

2018

PROPOSED RENOVATION OF HOTEL CLARKS - LUCKNOW

TENDER DOCUMENTS FOR PLUMBING SYSTEM

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1. GENERAL CONDITIONS OF CONTRACT

DEFINITIONS AND INTERPRETATIONS:

Definitions

In the Contract following words and expressions shall have meanings hereby assigned to them, except where the context otherwise requires (in alphabetical order)

1.1 APPROVED/APPROVAL

"Approved" means approved in writing by the Project Manager or Owner's authorized representative including subsequent written confirmation of previous verbal approval.

1.2 APPROVED EQUAL

"Approved Equal" shall mean an alternative product/ service approved by Project Manager or Owner's authorized representative as equivalent to that specified in the Contract Documents.

1.3 ENGINEERING CONSULTANT:

"Engineering Consultant" means M/s San Engineers & Consultants, Jaipur or in the event of it ceasing to be the Consultant for the purpose of this Contract, for whatever reasons, such other or additional person, firm or Company as the Owner may nominate for the purpose.

1.4 CONTRACT:

The "Contract Documents" consist of the Notice Inviting Tenders, the Agreement between **Client** and the Contractor, the General Conditions of Contract, Specifications, the Drawings, Schedule of Quantities, Schedule of Fiscal Aspects and relevant correspondence including all modifications thereof incorporated in the documents before their execution. **Client** means on whose behalf tenders are invited and include its successors permitted assigns and Legal authorized representatives.

1.5 CONTRACTOR:

"Contractor" means the person, firm or company whether incorporated / registered or not, employed as Contractor by **CLIENT** for undertaking the Works and shall include the Contractor's legal and authorized representatives, successors and permitted assigns.

1.6 CONTRACTOR'S REPRESENTATIVE:

The Contractor's Representative shall mean the person or party duly appointed by the Contractor, to act for and on its behalf on a day-to-day basis during the construction of the Work and the Project. Any action to be taken by the Contractor may be taken on the Contractor's behalf by the

Contractor's Representative. The Contractor's Representative shall be considered a "key person" for purposes of Section 12 of the General Conditions of Contract.

1.7 CONSTRUCTION PLANT:

"Constructional Plant" means all plant, tools, tackles, appliances or equipment, implements, scaffolding of whatever nature required for the execution of the Works but does not include materials, equipment or other things intended to form part of the Works.

1.8 "CONTRACT SUM" means

Shall mean the sums referred to in the Contract Documents for the Contractor's performance of the Work.

The Contract Price is inclusive of all taxes, duties, insurance premiums and all other statutory taxes and levies if any applicable to the contractors/workers etc., and the Owner shall not be responsible in any way whatsoever to pay for the same.

The Contract Price shall also include the Contractor's establishment, infrastructure, overheads and all other charges, and shall be inclusive of every cost and expense required by the Contract to be borne by the Contractor and necessary for the proper execution and successful completion of the Work under the Contract, in conformity with the Contract Documents and the best engineering and construction practices and to the satisfaction of the Engineering Consultants, Project Manager, Owner's Representative and the Owner.

The Contract is neither a fixed lump sum contract nor a piece work contract, but is an item rate contract to carry out the Works according to the actual measured quantities at the rates contained in the schedule of rates and probable quantities as provided in the Priced Bill of Quantities with Detailed Specifications. The Contract Price shall not exceed Rs. _____ (Rupees _____) as indicated in the Letter of Intent/Work Order, amounts in excess of this number, not approved in advance by the Owner's Representative shall be at the Contractor's expense. The Contractor has to closely monitor the quantities and cost and obtain an Approval from the Owner/Project Manager well in advance for any change outside the scope of the Work which would cause the cost of the Work to exceed the Contract Price as indicated in the Letter of Intent. Prices will be firm until the end of the contract. No escalation in price shall be allowed for any reason whatsoever during the entire period of the completion of Project.

1.9 DRAWINGS:

"Drawings" means the drawings referred to in the specifications and any modifications of such drawings or such other drawings as may be from time to time be furnished or approved in writing by Project Manager. The contractor shall not, without the prior written consent of **Client**, use or publish for any purpose whatsoever, any information, prepared for or in connection with the services envisaged herein. The said drawings are "COPYRIGHT PROTECTED."

1.10 DEFECT LIABILITY PERIOD:

"Defect liability period" is defined as the period from the completion/ handing over of the building whichever earlier when the contractor is supposed to remove all defects pointed out and arising during this period. The defect liability period shall be **Twelve months** from the date of virtual & satisfactory completion.

Any defect arising during this period shall be brought to the notice of contractor, consultant and the architect. The concerned parties shall act within 24 hours or earlier depending on the seriousness of the defect. It will be responsibility of the contractor to make all possible efforts to rectify the defect or replace the defective material within one week of being brought to the notice of the contractor. Extension to this time frame may be given to the Contractor by the Project Manager at their sole discretion. The Architect/ Engineering Consultant shall define this reasonable period depending on the nature of the defect.

1.11 OWNERS' REPRESENTATIVE:

"Owners' Representative" will be **PROJECT MANAGER of Client** On its behalf.

1.12 FORCE MAJEURE:

Force Majeure are risks due to riots (otherwise than among Contractor's employees) and civil commotion (in so far as both these are uninsurable), war (whether declared or not), invasion, act of foreign enemies, hostilities, civil war, rebellion, insurrection, military or usurped power, an act of Government, an act of God, such as lightening, unprecedented floods, tornado, and damage from aircraft.

1.13 MONTH:

"Month" means English Calendar month. "Day" shall mean a calendar day of 24 hours each.

1.14 MEASUREMENT BOOKS:

The "measurement books" shall be defined as the books maintained during the currency of the project to record all measurements qualifying for payment. The contractor shall maintain measurement books of all work done by them. The contractor shall get the measurement books verified by the Client Representative/PM/quantity surveyor periodically. It shall be responsibility of the contractor to get all the Works verified as per the measurement books before they get concealed. If the contractor fails to get the measurements of underlying items verified in time then he shall remove the overlying or concealing items and get the underlying or concealed items verified and make the work good at no extra cost to the Client.

All measurement books shall be hard bound with pages numbered. The Client/PM and the contractor shall verify the condition of the measurement book before implementation. No tearing of pages or overwriting shall be permitted in the measurement books. Only neat cutting of mistakes with joint signatures of contractor's representative and the PM/quantity surveyor shall be permitted.

1.15 NOMINATED SUB-CONTRACTOR:

"Nominated Sub-Contractor" refers to those specialists, tradesmen and others, nominated by Project Manager for executing special Works or supplying special equipment or materials, for which provisional sums are included in the Contracts. Such agencies shall be deemed to have been employed by the Contractor.

1.16 PROJECT MANAGER:

"Project Manager" means client or its authorized representatives. The Project Manager shall be authorized to represent and act on behalf of the Owner on day to day basis during all packages of construction of the Project. All communications, approvals and decisions to be taken in connection with the Architect's /Engineering Consultant's services shall be channelled through the Project Manager.

1.17 'RECORDS AND AUDITS' -

The contractor shall keep books and records to **CLIENT's** satisfaction, in such a manner, as to enable **Client** to carry out effective financial control.

1.18 SUB-CONTRACTOR:

"Sub-Contractor" means the person, firm or company to whom any part of the Contract has been sublet by the Contractor with the written consent of the Project Manager and includes the Sub-Contractor's legal and authorized representatives, successors and permitted assigns.

1.19 SPECIFICATION:

"Specification" means the specifications annexed to or issued with the tender and any modifications thereof or additions thereto as may from time to time be furnished or approved in writing by the Project Manager.

1.20 SITE:

"Site" means the lands and other places on, under, in or through which the Works are to be executed or carried out and any other lands or places provided by Client or used for the purpose of the Contract.

1.21 TEMPORARY WORKS:

"Temporary Works" means all temporary Works of any kind required for the execution of the Works by the Contractor.

1.22 TENDER:

"Tender" shall mean the Contractor's offer to construct the Work in strict accordance with the Contract Documents as set forth on the Tender Form.

1.23 TENDER DOCUMENTS:

“Tender Documents” shall mean the Contractor’s Tender Form. The Performa of Bank Guarantee for Performance Bond, the Performa of Bank Guarantee against Mobilization Advance, and Notice Inviting Tender, Tender Form and Construction Contract Draft, General Conditions Of Contract, Special Conditions Of Contract, Plumbing & Sanitary System Technical Specifications, Technical Parameters, Bill Of Quantities and Drawings Of Plumbing & Sanitary System.

1.24 TERMS “AND”, “OR”, “AND/OR”:

The terms “and”, “or”, “and/or” used in context with the description or enumeration of two or more items or components of work of documentation or anything similar shall mean as is relevant and applicable to the text.

1.25 WORK:

“Work” shall mean and include all materials and labour necessary to construct the Fire Fighting components of the Project in full compliance with the requirements of the Contract Document.

1.26 “WRITTEN NOTICE”:

Written Notice shall be deemed to have been duly served if delivered in person to the authorized representative of the firm / company for whom it is intended or if delivered at and a written delivery receipt obtained or sent by registered mail to the last business address known to them, who gives the notice.

1.27 WORKING DAY:

“Working Day” shall mean any day except the National Holidays as notified by the Central Government.

1.28 VENDORS:

“Vendors” shall mean and include all suppliers, material men, contractors, sub-contractors, nominated sub-contractors and trade contractors engaged at army stage of the Project.

2 SINGULAR AND PLURAL

Words importing singular number shall also include plural and vice versa where the context so requires.

3 HEADINGS AND MARGINAL NOTES

The headings and marginal notes in these conditions are for the purpose of facilitating reference and shall not be deemed to be part thereof or taken into consideration in the interpretation or construction thereof or of the Contract.

4 LANGUAGE

All documentation and correspondence in respect of this Contract shall be in the English language.

5 SCOPE AND INTENT

The general character and the scope of work is illustrated and defined by the signed Contract Documents herewith attached:

The Contractor shall carry out and complete the said work in every respect in accordance with the Contract, and with the directions of and to the satisfaction of Project Manager/ **Client**

INCREASES / DECREASES TO SCOPE OF WORK:

The Owner reserves the right to increase or decrease the scope of the Work on any or all items or to change the nature of the Work involved in any or all items or to completely delete any items of the Work under the Contract. The Contractor shall not be entitled to claim for loss of anticipated profits, for mobilization of additional resources, or for any other such reason on account of these change orders.

ITEMS OF WORK FOR COMPLETION:

The Contractor is bound to carry out any items of work necessary for the completion of the Work even though such items of work may not be expressly described in the Contract Documents.

The Client/Project Manager may, from time to time, issue further supplementary drawings and/or written instructions, details and directions and explanations, which are collectively referred to as Project Manager's Instructions. The Contractor shall forthwith comply with and duly execute Works comprised in such Project Manager's instructions provided always that verbal instruction, directions and explanations given to the Contractor or their work's representative by Project Manager shall, if involving a variation, be confirmed in writing.

SITE MANAGER

The Project Manager or their authorized Site Manager would be responsible for the day-to-day supervision of the Contract and shall represent the Project Manager at the Site under the instructions of the Project Manager. The Contractor shall provide all necessary facilities for the performance of their duties.

6 DUTIES OF SITE MANAGER

6.1 The Site Manager shall carry out such duties in issuing decisions, certificates and orders as are specified in the Contract and such additional functions as are delegated to them by the Project Manager from time to time. The Site Manager shall coordinate, watch and supervise the Works and examine and approve materials to be used or workmanship employed in connection with the Works.

6.2 Provided always that Failure of the Site Manager or their representative to disapprove any work or materials shall not prejudice the power of the Project Manager to disapprove such work or materials except as otherwise provided in these documents, if the Contractor shall be dissatisfied by reason of any decision of the Site Manager, he shall be entitled to refer the matter to the Project Manager / **Client** in writing, within 15 days of the receipt of such decision, who shall thereupon confirm, reverse or vary such decision.

Subject as otherwise provided in this Contract, all notices to be given on behalf of the Project Manager, and **Client** and all other actions to be taken on their behalf may be given or taken by the Site Manager.

7 SITE

Before tendering, the Contractor shall visit the Site and satisfy themselves about the Site conditions. He shall examine the Site and take note of existing roads and other means of communication and the character of the soil and of the excavations, the correct dimensions of the work and facilities for obtaining the special articles called for in the contract documents and shall obtain their own information on all matters affecting the continuation and progress of the Works. No extra claim made in consequence of any misunderstanding or incorrect information for any of these points or on the grounds of insufficient description shall be allowed. Should the Contractor, after visiting the Site, find any discrepancies, omissions, ambiguities or conflicts in or among the contract documents or to be in doubt as to their meaning he shall bring the question to the Project Manager's attention, not later than 3 days before the opening date of the tender.

8 ASSIGNMENT

The Contractor shall not assign the Contract or any part thereof, or any benefit or invest or there under otherwise than by a charge in favour of Contractor's bankers of any monies due or to become due under this Contract, without prior written consent of the Project Manager.

9 SUB-CONTRACTORS

As soon as practicable and before awarding any sub-contract, the Contractor shall submit the names and details of such firms whom he is going to employ for approval of Project Manager. These details shall include the expertise, financial status, technical manpower, equipment, resources, and list of Works executed and on hand of the sub-contractor. The Contractor and the Project Manager shall mutually decide the Sub-contractor to whom the work could be awarded. It is clearly understood that the Contractor will be fully responsible for all the acts and omissions of Sub-contractor, including damages as per this Agreement or otherwise including but not limited to for waterproofing, pest control, doors and windows, insulation and other specialist items shall be got approved well in advance.

10 SPECIALIST AGENCIES

The Contractor may entrust specialist items of work to the agencies specialized in the specified trade. The Contractor shall give the names and details of such firms whom he is going to employ

for approval of Project Manager. These details shall include the expertise, financial status, technical manpower, equipment, resources, and list of Works executed and on hand of the specialist agency.

11 CONTRACTOR'S GENERAL RESPONSIBILITIES

The Contractor shall execute and maintain the Works with due care and diligence and shall provide all materials, labour including supervision thereof, constructional plant, temporary Works, transport and all other things, whether of temporary or permanent nature, required for the proper execution and maintenance of the Works.

The Contractor shall execute the whole and every part of the Works in the most substantial and workmanlike manner, both as regards materials and labour and otherwise in every respect in strict accordance with the specifications. The Contractor shall conform exactly, fully and faithfully to the designs, drawings and instructions relating to the work, in writing.

Before commencing any item of work, the Contractor shall co-relate all relevant drawings and information and satisfy themselves that the information available thereof is complete, unambiguous and without any discrepancies. The Contractor shall be responsible for any errors in the execution of the Works and/or damage caused due to any discrepancy in the Contract documents, which was overlooked by the Contractor and/or their Sub-Contractor, and is not brought to the notice of the Project Manager.

Levels, dimensions and other information shown on the drawings are believed to be correct. The Contractor shall, however, verify them for themselves and no claim or allowance whatsoever shall be entertained on account of any errors or omissions in the levels, dimensions, etc. from those shown in the drawings.

Any loss or damage caused by negligence of the Contractor to the materials whether procured by the Contractor or Client shall be to their account.

Any loss or damage caused by the Contractor and their staff to the structure and/or services of the building including any damage caused to the curtain walls and glass panes shall be to Contractor's account and would be recovered from them through deductions from their running bill.

The Contractor shall submit an organization chart, specific to the project, qualification of the key personnel, number of skilled and unskilled people that the contractor would be employing to this project, detailed procurement schedule accompanied by a Project Schedule GANTT/PERT chart along with the tender.

12 DOCUMENTS MUTUALLY EXPLANATORY

The Contract documents are complimentary and cumulative and what is called for by any one shall be binding as if called for by all. The intention of the documents is to include all labour and materials, equipment and transportation necessary for proper execution of the work (exempting those materials and equipment listed separately which are to be supplied by the Owner). Materials

of work described in words which so applied have a well known technical or trade meaning shall be held to refer to such recognized standards as applicable.

13 DISCREPANCIES AND ADJUSTMENTS OF ERRORS

In the event of ambiguities, discrepancies, and contradictions between the Bill of Quantities, the drawings and/or specifications, the contractor shall immediately notify the Project Manager. The Architect/ Engineering Consultant shall explain the same and the Project Manager shall in their sole discretion, determine which of the requirements govern and/or clarify any such ambiguity or discrepancy and the Contractor shall comply with such determination.

If there are discrepancies in the rates quoted by the Contractor in figures and in words, the rates quoted in words shall prevail.

All errors in extensions or computing the amounts and totalling shall be corrected. Decision of the Project Manager in this regard will be final.

The Contractor shall not be entitled to any extension of time or any compensation due to such determination.

14 DRAWINGS

The drawings shall remain in the sole custody of Project Manager/Client. Two (2) copies of the Drawings shall be furnished to the Contractor, free of charge.

One copy of the Contract Documents including drawings furnished to the Contractor shall be kept at the Site and the same shall, at all reasonable times, be available for inspection.

The Contractor shall give written notice to the Site Manager and inform Project Manager, whenever planning or progress of the work is likely to be delayed or disrupted, unless the required drawings or order including a direction, instruction or approval is issued within reasonable time.

The Project Manager shall have full power and authority to supply to the Contractor, from time to time, during progress of the Works such further drawings and instructions as shall be necessary for proper and adequate execution of the Works.

15 TYPE OF CONTRACT

Item Rate – Contract

The Contract shall be an item rate Contract. The Contractor shall be entitled to payment, in Indian Rupees, of no more than the Contract Price as stated in the Letter of Award, in consideration of the Work performed and completion of the Work. The Contractor understands and agrees that the amount payable is assessed on a measurable basis in accordance with the tendered rates. However, the Contract Price may be altered on account of a change order. The Contract Price shall include payment for the supply of all labour (including payment to his Sub-Contractors), equipment, materials, power, water, plant and machinery, tools, transportation, framework,

scaffolding, all applicable taxes, duties, octroi, levies, royalties, fees, GST, insurance premiums, etc.

16 TAXES, DUTIES ETC.:

The Contract price/rates shall be deemed to include all taxes and duties, all insurance cover and all other applicable taxes, duties and levies. Client shall not entertain any claim whatsoever on this account and these rates shall remain firm during the currency of the project under what so ever reason.

The Contractor shall also co-operate with and render all necessary assistance to the Owner to enable the Owner to avail of Mod vat facility and/or recovery of other indirect taxes, duties and the like.

17 NOTICES, FEES, BYE LAWS, REGULATIONS:

The Contractor shall comply with all applicable laws and government acts including the by-laws or regulations of local authorities relating to the Work in so far as construction, fabrication and installation activities are concerned, and he shall obtain from the local authorities all permissions and approvals required. The Contractor shall give all notices and pay all fees and charges that are and that can be demanded by law hereunder. In the Contract Price for the Work, the Contractor shall allow for such compliance and work, and for the giving of all such notices, and shall include the payment of all such fees and charges.

18 LICENSES AND PERMITS:

All licenses and permits for the materials under Government control, and those required to be obtained by the Contractor for the execution of the Work, shall be directly obtained by the Contractor. The Contract Price shall include all transportation charges and the other expenses that may be incurred in this connection.

19 ROYALTIES AND PATENT RIGHTS:

All royalties or other sums payable in respect of the supply and use of any patented articles, processes or inventions for the carrying out of the Work as described by or referred to in the Contract Documents, shall be deemed to have been included in the Contract Price.

20 SCHEDULE OF QUANTITIES

The quantities given in the Schedule of Quantities are provisional and are meant to indicate the intent and provide a uniform basis for tendering. The Contractor shall be paid for the actual quantity of work executed by them in accordance with the contract documents at the Contract Rates. Client/Project Manager reserves the right to increase or decrease any of the quantities or to totally omit any items of work and the Contractor shall not claim any extra or damages on these grounds. Any error in description or in quantity or omission of item in the Schedule of Quantities shall not vitiate this contract but shall be deemed to be a variation required by Project Manager.

21 SEPARATE CONTRACTS

Client reserves the right to award other contracts in connection with the Works. The Contractor shall give other Contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work, and shall properly connect and coordinate its work and theirs. If any part of the Contractor's work depends on proper execution or results upon the work of any other Contractor, the Contractor shall inspect and promptly report to the Project Manager any defects in such work that render it unsuitable for such proper execution and results. Its failure to inspect and report shall constitute an acceptance of the other Contractor's work as fit and proper for the reception of its work, except as to the defects which may develop in the other Contractor's work after execution of the work.

22 CONTRACTOR'S DESIGNS & MANUFACTURER'S CATALOGUES

For the items of work which are executed to the Contractor's designs and specifications, the Contractor shall allow in their tender for providing Client with 4 copies of all designs, drawings and specifications, general arrangement drawings and shop drawings which he needs to submit.

The Contractor shall supply 4 copies of all manufacturer's catalogues, brochures of all equipment and proprietary articles specified or which the Contractor proposes to use for the approval by the Architect/Engineering Consultant as soon as is reasonably practicable.

23 CONTRACTOR TO PREPARE 'AS BUILT' DRAWINGS AND DOCUMENTATION

The Contractor shall during the course of execution, prepare and keep updated a complete set of "as built" drawings to show each and every change from the Contract drawings. The Architect/Engineering Consultant and the Contractor shall countermand changes recorded. Three copies of "as built" drawings, folded and bound to suitable / approved size shall be supplied to the Architect/Engineering Consultant within 30 days of the completion. Four sets of these drawings in CDs shall also be supplied on latest and updated version of AutoCAD at no extra cost to Client. The contractor shall provide adequate training, if required, to Client's operations and maintenance staff at the time of handing over of their Works and submit a Handing over Manual in a format prescribed by Client which will be supplied to the Contractor in due course.

24 INTEREST

No interest shall be payable on any money due to the Contractor against security deposit, interim or final bills or any other payments due under this contract.

25 WORK TO SATISFACTION OF CLIENT/PROJECT MANAGER

The Contractor shall execute and maintain the Works in strict accordance with the Contract to the satisfaction of the Client/Project Manager and shall comply with and adhere strictly to the Project Manager's instructions and directions on any matter whether mentioned in the Contract or not, touching or concerning the Works. Client/Project Manager's decision relating to the use and quality of materials and visual and aesthetic effect shall be final and binding.

26 PROGRAMME EVALUATION AND REVIEW

Network based integrated time schedule shall be submitted by the Contractor. The time schedule shall also include details of mobilization of resources, materials, equipment and labour. After award of Contract, the Architect/Engineering Consultant may require the Contractor to expand the information given in the program until it is suitable for the effective review of progress during the execution of the Works. The critical path shall be determined. It is the Contractor's obligation to ensure that such a program, duly approved by the Project Manager is available within 15 days of placement of order.

The Contractor shall, every fortnight, review and update this program and furnish for the information of the Project Manager, in writing, details of the Contractor's arrangements for executing the Works, materials procured, erected, balance at Site, and expected deliveries during the next fortnight; skilled/unskilled labour, foremen, supervisors working at Site and steps proposed for speeding up progress of work.

If at anytime it should appear to the Client/Project Manager or the Architect/Engineering Consultant that the progress of the Works does not conform to the approved program, the Contractor shall furnish a revised program and take such steps at their cost, as are necessary to expedite progress and ensure completion of the Works within the completion period or extended date of completion, provided that any extension of time given by the Project Manager on account of revised programme shall not affect the penalty clauses given in Clauses as per the Schedule of Fiscal Aspects of the Contract.

Approval by the Project Manager of such programs or the furnishing of such particulars shall not relieve the Contractor of any of their duties or responsibilities under the Contract.

The Contractor shall be called upon to attend co-ordination meetings with Client /Project Manager/Architect /Engineering Consultant and other Contractors and shall fully co-operate with such persons and agencies involved in these discussions. The Contractor shall take notes of the discussions during the meeting and shall strictly adhere to the decisions of the Project Manager in performing the Works.

