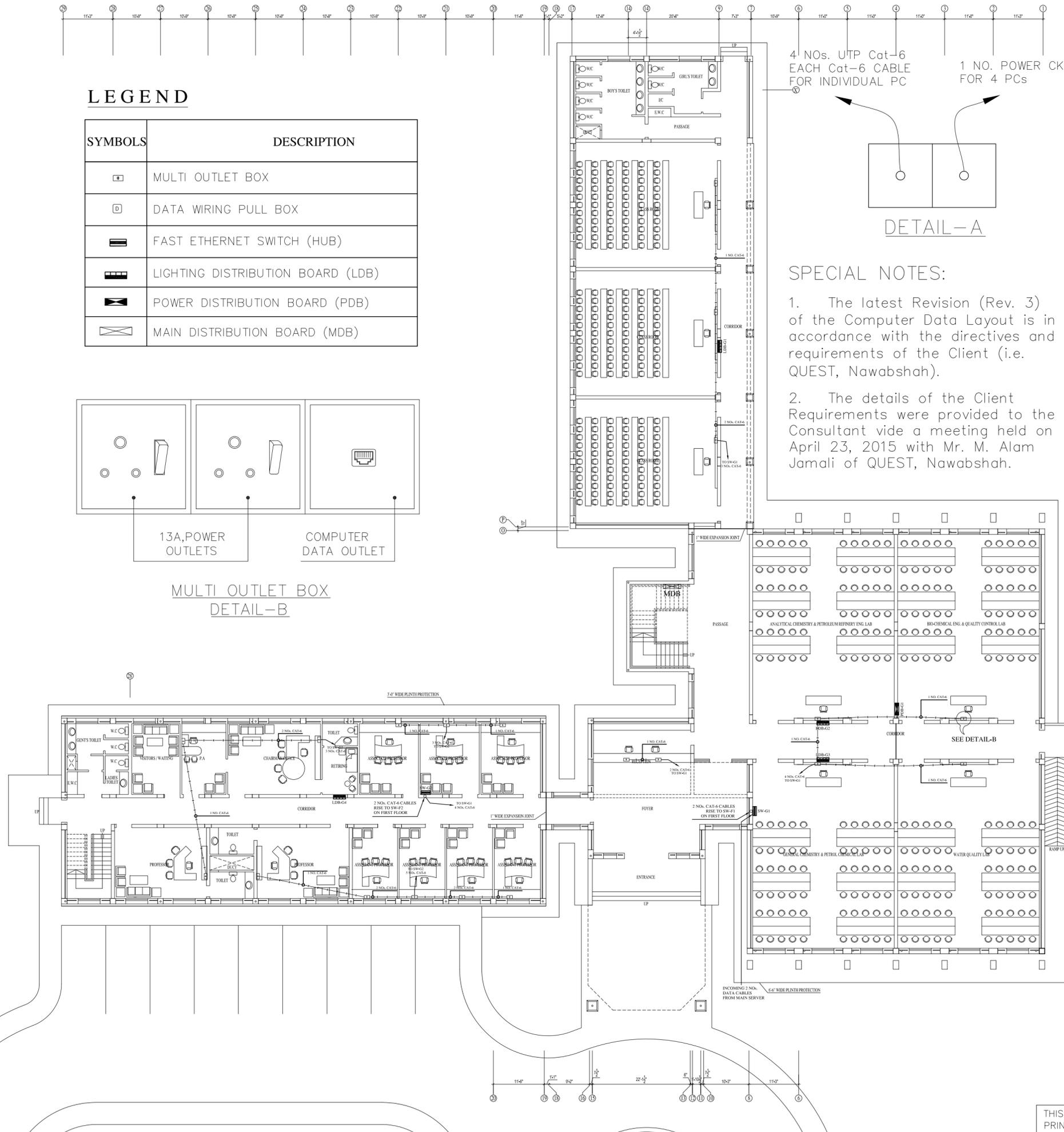
3	05-05-15	REVISED AS PER CLIENT
2	31-03-15	ARCH. LAYOUTS REVISED
1	23-09-14	ISSUED FOR TENDER
0	10-09-14	ISSUED FOR APPROVAL
MARK	DATE	REVISION
TITLE		
COMPUTER POWER LAYOUT FOR CHEMICAL ENGG. DEPT. GROUND FLOOR		
PROJECT		
QUAID-E-AWAM UNIVERSITY OF ENGINEERING, SCIENCES & TECHNOLOGY, NAWABSHAH.		
DRAWN BY	R. A. KHAN	PROJECT NO.
CHECKED BY	M.SAFWAN ALI	626/2014
SCALE:	N.T.S	DRAWING NO.
DATE:	02-09-2014	E-06
ARCHITECTS		
NAQVI AND SIDDIQUIE INC. ARCHITECTS AND ENGINEERS BLOCK NO 18, 1 ST. FLOOR MASJID SUPER MARKET MARKAZ F-6, ISLAMABAD.		
CONSULTANTS		
ATCONS ASSOCIATED TECHNICAL CONSULTANTS ELECTRICAL, MECHANICAL AND AIRCONDITIONING CONSULTANTS		

LEGEND

SYMBOLS	DESCRIPTION
	MULTI OUTLET BOX
	DATA WIRING PULL BOX
	FAST ETHERNET SWITCH (HUB)
	LIGHTING DISTRIBUTION BOARD (LDB)
	POWER DISTRIBUTION BOARD (PDB)
	MAIN DISTRIBUTION BOARD (MDB)



MULTI OUTLET BOX
DETAIL-B

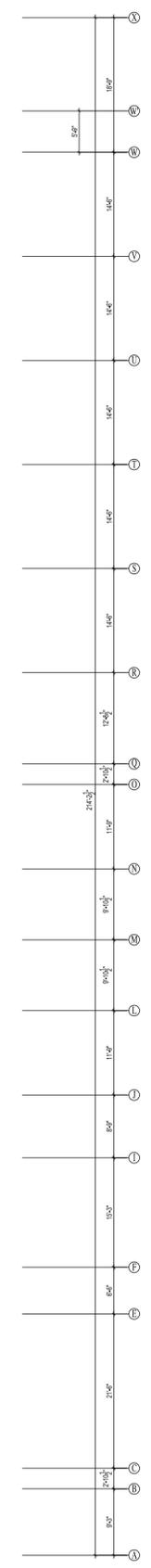


SPECIAL NOTES:

- The latest Revision (Rev. 3) of the Computer Data Layout is in accordance with the directives and requirements of the Client (i.e. QUEST, Nawabshah).
- The details of the Client Requirements were provided to the Consultant vide a meeting held on April 23, 2015 with Mr. M. Alam Jamali of QUEST, Nawabshah.

NOTES:

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 - Masonry / R.C.C. - PVC "D-Class" Conduits
 - Surface / Cable Trays - uPVC Electric Conduits
 - Furniture - PVC Flexible Conduits
- NO Data Outlets are to be used as Junction Boxes for Circuit Wiring or Cable Pulling. For all cable pulling, pull boxes are to be used and provided.
- All Electrical Equipments shown on drawings are 'Not to Scale'.
- All fixtures and cables are to be tagged appropriately as per their circuit identifications as indicated in the drawings.



3	05-05-15	REVISED AS PER CLIENT
2	31-03-15	ARCH. LAYOUTS REVISED
1	23-09-14	ISSUED FOR TENDER
0	10-09-14	ISSUED FOR APPROVAL
MARK	DATE	REVISION
TITLE		
COMPUTER DATA LAYOUT FOR CHEMICAL ENGG. DEPT. GROUND FLOOR		
PROJECT		
QUAID-E-AWAM UNIVERSITY OF ENGINEERING, SCIENCES & TECHNOLOGY, NAWABSHAH.		
DRAWN BY	R. A. KHAN	PROJECT NO.
CHECKED BY	M.SAFWAN ALI	626/2014
SCALE:	N.T.S	DRAWING NO.
DATE:	02-09-2014	E-08
ARCHITECTS		
NAQVI AND SIDDIQUIE INC. ARCHITECTS AND ENGINEERS BLOCK NO 18, 1 ST FLOOR, MASJID SUPER MARKET MARKAZ F-6, ISLAMABAD.		

CONSULTANTS

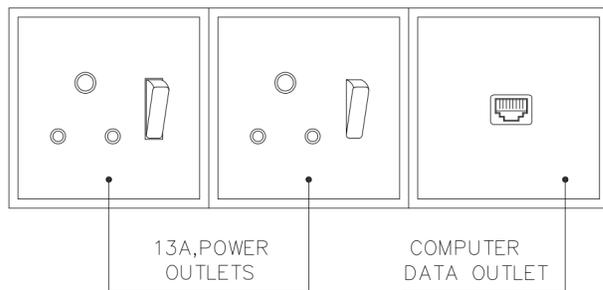
ATCONS
ASSOCIATED TECHNICAL CONSULTANTS
ELECTRICAL, MECHANICAL AND AIRCONDITIONING CONSULTANTS

505, AMBER ESTATE, SHAHRAH-E-FAISAL, KARACHI.
PHONE NO. 4545560-61

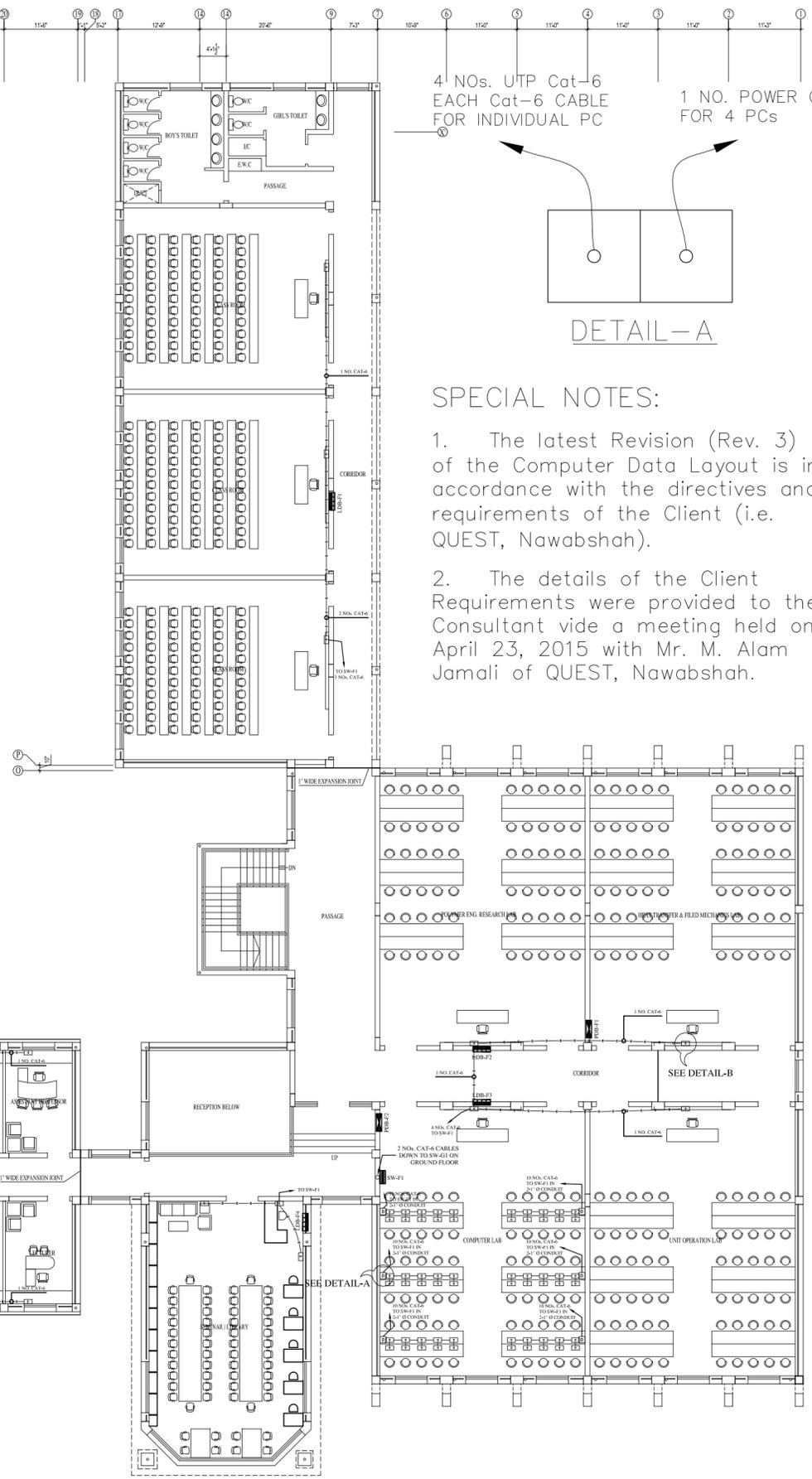
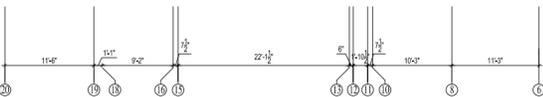
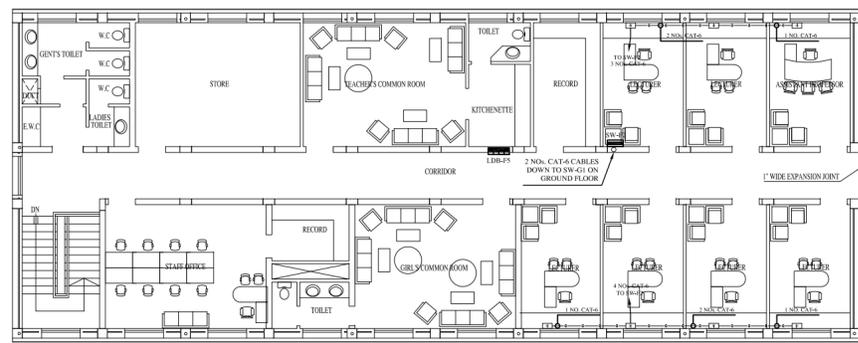
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LEGEND

SYMBOLS	DESCRIPTION
	MULTI OUTLET BOX
	DATA WIRING PULL BOX
	FAST ETHERNET SWITCH (HUB)
	LIGHTING DISTRIBUTION BOARD (LDB)
	POWER DISTRIBUTION BOARD (PDB)
	MAIN DISTRIBUTION BOARD (MDB)

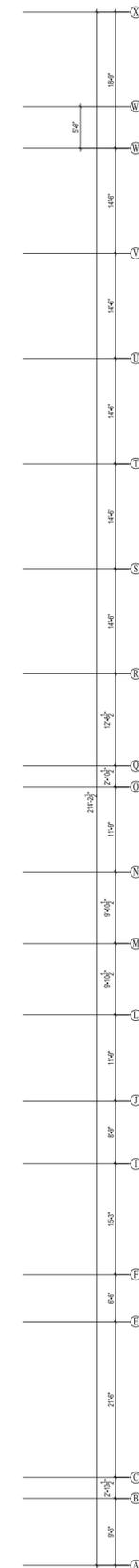


MULTI OUTLET BOX
DETAIL-B



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 - Furniture - PVC Flexible Conduits
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- All fixtures and cables are to be tagged appropriately as per their circuit identifications as indicated in the drawings.



MARK	DATE	REVISION
3	05-05-15	REVISED AS PER CLIENT
2	31-03-15	ARCH. LAYOUTS REVISED
1	23-09-14	ISSUED FOR TENDER
0	10-09-14	ISSUED FOR APPROVAL