27 CONTRACTOR'S SUPERVISION

27.1 The Contractor shall provide all necessary supervision during the execution of the Works and defects liability period for the proper fulfilling of the Contractor's obligations under the Contract. The Contractor or a competent and authorized agent approved in writing by the Project Manager, which approval may at any time be withdrawn; is to be constantly on the Works and shall give their whole time to supervise the Works. Such an authorized agent shall receive on behalf of the Contractor, directions and instructions from the Project Manager, the Architect or the Engineering Consultant. Apart from the Contractor/ authorized agent, independent floor managers/independent activity in-charge would be assigned to the different floors/areas for supervision and co-ordination of Works throughout the execution of the Project. The contractor's Supervisory staff must arrive at the site by 0900 hrs. every day and should lead the workforce into

the site. It may be noted that the workers would not be allowed entry into the site without their respective floor supervisors/activity in charges.

27.2 The Contractor shall employ for the execution of the Works

Such technical persons as are qualified and experienced and such representatives, foremen and supervisory staff as are competent to give supervision to the work, and

Such skilled, semi-skilled and unskilled labour as is necessary for the proper and timely execution and maintenance of the Works.

27.3 Any staff of Contractor found to be negligent of duties would be replaced on the request of Project Manager without delay.

CARE OF WORKS

29. SETTING OUT

The Contractor shall be responsible for the true and proper setting out of the Works at their expense in relation to reference points, lines, levels given in the drawing or furnished by the Project Manager in writing and for the correctness of the positions, levels, dimensions and alignment of every part of the Works. If any error in setting out is noticed at any stage, the Contractor shall, at their own cost, rectify such errors to the satisfaction of the Project Manager.

30. NUISANCE

The Contractor shall not at any time do, cause or permit any nuisance on the Site or do anything which shall cause unnecessary disturbance or inconvenience to the others working on or near the Site and to the public generally.

31. WATCHING AND LIGHTING

The Contractor shall arrange necessary power and provide and maintain at their cost all lights, fans, guards, fencing and watching, when and where necessary or as directed by the Site Manager, for the protection of Works, materials, plant, equipment etc. Any loss or damage caused to the materials procured by the Contractor shall be to their account.

32. CO-OPERATION WITH OTHER CONTRACTORS

The Contractor shall co-operate with other contractors, Architect and Engineering Consultant and freely exchange with them such technical information as necessary for the proper execution of the Works.

The Contractor shall, in accordance with the directions of the Project Manager/Site Manager, afford all reasonable opportunities to other contractors and their workmen and to the workmen of Client who may be employed in the execution of the Works not included in the Contract, for carrying out their work.

All operations necessary for the execution of Works shall be carried out so as not to interfere unnecessarily or improperly with the execution of Works by other contractors. Execution of Works under this Contract shall be co-coordinated with the work of other Contractors where it would interfere with their work or working. The Site Manager and the concerned Contractor shall be informed well in time for effective coordination and proper execution of Works.

33. CONTRACTOR TO KEEP SITE CLEAR

During the progress of the Works, the Contractor shall keep the Site clean and reasonably free from all necessary obstructions and shall store or dispose of any Constructional plant and surplus materials, wreckage, rubbish or Temporary Works no longer required. If the Contractor is found to be lagging in maintaining good housekeeping practice at site, the Site Manager/ Client would be authorized to have the debris cleared / cleaning carried out by some other agency and recover cost of the same from the defaulting Contractor.

34. COORDINATION OF WORK

34.1 At the commencement of work, and from time to time, the Contractor shall confer with other Contractors, sub- Contractors, and persons engaged on separate contracts in connection with the work, and with the Project Manager for the purpose of coordination and execution of the various phases of work. The Contractor shall ascertain from the other Contractors, Sub-Contractors and persons engaged in separate contracts, in connection with the Works, the extent of all chasing, cutting and forming of all opening, holes, grooves etc. as may be required to accommodate the various services and will be paid nothing extra for such Works.

34.2 The Contractor shall ascertain the routes of all services and the position of all floor and wall outlets, traps etc. in connection with the installation of plant, services and arrange for the construction of work accordingly. The breaking and cutting of the completed work must not be done unless specifically authorized in writing by the Site Manager. Generally, all breaking shall be by the Contractor for civil/interior work and no work shall be done over broken or patched work without first ascertaining that the broken surface is adequately prepared and reinforced to receive and hold further work.

35. CLEARANCE OF SITE ON COMPLETION

35.1 Before the issue of the Completion Certificate, the Contractor shall clear away and remove from the Site all constructional plant, surplus materials, rubbish and temporary Works of every kind and leave the whole of the Site and Works clean and in workman like condition to the satisfaction of the Site Manager.

35.2 The Contractor shall on completion of work return back the storage space and office space to Client in the same condition as was provided to the Contractor in the beginning of the project.

36. PATENT RIGHTS

Contractor shall fully indemnify Client against any action, claim or proceeding relating to any infringement of the use of any patent or design or any alleged patent or design rights and shall pay royalties which may be payable in respect of any article or part thereof included in the Contract.

37. LABOUR HUTS

The Contractor shall not be allowed to put up huts for labour at the Works Site as the space at the Site is very limited.

38. SITE RECORDS

The Contractor shall keep books, accounts and Site documents and documents and records showing the number of men employed each day, wage bills, delivery notes, priced invoices for all materials ordered or delivered, visitors to the Site or such records as Project Manager may require the Contractor to maintain from time to time. The Contractor shall furnish such documents and records to the Project Manager, when required. The Contractor shall ensure that there is a clear demarcation made on the amount spent on materials and labours.

39. RELEASE OF INFORMATION

All information gathered under this Contract by the Contractor all reports and recommendations relating to this contract shall be treated as confidential by the Contractor and shall not, without the prior written approval of Client is made available to any person or party other than the Project Manager, the Architect, Engineering Consultant or any concerned Government Authority.

INSURANCE AND INDEMNITIES

40. INSURANCE OF WORKS

Without thereby limiting their responsibilities, the Contractor shall at its own expense carry out and maintain the following insurance:

Group Personal Accident Insurance Policy covering the Contractor's staff. The Contractor shall ensure that any sub-contractor appointed by them shall also have a similar insurance coverage.

Insurance Policy covering the Contractor's own property at site including but not limited to equipment and vehicles.

Professional Indemnity Insurance Policy sufficient to cover risks associated with contractor's services.

The Contractor shall insure, in the joint names of Client and the Contractor, against all loss or damage during transit, storage, and execution or installation and commissioning from whatever cause arising, for which he is responsible under the terms of contract, and also for all loss and damage arising from improper workmanship, earth quake, floods, fire and like in such manner that Client and the Contractor are covered for the period up to 3 months after the entire

work/installation is certified complete. The value of the insurance cover should be adequate to cover the replacement value of the material and services.

All payments received from the insurer under the said policy or policies shall be first received by Client and shall be paid to the Contractor in instalments for the purpose of rebuilding or replacement or repair of the Works and/or goods destroyed or damaged as the case may be. However any delay in receipt of insurance claim amounts shall not entitle the Contractor to any claim on Client, nor shall it entitle them for any extension in the date of completion.

41. INSURANCE AGAINST ACCIDENT OR INJURY TO WORKERS:

The Contractor shall be responsible for the safety of Contractor's own property, materials, all employees or workmen engaged by them or their Sub-contractors in connection with the Work and shall forthwith report to the Project Manager any incidence of accidents causing damage to property or injury to personnel, however and wherever caused in the Works, and shall make adequate arrangement for rendering all possible aid to the victims of such accident. Contractor shall be obliged to pay any compensation to the employees or workmen employed by the Contractor in the execution of the Work, in accordance with the Workmen's Compensation Act or any other Statute as may be applicable.

The Contractor shall continue such insurance during the whole execution time that any persons are employed by them or the Sub-Contractors on the Works.

42. THIRD PARTY INSURANCE:

Before commencing the execution of the Works, the Contractor shall insure against their liability for any materials or physical damage, loss or injury which may occur to any property including that of Client, and to any person including any employee of Client, Project Manager, Architect, Engineering Consultant by or arising out of the execution of the Works or in carrying out of the Contract.

Such insurance must ensure a minimum coverage to the extent of INR. 10, 00,000 (Rupees Ten lakhs) per claim.

43. INSURANCE - GENERAL:

All insurance covers shall be taken from a nationalized insurance company only. If the contractor desires to take insurance cover from some other insurance company, prior approval from the Clients / Project Managers would need to be taken.

The terms of the insurance policies shall include a provision whereby, in the event of any claim in respect of which the Contractor would be entitled to receive, indemnify under the policy being brought or made against Client the insurer will indemnify Client against such claims and any costs, charges and expenses in respect thereof.

The Contractor shall provide Client and the Project Manager with a copy of each of the Insurance policies and documents taken out by them in pursuance of the Contract immediately after such insurance coverage.

If the Contractor shall fail to effect and keep in force insurance, as per the terms of contract, Client may effect and keep in force any such insurance and pay such premium or premiums as may be necessary for that purpose and from time to time deduct the amount so paid by Client as aforesaid from any monies due or which may become due to the Contractor, or recover the same as a debit due from the Contractor.

The Contractor shall be responsible for preparing of all claims and make good for the damage or loss by way of repairs and/or replacement of the portion of the Works damaged or lost. The transfer of title shall not in any way relieve the Contractor of their responsibilities during the period of the contract including defects liability guarantee period.

LABOUR

44. ENGAGEMENT OF LABOUR:

The Contractor shall make their own arrangements for the engagement of labour, local or otherwise, and for their transport, housing and payment. All labour engaged by the Contractor shall be and remain the employees of the Contractor and no claim whatsoever shall lie against Client by them or Contractor and any person claiming on their behalf against Client in respect of any right or benefit or compensation due to them in their employment. The Contractor shall indemnify Client in case any claim is made on them in this regard.

The Contractor shall obtain a valid license under the Contract Labour (Regulation and Abolition) Act , before the commencement of the work and continue to have a valid license until the completion of work or expiry of guarantee period, if applicable.

The Contractor shall pay the labour employed by them directly or through Sub-Contractors, wages not less than the minimum wages notified under the Minimum Wages Act updated till completion of project.

Client shall on a report from the competent authority have the power to deduct from the monies due to the Contractor any sum notified under the provisions of the relevant Act.

The Contractor shall indemnify Client against all or any payments to be made under and for the observance of any Act, Rules and Regulations aforesaid without prejudice to their right to claim indemnity from their Sub-Contractors.

The Contractor shall ensure compliance with the Inter-state Migrant Workmen and Rules framed there under all other relevant acts, rules, regulation and by laws.

45. SAFETY REQUIREMENTS

NOTE - To be strictly followed and implemented at Site.

All construction personnel, visitors and any other person on the project shall wear approved Hard Hats; Colour coded T – Shirts, Safety glasses with side shields, shoes and an identification badge. These badges must clearly be shown to the security. Persons without badge will not be allowed on project site.

All ladders will be factory or shop built. They shall be tied off and extended 1.0m above the landing. Painted ladders are not allowed. Ladders of aluminium alloy would be permitted at site with adequate rubber bases. Wooden ladders would not be allowed.

All scaffolding shall have clear timber or steel planks with toe boards. It will have handrails extending 36" above the deck. A mid-rail must be provided at 18".

No workman shall walk under a load being lifted.

Job site must be kept free from scrap wood, paper, plastics, garbage, loose and broken materials. House keeping will be enforced and each contractor shall be responsible for their own work area. A housekeeping program shall be established and waste disposal will conform to local legislation. Removal of debris and waste shall be carried out without fail on a daily basis. The contractor would be required to depute a certain number of workers (which would be communicated by the Project Manager) to the general site housekeeping team which would comprise of workers of the various contractors working at site.

All extension cords or electrical cable shall be free of cuts or scuffs. All cords shall have either male or female 3-point sockets. Bare wire stuff into a receptacle will not be allowed. All sliced wire shall be done with a splice kit, not just turned and taped. All portable electrically operated equipment shall be inspected by a competent person.

All electrically operated equipment should be grounded.

Each contractor shall have a safety meeting each Monday morning to be attended by all workers of the particular contractor. The person holding the meeting shall have a report stating the names of all persons attending, and topics discussed. These reports would be submitted to the Project Manager every Monday evening.

Each Contractor shall appoint a safety monitor to monitor their work. All contractor safety monitors shall have a scheduled weekly meeting with Project Manager/ Client's Safety Manager.

All electrical hook-ups and connections to power panels, step down transformers and distribution boxes shall be done by a certified electrician.

All contractors and sub-contractors will submit a weekly report stating all accidents.

All gas bottles shall be stored upright secured by chain and separated by type. Empty bottles shall be stored in the same manner. Valve assembly caps shall be provided for all bottles.

No gas bottles shall be rolled or dragged on the ground or concrete. They must be kept upright and moved on a cart and carried.

No hoses shall be connected to the oxygen or acetylene bottles without a proper working gauges and flashback arrestor.

All contractors must develop an emergency treatment and medical evaluation procedure. He will set up a working arrangement with local medical doctor to handle injury cases, and provide for other treatment by a specialist or local hospital. Project Manager must be notified immediately of all work injuries.

Visitors are not allowed on the project site without a visitor's badge, which the contractor must obtain, for security.

Project Manager and or security are authorized to inspect all vehicles and personal lunch boxes, packages and bundles entering or leaving the project.

All scaffolding shall be manufactured frames, bracing connecting pins and other accessories. Wooden Bullies will not be allowed.

Project Manager shall have the authority to shut a portion of the work in progress or all work of the project whether they deem that the work is being carried out in an unsafe manner, safety equipment is not being used and safety procedures are not followed.

Provision for sufficient and workable fire extinguisher to be made in each zone of the site as per directions of the Project Manager at their own cost.

Maintain and active list of all hazardous substance and be in possession of material safety data sheets.

The contractor shall provide at his expense one room of -reasonable dimensions plus toilet facilities for the use of their workers as rest room. The room & toilet shall be well-lit and well ventilated. Contractor shall also provide necessary arrangement for final disposal of sewage at their cost.

The Contractor shall establish a fully equipped and staffed first aid centre on the Site to deal with accidental injuries and workers health

The Contractor shall not employ any labour less than 18 years of age on the job. If female labour is engaged, the Contractor shall make necessary provisions at his own expense for safeguarding and care of their children and keeping them in Crutch, which will also maintained by the contractor. No children shall be permitted on the Site.

If women workers are employed on the Work, the Contractor shall provide at his expense two rooms of -reasonable dimensions plus toilet facilities for the use of their children under the age of six years. One room shall be used as a playroom and the other as the bedroom of the children. The rooms shall be built to reasonably good specifications in consultation with the Project Manager. The rooms shall be well-lit and well ventilated.

Welding Works wherever carried out should be should undertaken using complete protection equipment like, but not limited to glass cover for eye protection and should always be accompanied by a fire extinguisher. Such Works should only be undertaken by trained technicians and should always be done in the presence of an extra person.

The contractor shall put safety net on edges for working at heights. Also he shall provide safety harness / safety belts etc for workers working on edges or on height.

46. MODEL RULES

The Contractor shall at their own cost comply with or cause to be complied with Model Rules for labour welfare framed by the Government or other local bodies / authorities from time to time for the protection of health and for making sanitary arrangement for workers employed directly or indirectly on the Works. In case the Contractor fails to make arrangements as aforesaid, Client shall be entitled to do so and recover the cost thereof from the Contractor.

47. RETURNS OF LABOUR

The Contractor shall furnish to the Site Manager a return every fortnight in such detail and form as the Site Manager may prescribe showing the supervisory staff and the number of labour employed by the Contractor and Sub-Contractors on the Site separately for each category of labour indicating their working hours and wages paid to them and any other information as directed by the Site Manager.

48. CONTRACTOR'S SITE ORGANIZATION AND EQUIPMENT

Site Supervisor: The Contractor shall ensure continued effective supervision with the help of a qualified, experienced person assisted by adequate staff, for the entire duration of the Works. The Site Supervisor will be responsible for carrying out the work to the true meaning of the drawings, conditions of contract, specifications, schedule of quantities and Architect's/ Consultants instructions and directions or instructions given to them in writing shall be held to have given to the Contractor officially. Attention is called to the importance of requesting written instruction from the Architect before undertaking any work where Architect's directions or instructions are required. Any such work done in advance of such instructions will be liable to be removed at the Contractor's cost. The Site Supervisor and their technical staff shall not be transferred from the work without the written prior permission from the Site Manager/Architect.

The contractor shall post at least one Graduate Engineer with relevant experience to handle the job along with the support of Diploma holder Engineers and foreman, who are competent enough to handle the job.

Equipment: The Contractor shall provide and install all necessary ladders, scaffolding, tools, plants and all transport for labour, materials and plant necessary for the property execution and completion of the work to the satisfaction of the Site Manager /Architect/Consultant/Client.

Security: The Contractor shall provide adequate number of watchmen to guard the Site premises, materials and equipment at all times at their expense.

Telephone: The Contractor shall make necessary arrangements to install a working telephone line at their own cost and maintain its upkeep. The Contractor shall pay all charges in connection with the same till the completion of the work.

T-Shirts / Helmets / Safety Shoes: The Contractor shall arrange to provide all their staff employed at site (skilled as well as unskilled) with construction helmets, safety shoes & coloured T-shirts (colour to be decided at the time of award of work and would be communicated by the Project Manager) with their company/firm name clearly embossed in the front of the T-shirt.

MATERIALS AND WORKMANSHIP

49. QUALITY OF MATERIALS AND WORKMANSHIP:

All Materials and workmanship shall be the best of the respective kinds described in the Contract and in accordance with the instructions and directions of the Project Manager /Architect/ Engineering Consultant shall be subjected from time to time, to such tests as the Project Manager/ Architect/ Engineering Consultant may direct at the place of manufacture or fabrication or on the Site or at such other places as may be directed by the Site Manager. The Contractor shall execute the whole and every part of the work in the most substantial and workman-like manner, both as regards to materials and workmanship and in every respect in strict accordance with the specifications etc. The Contractor shall also conform exactly and faithfully to the designs, drawings and instructions in writing of the Project Manager, Architect and the Engineering Consultant.

50. STORAGE OF MATERIALS:

All materials and equipment brought on to the Site shall be stored by the Contractor only at places approved by the Site Manager. Storage and safe custody of materials and equipment shall be the responsibility of the Contractor.

51. APPROVAL OF MATERIALS:

The Contractor shall supply samples of all materials including those specified by brand names for approval of the Client/Project Manager/Architect. The Client/Project Manager/Architect will approve the samples in writing before the Contractor arranges bulk supplies. The cost of arranging/making of test samples cost of their packing and forwarding and testing charges shall be borne by the Contractor.

The Project Manager and the Architect /Engineering Consultant may at any time during the execution of work call upon the Contractor to submit samples of any materials used or to be used in the Works for checking compliance with the Contract specifications or approved samples. Should these samples fail to comply with the Contract specifications or not conform to approved samples, then the materials from which the said samples were taken shall be removed from the Site immediately and all work executed with such materials shall be replaced and made good to the satisfaction of the Site Manager, at the expense of the Contractor. Consequence arising from delay in submission of samples should be sole responsibility of the Contractor.

52. QUALITY CONTROL:

The Contractor shall submit to the Site Manager a comprehensive quality approval plan for all materials, equipment, and things to be provided under the Contract. No material or equipment shall be dispatched by the manufacturer or vendor or brought to Site by the Contractor until the quality of the material or equipment has been established through inspection and tests or through test certificates furnished by the manufacturer. In case the Site Manager accepts such test certificates as sufficient proof that the material or equipment conforms to the Contract Specifications, he shall accord their approval for the dispatch of material or equipment. Additional tests if required by the Project Manager shall be carried out as per the specifications laid down by the Project Manager at the cost of the Contractor.

53. STANDARD OF WORKMANSHIP:

To determine the acceptable standard of workmanship, Project Manager/ Site Manager/ Architect/ Engineering Consultant may require the Contractor to execute certain proportions of Works and services such as walls, flooring, joinery, finishes, sanitary installation etc. under their close supervision. On approval such samples of work shall be termed as guiding samples. Work shall be executed to conform to the standard of workmanship of these samples. No extra cost for the preparation of such sample shall be payable to the contractor.

54. INSPECTION OF WORKS:

Client /Project Manager, the Architect/ Consultant and any person authorized by them shall at all times have access to the Works and to all Workshops and places where work is being prepared or from where materials, or equipment are being obtained for the Works and the Contractor shall afford every facility and assistance in obtaining the right to access.

All work embracing more than one process shall be subject to examination and approval at each stage thereof and the Contractor shall give due notice to Project Manager / Site Manager when each stage is ready.

55. EXAMINATION OF WORKS:

No work shall be covered up or put out of view without the approval of the Project Manager. The Contractor shall give due notice to the Site Manager and afford them full opportunity to examine any work, which is about to be covered up or put out of view.

The Contractor shall open any part or parts of the Works as Project Manager or the Architect/ Engineering Consultant may direct from time to time and shall reinstate and make good such part or parts to the satisfaction of the Project Manager.

56. REMOVAL OF IMPROPER WORK & MATERIALS:

The Project Manager shall have full powers to order in writing for :

The removal from the Site, within such time as may be specified in the order, of any materials which, in the opinion of Project Manager are not in accordance with the Contract.

The substitution of proper and suitable materials, and

The removal and proper re-execution notwithstanding any previous test thereof or interim payment thereof, or any work which, in respect of materials or workmanship is not in the opinion of the Project Manager or, in accordance with the Contract.

In case the Contractor defaults in carrying out such order, Client shall be entitled to employ and pay other persons to carry out the same and all expenses consequent thereon or incidental thereto shall be recoverable from the Contractor by Client, or may be deducted by Client from any monies due or which may become due to the Contractor.

CONSTRUCTIONAL PLANT, TEMPORARY WORKS AND MATERIALS

57. CONTRACTOR TO SUPPLY ALL PLANTS, MACHINERY, SCAFFOLDING, ETC.:

No plant, machinery, scaffolding and tools & tackles will be arranged or issued by Client

58. MATERIALS, PLANT ETC. EXCLUSIVE USE FOR THE WORKS

All constructional plants, temporary Works and materials when brought to the Site shall be deemed to be exclusively intended for the execution of the Works. The Contractor shall not remove the same or any part thereof, without the consent, in writing, of the Site Manager, which shall not be unreasonably withheld.

Upon completion of the Works, the Contractor shall remove from the Site all the said constructional plant and temporary Works remaining thereon and any unused materials provided by the Contractor.

Client shall not at any time be liable for the loss of or damage to any of the said constructional plant, temporary Works or materials. The storage and safe custody of all materials, equipment constructional plant and the Works executed shall be the responsibility of the Contractor.

DEVIATIONS/ VARIATIONS

59. EXTRAS AND VARIATIONS

Project Manager shall have the power to make and order any variation of the form, quality of the Works that may appear to them to be necessary during the progress of the Works. The Contractor shall carry out the Works as directed.

The quantities as mentioned in BOQ are tentative and may increase or decrease. No extra claim will be acceptable for such increase and the percentage of variation should not be more than 5% with respect to BOQ quantities. Variations shall not in any way vitiate or invalidate the Contract.

No verbal orders by Project Manager /Architect/ Engineering Consultant shall constitute an authority for the Contractor to undertake any variations from the Contract, specifications. If the Contractor, for any reason, has been given verbal orders it shall be their responsibility to ask confirmation of the orders and shall proceed accordingly only after the orders are confirmed in writing.

All altered, additional or substituted items of work shall be priced at the minimum rate arrived at based on the points mentioned as under-

An item of work included in the bills of quantities at the applicable rate in the respective bill of quantities.

An item of work similar in character to the item included in the bill of quantities at the rate derived from the rate for a similar class of work in the bill of quantities as approved by Project Manager.

If the rate for an item of work cannot be determined in the manner at (a) and (b) above, the rate shall be decided by the Project Manager on the basis of rate analysis based on the cost to the Contractor at Site i.e. cost of materials including taxes, duties, Octopi, packing and forwarding charges, handling and insurance and cost of labour plus goods and service tax both on actual: plus 15% (Fifteen Percent) to cover Contractor's profit and overheads, except on the cost of any material or service supplied/provided by Client..

It shall be the responsibility of the Contractor to inform the Project Manager the rate which he proposes to claim for such item of work, supported by analysis of the rate claimed. The Project Manager shall, within fifteen days, thereafter arrive at an appropriate rate. In case it is not practical for the Contractor to furnish vouchers in support of the cost of materials or such evidence as the Project Manager shall fix only a provisional rate for the purpose of interim payments. The Contractor shall have no right to suspend the work on the plea of non-settlement of the rates and the decision of the Project Manager shall be final.