TITLE
COMPUTER DATA LAYOUT FOR CHEMICAL ENGG. DEPT. FIRST FLOOR

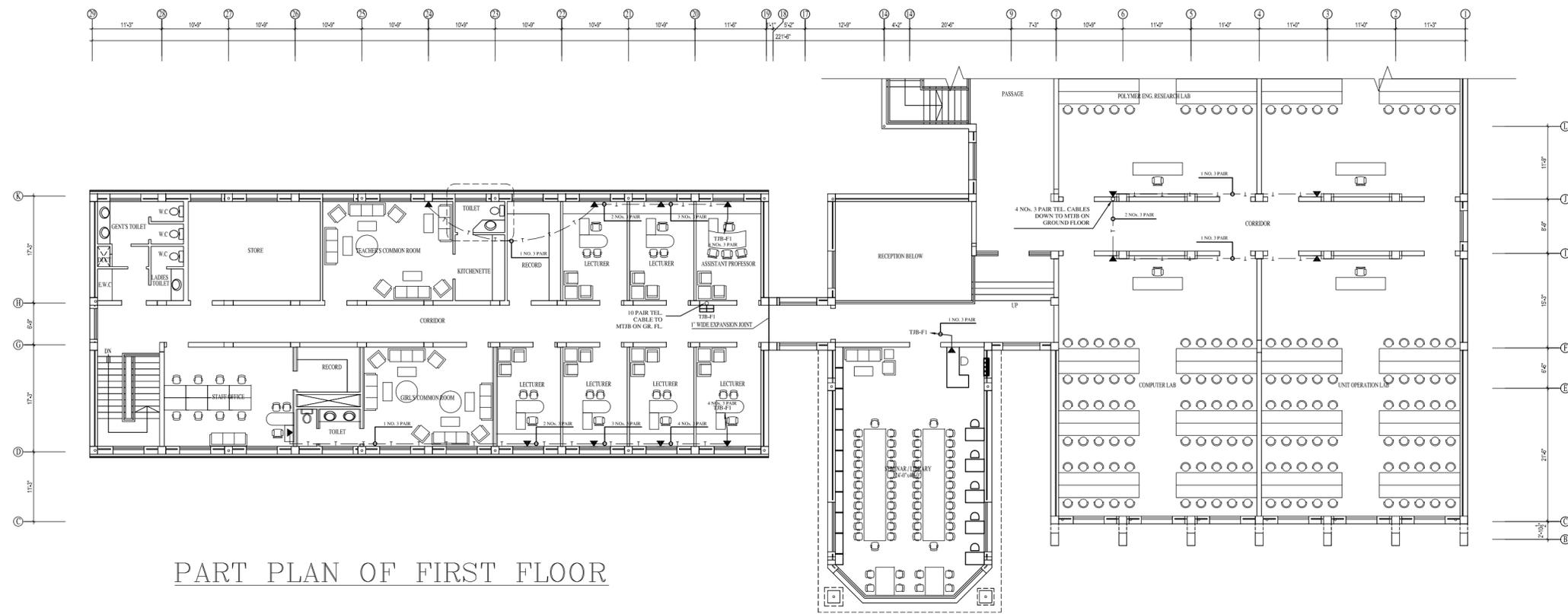
PROJECT
QUAID-E-AWAM UNIVERSITY OF ENGINEERING, SCIENCES & TECHNOLOGY, NAWABSHAH.

DRAWN BY: R. A. KHAN
PROJECT NO.: **626/2014**

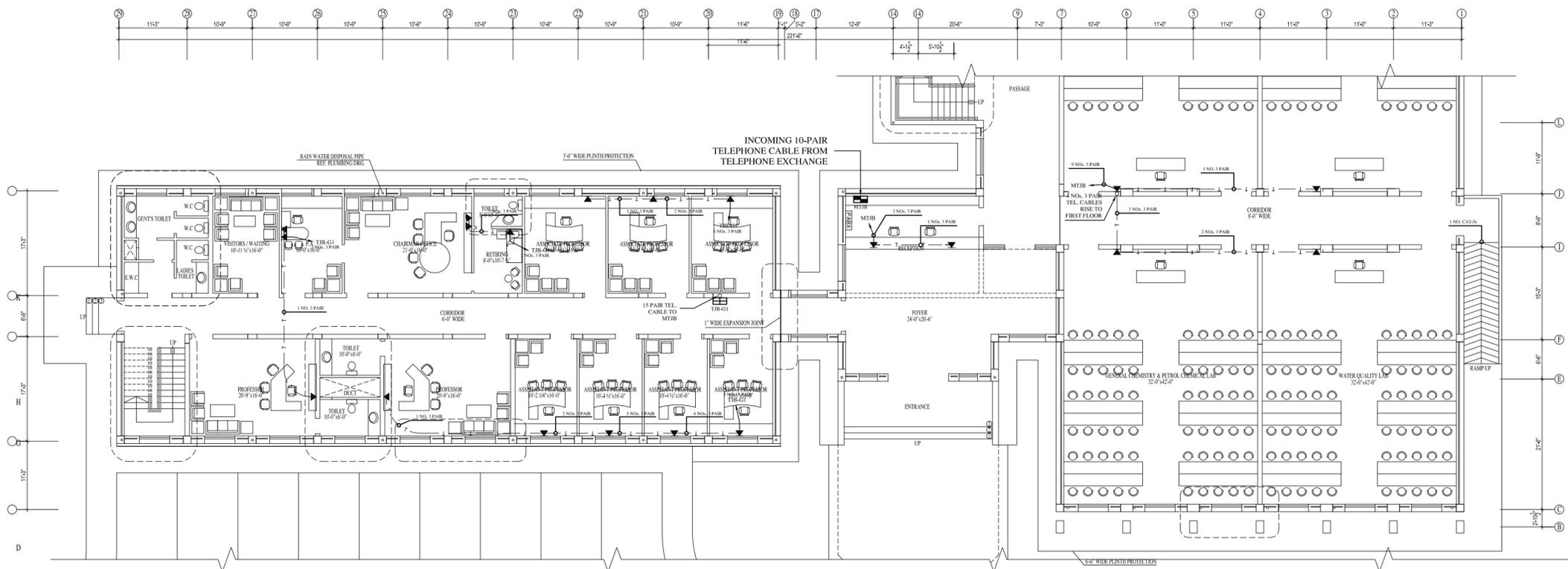
CHECKED BY: M.SAFWAN ALI
SCALE: N.T.S.
DRAWING NO.: **E-09**

DATE: 02-09-2014
ARCHITECTS: **NAQVI AND SIDDIQUIE INC. ARCHITECTS AND ENGINEERS**
BLOCK NO 18, 1 ST. FLOOR, MASJID SUPER MARKET MARKAZ F-6, ISLAMABAD.

CONSULTANTS: **ATCONS ASSOCIATED TECHNICAL CONSULTANTS**
ELECTRICAL, MECHANICAL AND AIRCONDITIONING CONSULTANTS
505, AMBER ESTATE, SHAHRAH-E-FAISAL, KARACHI.
PHONE NO. 4545560-61



PART PLAN OF FIRST FLOOR



PART PLAN OF GROUND FLOOR

LEGEND

SYMBOLS	DESCRIPTION
◀	TELEPHONE OUTLET
▢	TELEPHONE JUNCTION BOX (TJB)
■	MAIN TELEPHONE JUNCTION BOX (MTJB)

NOTES:

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 - 3.2. Surface / Cable Trays - uPVC Electric Conduits
 - 3.3. Furniture - PVC Flexible Conduits
- NO Telephone Outlets are to be used as Junction Boxes for Circuit Wiring or Cable Pulling. For all cable pulling, pull boxes are to be used and provided.
- All Electrical Equipments shown on drawings are 'Not to Scale'.
- All fixtures and cables are to be tagged appropriately as per their circuit identifications as indicated in the drawings.

MARK	DATE	REVISION
2	31-03-15	ARCH. LAYOUTS REVISED
1	23-09-14	ISSUED FOR TENDER
0	10-09-14	ISSUED FOR APPROVAL

TITLE
**TELEPHONE LAYOUT FOR
 CHEMICAL ENGG. DEPT.
 GROUND FLOOR**

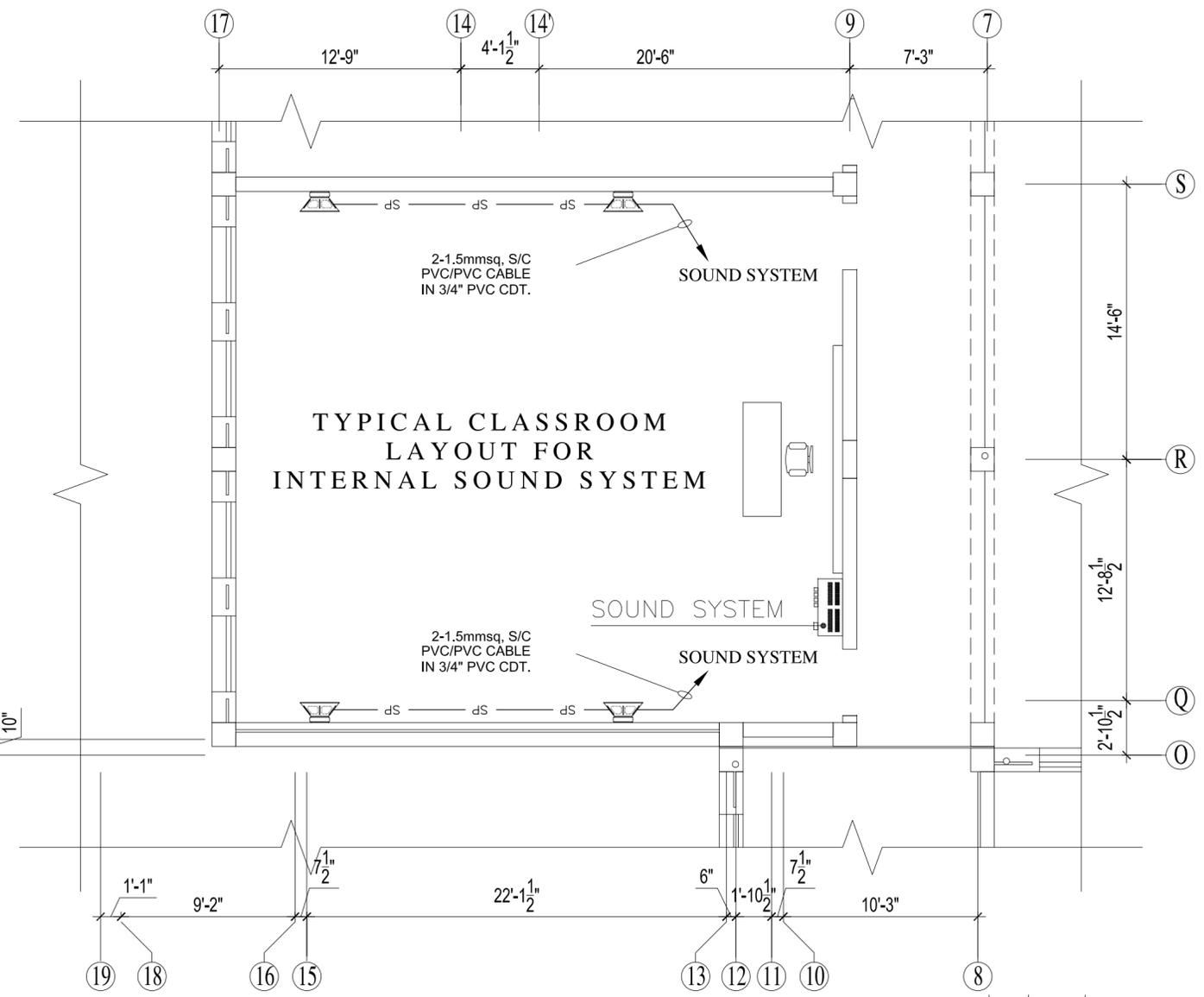
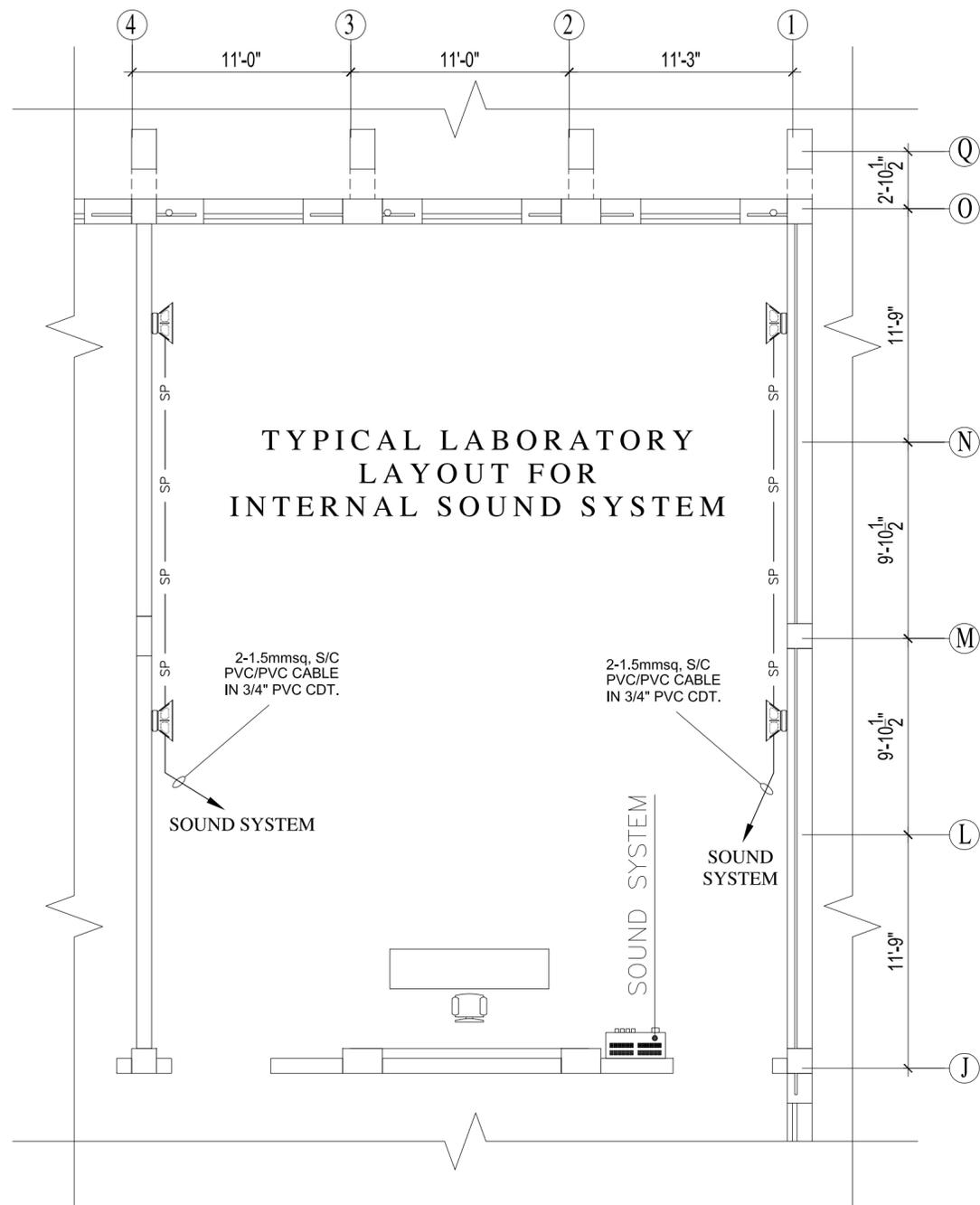
PROJECT
**QUAID-E-AWAM UNIVERSITY OF
 ENGINEERING, SCIENCES & TECHNOLOGY,
 NAWABSHAH.**

DRAWN BY: R. A. KHAN
 CHECKED BY: M.SAFWAN ALI
 PROJECT NO. **626/2014**

SCALE: N.T.S.
 DATE: 02-09-2014
 DRAWING NO. **E-12**

ARCHITECTS
NAQVI AND SIDDIQUIE
 INC. ARCHITECTS AND ENGINEERS
 BLOCK NO 18, 1 ST. FLOOR MASJID
 SUPER MARKET MARKAZ F-6,
 ISLAMABAD.

CONSULTANTS
ATCONS
ASSOCIATED TECHNICAL CONSULTANTS
 ELECTRICAL, MECHANICAL AND AIRCONDITIONING CONSULTANTS
 505, AMBER ESTATE,
 SHAHRAH-E-FAISAL,
 KARACHI.
 PHONE NO. 4545560-61



- NOTES:
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 - 3.3. Furniture - PVC Flexible Conduits
 4. NO Speaker Outlets are to be used as Junction Boxes for Circuit Wiring or Cable Pulling. For all cable pulling, pull boxes are to be used and provided.
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 6. All fixtures and cables are to be tagged appropriately as per their circuit identifications as indicated in the drawings.