60. DEVIATION LIMIT:

As a result of variations ordered, the quantities of any individual items of work done, omitted, altered and substituted could vary to any extent, without any adjustment in the quoted unit rates.

61. CLAIMS

The Contractor shall send to the Project Manager every month, an account giving full particulars, as full and detailed as possible of all claims for any additional payments to which the Contractor may consider them selves entitled and of all extra work ordered in writing and which he has executed during the preceding month. The bills of the Contractors shall be cleared, only after all payments are made to the workmen and necessary contributions in terms of Statutory Rules are

made. The Contractor shall ensure that a copy of the relevant Variation/extra items approval Register is handed over to the Site Manager, to enable them to clear the bills.

No claim for payment for any extra work or expense will be considered which has not been included in such particulars. Client may consider payment for any such work or expenses where admissible under the terms of the Contract, if the Contractor has at the earliest practicable opportunity notified Client in writing that he intends to make a claim for such work and expense and it is certified by Project Manager that such payment was due.

Any claim which is not notified by the Contractor in two consecutive bills shall be deemed to have been waived and extinguished.

CERTIFICATES AND PAYMENTS

63. QUANTITIES:

The quantities set out in the Bill of Quantities are to be estimated quantities of the work; they are not to be taken as the actual or correct quantities of the Works to be executed by the Contractor in fulfilment of their obligations under the Contract.

64. VALUATION:

The Site Manager shall except where otherwise stated, ascertain and determine the value of work done by measurement in accordance with the Contract.

65. WORKS TO BE MEASURED:

The measurement of work done by the Contractor shall be recorded in the Measurement books by the Site Manager, from time to time, jointly with the Contractor. Measurements of altered, additional or substituted items of work ordered shall be recorded as and when these are executed even if the rates for these items have not been settled.

The Project Manager shall, when he requires any part of the Works to be measured, give a reasonable notice to the Contractor who shall attend or send their representative to assist the Project Manager or their representative in making such measurements, and shall furnish all particulars required by them. The Contractor shall provide necessary platform for the safety of the person(s) undertaking the measurements at their own cost.

Measurements shall be signed and dated by both the Contractor and Project Manager on the completion of each set of measurements. If the Contractor objects to any of the measurements recorded by the Project Manager, the Contractor or their authorized representative shall record a note to this effect in the Measurement Book against items objected to and such a note shall be signed and dated by both the Contractor and the Project Manager.

If the Contractor fails to attend or neglects or omits to send their authorized representative, then the measurements made by the Project Manager or approved by them shall be taken to be correct measurement of the work. If after examination of such record of measurements, the Contractor does not agree with the same or does not sign the same as agreed, these shall nevertheless be

taken as correct, unless the Contractor shall have within 7 days of such examination, notifies the Project Manager in writing in which respect the measurements recorded are claimed by them to be incorrect.

66. METHOD OF MEASUREMENT

The works shall be measured in accordance with relevant codes. Notwithstanding any general or local custom, except where otherwise specifically described or prescribed in the contract. The Client/Project Manager reserves the right to get the measurements checked/ audited by an independent agency and in such case the claim as settled by the Client shall be final and binding. In addition, Client reserves the right to impose suitable penalties on the Contractor if it is detected that such claims are based on wilful intent.

67. INTERIM BILLS:

The Contractor shall, as specified in the schedule of fiscal aspects of the tender submit interim bills in 4 copies showing the value of the work executed in accordance with the Contract based on the measurements recorded in the measurement books.

The Project Manager shall evaluate the quantity of work executed at site and in consultation with in-house QS Manager approve the quality of materials, equipment and workmanship and adherence to the details as per drawings, specifications

Payment for items of work, which is partly completed, shall not be allowed except for material at site payment if allowed.

All interim payments shall be treated as payments by way of advances against final payment and not as payments for the work done or be considered as an admission of the due performance of the Contract.

Inclusion of any supplies made or Works executed in an interim bill and payment of such interim bills shall not be deemed to constitute approval by the Project Manager of any such supplies or Works nor shall it in any way affect the rights of Client under the Contract.

From the amount of the interim bill certified, the Project Manager, shall deduct a value of the work as set out in the Schedule of Fiscal Aspects, towards Retention Money.

The Project Manager may by any certificate correct or modify any previous certificate and shall have the power to withhold any certificate if, the Works or any part thereof have not been carried out to Client/Project Manager/ Architect's/Consultant satisfaction.

68. FINAL BILL

Not later than 30 days after the Completion of work , the Contractor shall submit to Project Manager, 4 (four) copies of final bill with supporting documents showing in detail the value of work done in accordance with the Contract, the payments received by them and other recoveries/ deductions to be effected from the Contractor. Within 21 (twenty one) days of the receipt of final

bill and all information reasonably required for verification of the final bill, the Project Manager shall approve and render a certificate to Client that he has satisfied themselves that the work executed is as per Contract specifications and to their satisfaction. Client shall subsequently release the payment to the contractor after it's through verification with in 30 days after receiving the payment certificate from Project Manager.

Note:

1. No request for the release of ad-hoc payment against the bill shall be entertained.

An indemnity bond shall be submitted by the contractor to the effect that he shall indemnify Client in case of any financial liability/loss arising on the Client due the any action or default of the contractor.

69. WITHHOLDING OF PAYMENTS

The Project Manager may withhold or on account of subsequently discovered evidence, nullify the whole or a part of any certificate to such extent as may be necessary to protect Client from loss on account of

- A Defective work not remedied within the time period given by the Project Manager
- b Failure of the Contractor to make payments properly to Sub-contractors for materials or labour or equipment
- c Damage to work of another Contractor or Sub-Contractor
- d A reasonable doubt that the Contract cannot be completed for the balance unpaid amount
- e A reasonable doubt that the Contractor intends to leave work items incomplete.
- f Due payments not made to their workmen as per labour statutes, in force.
- g Contractor has not met fully their obligation towards payments of all statutory dues.
- h Copies of relevant extracts of Statutory Registers not handed over to Site Manager.

70. CHANGE ORDERS:

The Owner reserves the right to alter the Scope of Work and consequently the Contract Price shall be suitably adjusted for such changes by reference to the rates in the Schedule of Rates. All change orders shall be issued by the Project Manager after the requisite explanations have been provided by the Architect and prior written consent obtained from the Owner's Representative. The onus shall be on the Contractor to obtain such prior written approval of the Architect.

If the rates for the additional, altered or substituted work are not specifically provided in the Schedule of Rates then such rates shall be derived from the rates that are specified for a similar class of work in the Contract. The Project Manager's interpretation as to what is a similar class of

work and his decision on the method in which the rate is to be derived shall be final and binding on the Contractor.

If the rates for the additional, altered or substituted work cannot be determined in the manner specified above, then the rates for such work shall be determined on the basis of analysis of rates.

If the rates for the additional, altered or substituted work cannot be determined in the manner specified above, then the rates for such work shall be based on actual consumption of materials, and actual use of labour and plant and machinery, as detailed below:

- a) Cost of materials supplied by the Contractor, at no more than prevailing market rates, actually incorporated in the Work.
- b) Cost of labour actually used at the Site on the Work at prevailing rates of labour.
- c) Cost allocation toward the Work for the use of any plant and machinery at the Site, on actual basis.

15% of the actual costs in respect of (a), (b), and (c) above, towards Contractor's establishment and overhead and profit. Works contract tax and service tax shall be paid on change orders as per actual. However for owner supply material no profit shall be allowed to the contractor.

If the Contractor and the Project Manager cannot agree on a rate as determined in accordance with this sub-clause, then the Project Manager may determine a reasonable rate which shall be final and binding on the Contractor or, at the Owner's option, may order and direct the work to be carried out by such other persons or agencies as it may think fit, and such other persons or agencies shall not, in any manner be prevented or obstructed in their work or from entering upon the Work by the Contractor for the purpose of carrying out such work. The Contractor shall not be entitled to any payment whatsoever in connection with such work carried out by such other persons or agencies.

Before any extra work is undertaken by the Contractor, he shall ensure that he has received a specific Change Order, signed by the Owner, from the Client/Project Manager. No additional payments shall be made to the Contractor without prior agreement and receipt of the necessary signed Change Order. Each Change Order shall clearly state the value of the additional work agreed to and signed for by the Owner.

The Contractor shall at monthly intervals submit to the Project Manager an account giving particulars, as full and detailed as possible, of additional work ordered in writing by the Owner and which the Contractor has executed during the preceding month. If any Change Order instructed by the Owner causes a delay in the completion of the Work causing the Contractor to overrun the time fixed for completion of the Work, the Owner shall agree, following joint review of the circumstances with the Project Manager as to the extent of the delay, to postpone the time for completion of the Work by the period of delay, provided the Contractor has notified the Owner in writing, of such expected delay before such change order is actually issued by the Owner.

71. MATERIALS & WORKMANSHIP:

All materials and equipment to be incorporated in the Works shall be new materials and equipment and workmanship are to be of the best quality of the specified type and to the entire satisfaction of Project Manager / Architect/ Engineering Consultant. The Contractor shall immediately remove from the premises any materials, equipment and/or workmanship which in the opinion of Project Manager / Architect/ Engineering Consultant, are defective or unsuitable and shall substitute proper materials, equipment and/ or workmanship at their own cost. The term 'approval' used in connection with this Contract shall mean the approval of Project Manager. The Contractor shall, submit satisfactory evidence as to the kind and quality of materials and equipment

Where special makes or brands are called for, they are mentioned as a standard. Others of equivalent quality may be used, provided that the Project Manager considers the substituted materials as equivalent to the brand specified and approval is first obtained in writing from Project Manager / Architect/Consultant. Unless the substitutions are approved by the Client/Project Manager, no deviation from the specifications will be permitted. The Contractor shall indicate and submit written evidence of those materials or equipment called for in the specifications that are not obtainable for installation in the building within the time limit of the Contract. Such a change shall not entitle the Contractor for any extension of the date of completion.

All materials and equipment shall be delivered so as to ensure a speedy and uninterrupted progress of the work. The same shall be stored so as to prevent overloading of any portion of the structure. The Contractor shall be entirely responsible for damage or loss to the materials, by any cause whatsoever.

Within 15 days after signing the Contract, the Contractor shall submit for approval of Project Manager, a complete list of all materials and equipment he and their Sub-Contractors propose to use in the work, or definite brand or make, which differ in any respect from those specified; also the particular brand of any article where more than one is specified as a standard. He shall also list items not specifically mentioned in the specifications but which are reasonably inferred and are necessary for the completion of the work.

The Contractor shall employ the right kind of workmen, jigs, tools and equipment to fabricate all materials and equipment, whether locally purchased or imported. They shall be fabricated and installed without any damage and in accordance with the manufacturer's instructions and manuals.

All materials, equipment and workmanship shall be subject to inspection, examination and test by Project Manager at any and all times during manufacture and/ or construction. Project Manager shall have the right to reject defective material, equipment and workmanship or require its correction. Rejected workmanship shall be satisfactorily corrected and rejected materials and equipment shall be satisfactorily replaced with proper material and equipment without charge therefore, and the Contractor shall promptly segregate and remove the rejected materials and equipment from the premises. If the Contractor fails to proceed at once with the replacement of rejected materials and/or the correction of defective workmanship, Client may contract or otherwise replace such materials and equipment and/or correct such workmanship and charge

and recover the cost thereof to the Contractor or may terminate the right of the Contractor to proceed further with the work. The Contractor shall furnish promptly, without additional charge all reasonable facilities, labour, materials and equipment necessary for the safe and convenient inspection and test that may be required by Project Manager.

All tests on material, equipment and workmanship shall be carried out through an organization selected by the Project Manager. The Contractor shall arrange for such tests and also bear all expenses in connection therewith.

72. DEDUCTIONS FOR UNCORRECTED WORK:

If Project Manager deem it in expedient to correct work damaged or not done in accordance with the contract, an equitable deduction from the Contract Price shall be made thereof and Client Project Manager's decision in this respect shall be final.

73. CORRECTION OF WORK BEFORE COMPLETION OF WORK:

Project Manager in conjunction with the Architect/Client shall conduct a final inspection just before the completion of the work and prepare a list of materials, equipment, and items of work, which fail to conform to the Contract's Specifications. The Contractor shall promptly replace and re-execute such items in accordance with the Contract and shall bear all expenses of making good all work and cost of all work of other Contractors destroyed or damaged by such replacement or removal. If the Contractor fails to remove and replace above rejected materials, equipment and/ or workmanship within a reasonable time, fixed by written notice, Client may employ and pay other persons to amend and make good such defects at the expense of the Contractor. All expenses incurred by Client in rectifying the defects including all damages, loss and expense consequent to the defects shall be recoverable from any amount due or that may become due to the Contractor.

74. TIME - ESSENCE OF CONTRACT:

The time allowed for carrying out the Work as entered in the tender shall be strictly observed by the Contractor and shall be deemed to be of the essence of the Contract and shall be reckoned from the date of award of the Contract. The Work shall proceed with due diligence until Final Completion. The Contractor shall prepare a Construction Programme with time schedule keeping in view the completion period stipulated for specific portions of the Work and also the overall completion time and submit same for the approval of the Project Manager and the Owner's Representative. The Contractor shall comply with the time schedule as approved by the Project Manager and the Owner's Representative. In the event of the Contractor failing to comply with the overall and individual milestones contained in the time schedules, he shall be liable to pay liquidated damages as provided for in this Contract.

75. CAUSES OF DELAY FOR WHICH CLAIMS FOR EXTENSION OF TIME MAY BE CONSIDERED;

The Contractor shall be entitled to claim for extension of time, subject to the Conditions herein, should he be delayed or impeded in the execution of the Work by reason of the following:

Force Majeure;

Delay in the receipt of 'construction status' drawings from the Architect/Consultant provided that, in the opinion of the Project Manager, the Contractor has made every effort and endeavour to minimize the effect of such delays.

Any change orders directed by the Project Manager, which in the opinion of the Project Manager entail the requirement of additional time for completion of the Work.

In respect of items (a), (b) and (c) above, the Contractor shall submit in writing to the Project Manager his intention to claim for an extension of time within seven (7) working days of any of the above mentioned reasons or events causing a delay. Any claim of extension of time in respect of item (c) shall be notified by the Contractor before such change order is actually issued. The Contractor shall thereafter detail and submit his claim for the extension of time within fourteen (14) working days of such delay having occurred. If the Contractor does not comply with both these conditions for each and every delay caused by any of the above mentioned reasons or events then he shall not be entitled to any extension of time.

The Project Manager shall study and verify the particulars of the claim for extension of time submitted by the Contractor and shall then reject or amend or accept the claim. He will extend the time by notifying the Contractor in writing for completion of the Work by such period as he shall think adequate with the prior approval of the Owner's Representative and the time for completion of the Work so extended shall for all purposes of the Contract be deemed the time specified for completion of the Work. The decision of the Project Manager in this regard shall be final and binding on the Contractor. No extension of time shall be granted separately for any concurrent or parallel activities, and only a delay, caused by any of the above mentioned reasons or events, in a critical activity which has a direct effect on the overall completion of the Work, shall form a basis for granting extension of time.

Should any deletions or changes in the scope of the Work reduce the time required to complete the Work under the Contract, then the time savings accruing from such deletions may be considered by the Project Manager in off-setting the durations awarded for an extension of time.

76. NO FINANCIAL OR OTHER COMPENSATION FOR DELAYS:

EXTENTION OF TIME

In case the work is delayed beyond stipulated period of completion and the causes of delay are considered not attributable to the contractor, CLIENT shall, upon written request of the contractor to this effect at least one month prior to stipulate date of completion, grant suitable extension of time. No escalation shall be payable for extension period if granted.

INDEMNITY:

a. The Contractor shall indemnify, defend and hold and keep indemnified, the Owner from and against all actions, suits, claims, costs, liabilities and demands brought or made against the Owner in respect of any matter or thing done or omitted to be done by the Contractor or any of his

Sub-Contractor(s) or their employees, workmen representatives, agents, servants or suppliers in the execution of or in connection with the Work or the Contractor's or Sub-Contractor's performance under this Contract and against any loss or damage to the Owner in consequence of any action or suit being brought against the Contractor or any of his Sub-Contractor(s) or their employees, workmen, representatives, agents, servants or suppliers for anything do or omitted to be done in execution of the Work and the Project Coordination Services under this Contract, including but not limited to meeting the Project milestones, non compliance with the applicable laws and regulations of the government and local authorities, not obtaining the relevant licenses and permits infringing any patents rights and specifically regarding use, storage and disposal of Hazardous materials.

The obligations of the Contractor under this clause shall survive the termination of this Contract. The contractor shall also keep client indemnified and hold harmless against all claims, losses, damages, costs, expenses of any nature, whatsoever, on account of any defect in material or workmanship or otherwise in the Work carried out by the Contractors, its sub-contractor, agent, representatives etc.

b. The Contractor shall ensure that the Sub-Contractors indemnify, defend and hold, and keep indemnified the Owner harmless from all actions, suits, claims, costs, fines, judgments and liabilities in respect of any matter or thing done or omitted to be done by the Sub-Contractors or their employees, workmen, representatives, agents, servants and suppliers in execution of or in connection with the Work or arising out of or in any way alleged to be in connection with Sub-Contractors' performance under this Contract, including but not limited to, not meeting the Project milestones, non-compliance with the applicable laws and regulations of the government and local authorities, not obtaining the relevant licenses and permits, infringing any patents rights and specifically regarding the storage, use or disposal by the Sub-Contractors of hazardous materials in, on or under the Site or at any location whatsoever in connection with the Project in any way. The Sub-Contractors' responsibility under this indemnification shall also include any and all hazardous materials introduced to the Site by their agents, representatives, employees, workmen, servants and suppliers. The obligations of Sub-Contractors under this clause survive the termination or expiry of this Contract.

c. The liability of the Owner shall, notwithstanding any thing to the contrary contained herein, whether in tort or by contract, whether for special, incidental or consequential damages, direct or indirect, shall be limited to the Contract Price.

77. LIQUIDATED DAMAGES / PROGRAMME CHART / MILESTONES:

The project milestones shall be identified from the detailed micro project schedule submitted by individual contractor along with the quote. If the milestones are not achieved by the Contractor shall pay the Owner liquidated damages as contained in the Schedule of Fiscal Aspects for each week/day that the milestones work is incomplete in any way whatsoever after the date assigned for completion of the milestone work. Extension if allowed has to be obtained in writing from the Project Manager/Owner's Representative well in advance of completion dates.

78. PENALTY / FINE:

If the Project Manager notifies the Contractor of non-compliance with safety codes as in clause no. 45 of General Conditions of Contract, the Contractor shall immediately if so directed or in any event not more than 10 hours after receipt of such notice, make all reasonable effort to correct such non-compliance.

If the Contractor fails to do so, the Project Manager shall levy fine of Rs. 500 per head per day for not wearing personal safety equipment as indicated in this document and Rs. 5000 per day towards non-compliance of site conditions, as indicated in this document.

79. COMPLETION:

- a. The work shall be considered as complete when Client/Project Manager has certified in writing on recommendation of Architect/Engineering Consultant.
- b. The defect liability period shall commence from the date of such certificate.
- c. Should client decide to occupy any portion of the building or use any part of any equipment, before the Contract is completed, same shall not constitute an acceptance of any part of the work unless so stated in writing by the Client/Project Manager.

GUARANTEES, MAINTENANCE & DEFECTS

80. MAINTENANCE

The Contractor shall maintain the Works against defects for a period of 12 months reckoned from the date of Virtual Completion of the Works, termed as Defect Liability Period or Guarantee; and in the event of more than one certificate of completion, from the respective dates so certified by the Project Manager.

81. DEFECTS

The Contractor shall make good, at their own cost, and to the satisfaction of the Project Manager/Architect/Engineering Consultant, all defects, other faults, arising in the opinion of the Project Manager from work or materials not being in accordance with the Drawings or Specifications or Schedule of Quantities or the instructions of Project Manager, which may appear within 24 months after completion of work etc.

The Contractor may not maintain staff and labour at Site throughout the defects liability period. However, if any major defects are noted requiring their urgent attention, he shall attend to the same immediately.

82. RECTIFICATION OF DEFECTS/ REPAIRS

Should the Project Manager/Client consider, at any time during the construction or reconstruction or prior to the expiration of the Guarantee/Defects Liability Period, that any work has been executed with unsound or imperfect materials or unskilled workmanship or is of an inferior quality

or not otherwise in accordance with the Contract, in respect of which the decision of the Project Manager shall be final, the Contractor shall, on demand in writing from the Project Manager specifying the fault; notwithstanding that the same may have been inadvertently passed, certified and paid for, rectify forth or remove and reconstruct the defective work so specified, in whole or in part, as the case may require, at their own expense: and in the event of their failing to do so within the period specified by the Project Manager in their demand/direction, CLIENT may carry out the work by other means at the risk and expense, in all respects, of the Contractor.

If it becomes necessary for the Contractor to replace or renew any defective portions of the Works, plant or installation under this clause, the provisions of this clause shall apply to the portions of the Works/plant/installation so replaced or renewed until the expiration of 24 months from the date of such replacements or renewals.

83. GUARANTEE:

Besides guarantees required elsewhere, the Contractor shall guarantee the work in general for 24 months from the date of completion as noted in the General Conditions.

All required guarantees shall be submitted to Project Manager by the Contractor when requesting Certification of accounts for payment by Client

All required guarantees shall be submitted to Client / Project Manager in the format given as a pre-requisite to acceptance and payment.

84. DRAWINGS, SPECIFICATIONS ETC:

After the Contract is signed, the Contractor will be furnished with two copies of the drawings and one copy each of the Conditions of Contract, Specifications and schedule of Quantities without cost to them for their use until the completion of the Contract.

In general, the drawings shall indicate dimensions, positions and type of construction; the specifications shall indicate the qualities and the methods; and the Schedule of Quantities shall indicate the quantity and rate for each item of work. However, the above documents being complementary, what is called for by any one shall be as binding as if called for by all. In case of any discrepancies in or among the documents, the most stringent of all shall apply.

Any work indicated on the drawings and not mentioned in the Schedule of Quantities or Specifications or vice versa, shall be deemed as though fully set forth in each. Work not specifically detailed, called for, marked or specified, shall be the same as similar parts that are detailed, marked or specified or as specified by the Architect.

No deviations from the Drawings, Specifications and Schedule of Quantities shall be made. Project Manager's interpretation of these documents shall be final.

Errors or inconsistencies discovered in the Plans and Specifications shall be promptly called to the attention of Project Manager for interpretation or correction. Local conditions which may affect the work shall likewise be brought to the Project Manager's attention at once. If, at any time, it is

discovered that work being done which is not in accordance with the approved plans and Specifications, the Contractor shall correct the work immediately. Correction of defective work shall not be a basis for any claims for extension of time and/or rates. The Contractor shall not carry on the work except with the knowledge of the Site Manager.

Figured dimensions on the scale drawings and large-scale details shall govern. Large-scale details take precedence over scale drawings. Any work done before receipt of such details if not in accordance with the same, shall be removed and replaced or adjusted as directed, without expense to CLIENT.

All Drawings, Specifications and Schedule of Quantities and copies thereof furnished by Client. / Project Manager are property of client. They shall not be used on any other work and shall be returned to client. at their request or at the completion of the Contract.

85. SAMPLES & SHOP DRAWINGS:

After the award of the Contract, the Contractor shall furnish for the approval of Project Manager, samples and shop drawings required by the Specifications or Project Manager. Samples shall be delivered as directed by Project Manager. No extra payment shall be made to the Contractor for preparation of any samples. A schedule giving dates for the submission of samples shall be included in the time schedule. Unless specifically authorized all samples must be submitted for approval within 15 days of signing the Contract.

86. GUARANTEE CERTIFICATE

The Contract shall not be considered as completed until Guarantee/Defects Liability Period shall have expired. The Guarantee Certificate stating that the Works have been completed and maintained to their satisfaction and that all the defects notified had been rectified, shall be given by the Project Manager within one month of the expiry of the Guarantee period, and if different Guarantee periods shall become applicable to different parts of the Works, the expiry of the last such period; or as soon thereafter as any work ordered to be rectified during such period shall have been completed to the satisfaction of the Project Manager.