LEGEND

SYMBOLS	DESCRIPTION
	WALL MOUNTED SPEAKER
	AMPLIFIER
— SP —	SPEAKER WIRING

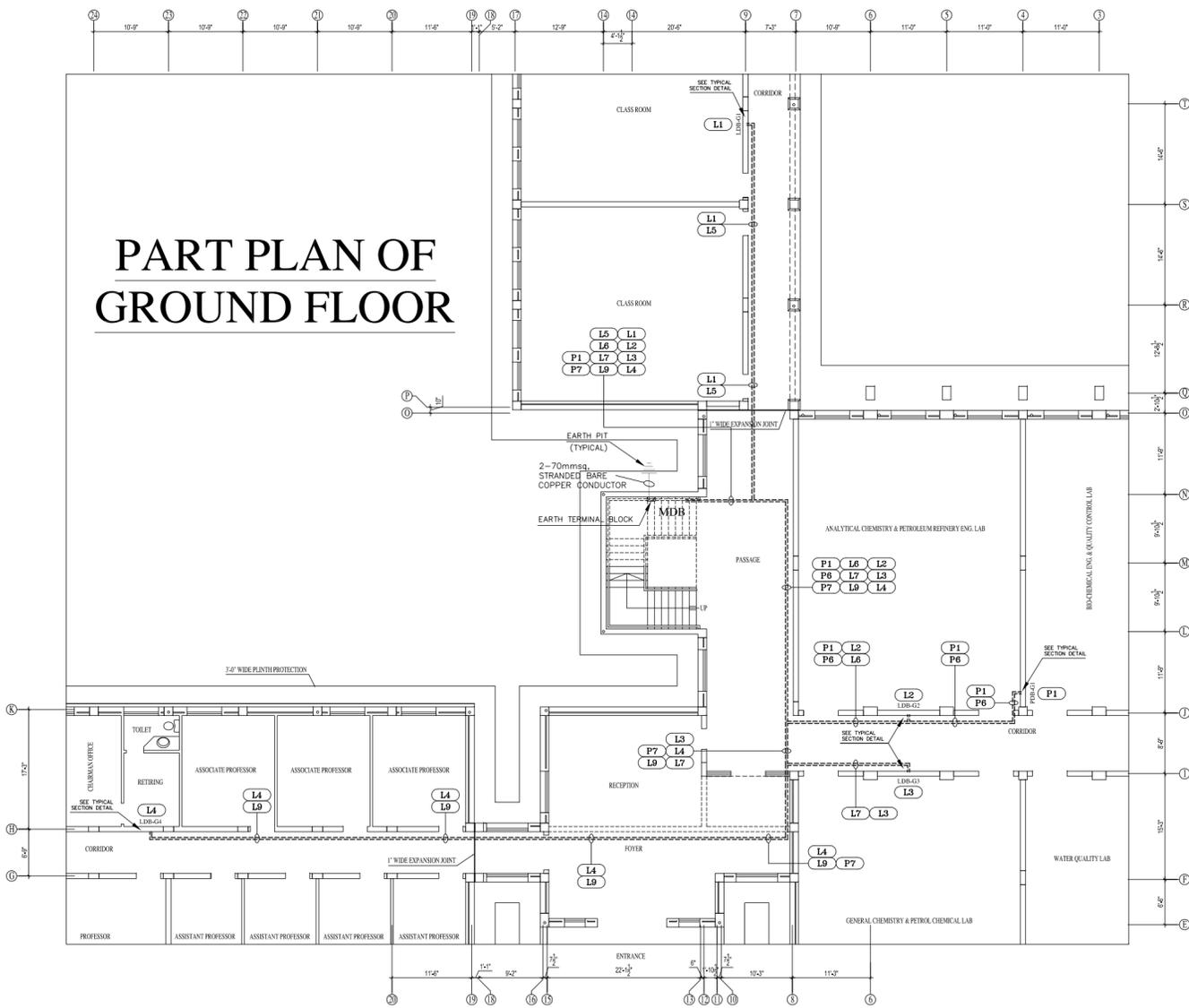
2	31-03-15	ARCH. LAYOUTS REVISED
1	23-09-14	ISSUED FOR TENDER
0	10-09-14	ISSUED FOR APPROVAL
MARK	DATE	REVISION
TITLE		
SOUND SYSTEM LAYOUT FOR CHEMICAL ENGG. DEPT.		
PROJECT		
QUAID-E-AWAM UNIVERSITY OF ENGINEERING, SCIENCES & TECHNOLOGY, NAWABSHAH.		
DRAWN BY	R. A. KHAN	PROJECT NO.
CHECKED BY	M.SAFWAN ALI	626/2014
SCALE:	N.T.S	DRAWING NO.
DATE:	02-09-2014	E-14
ARCHITECTS		
NAQVI AND SIDDIQUIE INC. ARCHITECTS AND ENGINEERS BLOCK NO. 18, 1 ST. FLOOR, MASJID SUPER MARKET MARKAZ F-6, ISLAMABAD.		

CONSULTANTS

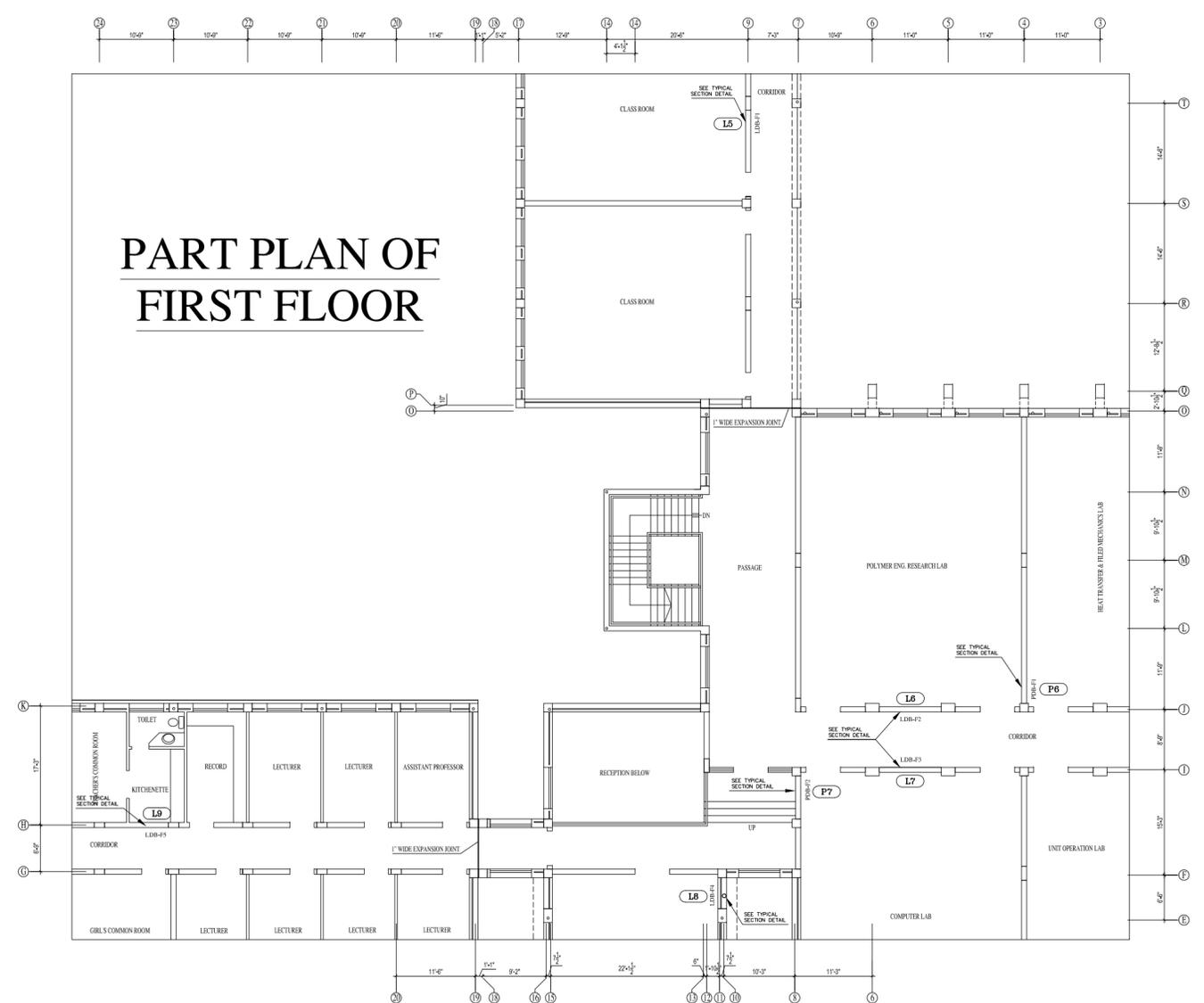
ATCONS
ASSOCIATED TECHNICAL CONSULTANTS
ELECTRICAL, MECHANICAL AND AIRCONDITIONING CONSULTANTS

505, AMBER ESTATE, SHAHRAH-E-FAISAL, KARACHI.
PHONE NO. 4545560-61

PART PLAN OF GROUND FLOOR

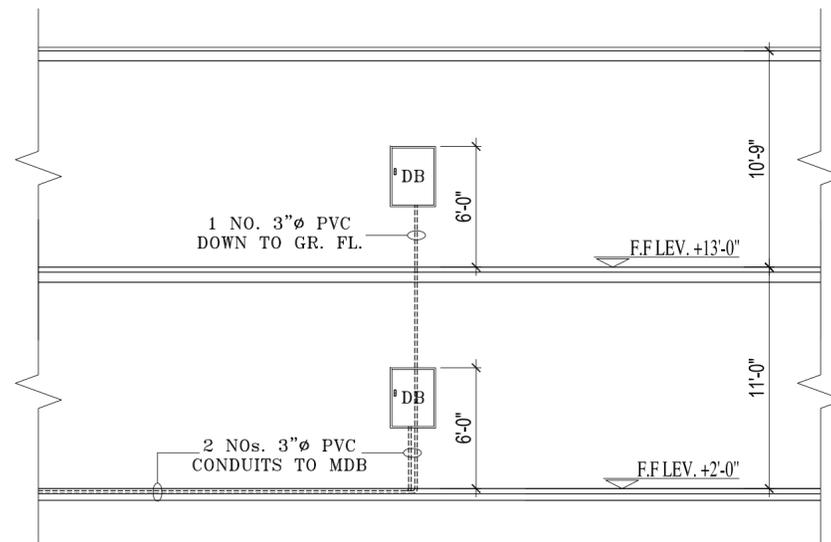


PART PLAN OF FIRST FLOOR



OUTGOING CABLES FROM MDB

CABLE NO.	CABLE ROUTE	SIZE			TOTAL LENGTH	
		CABLE (PVC/PVC)	ECC (mmsq)	CONDUIT (mm)	CABLE (Rft.)	ECC (Rft.)
L1	FROM MDB TO LDB-G1 (GROUND FLOOR)	1-6mmsq, 4 c	2-6mmsq	50	75	150
L2	FROM MDB TO LDB-G2 (GROUND FLOOR)	1-16mmsq, 4 c	2-16mmsq	63	75	150
L3	FROM MDB TO LDB-G3 (GROUND FLOOR)	1-16mmsq, 4 c	2-16mmsq	63	80	160
L4	FROM MDB TO LDB-G4 (GROUND FLOOR)	1-25mmsq, 3.5 c	2-16mmsq	75	165	330
L5	FROM MDB TO LDB-F1 (FIRST FLOOR)	1-6mmsq, 4 c	2-6mmsq	50	90	180
L6	FROM MDB TO LDB-F2 (FIRST FLOOR)	1-16mmsq, 4 c	2-16mmsq	63	90	180
L7	FROM MDB TO LDB-F3 (FIRST FLOOR)	1-16mmsq, 4 c	2-16mmsq	63	95	190
L8	FROM MDB TO LDB-F4 (FIRST FLOOR)	1-10mmsq, 4 c	2-10mmsq	50	100	200
L9	FROM MDB TO LDB-F5 (FIRST FLOOR)	1-16mmsq, 4 c	2-16mmsq	63	180	160
L10	FROM MDB TO DB-EXT. (GROUND FLOOR)	1-6mmsq, 4 c	2-6mmsq	50	70	140
P1	FROM MDB TO PDB-G1 (GROUND FLOOR)	1-16mmsq, 4 c	2-16mmsq	63	100	200
P2	FROM MDB TO PDB-G2 (GROUND FLOOR)	1-16mmsq, 4 c	2-16mmsq	63	80	160
P3	FROM MDB TO PDB-G3 (GROUND FLOOR)	1-16mmsq, 4 c	2-16mmsq	63	115	230
P4	FROM MDB TO PDB-G4 (GROUND FLOOR)	1-16mmsq, 4 c	2-16mmsq	63	65	130
P5	FROM MDB TO PDB-G5 (GROUND FLOOR)	1-16mmsq, 4 c	2-16mmsq	63	100	200
P6	FROM MDB TO PDB-F1 (FIRST FLOOR)	1-16mmsq, 4 c	2-16mmsq	63	115	230
P7	FROM MDB TO PDB-F2 (FIRST FLOOR)	1-16mmsq, 4 c	2-16mmsq	63	100	200
P8	FROM MDB TO PDB-F3 (FIRST FLOOR)	1-16mmsq, 4 c	2-16mmsq	63	115	230
P9	FROM MDB TO PDB-F4 (FIRST FLOOR)	1-16mmsq, 4 c	2-16mmsq	63	80	160
P10	FROM MDB TO PDB-F5 (FIRST FLOOR)	1-25mmsq, 3.5 c	2-16mmsq	75	115	230



TYPICAL SECTION DETAIL

LEGEND

SYMBOLS	DESCRIPTION
	LIGHTING DISTRIBUTION BOARD (LDB)
	POWER DISTRIBUTION BOARD (PDB)
	MAIN DISTRIBUTION BOARD (MDB)

SPECIAL NOTES:

- The latest Revision (Rev. 3) of the Main Feeder Layout is in accordance with the directives and requirements of the Client (i.e. QUEST, Nawabshah).
- The details of the Client Requirements were provided to the Consultant vide a meeting held on April 23, 2015 with Mr. M. Alam Jamali of QUEST, Nawabshah.

MARK	DATE	REVISION
3	05-05-15	REVISED AS PER CLIENT
2	31-03-15	ARCH. LAYOUTS REVISED
1	23-09-14	ISSUED FOR TENDER
0	10-09-14	ISSUED FOR APPROVAL

TITLE
MAIN FEEDER LAYOUT FOR CHEMICAL ENGG. DEPT. GROUND FLOOR

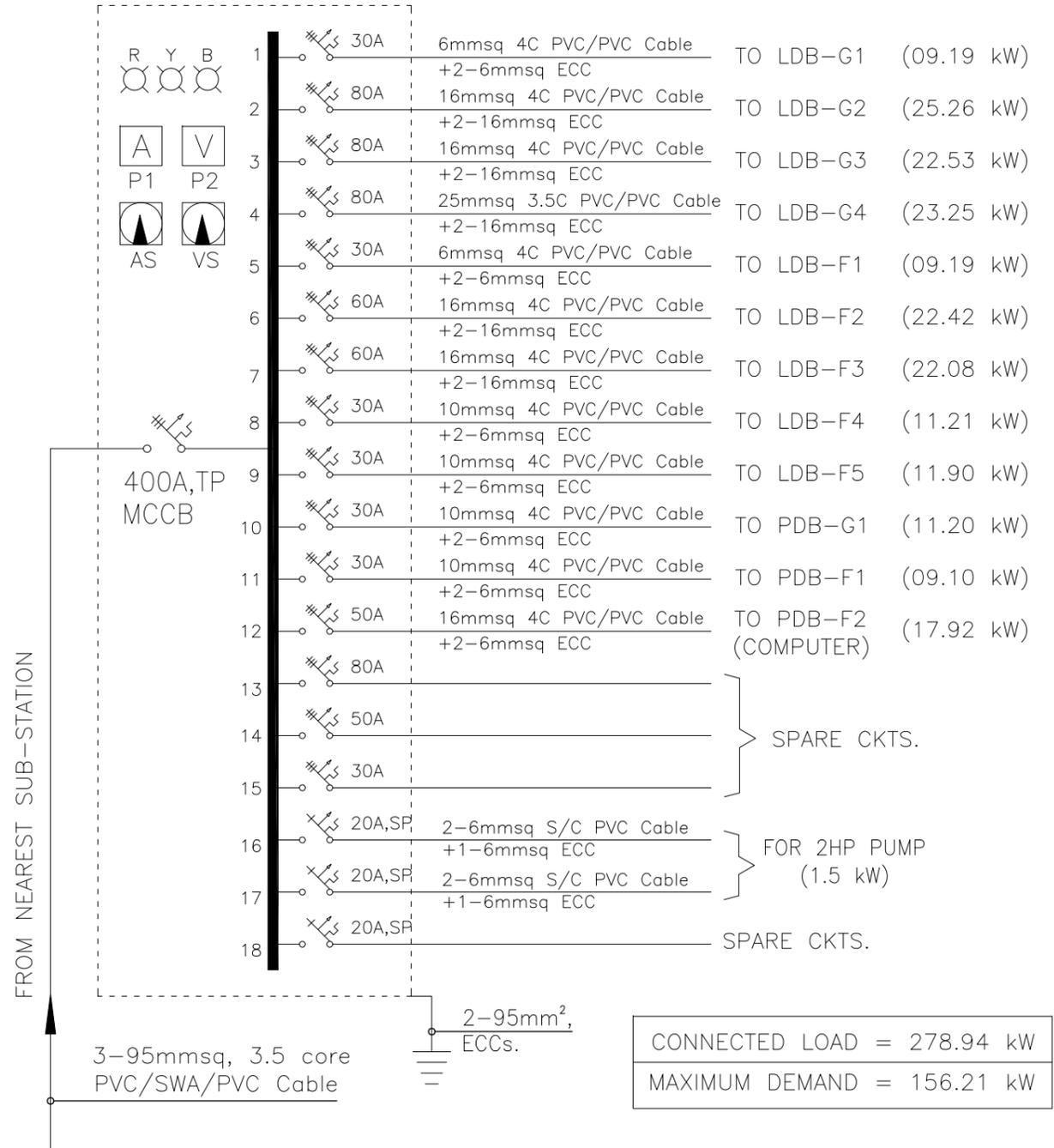
PROJECT
QUAID-E-AWAM UNIVERSITY OF ENGINEERING, SCIENCES & TECHNOLOGY, NAWABSHAH.