Provided that in the case of fraud, concealment or fraudulent concealment relating to the Works or materials or to any matter dealt with in any certificate, the Guarantee certificate shall not be conclusive evidence as to its sufficiency.

87. SAFETY PROCEDURES

The Contractor shall incorporate in their operation the requirements of all the "Safety Codes" issued by the govt. shall be deemed to apply. If the Contractor fails to take safety measures and provides facilities at the Site of work to ensure safety of Works and injuries to workmen, client. /Project Manager shall have the power to do so and recover the cost thereof from the Contractor. In no case shall the provisions enlisted in the Safety Requirements in Item 45 be diluted.

The Contractor shall provide safe means of access to all working places.

The Contractor shall properly design scaffolding, temporary access, ladders, ramps and hoisting arrangements, cranes etc. as applicable, to ensure safety of workmen as well as Works. All scaffolds, ladders and other safety devices shall be maintained in safe conditions.

All necessary personal safety equipment shall be kept available for the use of the persons employed on the Site and maintained in a condition for immediate use. The Contractor shall take adequate steps to ensure proper use of equipment by those concerned.

Adequate precautions shall be taken to prevent danger from electrical equipment.

No materials on the Site of Works shall be so stacked or placed as to cause danger or inconvenience to any persons.

All consequences, damages or losses arising by reasons of any violation of safety norms as specified in the Contract shall be met by the Contractor. The Contractor shall be bound to pay compensation to the persons for the injuries sustained or death owing to neglect of the safety precautions. Should any claim proceedings be filed against client, the Contractor hereby agrees to indemnify client. against the same.

FORE-CLOSURE AND DETERMINATION OF CONTRACT

88. FORECLOSURE OF CONTRACT

If at any time after the commencement of work, client. shall for any reason whatsoever, not require the whole or part of the Works specified, client shall give notice in writing of that to the Contractor who shall 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 work in full but which he did not derive in consequence of the full amount of work not having been carried out. The Contractor shall be paid at the contracted rates full amounts for the Works executed at Site and in addition a reasonable amount as certified by the Project Manager for the following which could not be utilized on the work to the full extent because of the foreclosure

The amount payable in respect of any preliminary items so far as the work or service comprised therein has been carried out and a proper proportion, as certified by the Project Manager, of any such items, the work or service comprised, which has been partially carried out or performed.

Cost of materials reasonably ordered for the Works which shall have been delivered to the Contractor or which the Contractor is legally liable to accept delivery.

A sum to be certified by the Project Manager being the amount of any expenditure reasonably incurred by the Contractor in the expectation of completing the whole of the Works in so far as such expenditure shall not have been covered by the payments made to the Contractor.

Provided that against any payments due from client under the clause, client shall be entitled to be credited with any outstanding balances due from the Contractor for any advances in respect of materials and otherwise and any other sum which on the date of foreclosing was recoverable by client from the Contractor under the terms of Contract.

89. CANCELLATION OF CONTRACT ON DEFAULT OF CONTRACTOR

If the Contractor shall become bankrupt, or being a corporation, shall go into liquidation (other than a voluntary liquidation for the purpose of amalgamation or reconstruction), or if the Contractor shall assign the Contract without the consent in writing of CLIENT first obtained, or shall have an execution levied on their goods or if the Project Manager shall certify in writing to CLIENT. that in their opinion the Contractor has abandoned the Contract, or time being the essence, without reasonable excuse has suspended the progress of the Works for five days after receiving from the Project Manager written notice to proceed, or despite previous warnings by the Project Manager, in writing, is not executing the Works in accordance with the Contract, or is persistently or flagrantly neglecting to carry out their obligation under the Contract, or has in defiance of CLIENT or their authorized representative's instructions to the contrary, assigned any part of the Contract, during the term of the contract, has suspended work for a total period of more than 15 (fifteen) days will not apply if the work is suspended as per instructions from Project Manager then CLIENT may, after giving fourteen days notice in writing to the Contractor, determine the Contract, and enter upon the Site and Works without releasing the Contractor from any of their obligation or liabilities under the Contract, or affecting the rights and powers conferred on CLIENT by the Contract and may either themselves complete the Works or may employ any other Contractor to complete the Works. CLIENT may use for such completion so much of the said Constructional Plant Temporary Works and materials, which may have been deemed to be reserved exclusively for the execution of the Works under the provisions of the Contract, as CLIENT may think proper; and CLIENT may at any time sell any of the Construction Plant, Temporary Works and unused materials and apply the proceeds of sale in or towards the satisfaction of any sums due or which may become due to CLIENT from the Contractor under the Contract.

The Project Manager shall, as soon as may be practicable after any such determination by CLIENT fix and determine ex-party, or by or after reference to the Contractor and shall certify what amount, if any, had at the time of such determination reasonably accrued to the Contractor and the value of any of the said un-used or partially used materials, any Constructional Plant and any Temporary Works.

If CLIENT determines the Contract under this clause, they shall not be liable to pay the Contractor any money on account of the Contract until the expiration of the Guarantee period and thereafter until the cost of execution and maintenance, rectification of defects, damages for delay in completion, and all other expenses incurred by CLIENT have been ascertained and the amount thereof certified by the Project Manager. The Contractor shall then be entitled to receive only such sum or sums, if any, as the Project Manager may certify would have been payable to them upon due completion by them after deducting the said amounts. The Contractor shall be paid accordingly.

90. CHANGE IN CONSTITUTION

If, there is a change in the constitution of the Contractor firm, after or prior to the award of the Contract and if prior approval is not obtained, the Contractor shall have been deemed to have

been assigned and CLIENT reserves the right to determine the Contract and the same consequence shall follow as if the Contract was determined on the Contractor's default.

91. DETAILS OF CONSTRUCTION NOT SPECIFICALLY MENTIONED & MINOR CHANGES

Rates quoted shall be deemed to allow for all constructional details which may not have been specifically described in the Bill of Quantities, shown on the drawings or given in the specifications but are essential for the execution of the work and services in a workman like manner, details of constructions not specifically shown in drawings/specified shall be furnished to the Contractor or by the Contractor during the execution of the work. In case of any difference of opinion between the Contractor and Architect/ Consultant, the Project Manager shall determine as to whether or not the item involved constituted a constructional detail or minor extra and their decision shall be final and binding.

92. URGENT REPAIRS

If, by any reason of any accident, or failure, or other event occurring, either during the execution of the Works or during the Guarantee Period, any remedial or other work or repair shall, in the opinion of the Project Manager, be urgently necessary for the safety of the Works and the Contractor is unable or unwilling to do such work or repair, CLIENT may employ and pay other persons to carry out such work or repair as the Project Manager may consider necessary. If the work or repair is so done by CLIENT, is work which, in the opinion of the Project Manager, the Contractor is liable to do at their own expense under the Contract, all expenses incurred by CLIENT in so doing shall be recoverable from the Contractor by CLIENT or may be deducted from any monies due or which may become due to the Contractor. Provided always that the Project Manager shall, as soon after the occurrence of any such emergency as may be reasonably practicable, notify the Contractor thereof in writing.

93. USE OF COMPLETED PORTIONS

Client shall have the right to take possession of and use any completed or partially completed portion of the Work, notwithstanding that the time for completing the entire work may not have expired. Taking such possession and use shall not be deemed acceptance of any work completed in accordance with the terms of this Contract.

94. FORCE MAJEURE

Force Majeure is defined as events which are not the fault of any party, which substantially prevents performance of contractual obligations, which could not be foreseen at the time this Contract is concluded and which are not capable of being remedied. Acts of God, Acts of War, Acts of Government blockades, strikes, civil commotion, riots and the like may constitute a Force Majeure if the elements thereof as defined in this clause exist but it excludes shortages, alleged shortages, price escalation and business risks. The Contractor shall make alternative arrangements for supplies when strikes or lockout period extends beyond reasonable time that affects completion unnecessarily

The party affected by Force Majeure shall give notice within a period of 5 days from the date of occurrence of Force Majeure indicating its cause and the period for which it is likely to last or affect execution.

The sole remedy of the Contractor to the exclusion of any other right or remedy, in the event of Force Majeure, shall be to extension of time for completion of the Works by a period to be determined by CLIENT at its sole discretion.

95. PERSONAL LIABILITY

Neither CLIENT nor the Project Manager nor the Architect/Engineering Consultant nor their Representatives shall be personally bound or liable for the acts or obligations or default or omission in the observance of any of the acts, matters or things which are herein contained.

96. NON WAIVER OF DEFAULTS

Failure of CLIENT / Project Manager to insist upon strict performance of any terms and conditions of the Contract or condemnation by them of any breach by the Contractor or any Sub-Contractor of any stipulations and conditions of the Contract shall in no way prejudice or affect or be construed as a waiver of any rights and remedies that CLIENT may have and will not be deemed a waiver of any subsequent default under the terms and conditions of the Contract.

97. USE BEFORE COMPLETION CERTIFICATE

If by reason of any default on the part of the Contractor, a completion certificate has not been issued in respect of every portion of the Works within one week after the time for completion or extended time as the case may be, CLIENT shall be at liberty to use the Works or any portion thereof in respect, of which a completion certificate has not been issued, provided that Works or the portion so used as aforesaid shall be reasonably capable of being used and that the Contractor shall be afforded the earliest opportunity of taking such steps as may be necessary to permit the issue of the certificate of completion.

Client shall be at liberty from time to time or at any time before the completion of the Works to take possession of and use any part of the Site or uncompleted Works and in such case the Contractor shall completely finish the said incomplete parts or a part of the Works as and when the Project Manager shall direct whether before or after the respective prescribed time or extended time or times (if any) for the completion of the Works and if required by the Project Manager while CLIENT is in possession of the said part or parts of the Site or Works.

98. PRICE ESCALATION

The contracted rates shall be final and binding. No escalation on any account whatsoever shall be allowed during currency of project.

99. PRICE ADJUSTMENTS

The rates quoted by the Contractor and accepted by CLIENT shall hold good till the completion of the work and no additional claim will be admissible on account of statutory increase in prices, fluctuation of market rates/exchange rates, increase in duties, taxes/and any other levies/ fees etc.

100. WORKING AT ALL HEIGHTS

Item rates quoted by the Contractor in the bills of quantities shall include allowance for executing work at all heights above the ground level, except where specific provision has been made to measure work separately at different heights. Indian Standard Method of Measurement with latest amendments shall be deemed to be modified accordingly.

101. JURISDICTION:

All matters arising out of or in any way connected with this Agreement shall be deemed to have arisen in Lucknow and only the Courts in Lucknow shall have Jurisdiction to determine the same.

102. ARBITRATOR

In the event of any dispute or difference between the parties hereto as to the construction or operation of this contract, or the respective rights and liabilities of the parties on any matter in question, dispute or difference on any account or as to the withholding by the owner of any certificate to which the contractor may claim to be an entitled to or if the owner fails to make a decision within 30 days of the receipt of the contractor's claim, then and in any such case, the contractor after 45 days of his presenting his final (last) claim on the disputed matters, may demand in writing that the dispute or difference be referred to and settled by two arbitrators, one to be nominated by the owner and the other by the contractor. The award of the arbitrators, or the umpire, who shall be appointed by the two arbitrators if there is any disagreement between the two arbitrators before entering on the reference, shall be final and binding on both the parties. Place of Arbitration procedures shall be at Lucknow.

103. PROTECTION AND CLEANING: PROTECTION OF SITE

The Contractor shall protect and preserve the Works from all damage or accident by providing temporary roofs, windows and door coverings, boxing or other construction as required by the Project Manager. This protection shall be provided for all property adjacent to the Site as well as on the Site.

104. COVERING UP

The Contractor must give at least three working days clear notice to the Project Manager and the Site Manager before covering up any of the work in foundation, ceiling, partitions, drains etc. in order that proper measurement may be taken of the work as executed and in the event of the Contractor failing to provide such notice, he is, at their own expense, to uncover as required to allow the measurements to be taken and afterwards to reinstate the work satisfactorily.

105. TOLERANCE

The Contractor shall exercise every care to ensure that all structural members are sufficiently plumb and true to dimensions called for on the drawings to receive prefabricated finishing elements such as doors, windows, cabinet work, ceramic work, concrete, tiles etc. Any variations may require rectification in the structural members or may involve remaking or replacing the finishing elements, fabricated to fit into the openings or spaces, as called for on the Drawings. Contractor whose work does not conform to dimensions called for, shall be liable for all the expenses which have been incurred for rectification or replacement as may be required by the Project Manager for the proper installation of the finishing elements. the Project Manager's decision in this respect shall be final and binding on the parties concerned.

106. SETTLEMENT OF DISPUTES

All disputes and differences of any kind whatever arising out of or in connection with the Contract or the carrying out of the Works (whether during the progresses of the Works or after their completion, and whether before or after the determination, abandonment or breach of the Contract) shall be referred to and settled by CLIENT. /Project Manager after hearing the disputing parties. The CLIENT. Project Manager shall state their decisions with reasons therefore. Such decisions may be in the form of a final Certificate or otherwise. The decision of CLIENT. The Project Manager with respect to any or all of the following matters shall be final.

The variation or modifications of the design.

The quality or quantity of Works or the addition or omission or substitution of any work.

Any discrepancy in the Drawings and/or Specifications and Schedule of Quantities.

The removal and/or re-execution of any Works executed by the Contractor.

The dismissal from the Works of any persons deployed thereupon.

The opening up for inspection of any Works covered up.

The amending and making good of any defects under defects liability period.

Acceptability of materials, equipment and workmanship.

Materials, labour, tools, equipment and workmanship necessary for the proper execution of work.

Assignment and sub-letting

Delay and extension of work

Termination of Contract by CLIENT.

107.0 Handing Over Requirement Overview

1. Connection and Commissioning
2. Licenses, Certificates and Registrations
3. Defects Liability Period – Maintenance and Certifications
4. 'As Constructed' Information and Manuals

Appendix A Maintenance Manuals

Background

The handover of a project to the client at the end of construction is a very important stage of the project procurement process and facility operation success. A well organized, efficient and effective transfer of information from project works to the University is essential.

The transfer of ownership of the project from contractor to client can have an effect on fire and life safety, reliability, standards of operation, maintenance and operational cost efficiencies to the University. The transfer/handover period can be a very stressful time for contractors' staff, and building owners and occupants alike as spaces become occupied and operation of the facility starts. The commissioning and fine tuning operations during handover can impact heavily on core business of the hotel if not managed in a structured manner. The capital works project management process identifies broad activities of the project handover stage.

The following sections of this document detail the requirements and actions required to be undertaken during any project handover.

The handover program shall be organized by the project manager in conjunction with the head contractor and subcontractors.

Pre Project Handover Site Meeting

Projects will require a dedicated project meeting to discuss the project handover process and to agree on requirements and outcomes. The meeting should be held no less than four weeks prior to the proposed project completion date.

A pro-forma agenda for the meeting would include:

- introduction and reason for the meeting
- CAD information

- plant and equipment asset detail collection
- Maintenance manuals
- Prescribed essential safety and health features and measures (PESHFM) maintenance during the defects liability period (DLP) - Understanding and process development
- defects management and after-hours callouts
- connection and commissioning
- systems operational training planning (includes building operations such as evacs)
- licenses and certificates
- warranties and guarantees
- security systems (includes key handover process)
- Space use information verification

The project manager will arrange this meeting with all concerns (architects, engineers, head contractor, major subcontractors and consultants).

Hotel Property Services staff members will be nominated to attend various elements of project handovers, meetings and operational training sessions.

Requirement Overview

A 'certificate of practical completion' shall not be issued and the project will not be handed over (for occupation and use) until the following five important 'contracted' activities have been undertaken or fulfilled:

1. Connection and commissioning of all systems, plant and equipment shall be complete and all testing data and reports made available (as part of the maintenance manuals to be supplied).
2. Licenses, certifications and registrations required by Workplace Standards, the national Building Codes or any other legislation shall be provided prior to taking occupancy or accepting the project as being handed over.
3. Defect liability period (DLP) maintenance management processes shall be in place and confirmed by the Hotel unit and the maintenance service provider.

4. Training sessions will have been successfully held to the satisfaction of operational managers in each field of expertise.

5. As-constructed or as-removed information must be supplied, at a minimum in draft prior to the project handover meeting.

The above task details and requirements are expanded in the subsequent pages and support information is offered in appendices:

Appendix A – Maintenance Manuals

1. Connection and Commissioning

POLICY STATEMENT

Specific testing and commissioning requirements and programs for individual projects will be those that are agreed at a pre-commissioning meeting attended by the contractor, project management, and Property Services staff. Connection testing and commissioning of all systems, plant and equipment shall be complete to the satisfaction of the Consulting Engineers and client.

REQUIREMENT

□ Provide testing and commissioning procedures at least a week in advance of the event that the Hotel staff will witness.

□ Provide relevant authorities inspections, manufacturers and consultant's witness/acceptance test reports and commissioning data as part of the as-constructed information documentation.

□ Label all equipment, switches and controls eligibly in accordance with clients requirement.

2. Licenses, Certificates and Registrations

POLICY STATEMENT

All licenses, certifications and documentation required by Workplace Standards or by any other specialized legislation such as the Building Code of Nepal or other certifying agency shall be provided prior to taking occupancy or accepting the project as being handed over.

3. Defects Liability Period – Maintenance and Certifications

POLICY

STATEMENT

Maintenance does not include construction defect repairs. Defects are dealt with separately under the construction contract.

The Building Regulations require client (as the building owner or occupier) to certify all prescribed essential safety and health features and measures (PESHFM) maintenance and other tasks have been undertaken.

□ The Annual Maintenance Statement and shows confirmation from the Building Owner or Occupier that all required certificates specified requirements have been undertaken during the preceding year.

REQUIREMENT

□ All maintenance activities undertaken during the defects liability period (DLP) must be undertaken by the construction project contracted providers/installers.

□ To ensure the required maintenance activities are actioned during the DLP, maintenance schedules for all essential services assets shall be in place and confirmed by the Hotel facilities manager prior to a project being handed over.

□ A separate process for management of contract related building defects shall be organized by the project manager.

□ During the month prior to the end of the DLP, a report must be submitted to the project manager from the various engineering consultants identifying how the various engineering systems/installations/works actually performed as compared to the design criteria; achievement of environmental targets including energy and water consumptions; quality of the indoor environment; and outline any inadequacies and adjustments made.

□ At the conclusion of the DLP, final inspections must be certified, including final seasonal adjustments undertaken to ensure proper operation of all systems.

4. As-Constructed Information and Manuals

POLICY STATEMENT

As-constructed information is required by the Hotel to allow a smooth transition from project to actual use or occupation. As-constructed information includes schedules of equipment, technical data and manufacturer's technical literature including performance information on individual plant and equipment; original software programs and all passwords; copies of certifications and warranties; all test results, maintenance schedules and complete as-built drawings in CAD format; list of suppliers; list of programmed operational time periods, thermostatic settings, etc.

REQUIREMENT

- It is recognized that it is very difficult to gather all as-constructed information prior to project handover due to the busyness of completing projects in the final stages and also the process of commissioning plant during the same period. Submit progressive as- installed drawings especially for those concealed/ underground cable and piping routes shall be provided prior to backfilling of excavation or concreting of floor slab or installation of non removable ceiling. Provide critical dimensions and access points.
- It is suggested that collection of required information is a managed process by site managers. Collecting information as tasks are complete or the equipment is installed helps avoid the rush at the end of the project.
- Items identified by (□). These must be provided, at a minimum in draft format prior to the final project handover meeting.
- All other listed items (if included in the project) must be provided within four weeks after the date of issue of a Certificate of Practical Completion.
- Various information that must be supplied as maintenance manuals. All information shall be provided in duplicate (1 x original and 1 x copy) hard copy, bound into 3- or 4-ring folders. These folders shall contain a compact disk or disks of electronic copies of the information supplied in the folders.
- Manuals must not contain superfluous information such as product catalogues that 'add bulk ' and make it look a healthy presentation. Only useful information shall be provided such as instructions, schedules, and maintenance plans etc covering the information identified.

□ For small projects, the Hotel project manager may approve an alternative to providing the information in 3-ring folders. As an example the information required for the installation of a split system air conditioner may take the form of operational instructions, schematic updates, warranties and appropriate asset detail forms. These could all be supplied on a CD.

□ Update existing maintenance manuals information as required with details such as system schematics and schedules for works that have been undertaken in existing buildings.

Appendix -A Maintenance Manuals

(to include soft copy of data)

Plumbing Services Information

☐ 3-ring folder

☐ loose leaf

□ Operation manual including a full step-by-step description of how the system works and interacts with other services (photographs encouraged)

□ Maintenance strategies, recommendations and service schedules

o Single line wiring diagrams (schematics)

□ FIP as constructed drawings (walkabouts) and copies in FIP cabinet

□ Installers certificate of compliance

□ Compliance and registration certificates

o Commissioning test results.

TENDER DETAILS FOR PHE WORKS

- | | | | |
|----|--|---|--|
| 1. | Date of collection Tenders | : | On or Before 15/09/2018 in office of Clarks – Lucknow. |
| 2. | Time and Date to receipt of Sealed Tenders | : | Up to 15:00 hrs. on 20/09/2018 in office of Clarks- Lucknow. |
| 3. | Validity of Offer | : | 90 days from the date of opening of tender |
| 4. | EMD (Earnest Money Deposit) | : | INR. 1,00,000.00 (Rupees One Lac Only). |

SUBHEAD : SANITARY PLUMBING INSTALLATION

TECHNICAL SPECIFICATIONS AND SCOPE OF WORK

1 SCOPE OF WORK

This part of the Contract shall generally include the following services:

- i) Installation of sanitary fixtures, faucets and toilet requisites,
- ii) Supply & Installation of internal hot and cold water supply distribution network,
- iii) Supply & Installation of above ground drainage system,
- iv) Supply & Installation of underground drainage system including construction of manholes and all other related appurtenances,
- v) Supply & Installation of external water supply system.
- vi) Supply & Installation of landscape irrigation system
- vii) Installation of Pumping Machinery

- vi) Fixing of inlet and outlet connections, over-flows and drain connections in the water storage tanks using puddle flanges,

The Contractor shall include for the supply, unless otherwise mentioned, delivery, installation, connection, commissioning and testing of all materials and equipment to provide a complete sewerage, drainage and water supply installation as described hereunder.

It is proposed that the Owner at his cost shall procure certain items of the works. The procurement of such equipment/material shall be done as per the advise of Architect / Consultant after necessary input from the Contractor as stated hereafter. The equipment/material shall be handed over to the Contractor at site. Thereafter it shall be Contractor's responsibility to takeover the possession of all such equipment, its insurance, safe custody etc. until installation, testing, commissioning and successful handing over the plant to the Owner for its beneficial use.

2 SPECIAL CONDITIONS

2.1 STATUTORY REGULATIONS AND APPROVALS

All Public Health Engineering works shall be carried out only by those Contractors who are licensed by the concerned local authorities to execute this type of work.

It shall be the responsibility of the Contractor to comply with the regulations as laid down by the local authorities. The Contractor shall also be responsible for obtaining all the statutory approvals/certificates for the work from the concerned Departments and these certificates shall be handed over to the Owner at the completion.

It shall also be the responsibility of the Contractor to get the sewerage, drainage & water supply connections from the concerned authorities. However, the Owner will bear all the statutory expenditures.

2.2 SITE CONDITIONS

It is assumed that before tendering the Contractor would have visited the site and familiarized himself with all the local conditions and means of transportation and communications. No claim of whatsoever nature would be entertained at a later date on account of the Contractor's ignorance of the local conditions.

2.3 STANDARD AND CODES OF PRACTICE

The work shall be carried out as per the enclosed Specifications of Work and the construction drawings to be issued from time to time. These specifications shall be read in conjunction with relevant Codes of Practice and Standards of India wherever applicable.

2.4 WORKMANSHIP

All the work shall be carried out in a workmanship like manner and as per the best practices of the trade.