DRAWN BY: R. A. KHAN
 CHECKED BY: M.SAFWAN ALI
 PROJECT NO. **626/2014**

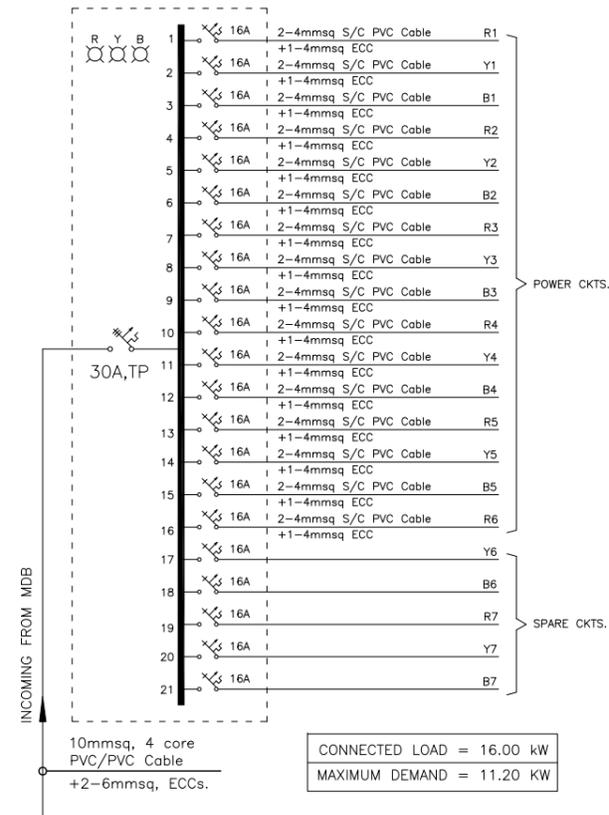
SCALE: N.T.S.
 DATE: 02-09-2014
 DRAWING NO. **E-15**

ARCHITECTS
NAQVI AND SIDDIQUIE
 INC. ARCHITECTS AND ENGINEERS
 BLOCK NO 18, 4 ST. FLOOR MASJID SUPER MARKET MARKAZ F-6, ISLAMABAD.

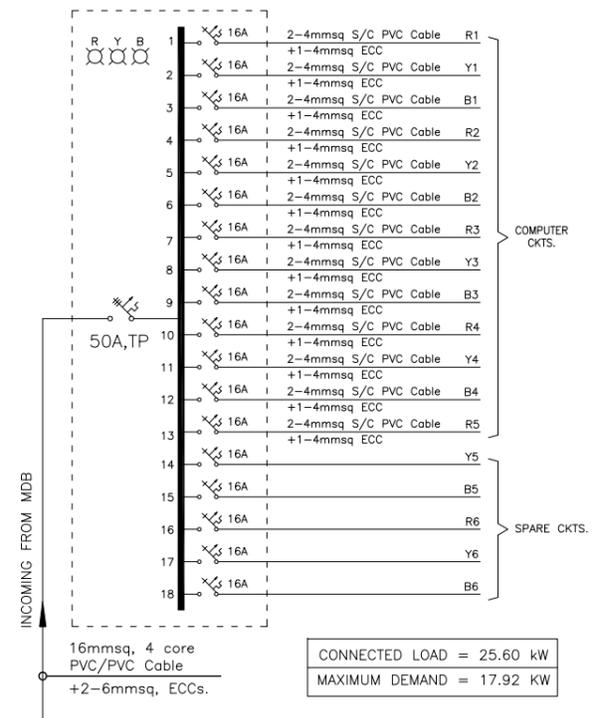
CONSULTANTS
ATCONS
ASSOCIATED TECHNICAL CONSULTANTS
 ELECTRICAL, MECHANICAL AND AIRCONDITIONING CONSULTANTS



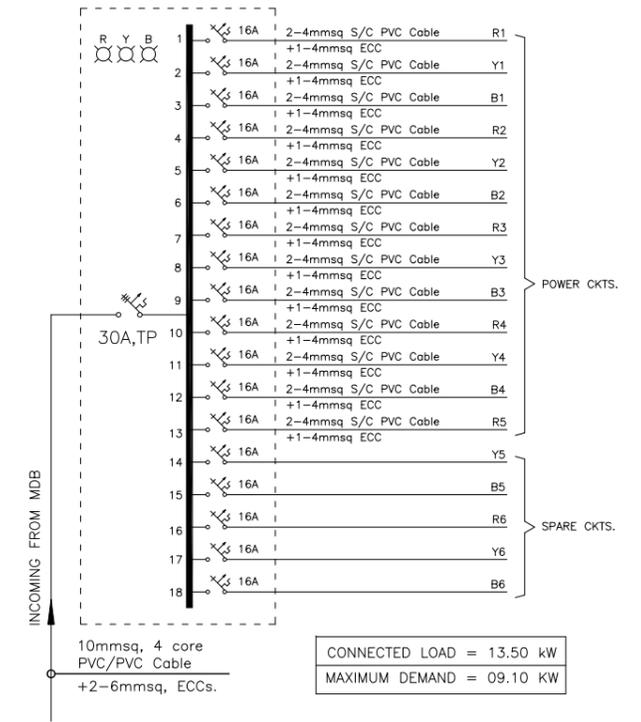
MAIN DISTRIBUTION BOARD (MDB)



PDB-G1



PDB-F2 (Computer)



PDB-F1

2	05-05-15	REVISED SCHEMATIC DIAGRAM
1	31-03-15	SCHEMATICS REVISED
0	20-10-14	ISSUED FOR APPROVAL
MARK	DATE	REVISION

TITLE
SCHEMATIC DIAGRAM FOR CHEMICAL ENGG. DEPT.

PROJECT
QUAID-E-AWAM UNIVERSITY OF ENGINEERING, SCIENCES & TECHNOLOGY, NAWABSHAH.