2.5 DRAWINGS AND DOCUMENTS

(1) General

- i) The Drawings provided with the Specification shall be treated as confidential documents and must not be copied or loaned to any other party without the express permission of the Project Manager / Architect.
- ii) The Drawings are intended as a guide to the firms tendering and give approximate positions of pipes, conduits, cable runs and/or equipment only and in measuring from these drawings, the Tenderer must make due and proper allowance for all necessary diversions from the straight line, rises or falls as may be required for the proper execution of the works.

Detail drawings in all cases shall be worked to in preference to those of a more general nature and figured dimensions where indicated shall be followed in preference to scale.

Where necessary, the exact positions of plant and/or equipment will be decided by the issue of further drawings, but no claim for extra payment due to insufficient information on this scope will be entertained.

In any case of doubt as to the interpretation of either Drawings and/or Specification, the Contractor must refer the matter to the Project Manager / Architect prior to the submission of his Tender.

- iii) It is to be clearly understood that this Tender is to be absolutely inclusive for the proper completion of the whole of the works specified to the true intent and meaning of the specification and/or Drawings and the description therein contained shall be read conjointly and together and no error, inconsistency, discrepancy in the Drawings and/or Specification will relieve the Contractor of his obligations to include for an hand-over the work in the true meaning and intent of the Specification and/or Drawings, complete in every respect.

Should any portion of the works which would reasonably and obviously be inferred as necessary for the installation as a whole not be expressly specified, the Contractor shall provide and execute such work as part of the Contract and shall not be entitled to any extra payment of that account.

- iv) The Contract Drawings and such other drawings as may be furnished to the Contractor during the progress of the Works shall be considered as illustrating between the Drawings and the Specification, the Contractor shall execute the work in accordance with the decision of the Project Manager / Architect . If modifications are necessary, the Contractor shall submit modifications to the Project Manager / Architect for approval before such modifications are executed.
- v) All Drawings and Specification are the property of the Project Manager / Architect .
- vi) The Contractor will be required to give and obtain all necessary site and other particulars and to agree such details with the Project Manager / Architect. The Contractor must also obtain details of any other Contractor's work affected by his work and shall work in close co-operation with all such firms or persons concerned.
- vii) The Contractor shall be responsible for any damage caused to buildings and contents and works by reason of, arising out of, or incidental to, or in connection with the execution of any work in the Contract Documents.

The Contractor shall permit nothing to be done which may injure the stability of the Works, or existing buildings and no cutting through floors or walls will be allowed other than where required by the Drawings, without the sanction of the Project Manager / Architect.

- viii) The Contractor shall submit to the Project Manager / Architect for approval, before the work is commenced, a copy of all working details and installation drawings and shall also supply sufficient copies for the use of the Owner/Civil Work Contractor etc.

These drawings must be submitted by the Contractor as soon as possible after the order is placed to give ample time for all parties concerned to study and comment thereon.

- ix) The work described on any working drawings submitted shall be carefully checked by the Contractor for all clearance, field conditions, maintenance of architectural conditions and proper co-ordination with all trades on the job. To this end, the Contractor, during the construction drawing stage, shall ensure that he co-ordinates drawings of all other trades that might interfere with the proper installation of his work. No payment shall be made for any variations or alterations on site due to lack of knowledge of other trades. Any unresolved conflict between various trades shall be referred to the Project Manager / Architect.

The equipment layout is to be detailed on the drawings, showing the exact method of installing and clearly illustrating components to be used in making all connections.

- x) Pipework drawings must be fully detailed, showing all pipework in double line and indicating the precise size of fittings, valves and equipment, position of hanger supports with reference numbers must be indicated and a large scale detail must be given, showing the type and method of installation of each type of hanger. A schedule is to be included on each drawing, showing details of the type of hanger fixings and reference number for each type.

All general layout drawings shall be drawn 1/50 scale, unless agreed otherwise with the Project Manager / Architect. Toilet piping layouts, details and hangers, cleanouts, methods of fixing of all fittings and fixtures including pipes, detailed cross sections of service ducts, etc., are to be drawn to 1/10 scale.

- xi) The Contractor shall provide a detailed programme incorporating working drawing production which can be read in conjunction with the building construction programme.
- xii) The Contractor shall prepare schedules and drawings showing precise details of holes in concrete, block works etc., base frames or support required and the like. The schedules shall show in detail the builder's work required to be performed by all other trades for the mechanical and electrical installations. These drawings and schedules, in an approved form, must be submitted to and properly approved by the Architect before any structural work requiring holes or other modifications is constructed.
- xiii) The Contractor shall submit all drawings as prescribed hereunder. All drawings shall be supplied in the form of a second negative and signed by a principal of the Contractor. After approval, the negative will be signed by the Project Manager / Architect and returned to the Contractor. The Project Manager / Architect will take as many prints from this negative as he requires for his own use.

Signed and approved drawings will not be departed from unless a signed variation or omission certificate is issued in writing by the Project Manager / Architect. Drawings returned to the Contractor for alteration or amendment shall be re-submitted to the Project Manager / Architect for approval.

Amended or altered drawings shall show the nature of the amendment or alteration in a revision block on the drawing, together with the revision number or letter and the date of the revision.

- xiv) Should the Contractor prove unable to produce satisfactory "Working Drawings" or be unable to produce drawings to conform to the progress of the work, the Project Manager / Architect reserves the right to take whatever steps are necessary to have drawings undertaken by others and debit the Contractor's account.

Any decision taken by the Project Manager / Architect to have working drawings produced elsewhere will not relieve the Contractor of his contractual obligations and the Contractor must provide to the Project Manager / Architect all necessary details, physical dimensions, descriptive literature, etc., of all equipment to be incorporated on drawings within 10 days of a request from the Project Manager / Architect .

(2) Manufacturers' Data

- i) Manufacturers' performance data, certified factory drawings of apparatus, giving full information as to capacity, dimensions, materials and all information pertinent to the adequacy of the submitted equipment shall be submitted for approval.

Manufacturer names, sizes, catalogue numbers and/or samples of all materials shall be submitted for approval.

Submittals and working drawings should, as far as possible be complementary so that drawings and submittals can be cross checked.

- ii) Order of equipment submitted for approval must be accompanied by relevant drawings, technical data, catalogues and samples, Where data, certified drawings or other required information is not available until after orders have been placed, the Project Manager / Architect will give provisional approval until all requested drawings and information have been supplied to the Project Manager / Architect and approved by him. It is the Contractor's responsibility to ensure that all necessary information is supplied to the Project Manager / Architect in accordance with the progress of the work.

(3) Operating and Maintenance Manual/Test Certificate

- i) The Contractor shall furnish six copies in bound form of an instruction manual and test certificates containing all information applicable to this section of the Works. This manual is to be similar in design and content to those to be provided under other services.

The manual shall contain a comprehensive written description of the Works, outlining the operation of the systems and maintenance procedures.

(4) "As Installed " Drawings

- i) The Contractor shall arrange to keep on Site a full set of drawings showing the progress of the Works, which must be kept up to date.

The Contractor shall keep a record as the work proceeds of any work installed not in accordance with the drawings. On completion of the Works the Contractor shall supply three clear coloured prints of each applicable drawing, showing the exact position of all apparatus, pipe lines, services, control valves, switchgear, etc., together with diagrams, schedules, etc. to the Project Manager / Architect requirements and in addition one complete set of plastic negatives.

The word "AS INSTALLED DRAWINGS" shall be clearly indicated on all drawings adjacent to the title block.

2.6 WORK AND TIME SCHEDULE

The Contractor shall prepare a work and time schedule in a format as approved by the Owner/Consultant. The schedule shall be submitted to the Owner/Consultant within ten days of the award of the Contract. It shall indicate the expected date of commencement and completion of each item of work. The chart shall also indicate the Scheduling of samples, shop drawings and approvals. In addition to this, the Contractor shall also furnish to the Owner/Consultant fortnightly progress reports indicating percentage completion of each item of work.

2.7 RATES

The rates quoted for any particular item by the Contractor shall be inclusive of the cost of material, erection, connection, testing, labour, supervision, tools, plant, transportation, excise duties and taxes, contingencies, breakage, wastage and all other sundries.

The rate shall also be inclusive of cutting holes, making chases in RCC and making good the same. No claim for extra would be entertained on this account.

The quantities mentioned in the BOQ may vary (increase or decrease) to any extent without any change in rates.

2.8 PLUMBING DRAWINGS

The plumbing drawings issued from time to time to the Contractor are diagrammatic but shall be following as closely as actual construction work will permit. Any deviation from the drawings required to conform to the building construction shall be made by the Contractor at his own expenses. The architectural drawings shall take precedence over the services drawings as far as the Civil and other trades works are concerned.

2.9 DISCREPANCIES IN THE DRAWINGS

Should there be any discrepancy due to in-complete description, ambiguity or omission in the drawings and other documents relating to this Contract found by the Contractor either before starting the work or during execution or after completion, the same shall be immediately brought to the attention of the Architect/Consultant and his decision would be final and binding on the Contractor.

2.10 MATERIALS

All materials to be supplied by the Contractor shall be new. All packed items shall arrive at site in original packing only. Any items found defective or damaged shall be replaced by the Contractor at his own expenses. The Contractor shall get the 'seal' of containers opened from Project Manager / Architect and maintain a record jointly signed by him and Project Manager / Architect. No empty containers shall be removed from the site till completion of work or without the written approval of Project in Charge.

2.11 STORAGE OF MATERIALS

All the materials brought at site shall be stored and stacked in a proper manner. The materials requiring protection from the Sun and rain shall be kept inside the temporary structures to be erected at site by the Contractor. The Contractor shall also follow the Manufacturers' instructions for storing and stacking the materials.

The storage facilities are to be created by the Contractor at his own expenses.

2.12 INSTRUMENTS FOR MEASUREMENT AND TESTING

The Contractor shall provide, free of cost, all equipment, instruments, labour and all other allied assistance required by the Architect/Consultant or their representatives for measurement and testing of the works.

2.13 CO-ORDINATION WITH OTHER TRADES

The Contractor shall be responsible for coordinating this work with works of other trades sufficiently ahead of time to avoid unnecessary hold ups. Hangers, sleeves, recesses etc. shall be left in time as the work proceeds.

2.14 SITE ORDER BOOK

The Contractor shall maintain a site order book, in which daily progress of the work and number of workers engaged shall be recorded. The site diary shall also be used by the Owner/Architect/Consultant for writing his comments/instructions.

2.15 UP-KEEP OF THE SITE

It shall be the responsibility of the Contractor to clear away, from time to time, all debris and excess material generated by the activities of his workers.

2.16 PROTECTION

All work shall be adequately protected, to the satisfaction of the Project Manager/ Architect , so that the whole work is free from the damage throughout the period of construction up to the time of handing over.

Special care must be taken to prevent damage and scratching of all fittings and fixtures. Tool marks on exposed fixtures shall not be accepted. Protective paper on fixtures shall be removed with hot water only at the final completion of the work.

Before handing over the work, the Contractor shall clean all elements of the complete installation, remove plasters, splashes, stickers, rust stains and all other foreign matter and leave every part in acceptable condition and ready for use to the satisfaction of the Owner/Architect/Consultant.

3 UNDER GROUND DRAINAGE

3.1 EXCAVATION

(1) Alignment and Grading

The sewers are to be laid to alignment and gradients shown on the drawings but subject to such modifications as shall be ordered by the Project Manager / Architect from time to time to meet the requirements of the works. No deviations from the lines, depths of cuttings or gradients of sewers shown on the plans and sections shall be permitted except by the express direction of the Project Manager / Architect.

(2) Excavation in Tunnels

The excavation for sewers and works shall be open cutting unless the permission of the Project Manager/ Architect for the ground to be tunnelled is obtained. Where sewers have to be constructed along narrow passages, the Project Manager / Architect may order the excavation to be made partly in open cut and partly in tunnel and in such cases the excavated soil shall be removed at once so as not to block up the passage and shall be brought back later on for refilling of the trenches or tunnels.

(3) Opening out Trenches

In excavating trenches, etc. the soling, road metalling, pavement kerbing etc. and turf is to be placed on one side and preserved for reinstatement when the trench or other excavation shall be filled up.

Before any road metal is replaced, it shall be carefully shifted. The surface of all trenches and holes shall be restored and maintained to the satisfaction of the Project Manager / Architect and of the owners of the roads or other property traversed and the Contractor shall not cut or break down any live fence or trees in

the line of the proposed works but shall tunnel under them, unless the Project Manager / Architect shall order to the contrary.

The Contractor shall grub up and clear the surface over the trenches and other excavation of all trees, stumps, roots and all other encumbrance affecting execution of the work and shall remove them from the site to the approval of the Project Manager / Architect.

(4) Obstruction of Roads

The Contractor shall not occupy or obstruct by his operation more than one half of the width of any road or street and if insufficient space shall then be left for public and private transit, he shall remove the materials excavated and bring them back again when the trench is required to be refilled. The Contractor shall obtain the consent of the Project Manager / Architect before closing any roads to vehicular traffic and the foot-walks must be kept clear at all times.

(5) Removal of Filth

All night soil, filth or any other offensive matter met with during the execution of the works, immediately after it is taken out of any trench, sewer or cess-pool, shall not be deposited upon the surface of any street or where it is likely to be nuisance or passed into any sewer or drain but shall be at once put into carts and removed to a suitable place to be provided by the Contractor.

(6) Excavation to be Taken to Proper Depths

The trenches shall be excavated to such a depth that the sewers shall rest on concrete as per specifications and drawings so that the inverts may be at levels given on the sections. In bad ground the Project Manager / Architect may order the Contractor to excavate to a greater depth than that shown on the drawings and to fill up the excavation to the level of the sewer with concrete, broken stone, gravel or other materials. Any such extra excavation, if ordered by the Project Manager / Architect, shall be extra as per provisions in the Contract conditions, but if the Contractor should excavate the trench to a greater depth than is required as per drawings without a specific order to that effect of the Project Manager / Architect, the extra depth shall have to be filled up with concrete at the Contractor's own costs and charges to the requirements and satisfaction of the Project Manager/ Architect .

(7) Refilling

After the sewer or other work has been laid and proved to be watertight, the trench or other excavations shall be refilled. Utmost care shall be taken in doing this, so that no damage shall be caused to the sewer and other permanent work. The filling in the haunches and up to 75 cm above the crown of the sewer shall consist of the finest selected materials placed carefully in 15 cm layers and flooded and consolidated. After this has been laid, the trench and the other excavation shall be

filled carefully in 150 mm layers with materials taken from the excavation, each layer being watered for proper consolidation unless the Project Manager / Architect shall otherwise direct.

(8) Contractor to Restore Settlements and Damages

The Contractor shall, at his own costs and charges, make good promptly during the whole period of the works are in hand, any settlement that may occur in the surfaces of roads, berms, footpaths, gardens, open spaces, etc. whether public or private, caused by his trenches or his other excavations and he shall be liable for any accidents caused thereby. He shall also, at his own expense and charges, repair and make good any damage done to buildings and other property. If in the opinion of the Project Manager, the Contractor fails to make good or pay or satisfy the expenses of making good such works / property, the Project Manager shall be at liberty to get the work done by other means and the expenses thereof shall be paid by the Contractor or deducted from any money that may be or become due to him or recovered from him in any other manner according to the conditions of the contract.

9) Disposal of Surplus Soil

The Contractor shall at his own costs and charges, provide places for disposal of all surplus materials not required to be used on the works. As each trench is refilled, the surplus soil shall be immediately removed, the surface properly restored and roadways and sides left clear.

(10) Timbering of Sewer & Trenches

The Contractor shall at all times support efficiently and effectively the sides of the sewer trenches and other excavations by suitable timbering, piling and sheeting and they shall be close timbered in loose or sandy strata and below the surface of the subsoil water level, without any extra cost.

All timbering, sheeting and piling with their walling and supports shall be of adequate dimensions and strength and fully braced and strutted so that no risk of collapse or subsidence of the walls of the trench shall take place. The Contractor shall be held responsible and accountable for the sufficiency of all timbering, bracing, sheeting and piling used for, all damage to persons and property resulting from the improper quality, strength, placing, maintaining or removing of the same.

(11) Shoring of Buildings

The Contractor shall shore up all buildings, walls and other structures, the stability of which is liable to be endangered by the execution of the work and shall be fully responsible for all damages to persons or property resulting from accident to any of such buildings.

(12) Removal of Water from sewer

The Contractor shall at all times, during the progress of work, keep the trenches and excavations free from water which shall be disposed of by him in a manner as will neither cause injury to the public nor to the public or private property nor to the work completed or in progress nor to the surface of any roads or streets, nor cause any interference with the use of the same by the public.

(13) Excess Excavation

If any excavation is carried out at any point or points to a greater width than the specified cross section of the sewer with its envelope, the same shall be filled with concrete by the Contractor at his own expenses and charge to the requirements of the Project Manager.

(14) Width of Trenches

Unless specified otherwise by the Project Manager, the width at bottom of trenches for pipes of different diameters laid at different depths shall be as given below :-

- a) For all diameters, up to an average depth of 120 cm, width of trench in cm = diameter of pipe + 30 cm.
- b) For all diameters or depths above 120 cm; width of trench in cm = diameter of pipe + 40 cm ; and
- c) Notwithstanding (a) and (b), the total width of trench at the top should not be less than 75 cm for depths exceeding 90 cm.

3.2 SALT GLAZED STONEWARE PIPES

(1) Specifications

Wherever specified for drainage/sewer lines, salt glazed stoneware pipes shall be used. These pipes shall be of first quality, straight, free from any roughness inside or outside and conforming to IS: 651-1980.

(2) Laying

The pipes shall be laid on a bed of 15 cm thick cement concrete 1:5:10 (1 cement : 5 fine sand : 10 graded stone aggregate of 40 mm nominal size) mix or as specified, with sockets leading uphill and should rest on solid and even foundations for the full length of the barrel. Socket holes shall be formed in the foundation sufficiently deep to allow the pipes jointer room to work right round the pipes and as short as practicable to admit the socket and allow the joint to be made.

If the bottom of the trench of rock or very hard ground that cannot be easily excavated to a smooth surface, the pipes shall be laid on concrete cradles to ensure even bearing.

The pipes shall be surrounded with 15 cm thick cement concrete 1:5:10 (1 cement : 5 fine sand : 10 graded stone aggregate of 40 mm nominal size) mix all around.

(3) Jointing

Tarred gasket of hemp yarn soaked in thick cement slurry shall first be placed round the spigot of each pipe and the spigot then shall be slipped home well into the socket of the pipe previously laid. The pipe shall then be adjusted and fixed in the correct position and the gasket caulked home so as to fill not more than one fourth of the total depth of the socket.

The remaining depth of the socket shall then be filled with a stiff mixture of cement mortar 1:1 (1 cement: 1 fine sand). When the socket is thus filled, a fillet shall be formed round the joint with a trowel forming an angle of 45 with the barrel of the pipe.

3.3 UPVC PIPES FOR UNDERGROUND DRAINAGE

(1) Specifications

Wherever specified for underground drainage/sewer lines, UPVC pipes and fittings (orange brown in colour) shall be used. These pipes shall be conforming to ISO:4435&ISO:3633

(2) Laying

The pipes shall be laid on a bed of 15 cm thick cement concrete 1:5:10 (1 cement : 5 fine sand : 10 graded stone aggregate of 40 mm nominal size) mix or as specified, If the bottom of the trench is rock or very hard ground that cannot be easily excavated to a smooth surface, the pipes shall be laid on concrete cradles to ensure even bearing. The pipes shall be surrounded with either a) pea gravel till 15 cm above the crown of the pipe or b) 15cm thick cement concrete 1:5:10 (1 cement : 5 fine sand : 10 graded stone aggregate of 40 mm nominal size) mix all around, as specified.

(3) Jointing

The pipes and fittings shall be jointing with water tight proprietary sealing rings

3.4 CAST IRON PIPES

(1) Specifications

Wherever specified, the cast iron pipes for drainage shall be centrifugally cast spun iron type conforming to ISO. standard

Generally, all drainage lines passing under buildings, floors, roads with heavy traffic and in exposed position above ground or like situations shall be in cast iron.

(2) Laying and Jointing

All excavation work for laying cast iron drainage pipes shall be done as described in Section AB3.1.

The spigot of the pipe shall be placed inside the socket and gasket caulked home. The interior of the socket and exterior of the spigots shall be thoroughly cleaned and dried. The spigot end shall be inserted into the socket right upto the back of the socket and carefully centered by two or three laps of treated spun yarn, twisted into ropes of uniform thickness, well caulked into the back of the socket to leave the depth for the required quantity of lead. Molten pig lead shall then be poured into the joint filling the same in one pouring. The lead shall be caulked by proper tools to make it even alround. The pig lead shall conform to ISO.

3.5 REINFORCEMENT CEMENT CONCRETE PIPES

(1) Specifications

Wherever specified for drainage/sewer lines, reinforcement cement concrete pipes shall be used. These pipes shall be suitable for semi fluid These pipes shall be of first quality, straight, free from any roughness inside or outside and conforming to ISO.

(2) Laying

The pipes shall be laid on a bed of 15 cm thick cement concrete 1:5:10 (1 cement : 5 fine sand : 10 graded stone aggregate of 40 mm nominal size) mix or as specified, with sockets leading uphill and should rest on solid and even foundations for the full length of the barrel. Socket holes shall be formed in the foundation sufficiently deep to allow the pipes jointer room to work right round the pipes and as short as practicable to admit the socket and allow the joint to be made.

If the bottom of the trench of rock or very hard ground that cannot be easily excavated to a smooth surface, the pipes shall be laid on concrete cradles to ensure even bearing.

The pipes shall be surrounded with 15 cm thick cement concrete 1:5:10 (1 cement : 5 fine sand : 10 graded stone aggregate of 40 mm nominal size) mix all around.

(3) Jointing

The jointis composed of specially shaped spigot and socket ends on concrete pipes. A rubber ring shall be placed on the spigot which shall be forced into the socket of the pipe previously laid. This copresses the rubber rings as it rools in to the annular space formed between the two surfaces of spigot and the socket, stiff mixture of cement mortar 1:2 (1 cement : 2 fine sand) shall then be filled into the remaining annular space and rammed with a caulking tool. After day's work any extraneous

materials shall be removed from the inside of the pipe and newly made joint shall be cured.

3.5 MANHOLES

(1) General

The Contractor shall construct all manholes, chambers, etc. in first class brick work to such levels, dimensions and specifications as shown in the drawings or as specified in the Bill of Quantities.

(2) Base Concrete, Benching and Channels

All manholes shall have a base of cement concrete 1:4:8 (1 cement : 4 coarse sand : 8 graded stone aggregate 40 mm nominal size) 200 mm thick or as shown on drawings. Channeling and benching shall be formed to the full depth of the diameter of the pipe with cement concrete 1:2:4 (1 cement : 2 sand : 4 graded stone aggregate 20 mm nominal size) finished with a floating coat of neat cement.

(3) Masonry Work

Masonry work shall be done with first class bricks in cement mortar 1:5 (1 cement : 5 fine sand). All manholes shall be plastered 12 mm thick inside with cement mortar 1:3 (1 cement : 3 coarse sand) finished with a floating coat of neat cement. Manholes shall be plastered outside with cement mortar 1:4 (1 cement : 4 coarse sand).

(4) Foot Rests

All manholes above 800 mm depth, shall have foot rests of specified type, spaced 300 mm vertically or as shown on drawings.

The foot rests may be set staggered in 2 vertical runs which may be 380 mm apart horizontally. The topmost step shall be 450 mm below the manhole cover and the lowest not more than 300 mm above the benching

The foot rests in general shall be of orange colour having minimum 6mm thick plastic encapsulating as per IS:10910 over 12mm dia steel bar conforming to IS:1786. The tread top surface shall be ribbed or chequered. The minimum dimensions shall be as follows: a) Cross-section 23mmx25mm b) over all length 263mm c) width 165mm.

The foot rests shall withstand the bend test and chemical resistance test as per specifications and shall have manufacturer's permanent identification mark to be visible even after fixing

(5) R.C.C. Slab

C.I./S.F.R.C frames and covers of the specified size and weight shall be embedded in reinforced cement concrete slab 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) 15 cm thick, reinforcement shall consist of 12 mm dia. M.S. bars of 15 cm centre to center (bothways). Additional bars shall be provided under the C.I. frame.

(6) Size of Manholes and Covers

Size of manholes and manhole covers shall be as follows unless otherwise specified in the Bill of Quantities:

| Size of Manhole (inside dimensions) | | Size and total weight of cover and frame | |
|--|---|---|--|
| 1. | Manhole not exceeding double 0.45 m depth duty) | 600 x 600 mm | 600 x 450 mm (inside) sealed C.I. cover (light |
| 2. | Manhole not exceeding double 0.90 m depth duty) | 900 x 800 mm | 600 x 450 mm (inside) sealed C.I. cover (light |
| 3. | Manhole not exceeding double 1.67 m depth duty) | 1200 x 900 mm | 600 x 450 mm (inside) sealed C.I. cover (light |
| 4. | Manhole exceeding depth 0.9 m made of S.F.R.C. | 900 mm circular | Medium Duty Dia-500 mm inside, Heavy Duty Dia-560 mm inside, made of S.F.R.C. |

| | | | |
|----|-------------------|---------|-----------------------|
| 5. | Manhole exceeding | 1200 mm | Medium Duty |
| | depth 1.67 m | | circular Dia - 500 mm |
| | inside, made of | | |
| | S.F.R.C. | | Heavy Duty |
| | | | Dia - 560 mm inside, |
| | made of | | |
| | S.F.R.C | | |

(7) Drop Manholes

Where it is impracticable to arrange the connection within 60 cm height above the invert of the manhole, the connection shall be made by construction of a vertical shaft outside the manhole chamber as shown in the detailed drawings. If the difference in level between the incoming drain and the sewer does not exceed 60 cm and there is sufficient room in manhole the connecting pipe may be directly brought through the manhole wall and fall accommodated by constructing a ramp in the benching of the manhole.

All manhole covers shall fit properly and bed evenly without rocking in their frames. Covers shall be sealed with grease upon final completion and testing.

(8) Lifting Keys

A set of lifting keys for each type of manhole cover shall be supplied by the Contractor.

3.6 RAIN WATER COLLECTION CHAMBER

The chamber shall be of brick masonry as specified for manholes above and shall have a polycrrete/ ferrocement grating with frame on top and C.I. grating with frame on side, both fixed in 15 cm thick cement concrete 1 : 2 : 4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size). The size of the chamber shall be taken as the clear internal dimensions of the polycrrete/ ferrocement frame. The chamber shall have a connection pipe, the length of which in metre between the road gully chamber and the manhole of the drain shall not be less than one by forty (1/40) times the nominal diameter of pipe in mm (i.e. for 150 mm connection pipe, length shall not be less than 3.7 m and for 250 mm connection pipe length shall not be less than 6.25 m). The chamber shall be built

at the location as shown on drawing or as fixed by the Project Manager considering the site conditions.

4 SOIL, WASTE AND VENT PIPEWORK

4.1 CAST IRON PIPES AND FITTINGS

(1) Specifications

Wherever specified, centrifugally cast (spun) iron pipes & fittings conforming to IS:3989-1984 shall be used for soil, waste and vent pipework unless specified otherwise. Pipes and fittings with irregular bore, blow holes and other manufacturing defects shall not be allowed to be used for work. All fittings shall be of the degree specified or as required at site.

All pipework shall be carried out in workmanship like manner following govt. Specifications in general.

(2) Fixing

All vertical pipes shall be fixed by M.S. Clamps truly vertical. Branch pipes shall be connected to the stack at the same angle as that of the fittings. No collars shall be used on vertical stacks. Each stack shall be terminated at top with a cowl (Terminal Guard).

Horizontal pipes running along ceiling shall be fixed on structural adjustable clamps of special design shown on the drawings or as directed. Horizontal pipes shall be laid to uniform slope and the clamps adjusted to the proper levels so that the pipes fully rest on them.

Contractor shall provide all sleeves, openings, hangers, inserts during the construction. He shall provide all necessary information to the building Contractor for making such provisions in the structure as necessary. All damages shall be made good to restore the surfaces if the above are not incorporated in time and provided afterwards by cutting walls and slabs..

(3) Cast Iron Floor Traps

Floor traps shall be cast iron deep seal type 'P' or 'S' traps with a minimum seal of 50 mm. They shall be with or without vent.

(4) Floor Trap Extension Piece

Wherever mentioned, floor trap shall be provided with G.I. extension piece. Length of the extension piece shall be as per the site conditions. On this extension piece, sockets of suitable diameters shall be welded at the required angle as per the drawing and site conditions. This extension piece shall be lead caulked into the collar of 'P'/'S' trap.

(5) Installation of Cast Iron, Soil, Waste and Ventilation Pipe Work

i) Gradient

The gradient of a horizontal branch should not be flatter than 1 in 50 and not steeper than 1 in 10.

ii) Layout

The pipework in branch connections should always be arranged to allow free drainage of the system. Connections to main or branch pipes should be so arranged as to prevent cross flow from one appliance to another. Connections should be made with an easy sweep in the direction of flow.

iii) Jointing

All cast iron soil, waste & vent pipework shall have either lead joints or epoxy resin joints as specified in bill of quantities. Lead joints, if specified, shall be as specified in the latest govt. specifications. Epoxy resin joint shall be done with specified proprietary products and shall be made as per the manufacturer's directives.

All joints in pipe work and all pipe work to appliances should be made in such a manner as to be air-tight and water tight and to remain so during use.

iv) Bends

Bends should be of long radius where practicable. In the case of bends in the bottom most pipes, they should necessarily be of long radius and should be preferably be made of 135 degree (1/8) bends.

v) Access

Ample provision should be made for access to all pipe work and embedding of joint in walls should be avoided as far as possible. All tee and cross pieces shall be with access doors. Wherever instructed by the Consultant, the bends with access doors shall also be provided. The bottom most pipe of every soil and waste stack shall be provided with an access piece at a height not more than 30 cm from the finished ground level.

vi) Soil pipes

Soil Pipes, whether inside or outside the building, shall not be connected with any rain water pipe and there shall not be any trap in such soil pipe or between it and any drain with which it is connected.

vii) Ventilating Pipe

- a) Ventilating pipes should be so installed that water cannot be retained in them. They should be fixed vertically. Whenever possible, horizontal runs should be avoided. Ventilating pipe shall be carried to such a height and in such a position as to afford by means of the open end of such pipe or vent shift, a safe outlet of foul air with the least possible nuisance.
- b) The upper end of the main ventilating pipe may be continued to the open air above roof level as separate pipe or it may joint the MSP and/or MWP above the floor level of the highest appliance. Its lower end may be carried down to join the drain at a point where air relief may always be maintained.
- c) Branch ventilating pipes should be connected to the top of the BSP and BWP between 75 mm and 450 mm from the crown of the trap.
- d) The ventilating pipe shall always be taken to a point 150 cm above the level of the leaves or flat roof or terrace parapet whichever is higher or the top of any window within a horizontal distance of 3 m. The least dimension shall be taken into account. The upper end of every ventilating pipe shall be protected by means of a cowl.

viii) Concrete Encasing

All soil and waste pipes horizontally laid in the sunken portion of the toilets (but not in open ducts or suspended with the ceiling) shall be covered with 75 mm thick cement concrete 1:2:4 all around. Encasement of such pipes shall be done after testing of the joints.

ix) Painting

All pipes in ducts and exposed position shall be painted with minimum two coats of enamel paint of approved shade and quality over a coat of primer. Pipes under floor or in chases need not be painted.

4.2 U.P.V.C. PIPES AND FITTINGS

12 (1) Specifications

Wherever specified, Internal above ground foul drainage pipework and fittings shall be of UPVC. Pipes of diameter 75 mm and above shall be confirming to IS/ISO:13592 Type-B and shall be of type commercially known as UPVC SWR system. Pipes of diameter 63mm and smaller shall be of pressure rating minimum 6 kg/sq.cm. Fittings in general shall be injection moulded and suitable for soil, waste and rain water drainage application. However, specials can be fabricated using pipes and fittings described above. All pipework fittings and accessories shall be installed strictly in accordance with the

manufacturer's recommendations. The Contractor shall ensure that the UPVC pipes are of a sufficiently high temperature rating to withstand the environmental conditions

13 (2) U.P.V.C Pipework Installations

During the installation of internal drainage and waste system, the Contractor shall make due allowance for the expansion of UPVC and polypropylene pipework and fittings during normal working conditions. Further allowance shall be made for solvent weld jointing of the above materials with regard to temperature and humidity.

The bore of all pipework shall be smooth and free from all burrs or obstructions; bends wherever possible shall be of the long radius type.

All connections between soil drainage, vent, waste or fixtures shall be made with approved connectors. The termination at high level of all vent stacks shall be carried out with a vent guard.

All fixtures and fittings draining into the internal drainage installations shall be fitted with traps. In case of traps for sanitary fixtures e.g., hand wash basins, sinks etc., shall be of the deep seal type having a water seal of 50 mm.

Traps to sanitary fittings shall have deep seals of at least 50 mm depth of water and shall have inlet sizes as follows:

| | | |
|-------------|---|-------|
| Wash Basins | - | 32 mm |
| Sinks | - | 40 mm |
| Bath Tubs | - | 40 mm |

Pipework shall be fixed accurately to approved falls, the gradient shall be consistent and pipework shall follow a true line. Allowance shall be made for the rodding of the whole installation in addition to which, at all changes of direction, a rodding eye shall be installed.

The pipework shall be fixed to the walls using standard PVC coated mild steel or PVC brackets of a screw-on type recommended by the manufacturers.

The maximum spacing between the supports shall be as follows:

| Pipe Diameter | Horizontal | | | |
|---------------|------------|---|------|---|
| Vertical | | | | |
| 32 mm | 1.00 | M | 1.25 | M |
| 40 mm | 1.00 | M | 1.25 | M |
| 50 mm | 1.00 | M | 1.25 | M |
| 110 mm | 1.25 | M | 2.00 | M |

The Contractor shall provide access or rodding eyes wherever required to provide full access to the system. The rodding eye shall also be provided at the foot of all vertical stacks at the point of connection to the underground drain pipe.

Access doors in suspended pipework within 0.5 M of the soffit shall not face upwards but be located on the side or underneath the pipe.

Where traps, access branches and access doors are located above false ceiling, removable panels shall be provided.

Soil and waste ventilation pipes passing through roofs shall be weather proofed to the satisfaction of the Project Manager.

The vent pipes shall be carried upto a minimum height from finished roof level of 500 mm to prevent any pressure fluctuations in the stack due to wind effect.

Connections to the outlets of the water closets shall be made by the use of proprietary UPVC WC connectors.

Generally vent and anti-syphonage pipes and fittings shall be installed above the flood level of the fitting wherever possible.

The whole of the installation shall be tested in accordance with the requirements of govt./international Standards, specifications. All tests shall be to the full satisfaction of the Project Manager.

(3) U.P.V.C. Floor Traps

Floor traps shall be UPVC deep seal type 'P' traps with a minimum seal of 50 mm. They shall be with or without vent as required.

(4) U.P.V.C. Floor Trap Extension Piece

Wherever mentioned, floor trap shall be provided with UPVC extension piece. Length of the extension piece shall be as per the site conditions. Extension piece shall be formed out of boss pipe as per standard details and drawings.

14 4.3 GALVANISED IRON SOIL, WASTE AND VENT PIPEWORK

Wherever specified, small bore (upto 65 mm dia) galvanized iron soil, waste, vent and rain water pipework shall be executed as per the specifications given under section A5.1.1.1 G.I pipework

15 4.4 CLEAN OUTS

Clean outs shall be provided in the soil, waste and vent pipework as per the standard details wherever shown on the drawings and wherever required by the Consultant/Architect/Project Manager.

16 4.5 VENTILATION SYSTEM

- i) Ventilating pipes shall project through walls or roofs to vent into the open air at the points shown on the drawings. The ventilation pipes shall be fitted with balloon at the top.
- ii) No vent terminal shall be directly beneath any door, window or other ventilating openings of the building, nor shall any such vent terminal be within 3 M horizontally of such an opening unless it is 60 cm above the top of such an opening.
- iii) All vent and branch vent pipes shall be so graded and connected as to drip back to the soil or waste pipe by gravity.
- iv) Where vent pipes connect to horizontal soil or waste pipes, the vent pipes shall be taken off above the centre line of the pipe. The vent pipes shall rise vertically or at an angle not more than 45° from the vertical to a point at least 150 mm above the floor level rim of the fixture it is venting before off-setting horizontally or before connecting to the branch vent.
- v) A connection between a vent pipe and vent stack or stack vent shall be made at least 150 mm above the flood level rim of the highest fixtures served by the vent. Horizontal vent pipes forming branch vents, relief vents or loop vents shall be at least 150 mm above the flood level rim of the highest fixture served.

17 4.6 RAIN WATER PIPES

Pipes for the conveyance of the rain water from the roof top, balcony etc. shall be installed, unless otherwise mentioned, as per the specifications for soil, waste and vent pipework as described above and of material as specified in bill of quantities.

The rain water inlet fittings shall be of type and material as specified in bill of quantities. Wherever, no special inlet fitting is specified in the bill of quantities, the cost of supplying and fixing of a normal grating of size matching with pipe size and of material as that of the pipes shall be deemed to be included in the cost of the rain water pipework.

The gaps between outlet and roof slab shall properly sealed.

18 4.7 PIPE SLEEVES

The Contractor shall install sleeves for all piping passing through slabs, beams, walls or any other building member. The sleeves shall be fixed in formwork before pouring of concrete. In foundations and walls the sleeves shall be properly grouted and the gap between sleeve and building member shall be made water tight.

All sleeves shall be of PVC unless mentioned otherwise.

19 4.8 JOINTING OF NON-SIMILAR MATERIALS UPVC & Cast Iron Pipes

Wherever cast iron pipes and UPVC pipes are to be jointed, the spigot end of UPVC pipe shall be jointed with socketed end of cast iron pipes. The length of spigot / plain end of UPVC pipe to be inserted in the socket of C.I. pipe shall be applied with PVC solvent

cement and sprinklered with coarse sand and left for 24 hours. The joint shall be made with epoxy based (**like Drip-Seal**)

5 DOMESTIC WATER SERVICES

5.1.1 PIPE WORK

Wherever specified G.I. pipes for water supply inside and outside the building shall be genuine galvanised steel tubes conforming to international of specified grade with latest amendments.

All fittings shall be malleable iron galvanised fittings conforming to international standard with latest amendments. All fittings shall have manufacturer's trade mark stamped on it. Fittings in G.I. pipe lines shall include elbows, tees, bends, reducers, nipples, union, bushes, G.I. clamps of approved design, G.I. flanges with 3 mm rubber insertion, nuts, bolts, washers, etc. All fittings shall be tested at manufacturer's work. Contractors may be required to produce certificate to this effect from the manufacturers.

All pipework for water supply (both hot and cold) inside the building shall be carried out in a workmanship like manner following govt. specifications in general. All materials shall be as specified in these specifications, bills of quantities and drawings. In case specifications of a material is not mentioned or not clear in the above, the reference shall be made to govt. specifications and the relevant Indian Standards/codes.

5.1.2 CPVC PIPE WORK

Wherever specified, CPVC piping system for water supply system shall be SDR 11 rated and of approved makes. All pipes and fittings shall be conforming to ASTM-D-2846 and European standard (wherever there is a conflict, the material shall conform to stringent of the two parameters).

All fittings shall be injection moulded. CPVC to CPVC jointing shall be fusion bonding type (Solvent Cement Type) using proprietary CPVC fusion compound. Transition fittings (for making connections with valves, faucets, other appurtenances and non CPVC pipes) shall have brass insert having threads as per European standard. CPVC threaded fittings are not to be used.

All CPVC pipework for water supply (both hot and cold) inside the building shall be carried out in a workmanship like manner as per the manufacturer's recommendations. All materials shall be as specified in these specifications, bills of quantities and drawings. All the brass threaded adaptors and specials shall be jointed properly using Teflon tape. For storage, cutting, jointing, installing and testing of CPVC material, manufacturer's instructions shall be strictly adhered to.

Solvent Cement : The jointing of pipes and plain fittings shall be by solvent cement of make and grade as specified and supplied by the manufacturer of CPVC piping system. It shall be ensured that the solvent supplied is not used beyond the expiry period as mentioned on the packaging of the material.

HORIZONTAL SUPPORTS SPACING:

| DIA | SPACING IN METRE AT WORKING TEMPERATURE | | | |
|-------|---|--------|--------|--------|
| | 23° C | 38° C | 60° C | 82° C |
| ½ “ | 1.22 M | 0.98 M | 0.82 M | 0.66 M |
| ¾ ” | 1.22 M | 0.98 M | 0.82 M | 0.66 M |
| 1 ” | 1.22 M | 0.98 M | 0.82 M | 0.66 M |
| 1 ¼ ” | 1.29 M | 1.14 M | 0.98 M | 0.66 M |
| 1 ½ ” | 1.29 M | 1.14 M | 0.98 M | 0.66 M |
| 2 ” | 1.29 M | 1.14 M | 0.98 M | 0.66 M |

Curing Time: After the CPVC installation is completed, adequate time as per following schedule shall be provided for the curing of the of the joints before subjecting the system to pressure testing or putting it to use:

| Ambient Temperature | Pipe Sizes ½’ – 1 ¼” | Pipe Sizes 1 ½” – 2” |
|---------------------|-------------------------|-------------------------|
| Above 16° C | ½ hr. | 1hr. |
| From 5° C – 16° C | 1hr. | 2hr. |
| Below 5° C | 3hr. | 6hr. |

A5.1.3 GALVANISED IRON (G.I.) PIPE WORK (FOR EXTERNAL WORKS)

Specifications

Where specified G.I. pipes for water supply inside and outside the building shall be genuine galvanised steel tubes conforming to IS:1239(Part-I)-1979 or European standard of specified grade with latest amendments. Jointing of all G.I pipes shall be threaded

All fittings shall be malleable iron galvanised fittings conforming to IS:1879(Part-1 to 10)-1975 or European standard with latest amendments. All Threaded fittings shall have

manufacturer's trade mark stamped on it. Threaded Fittings in G.I. pipe lines shall include elbows, tees, bends, reducers, nipples, union, bushes, G.I. clamps of approved design, G.I. flanges with 3 mm rubber insertion, nuts, bolts, washers, etc. All fittings shall be tested at manufacturer's work. Contractors may be required to produce certificate to this effect from the manufacturers.

Laying and Jointing

All excavation work for laying G.I. pipes shall be done as described in section A3.1 in general. However, the special care must be taken to ensure that the hard objects like stones, rock pieces, tree roots etc. are not present. Pipes shall be bedded in sand or soft soil free from rock and gravel. Backfill upto 15 cm above the pipe shall also be of fine sand (conforming to grading zone V) or soft soil. Pipes shall be protected by painting two coats of anti-corrosive bitumastic paint over a coat of primer. All the pipe surfaces shall be thoroughly cleared and dried before the application of the primer and shall be free of dirt, grease, oil, rust, scale or other foreign matter. The width of the trench shall be outside diameter of the pipe plus 30 cm. Pipes shall be laid atleast 90 cm. below the ground level (measured from surface of the ground to the top of pipe).

Screwed G.I. pipes shall be jointed with screwed socket joints, using screwed fittings. Care shall be taken to remove any burr from the end of the pipes after cutting. Thread lock cement with grummet of a few strands of fine hemp shall be applied while tightening. All piping shall be kept plugged at the end of day's work.

Protection of Underground Pipes:

The underground G.I pipes and Fittings shall be protected by Coal tar based polymeric corrosion protection tape (minimum 4 mm thick) conforming to IS: 15337 – 2003 or European standard,.

If specified in Bill of Quantities, the proprietary pipe protection system shall be provided as per the Manufacturers recommendation. The proprietary system shall be of approved make.

5.1.3 POLYBUTENE (PB) PIPE WORK (FOR EXTERNAL WORKS)

Specifications

Where specified PB. pipes for water supply inside and outside the building shall be conforming to ENISO 15876 of specified grade with latest amendments. Jointing of pipes shall be by polyfusion socket welding or electric socket welding

LAYING AND JOINTING

All excavation work for laying PB pipes shall be done as described above in general. However, the special care must be taken to ensure that the hard objects like stones, rock pieces, tree roots etc. are not present. Pipes shall be bedded in sand or soft soil free from

rock and gravel. Backfill upto 15 cm above the pipe shall also be of fine sand or soft soil. Pipes shall not be painted. The width of the trench shall be outside diameter of the pipe plus 45 cm. Pipes shall be laid atleast 60 cm. below the ground level (measured from surface of the ground to the top of the pipe). The pipes shall be encased with 150 mm sand all-around

5.1.2 GALVANISED IRON (G.I.) PIPES FOR DOMESTIC WATER SUPPLY

Specifications

Where specified G.I. pipes for external water supply shall be genuine galvanised steel tubes conforming to IS:1239(Part-I)-1979 or European standard of specified grade with latest amendments.

All fittings shall be malleable iron galvanised fittings conforming to IS:1879(Part-1 to 10)-1975 or European standard with latest amendments. All fittings shall have manufacturer's trade mark stamped on it. Fittings in G.I. pipe lines shall include elbows, tees, bends, reducers, nipples, union, bushes, G.I. clamps of approved design, G.I. flanges with 3 mm rubber insertion, nuts, bolts, washers, etc. All fittings shall be tested at manufacturer's work. Contractors may be required to produce certificate to this effect from the manufacturers.

Laying and Jointing

All excavation work for laying G.I. pipes shall be done as described in section 3.1 in general. However, the special care must be taken to ensure that the hard objects like stones, rock pieces, tree roots etc. are not present. Pipes shall be bedded in sand or soft soil free from rock and gravel. Backfill upto 15 cm above the pipe shall also be of fine sand (conforming to grading zone V) or soft soil. Pipes shall be protected by painting two coats of anti-corrosive bitumastic paint over a coat of primer. All the pipe surfaces shall be thoroughly cleared and dried before the application of the primer and shall be free of dirt, grease, oil, rust, scale or other foreign matter. The width of the trench shall be outside diameter of the pipe plus 30 cm. Pipes shall be laid atleast 90 cm. below the ground level (measured from surface of the ground to the top of pipe).

Screwed G.I. pipes shall be jointed with screwed socket joints, using screwed fittings. Care shall be taken to remove any burr from the end of the pipes after cutting. White lead with grummet of a few strands of fine hemp shall be applied while tightening. Other pipe jointing compound may be permitted if approved by the Engineer-in-Charge before starting the work. All pipes shall be fixed with G.I. holder bat clamps clear off the wall. If pipes are fixed in chases they shall be fixed in position by iron hooks. All piping shall be kept plugged at the end of day's work.

Protection of Underground Pipes:

The underground steel pipes shall be protected by coating and wrapping. The coating and wrapping shall be done, in general, as per IS:10221 – 1982 or European standard.

If specified in Bill of Quantities, the proprietary pipe protection system shall be provided as per the Manufacturers recommendation. The proprietary system shall be of approved make.

5.1.3 HDPE PIPEWORK

Wherever specified for external water supply including landscape irrigation, HDPE. Piping system shall be provided using specified materials and employing specially trained workmen.

HDPE PIPES

High Density Polyethylene (HDPE) pipes for potable water supply shall conform to IS : 4984-1978(Second Revision) (Material Grade PE-80) and be of appropriate pressure rating.

The pipes shall be reasonable round and shall be supplied in straight lengths or in coils as specified. The internal and external surfaces of the pipes shall be smooth and clean, free from grooving and other defects.

Pipes shall be manufactured using virgin material and shall be continuously and permanently marked with following information.

Manufacturer's Name

Standards

Size and Pressure rating

HDPE FITTINGS

- a) All Compression fittings shall be rated for 10 Kg/cm² suitable for HDPE pipes specified above.
- b) All Butt welded fittings shall be of 10 Kg/cm² rating and shall be of same make as Pipes.
- c) Wherever a branch or outlet of 50% or less dia is required, Clamp saddles shall be used instead of Tee. Saddles shall be Non metallic and shall be of same make as Compression fittings. Nuts and Bolts if used shall be SS 314.
- d) Union wherever used shall be PVC as per DIN standards and shall be of 16 Kg/cm² rating. Unions shall be double union type and shall be threaded.
- e) Flanges shall be selected to suit Valve flanges and shall be 10 Kg/cm² (Min) depending on pipe line material. All bolts, nuts and washers shall be SS 314.