DRAWN BY: R. A. KHAN
CHECKED BY: M.SAFWAN ALI
PROJECT NO.: **626/2014**

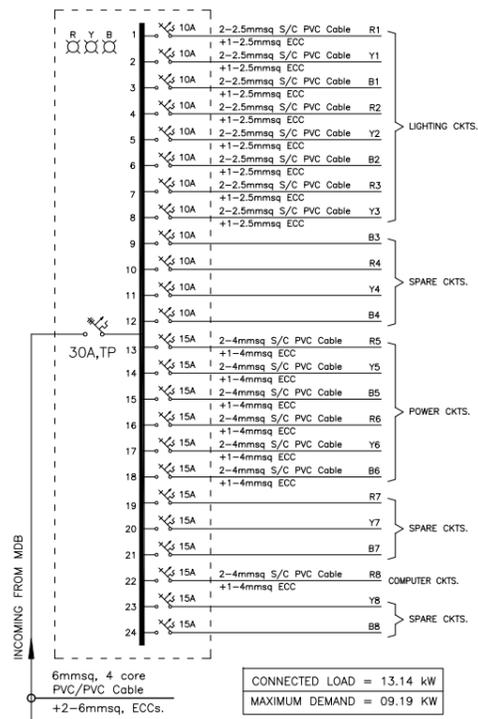
SCALE: N.T.S
DATE: 02-09-2014
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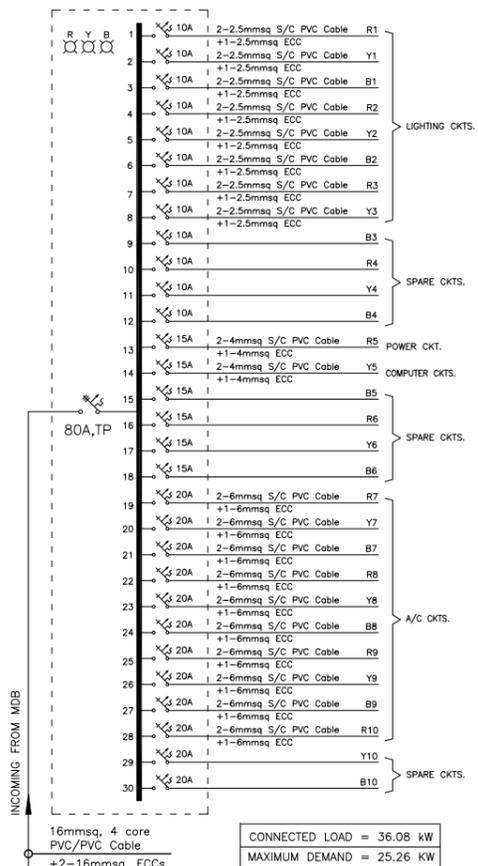
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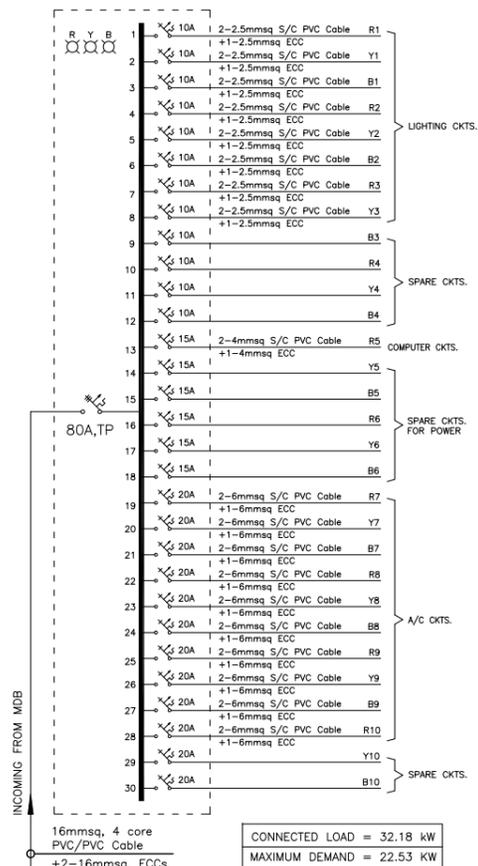
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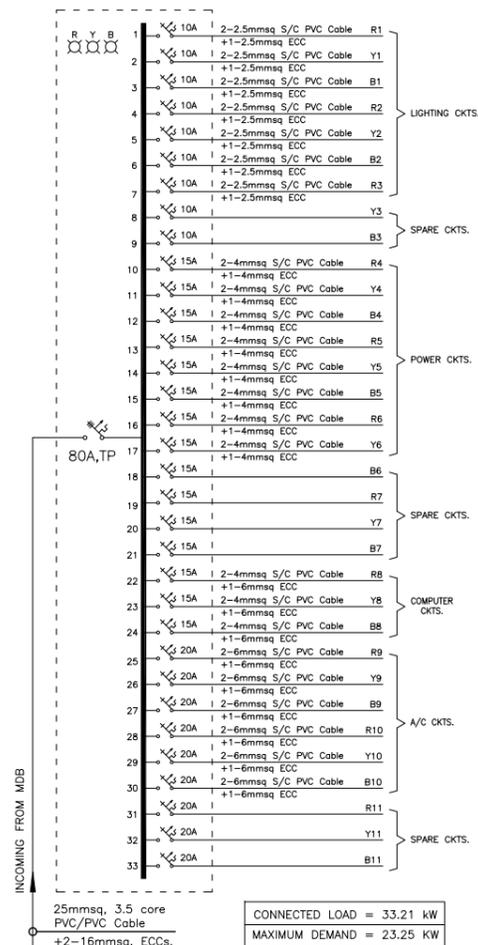
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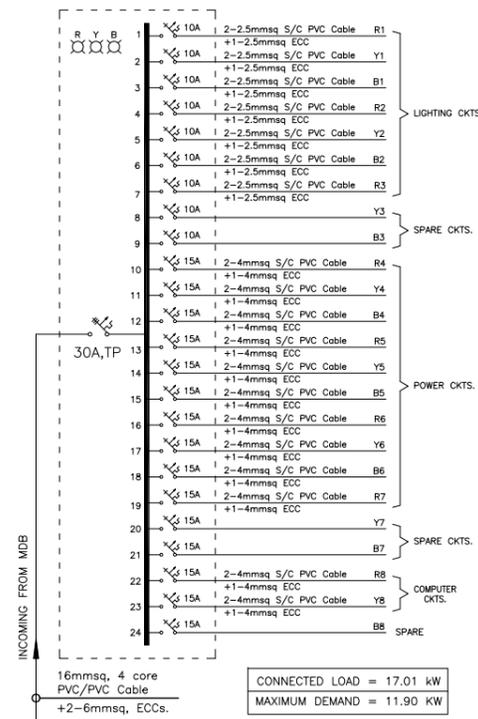
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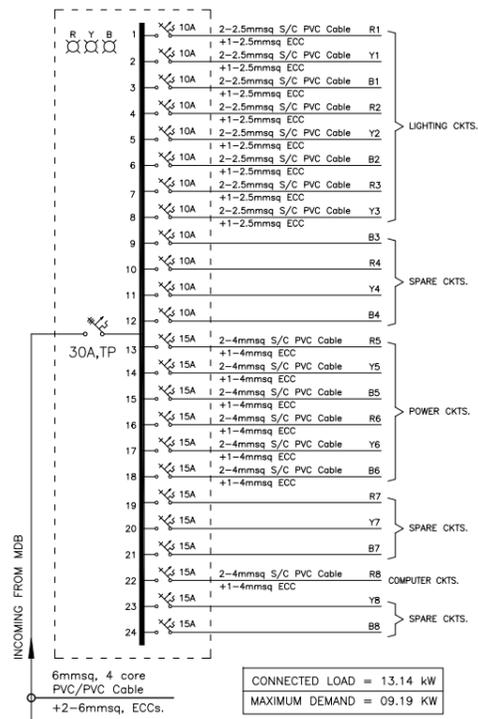
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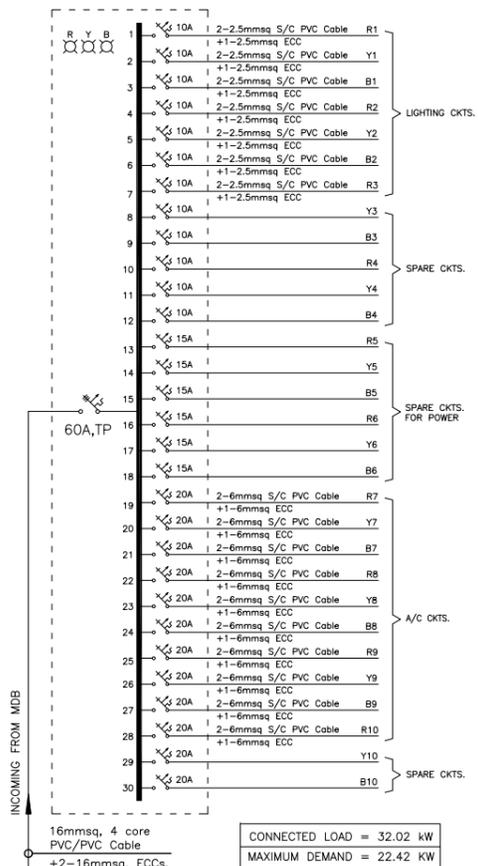
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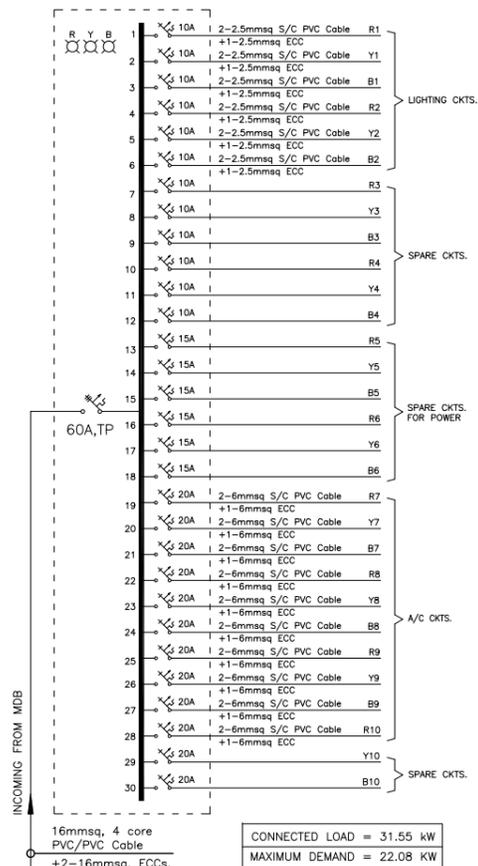
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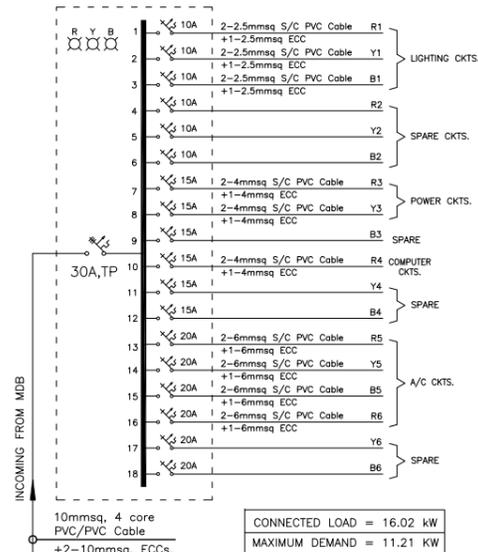
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LDB-F2



LDB-F3



LDB-F4

1	31-03-15	SCHEMATICS REVISED
0	20-10-14	ISSUED FOR APPROVAL
MARK	DATE	REVISION

TITLE
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DRAWN BY: R. A. KHAN
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PROJECT NO.: **626/2014**

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