LAYING AND JOINTING

All excavation work for laying HDPE pipes shall be done as described above in general. However, the special care must be taken to ensure that the hard objects like stones, rock pieces, tree roots etc. are not present. Pipes shall be bedded in sand or soft soil free from rock and gravel. Backfill upto 15 cm above the pipe shall also be of fine sand or soft soil. Pipes shall not be painted. The width of the trench shall be outside diameter of the pipe plus 45 cm. Pipes shall be laid atleast 60 cm. below the ground level (measured from surface of the ground to the top of the pipe).

HDPE pipes shall be butt jointed by heat fusion method in accordance with the following procedures. HDPE pipes shall not be threaded. Jointing procedure shall be as follows and shall be strictly adhered to obtain optimum quality of joints. skillful application of qualified technique, welder and the use of proper construction equipment in good condition shall be made to achieve sound joints in HDPE piping.

Preparation

Any kinks or buckles in pipe near its ends shall be removed by cutting out as a cylinder. The face of the joints to be welded shall be flat. Correct position and holding of pipe is necessary when sawing pipe to achieve this. For pipes 160 mm. OD and above, shaping tool may be used.

Whether pipes have been sawn or not, joint faces shall be slightly scrapped with a knife, prior to welding, to remove exposed layers which may lead to unsatisfactory joint. Both the sections of pipe to be welded shall be positioned by using rollers and/or wooden supports.

Welding

Butt heat-fusion joint procedure shall require the use of jointing device (welding jack) that holds the heat element (mirror) square to the ends of pipes, can compress the heated ends together and holds the piping in proper alignment while the plastic hardens.

Temperature of joints should be 200° C. Surface temperature, of the heating mirror, must, therefore, be 210° C + 5° C. The faces of pipes to be joined shall be on either sides of the heating mirror and maximum of 0.4 kg/cm² contact pressure shall be applied. Contact pressure should not exceed this, otherwise the molten mass from the joint faces will be squeezed out prior to welding. Even with the lowest pressure a rim of molten material shall be formed on the ends of pipes being joined. Care shall be taken in the heating operation to prevent damage to the plastic material from over heating or having the material not sufficiently heated to ensure a sound joint. Direct application of heat, with a torch or other open flame is prohibited.

Approximate heating for series IV pipe may be taken as :-

32 mm OD pipe : 1 minute

| | | |
|----------------|---|-----------|
| 75 mm OD pipe | : | 3 minutes |
| 160 mm OD pipe | : | 5 minutes |

Heating time for pipes with lesser wall thickness may be according to experience and ambient temperature prevailing. Completion of heating is indicated by formation of a uniform rim of molten material at the edges of pipes.

Subsequent to heating, the pipes shall be removed from the heating mirror and shall be immediately joined by application of moderate pressure for 2-3 seconds, after which, pressure of approximately 0.6 Kg/cm² shall be applied for two minutes. After two minutes the pressure shall be increased to 1.2 kg/cm² and sustained for pipes upto 160 mm OD and 30 minutes for pipes 225 mm OD and larger.

Care shall be taken that the rim formed during welding is not too large. Pressure shall be maintained until the joint is hand-warm. After relieving pressure joint shall be allowed to cool completely before handling.

The electric heating mirror used shall be specially designed to meet the requirements of HDPE pipe welding. It should have a proper regulator to control and maintain its temperature during the welding procedure. It shall have P.T.F.E. cloth fitted on both sides to prevent adhesion of molten polyethylene on surface of the mirror.

Use of Crayons

The monochrome crayons (200^o C & 220^o C) shall be used to determine the temperature of mirror. At the correct temperature of 210^o C the colour of 200^o crayon mark shall change within 2 seconds. If the colour change takes longer time, the temperature is lower and if the colour change is immediate, the temperature is higher than necessary. As thin a layer as possible of crayon shall be used when checking. If the layer is too thick, the indications will be incorrect

5.1.4 UPVC PIPEWORK

Wherever specified for external water supply including landscape irrigation, UPVC Piping system shall be provided using specified materials and employing specially trained workmen.

UPVC PIPES

All pipes for laterals shall be un plasticised polyvinyl chloride (UPVC). UPVC pipes shall conform to IS:4985-1988 and shall be rated for 10 Kg/cm² working pressure.

Pipes shall be of uniform wall thickness, smooth finish inside and outside and shall show no evidence of interior scratches, extrusion marks, blisters, groves or any manufacturing or transit damage. Supplier shall provide test certificate of randomly selected pipes from supplied material. Sample shall be taken from site.

Pipes shall be supplied in lengths of six meters with integral socket end for solvent welding and each length shall bear following permanent marking at regular interval.

Manufacturer's Name

Standards

Size and Pressure rating

PVC Fittings

All PVC fittings shall have a minimum pressure rating of 16 kg/cm² working pressure, confirm to standards and shall be of same material as UPVC Pipes.

All fittings including the threaded ones to be of Injection Molded type. Fittings shall preferably be of same make as pipes.

Joint Cement and Primer

Solvent Cement and Primer for UPVC Pipes shall be as per Pipe manufacturer's recommendations.

5.1.5 LLDPE Tubing and fittings

Wherever specified for landscape irrigation, LLDPE tubing system shall be provided using specified materials and employing specially trained workmen.

Linear Low Density Polyethylene (LLDPE) Drip tubing shall have minimum out side diameter of 16 mm and minimum wall thickness of 1.2 mm and it shall be rated for 4 bar working pressure.

Drip lines shall have uniform wall thickness, and to be free from extrusion marks, grooves and blisters. The drip lines shall have the marking of manufacturer's name, size and pressure rating imprinted on it at regular intervals.

5.2 INSULATION OF HOT WATER PIPES

The insulation of the hot water pipework shall be done with closed cell chemically cross-linked polyethylene (XLPE) preformed pipe sleeves. The pipe shall be thoroughly cleaned and applied with proprietary glue and then the pre-slit insulation pipe section shall slipped on the pipe. The slits should be sealed properly with proprietary adhesive tapes as per the direction of the manufacturer.

All exposed hot water pipework in ducts, cavities, above false ceiling etc. should be insulated with pre laminated (with aluminum foil) pipe sleeves while those in chases shall be insulated with plain pipes sleeves.

5.3 VALVES, TAPS AND MIXERS

(1) General

Each valve body shall be marked with cast or stamped lettering giving the following informations :

- a) The manufacturer's name or trade mark

- b) The size of the valve
- c) The guaranteed working pressure

Isolating valves on the water supply lines shall be full bore ball valve type for pipe diameters upto 50 mm. For 65 mm dia and 80 mm dia., these shall be gate valve type and diameters above 80 mm, these shall be sluice valve type.

(2) Float Valve

Float valves 50 mm and smaller shall be of brass, gun metal or other equally suitable corrosion resistant alloy in accordance with IS:1703-1977 or approved equal. The float valves shall have copper or plastic floats suitably reinforced to hold the threaded insert. The float valves fixed to the system shall be secured with backnuts.

(3) Fullway Gate Valve

The valves shall be of quality approved by the Consultant/Project Manager and shall generally conform to IS:778-1971 or European standard .

(4) Full Way Ball Valve

The valves shall be of full bore type and of quality approved by the Consultant/Project Manager. The body and ball shall be of copper alloy and stem seat shall be of teflon. OR as specified in bill of quantities

(5) Non-Return Valves

Non-return valves are to be IS:778-1984 or European standard manufactured from gun-metal or dezincification resistant brass.

(6) Pressure Reducing Valve

The valve shall be suitable for water application and shall conform to relevant BIS standard. The valve should be installed in a vertical portion on horizontal line. In all cases, a stop valve should be installed in an easily accessible position on the inlet side of the pressure reducing valve. A safety valve and a pressure gauge must always be installed on the reduced pressure or outlet side of the pressure reducing valve. To avoid any dirt from entering the valve, it is advisable to fit a strainer on the inlet or high pressure line. The pressure reducing valve and accessories should conform to relevant BIS standard and of approved make.

(7) Butterfly Valves

The valve shall be of cast iron conforming to relevant IS:13095 or European standard. The valve shall be of quality approved by the consultant/Project Manager.

(8) Taps and Mixers

Bib or mixer taps shall be fixed to sinks, lavatory basins, bathtubs and showers and as shown on the drawings and/or specified under the Sanitary ware schedule.

The Contractor must ensure that the installed taps and mixers are not damaged or mishandled till the handing over of the installation.

6 SANITARY FIXTURES AND FITTINGS

6.1 WORKMANSHIP

All Sanitary ware shall be fixed in neat workmanship like manner, true to level and plumb. Manufacturer's instructions shall be followed closely regarding installation and commissioning.

6.2 SANITARYWARE

All fittings provided by the Contractor shall be of first quality, free from wraps, cracks and glazing defects. All sanitary ware, fittings and fixtures shall be fitted as shown in drawings and as described in details in Bill of Quantities.

6.3 FIXING

All sanitary wares shall be installed in accordance with manufacturers printed instructions for conditions indicated and as required to obtain a rigid installation. The location of each fixture and the fixing method of ceramic fixtures shall be as shown on the drawings or as directed by the Project Manager.

After all fittings have been mounted and are ready for use and before completion, all fittings furnished and mounted shall be thoroughly cleaned removing all plaster, stickers, rust, hair and other foreign matter or discolouration of fixtures, leaving each and every part in perfect condition and ready for use.

6.4 PROTECTION

The Contractor shall take adequate precautions to ensure that the sanitary wares are not damaged in any way before or after installation. Any piece of sanitary ware that is damaged shall be replaced at the Contractor's expense. The Contractor shall be responsible for checking sanitary ware on arrival at site. If any pieces of sanitary wares are found to be damaged on arrival at site, the Contractor shall inform the Project Manager within two days. If the sanitary wares are delivered in damaged state, the Contractor shall refuse delivery of the damaged piece and shall request a replacement of the same.

6.5 TESTING

Just prior to handing over the building to the Owner, each piece of sanitary ware shall be tested. Each water closet shall be flushed twice and checked for leaks and any other defects by the Project Manager.

Each basin, bidet, bath and sink shall be filled to the overflow level and then after running the water through the overflow for a minimum of 30 seconds, the plug shall be removed or

opened. Each of the above mentioned fixtures shall be inspected for leaks and defects by the Project Manager.

Any defects or leaks shall be repaired or in the case of the defect being chips or cracks or other visible damage, the fixture shall be replaced at the Contractor's expense. Any sanitary ware condemned by the Project Manager for any other reason shall be replaced at the Contractor's expense.

7 TESTING AND COMMISSIONING

7.1 GENERAL

The Contractor shall be responsible for testing and commissioning the entire services installation described in these specifications and will demonstrate the operation of the system of the entire Satisfaction of the Architect/Consultant and to the Owner approval.

7.2 GENERAL

The test on various services shall be carried out as described herein as described in relevant Indian Standards and British Standards and also as directed by the Project Manager. The carrying out and recording of tests shall be agreed with the Architect/Consultant

7.3 WATER FOR TESTING

Water for testing shall be obtained by the Contractor from an approved source. It shall be free from bacterial contamination silt, grit, sand etc. After testing, the Contractor shall satisfactorily dispose off all water, or it may be re used providing it is clean and is not contaminated.

7.4 TEST RECORDS

The Contractor shall be responsible for the keeping all records of tests and on completion shall provide records and reports of the tests in triplicate. All test records shall clearly identify the item of the test and must be signed by the Contractor's authorised representative and Project Manager.

7.5 UNSATISFACTORY WORKS

If the tests reveal unsatisfactory materials, installation or adjustment, the Contractor shall, at his own expense, carry out such alternations or replacements as may be necessary to rectify the defective work. The Contractor shall then repeat the tests as necessary to establish the satisfactory nature of the alterations or replacements.

7.6 TESTING AT WORKS

All plants and equipments shall be tested at manufacturer's works before despatch and the test certificate in duplicate shall be forward to Architect/Consultant. The Contractor shall similarly provide a set of manufacturer's certified test curves for any pump installed

under the Contract. All tests shall be in accordance with the appropriate Indian Standards and British Standards as applicable.

7.7 ON SITE TESTING

The Contractor shall provide on site all the necessary instruments, plant, equipment, materials, water, electricity and labour necessary for carrying out the specified tests. All tests shall be carried out as required to meet the construction programme and the Contractor shall include for all necessary isolation and other works as may be required for testing the whole or parts of the installation. The Contractor shall also be responsible for re-testing, if necessary, until satisfactory tests are achieved.

7.8 TEST PRESSURES

| Pipe Line | Test Pressure | Period | Method |
|---|---|---------------|-------------------------|
| Water Mains, Fire Mains & Water Services. | 10 kg/sq.cm. or maximum working pressure plus 50 percent which ever is greater. | 24 Hours | Hydraulic Pressure Test |
| Underground Drainage | 1.5 metres head of water at highest point | 12 Hours | Hydraulic Test |
| Foul Drainage above ground | i) Not more than 4.5 M head in any section | 2 Hours | Hydraulic Test |
| | ii) 75 mm water gauge | 3 min. | Air Test |

7.9 TESTING OF VARIOUS SERVICES

(1) Water Services

Before the pipes for water supply are painted or covered they shall be tested to a hydraulic pressure of 5 kg/sq.cm or maximum working pressure plus 50 percent whichever is greater. Pressure shall be maintained for at least 2 hours without appreciable drop in pressure. In addition to the sectional testing of water supply

pipes, the Contractor shall test the entire installation on completion of the job to the entire satisfaction of the Project Manager. The Contractor shall rectify all leakages and restore damage done to the building and furniture at his own cost.

(2) Underground Drainage

The sewer and drain lines shall be tested for water tightness and straightness as described below

i) Water Test:

Pipes and joints shall be subjected to a test pressure of at least 1.5 m head of water at the highest point of the section under test. The test shall be carried out by suitably plugging the low end of the drain and filling the system with water. A knuckle bend shall be temporarily jointed in at the top end and a sufficient length of vertical pipe jointed to it so as to provide the required head. Or top end may be plugged with a connection to a hose ending in a funnel which could be raised or lowered till the required head is obtained and fixed suitably for observation.

ii) Test for Straightness and Observation.

Sewer lines shall be tested for straightness :

- a) By inserting at the high end of the sewer or drain a smooth ball of diameter 13 mm less than the pipe bore. In the absence of obstruction, such as yam or mortar projecting through the joints, the ball should roll down the invert of the pipe and emerge at the lower end; and
- b) By means of a mirror at one end of the line and lamp at the other. If the pipe line is straight, the full circle of light can be observed. If the pipeline is not straight, this will be apparent. The mirror will also indicate obstruction in the barrel.

(3) Above Ground Foul Drainage

All soil, waste and vent pipes shall be tested by filling up the whole or part of stack with water. All openings for connections, etc. shall be suitably plugged. The total head shall however not exceed 4.5 metres.

Contractor shall remove and replace all pipes having holes, cracks etc. All leaking joints and access doors shall be replaced or remade to the entire satisfaction of the consultant. Water shall be retained in stack for a minimum period of 2 hours. After all plumbing fixtures are installed. Contractors shall apply the smoke test to the entire stack to the satisfaction of the Consultant.

(4) Sanitary Fixtures & Fittings

When the installation has been complete to the satisfaction of the Consultant, it shall be tested in the following manner :

- i) The entire system shall be slowly filled with water, allowing any trapped air to escape.

- ii) When all outlets are closed, the system shall be checked for water tightness.

Each outlet shall then be checked for rate of flow and correct operation.

- i) Waste outlets of wash basins and sinks shall be plugged and the basin and sink bowls shall be filled upto over flow level. Plug shall be removed and waste pipe and trap shall be checked for leakage and floor drain (if fixture waste is connected to floor drain) shall be checked for overflow.

(5) Testing Manholes

All open channel manholes shall be tested with water to a height of 1 metre above the channel invert or as otherwise directed. The water level shall be retained for a 2 hour period without appreciable loss. When the water is released the benching shall be inspected to ensure that there are no cracks.

7.10 FLUSHING OUT AND STERILISATION OF PIPEWORK AND TANKS

It is essential that all internal water services, external mains and tanks are thoroughly flushed out prior to being put into service and that drinking and domestic water services mains and tanks are sterilized in accordance with clause 13 of IS : 2065-1983 or European standard – Code of Practice for Water Supply in Buildings.

The Contractor shall be responsible for making any temporary pipe work connections required.

Following completion of sterilization of every part of the drinking and domestic water system, the Contractor is to ensure that satisfactory bacteriological samples are obtained and tested at an approved laboratory and the result approved by the Architect/Consultant prior to completion of the contract and handing over to the Owner.

8 LIST OF APPROVED MAKES/MANUFACTURES OF MATERIALS

NOTE : All Brand Names/Manufacturers are Indian unless specified otherwise.

| S.NO. | MATERIAL | BRANDNAME / |
|---------------------|---|---|
| MANUFACTURER | | |
| | A. Sanitary Fixtures and Faucets The Owner's Supply | |
| | B. Pipes and Fittings (ISI Marked or Approved Quality) | |
| 1. | Centrifugally Cast (Spun) Iron Soil, Waste & Vent Pipes and Fittings (Nagpur) | a) Jayaswal Neco b) Apex |
| 2. | UPVC Soil, Waste & Vent Pipes and Fittings | a) Astral b) Supreme c) Finolex. |
| 3. | CPVC Pipes and Fittings | a) Astral |
| 4. | G.I. Pipes | a) Tata b) Jindal, Hissar |
| 5. | G.I. Fittings | a) Unik Brand b) Zoloto-m |
| 6. | R.C.C. Pipes | ISI/ISO marked of approved quality a) Pragati b) Laxmi c) Jain Spun Pipe (JSP) |

| S.NO. | MATERIAL | BRANDNAME / MANUFACTURER |
|--------------|--|--|
| 7. | UPVC Underground Drainage Pipes& Fittings | a) Jain Irrigation (Orange brown in clour) b) Astral |
| 8. | HDPE Pipes and Butt Fittings | a) Jain Irrigation b) Astral c) Dura-line |
| 9. | HDPE Compression Fittings, Converters and Adapters | a) Plasson, Israel b) Palaplast, Greece c) Alprene, Italy d) MAIS, Saudi Arabia |
| C. | Insulation | |
| 1. | Closed cell chemically cross-linked polyethylene (XLPE) Insulation | a) Armacell b) Thermaflex |
| D. | Valves | |
| 1. | Ball Valves | a) R B, Italy b) Cim, Italy c) Arco, Spain d) Sant |
| 2. | Gunmetal Gate Valves, Non-return Valves, Float Valves | a) Leader b) Zoloto c) Sant |

| S.NO. | MATERIAL | BRANDNAME / MANUFACTURER |
|--------------|---|--|
| E. | Manhole Covers, Gratings etc. | |
| 1. | Steel Fibre Re-enforced Concrete Manhole Covers and Gratings | a) K.K. Manholes b) Pragati Concrete |
| 2. | C.I. Manhole Covers | a) Apex b) Neco |
| F. | Paint / Primer | a) Shalimar b) Asian c) Nerolac |
| G. | Miscellaneous Items | |
| 1. | Casted Gratings, Cleanouts, Funnel etc. | a) GMGR b) Neer c) Flowmax |
| 2. | Shower/Floor Outlets | a) Viega, Germany b) ACO |
| 3. | Industrial Gully traps made of Stainless Steel | a) ACO, Spain |
| 4. | C.P Brass Angle Valve. | a) Arco, Spain b) Scheel |
| 5. | Stainless Steel Gratings. | a) ATGT, China b) Chilly |

| S.NO. | MATERIAL | BRANDNAME / MANUFACTURER |
|--------------|--|--|
| 6. | Stainless steel braided flexible connection pipe | a) ASR |
| 7. | Quick Release Coupling | a) Rain Bird, USA b) Toro, USA |
| 8. | PVC preassembled triple swing joint | a) Jain Pipes b) Ajay Industrial Corp |
| 9. | HDPE Valve Box | a) MAIS, Saudi Arabia b) Rain Bird |
| 10. | Expansion Bolts | a) Hilti |
| 11. | G.I. Hangers for Pipes / Adjustable Hanger | a) Chilly b) Camry |
| 12. | T/Y Strainer | a) Sant b) Zoloto |
| 13. | Solenoid Valves | a) Danfoss b) Aira - Airmax |
| 14. | Water Level Controller | a) Janus (Magnetic Float Type) b) Cirrus c) Elegant Control |

| S.NO. | MATERIAL | BRANDNAME / |
|---------------------|--|--|
| MANUFACTURER | | |
| 15. | HDPE Tanks | a) Sintex b) Durawell |
| 16. | Anti-vibration Pads/Footings | a) Resistoflex |
| 17. | Vibrations Eliminators | a) Resistoflex |
| 18. | Pressure Switches | a) System Sensor b) Danfoss |
| 19. | Pressure Gauges | a) H. Guru b) Fiebig |
| 20. | Digital Water Quality Monitoring Equipment | a) Fluid Control stem, USA b) Impell |
| 21. | Water Flow Meter Turbine Type | a) Kranti b) Kent |

Note : Contractor to quote any make from recommended list only. In case of non-availability of any material . The Contractor must seek written approval from Consultant/Architect/Project Managers for use of alternate make. The cost differential from listed make to alternate make shall be reimbursed to the Client. The Contractor shall not be eligible for payment of non-approved make of material

9 PREAMBLE TO BILL OF QUANTITIES

9.1 The Bill of Quantities should be read with all the other sections of this tender. All the items of work mentioned in the Bill of Quantities covered by this contract shall be carried out as per the drawings, specifications and directions of the OWNERS/PROJECT MANAGER and shall include the cost of all labour, materials, tools and plants, Machinery / equipments, all form works, scaffoldings, pouring, vibrating, curing of concrete etc. and wastages etc. and testing of materials, if any, with CONTRACTOR's testing appliance, all octroi, duties, royalties, sales tax on works contract, toll tax, taxes and CONTRACTOR's profit and overheads etc.....

- 9.2 The TENDERERS shall be deemed to have studied the drawings, specifications and details of work to be done within the time schedule and to have acquainted himself of the conditions prevailing at site. The quoted rates shall be applicable for all works in any section / size / shape and Design etc.
- 9.3 The quantities shown against the various items are only approximate. Any increase or decrease in the quantities shall not form the basis for alteration of the rates quoted and accepted.
- 9.4 In case where the specifications given in the Description of the item of work given in Bill of Quantities are found wanting, the govt.. specifications (with up to date corrections slips) shall be followed; where not specified the latest edition of relevant Specifications shall be applicable. In case of any ambiguity in interpretations, the OWNERS decision shall be final and binding.
- 9.5 The rates quoted for items of work shall include all costs for :-
- a) Working in all conditions in all floors at all heights / depths including in / under water, liquid mud, foul conditions etc. and shall also include bailing or pumping out water from the foundations basements or any other place of construction collected from rain or any other source whatsoever at any time, till the completion of work including all suspension period and delays whatsoever.
 - b) Cutting chase / openings / holes etc. and making good in brick / R.C.C. walls and floors R.C.C. slabs etc. as necessary and restoring the cut-outs to their original finish whether explicitly mentioned in the item or not ;
 - c) disposal of surplus earth and any dismantled R.C.C. / Cement concrete rubbish or debris etc. outside the site premises;
 - d) all form work for any size, section, thickness, and for all heights and all depths, curing of cement concrete / R.C.C. work and all works wherein cement is consumed.
 - e) Supplying, storing and safe handling of all fixtures and fittings.
 - f) Providing all necessary approved fittings and accessories. Accessories to be supplied to match the fixtures.
 - g) Effecting proper inlet, outlet, joints and slopes as required.
 - h) Testing, cleaning, of all sewer, soil , waste, vent, storm water drainage & water supply lines and dis-infection of water supply system etc. as called for in the specifications.
 - i) All lead caulk jointing for HCI pipe work including cost of the lead, cutting of pipe and clamps etc. complete in all respects.
 - j) Any item of work where steel reinforcement is used, shall be inclusive of cost of

necessary supply & laying of steel reinforcement, shutterings & cement concrete of specified grades.

- k) All necessary C.P. Brass / Galvanised M.S. screws / P.V.C., expandable dash fasteners etc. including drilling holes in walls / R.C.C. / Masonry / Wood Work etc. for installation & fixing purposes, as required.

9.6 All the items of work shall be carried out as per description given in the Bill of Quantities and as shown in the drawings. All materials to be got approved from the OWNERS.

9.7 The OWNER reserves the right to with draw from the scope of work and/or to order to any other agency for any item or group of work, or to split the work between two or more SUB-CONTRACTOR's if necessary. Such a step shall not constitute a breach of the contract.

9.8 For all items of work the rates shall be comprehensive and all inclusive. The rates shall include for all materials and things necessary for satisfactory completion and maintenance of the work in proper working order and to the satisfaction of the Owner/Consultant, including testing, making samples etc., and all that have been indicated in the Specifications or other Tender Documents either directly or indirectly and cover for all obligations of the Contractor under the Contract. No claim for additional payment shall be allowed for any error or misunderstanding by the Contractor of the work involved.

9.9 Unless otherwise mentioned in the description of the item, this Bill of Quantities shall be applicable for work at any height/depth, position or condition, at all floors, in all shapes, sizes etc.

9.10 Unless otherwise stated, method of 'measurement' as described in the latest 'Specifications' of govt. shall be followed. In case of any dispute in this regard, the Owner/Consultant's decision shall be final, binding and conclusive.

9.11 The following notations have been used throughout the Bill of Quantities and Rates :

| | |
|-------|----------------|
| m/M | Running Metre |
| Sqm | Square Metre |
| Cum | Cubic Metre |
| mm/MM | Millimetre |
| No. | Number/Numbers |
| Dia. | Diameter |
| Kg. | Kilogram/s |
| T. | Tonne |

1. Manholes, masonry chambers for Valves,
CHAMBER
Hydrants and other Appurtenances.

MANHOLES AND OTHER

SHALL BE MEASURED IN
NUMBER. THE RATES SHALL
INCLUDE -

- a) excavation in any kind of soil including quick sand but excluding rock which requires blasting :
- b) protecting the excavation with all necessary shoring, strutting and keeping the excavation clear of water;
- c) providing and laying foundation concrete as shown on drawing and as specified;
- d) providing and constructing brick masonry walls in cement mortar as shown on drawing and as specified. The openings

required to be left open for pipes and subsequent grouting shall also be included in the rates;

- e) providing and casting R.C.C cover as shown in drawing and as specified;
- f) providing, fitting and fixing C.I. surface box, manhole cover as shown in drawing and as specified and or directed at site by Owner's Representative, and;
- g) providing cement plastering to the walls of chamber, internally as well as externally.

The depth of the manhole shall be reckoned from the top level of C.I. cover to the invert level of channel. The extra depth shall be measured and paid as extra over the specified depth.

2. Pipe work

R.C.C. , STONEWARE AND CAST IRON PIPEWORK FOR UNDERGROUND DRAINAGE

- a) Pipework is to be measured in running meter nearest to a cm as laid or fixed from inside of one manhole to inside of the other manhole. The length shall be taken along the center line of the pipes over all fittings such as bends, junctions, etc. which shall not be measured separately.

SOIL, WASTE AND VENTILATION PIPEWORK

a) Pipework is to be measured in running meters nearest to a cm as fixed or laid. The length shall be taken along the center line of the pipes over all the fittings, such as bends, tees, junctions, all with or without doors, door pieces, cowls, etc. which shall not be measured separately.

b) The rate shall include the cost of materials and labour involved in supplying, fixing with holder bats & MS stays, laying underground, cutting holes, chases in walls, floors and painting with two or more coats of paint of approved quality and shade.

c) Floor Traps

Floor traps shall be measured by number. The rate shall be inclusive of supplying of trap and grating, setting, in concrete and connecting branch pipes to it.

G. I. PIPES FOR WATER SUPPLY (EXTERNAL)

a) Pipe work is to be measured in running meters nearest to a cm for the finished work, which shall include G.I. fittings such as bends, tees, elbows, reducers, crosses, plugs, sockets, nipples

and nuts but shall exclude brass or ornamental taps, valves, etc.

- b) The rate shall be inclusive of the cost of materials and labour, excavation and earth work and painting pipes with two coats of anti-corrosive bitumanistic paint and surrounding with Yamuna sand 150 mm all around

G. I. PIPES FOR WATER SUPPLY (INTERNAL).

- a) As above.
- b) The rate shall be inclusive of cost of materials and labour, cutting holes and chasing in walls and floors and making good the same, providing sleeves, applying anti-corrosive bitumanistic paint and 0.2mm thick PVC on buried and concealed pipe work and painting of exposed pipes.
- c) The rate shall be inclusive of providing 'Identification and Labeling' of pipes with the colour coded bands.
- d) Insulation of hot water pipes shall be paid separately.

3.

Valves, cocks and other Appurtenances

Appurtenances like valves, water meter etc. shall be measured in number. Rates shall include -

- a) testing and checking of appurtenances and fittings

before taking delivery of the same.

- b) delivering the appurtenances to the specified storage area at site;
- c) lowering the same into specified support (including providing the support) jointing, fitting and fixing true to line and level including repairing of protective coating, if necessary; and
- d) providing all equipment labour and materials necessary to carry out the above works complete in all respect as specified and/or instructed.
- e) Insulation of valves shall be paid separately.

4. Sanitary Fixtures & Faucets

All sanitary fixtures and faucets of specified trade mark or equivalent shall be paid by number. The rate shall include fixing components, brackets, screws and any other specials required, cutting holes in walls and making good the same.

The rate shall also be inclusive of painting R.S. or M.S. brackets for cisterns, wash basin, sinks etc. with one coat of red oxide and two coats of epoxy paint of approved shade and quality.

PROPOSED RENOVATION OF CLARKS - LUCKNOW

| | | | |
|---|---|---------------|--|
| | | | |
| | | | |
| SUBHEAD : SANITARY PLUMBING INSTALLATION | | | |
| | | | |
| SUMMARY | | | |
| | | | |
| | | | |
| S.NO. | DESCRIPTION | AMOUNT | |
| | | | |
| | | | |
| 1 | SANITARY FIXTURES, FAUCETS & TOILET REQUISITES (FIXING RATE ONLY) | Rs. | |
| | | | |
| | | | |
| 2 | SOIL, WASTE & VENT AND FITTINGS (ABOVE GROUND DRAINAGE) | Rs. | |
| | | | |
| | | | |
| 3 | WATER SUPPLY | Rs. | |
| | | | |
| | TOTAL | Rs. | |
| | | | |
| | | | |
| In Words : Rupees . | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| Date | Signature and Seal of Tenderer | | |
| | | | |

| SUBHEAD : SANITARY PLUMBING INSTALLATION | | | | | |
|--|--|-----|------|------|--------|
| BILL OF QUANTITIES | | | | | |
| S.NO. | DESCRIPTION | QTY | UNIT | RATE | AMOUNT |
| 1.0 | SANITARY FIXTURES, FAUCETS & TOILET REQUISITES (FIXING RATE ONLY) | | | | |
| | NOTE : | | | | |
| | FOR ITEMS UNDER THIS HEAD, THE FIXTURES, FAUCETES, FLUSHING UNITS ETC. SHALL BE PROVIDED BY THE OWNER AT SITE ON HIS OWN COST | | | | |
| | THE OWNER SHALL SUPPLY THE FOLLOWING : | | | | |
| | a) SANITARYWARES INCLUDING PROPRIETARY BRACKETS, SUPPORTS, CHAIRS, FASTNERS, EXPANSION BOLTS, PAN CONNECTORS, WASTE COUPLINGS, BOTTLE TRAPS, COPPER / FLEXIBLE CONNECTING PIPES ETC. | | | | |
| | b) SINKS, | | | | |
| | c) FAUCETS & FIXTURES | | | | |
| | d) TOILET REQUISITES | | | | |
| | e) AUTOMATIC FLUSHING MECHANISM | | | | |
| | THE TENDERER MUST INCLUDE FOR IN HIS RATES THE FOLLOWING : | | | | |
| | a) RECEIVING, STORING, UNPACKING ETC. | | | | |
| | b) INSTALLATION, TESTING & COMMISSIONING | | | | |
| | c) ANY CONSUMABLE LIKE CEMENT MORTAR, YARN, TEFLON TAPE, RAWL PLUGS, WOODEN CLEATS, SCREWS etc. | | | | |
| 1.1 | Fixing vitreous wall hung china water closet without cistern complete with seat and cover, including making connection with soil pipe, cutting and making good the walls and floors wherever required. | 14 | Nos. | | |
| 1.2 | Fixing wall concealed W.C cistern, making inlet and outlet connections with water supply and W.C. pan respectively, cutting and making good the walls wherever required. | 14 | Nos. | | |
| 1.3 | Fixing vitreous china wash basin complete with waste outlet including making connection with water supply pipe and waste pipe, cutting and making good the walls and floors wherever required. | | | | |
| | a) Under Counter / Counter Top Fitting | 19 | Nos. | | |
| 1.4 | Fixing of Kitchen sink with or without drainboard complete with waste outlet including making connection with waste pipe, cutting and making good the walls wherever required. | | | | |
| | Material : Stainless Steel | 1 | Nos. | | |

PROPOSED RENOVATION OF CLARKS- LUCKNOW

| S.NO. | DESCRIPTION | QTY | UNIT | RATE | AMOUNT |
|-------|--|-----|------|------------|--------|
| 1.5 | Fixing of counter/ basin mounted single lever mixer set. | 19 | Nos. | | |
| 1.6 | Fixing of Slab/ wall-mounted Kitchen sink mixer with swivel spout and wall flange. | 1 | Nos. | | |
| 1.7 | Fixing of 4-way concealed diverter mixer thermostatic fitting including making connections with water supply, cutting and making good the walls wherever required. | 0 | Nos. | | |
| 1.8 | Fixing of wall mounted bath cum shower mixer fitting with diverter lever and bend for overhead shower connection including making connections with water supply, cutting and making good the walls wherever required. | 0 | Nos. | | |
| 1.9 | Fixing overhead shower rose/ rain shower/ hand shower complete with arm/ flexible cord and wall flange. | 0 | Nos. | | |
| 1.9a | Fixing bath spout with wall flange | 0 | Nos. | | |
| 1.9b | Supply and Fixing of angle valve with stainer including flexible connection pipe with wall flange. Make : Bugati or Arco | 52 | Nos. | | |
| 1.9c | Fixing health faucet complete with flexible tube and wall hook. | 14 | Nos. | | |
| 1.9d | Fixing of Grab Bar with all consumeables. | 0 | Nos. | | |
| 1.9e | Fixing of Hide - a Line with all consumeables. | 40 | Nos. | | |
| 1.9f | Fixing of corner soap disch with all consumeables | 5 | Nos. | | |
| 1.9g | Fixing of paper holder with all consumeables | 28 | Nos. | | |
| 1.9h | Fixing of Robe Hooks | 5 | Nos. | | |
| 1.9i | Fixing of Towel rack with all necessary consumeables. | 0 | Nos. | | |
| 1.9j | Fixing of Towel rail with all necessary consumeables. | 0 | Nos. | | |
| | TOTAL for "Sanitary Fixtures, Faucets, & Toilet Requisites" carried over to SUMMARY | | | Rs. | |

| S.NO. | DESCRIPTION | QTY | UNIT | RATE | AMOUNT |
|-------|--|-----|-------|------|--------|
| 2.0 | SOIL, WASTE & VENT AND FITTINGS (ABOVE GROUND DRAINAGE) | | | | |
| | | | | | |
| 2.1 | Providing, jointing and fixing UPVC Soil, Waste and Vent System | | | | |
| | The work shall be done as per technical specifications and in general shall include: | | | | |
| | Material: UPVC pipes and fittings (moulded as well as fabricated) conforming to IS : 13592 - Type B | | | | |
| | Fittings shall include all standard moulded as well as fabricated fittings like bends, tees, Y-tees, crosses, boss connections, access pieces, saddle pieces, cleanouts, adaptors for connections to other materials, plugs, reducers, cowls, offsets and other specials | | | | |
| | Jointing: Pushfit rubber ring jointing technique in general. Solvent cement joints may be provided for fittings and specials which are not manufactured with pushfit rubber joints | | | | |
| | Installation, Testing and Commissioning: The installation shall be complete in all respects including cutting chases / holes in walls, slabs, excavation, refilling and disposal of surplus earth where required and making good, etc | | | | |
| | M.S Supports: All vertical and suspended horizontal pipework shall be fixed on MS brackets and hangers with U-clamps made from 10 mm dia galvanised steel rod complete with nuts and washers. Cost for MS structural work for supports shall be included in the rates | | | | |
| | Concrete Encasing (In case of Sunken Floor/ buried pipes): The pipes and fittings shall be encased with 75 mm thick cement concrete (1:2:4) all around | | | | |
| | Making Good the Structure Crossings: For all horizontal and vertical crossings of building structure (slabs, walls, beams, column etc), the space between pipe and the structure shall be made good and water tight with concrete. The annular space between the pipe and the sleeves shall be sealed (upto a minimum depth 25 mm) with fire resistant acrylic based sealant of approved make and quality. | | | | |
| | | | | | |
| | a) 32 mm OD | 50 | Mtrs. | | |
| | b) 40 mm OD | 45 | Mtrs. | | |
| | c) 50 mm OD | 110 | Mtrs. | | |
| | c) 80 mm OD | 65 | Mtrs. | | |
| | d) 110 mm OD | 260 | Mtrs. | | |
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PROPOSED RENOVATION OF CLARKS- LUCKNOW

| S.NO. | DESCRIPTION | QTY | UNIT | RATE | AMOUNT |
|-------|--|-----|-------|------|--------|
| 2.2 | Providing, jointing and fixing Centrifugally Cast (Spun) Iron Soil, Waste and Vent System (Suspended Pipework in in common areas) | | | | |
| | The work shall be done as per technical specifications and in general shall include: | | | | |
| | Material: Centrifugally Cast (Spun) Iron Pipes and Fittings conforming to IS:3989-1984 | | | | |
| | Fittings shall include all standard specials, i.e. bends, tees, crosses, access pieces, adaptors for connections to other materials, cleanouts, plugs, reducers, cowls, offsets, etc including black enamel paint. | | | | |
| | Jointing: Epoxy based sealant-`Dripseal`, | | | | |
| | Installation, Testing and Commissioning: The installation shall be complete in all respects including cutting chases / holes in walls, slabs, excavation, refilling and disposal of surplus earth where required and making good, etc | | | | |
| | M.S Supports: All vertical and suspended horizontal pipework shall be fixed on MS brackets and hangers with U-clamps made from 10 mm dia galvanised steel rod complete with nuts and washers. Cost for MS structural work for supports shall be included in the rates | | | | |
| | Concretre Encasing (In case of Sunken Floor/ burried pipes): The pipes and fittings shall be encased with 75 mm thick cement concrete (1:2:4) all around | | | | |
| | | | | | |
| | Making Good the Structure Crossings: For all horizontal and vertical crossings of building structure (slabs, walls, beams, column etc), the space between pipe and the structure shall be made good and water tight with concrete. The annular space between the pipe and the sleeves shall be sealed (upto a minimum depth 25 mm) with fire resistant acrylic based sealent of approved make and quality. | | | | |
| | a) 75 mm dia | 0 | Mtrs. | | |
| | b) 100 mm dia | 0 | Mtrs. | | |
| | | | | | |
| 2.3 | Providing and fixing of floor traps formed of PVC 'P' traps, setting in concrete surround when installed in earth or sunken floor and steel suspender when installed under slung all complete including cost of cutting and making good the walls and floors wherever required. (Floor trap grating will be paid seperately as per relevant item). | | | | |
| | a) 100 mm inlet and 110 mm outlet | 11 | Nos. | | |
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PROPOSED RENOVATION OF CLARKS- LUCKNOW

| S.NO. | DESCRIPTION | QTY | UNIT | RATE | AMOUNT |
|-------|--|-----|------|------|--------|
| 2.4 | Providing and fixing PVC floor trap EXTENTION PIECE formed out of 110 mm pipe with multiple side inlets formed with saddle pieces, suitable for 32, 40, 50 and 63 mm dia side connections as per standard detail. | 11 | Nos. | | |
| 2.5 | Providing and fixing floor trap Extension Piece made out of 100 mm dia M.S pipe (medium grade) of required length (upto 450 mm) with 32 mm to 50 mm dia threaded maleable iron sockets (maximum 4 nos.) welded as side inlets, neatly finished, inside and outside epoxy painted, including the cost of jointing with floor trap with dripseal joint. | 0 | Nos. | | |
| 2.6 | Providing and fixing of UPVC Nahani Traps , setting in 1:2:4 mix cement concrete block or clamping to the wall or suspending with the ceiling including cutting and making good the walls and floors wherever required. | | | | |
| | a) 75-110 mm OD inlet and 63-80mm OD outlet | 14 | Nos. | | |
| 2.7 | Providing and fixing floor drain points formed out of 100 X 50 mm dia reducing elbow with suitable extension piece including cost of cutting and making good the walls and floors wherever required. (Floor drain grating will be paid seperately as per relevant item). | 0 | Nos. | | |
| 2.8 | Providing and fixing screwed down type nickel bronze alloy cast floor cleanout with opening arrangements for soil / waste pipe and other necessary fittings inlcuding jointing, all complete as per standard detail. | | | | |
| | a) for 110 mm dia pipe | 8 | Nos. | | |
| 2.9 | Providing and fixing 120 mm dia round stainless steel rotate lock type grating with frame and ABS Plastic cockroach trap , embedded in floor, all complete of following make or equal approved Make : ATGT, China Model: DD 3128 | 14 | Nos. | | |
| | TOTAL FOR "Soil, Waste & Vent Pipework" carried over to SUMMARY | | | Rs. | |
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PROPOSED RENOVATION OF CLARKS- LUCKNOW

| S.NO. | DESCRIPTION | QTY | UNIT | RATE | AMOUNT |
|-------|--|-----|-------|------|--------|
| 3.0 | WATER SUPPLY | | | | |
| 3.1 | Providing, jointing and fixing CPVC Cold and Hot Water Supply System. | | | | |
| | The work shall be done as per technical specifications and in general shall include: | | | | |
| | Material: Upto 2 inch dia — CPVC pipes and fittings conforming to IS: 15778:2007 of SDR 11 Grade. Basic Raw Material of Pipe work - FlowGuard of Lubrizol Inc. USA. | | | | |
| | Fittings shall include all standard moulded fittings elbows, tees, couplers, reducers, unions, plugs, adaptors with brass threaded insertions and specials. | | | | |
| | Jointing: Solvent cement jointing. The Solvent Cement shall be of make and grade as specified by the manufacturer of CPVC piping system | | | | |
| | Installation, Testing and Commissioning: The installation shall be complete in all respects including cutting chases / holes in walls, slabs and making good, etc The entire CPVC piping system shall be installed, tested and commissioned following the recommendation of the manufacturer including provision of expansion loops | | | | |
| | M.S Supports: All pipework in shafts, ceiling voids and terrace shall be fixed on MS brackets and hangers with U-clamps made from 10 mm dia galvanised steel rod complete with nuts and washers. Cost for MS structural work for supports shall be included in the rates | | | | |
| | Making Good the Structure Crossings: For all horizontal and vertical crossings of building structure (slabs, walls, beams, column etc), the space between pipe and the structure shall be made good and water tight with concrete. The annular space between the pipe and the sleeves shall be sealed (upto a minimum depth 25 mm) with fire resistant acrylic based sealant of approved make and quality. | | | | |
| | Exposed un insulated pipe should be painted as per approved shade. | | | | |
| | a) 1/2" N.D. | 192 | Mtrs. | | |
| | b) 3/4" N.D. | 60 | Mtrs. | | |
| | c) 1" N.D. | 70 | Mtrs. | | |
| | d) 1 1/4" N.D. | 25 | Mtrs. | | |
| | e) 1 1/2" N.D. | 0 | Mtrs. | | |
| | f) 2" N.D. | 0 | Mtrs. | | |

PROPOSED RENOVATION OF CLARKS- LUCKNOW

| S.NO. | DESCRIPTION | QTY | UNIT | RATE | AMOUNT |
|-------|--|-----|-------|------|--------|
| 3.2 | Providing and fixing insulation to hot water piping with closed cell chemically cross-linked polyethylene (XLPE) preformed pipe sleeves of specified wall thickness using propriety adhesive and self adhesive tapes, all as per the manufacturer's specifications. | | | | |
| | a) 15 mm dia - 9 mm thickness | 130 | Mtrs. | | |
| | b) 20 mm dia - 9 mm thickness | 40 | Mtrs. | | |
| | c) 25 mm dia - 13 mm thickness | 45 | Mtrs. | | |
| | d) 32 mm dia - 13 mm thickness | 16 | Mtrs. | | |
| | e) 40 mm dia - 13 mm thickness | 0 | Mtrs. | | |
| | f) 50 mm dia - 20 mm thickness | 0 | Mtrs. | | |
| 3.5 | Extra for providing and wrapping with 5 mile glass cloth on hot water lines insulation and applying of coat of hardner paint of approved shade, all complete in a workmanship like manner | | | | |
| | a) 15 mm dia pipe plus insulation | 130 | Mtrs. | | |
| | b) 20 mm dia pipe plus insulation | 40 | Mtrs. | | |
| | c) 25 mm dia pipe plus insulation | 45 | Mtrs. | | |
| | d) 32 mm dia pipe plus insulation | 16 | Mtrs. | | |
| | e) 40 mm dia pipe plus insulation | 0 | Mtrs. | | |
| | f) 50 mm dia pipe plus insulation | 0 | Mtrs. | | |
| 3.6 | Providing, fixing, testing and commissioningof Full Bore Ball Valves of approved makes. | | | | |
| | MOC: | | | | |
| | Body : Nickel plated brass | | | | |
| | Ball : Chrome plated brass | | | | |
| | Washers : PTFE | | | | |
| | Operating Handle : Aluminium Painted | | | | |
| | Pressure Rating : Minimum 20 Bar | | | | |
| | Temperature Withstanding : 90 ⁰ C Min. | | | | |
| | a) 15 mm dia | 21 | Nos. | | |
| | b) 20 mm dia | 10 | Nos. | | |
| | c) 25 mm dia | 4 | Nos. | | |
| | d) 32 mm dia | 6 | Nos. | | |
| | e) 40 mm dia | 0 | Nos. | | |
| | f) 50 mm dia | 0 | Nos. | | |
| 3.7 | Insulating isolating valve with 25mm thick nitrile rubber sheet. Insulation shall be covered 500 g polythene sheet and 24 gauge aluminium sheet cladding tested to 15 kg/sqcm pressure | | | | |
| | a) 15 mm dia | 14 | Nos. | | |
| | b) 20 mm dia | 6 | Nos. | | |
| | c) 25 mm dia | 2 | Nos. | | |
| | d) 32 mm dia | 4 | Nos. | | |
| | e) 40 mm dia | 0 | Nos. | | |
| | f) 50 mm dia | 0 | Nos. | | |

PROPOSED RENOVATION OF CLARKS- LUCKNOW

| S.NO. | DESCRIPTION | QTY | UNIT | RATE | AMOUNT |
|-------|--|-----|------|------------|--------|
| 3.8 | Providing, fixing and testing forged brass 25 mm dia screwed inlet single acting air release valve with 25 mm dia ball valve on inlet side and pressure gauge with isolating cock. | 2 | Nos. | | |
| | | | | | |
| 3.9 | Making connection of water supply line with existing pipe line including breaking into and making and making good etc., complete. | | | | |
| | | | | | |
| | a) up to 32 mm dia | 6 | Nos. | | |
| | b) up to 63 mm dia mm dia | 0 | Nos. | | |
| | | | | | |
| 3.9a | Making connection of drain or sewer line with existing pipe line including breaking into and making and making good etc., complete. | | | | |
| | a) Pipe size not more than 100 mm dia | 4 | Nos. | | |
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| | | | | | |
| | TOTAL of "Water Supply " carried over to SUMMARY | | | Rs. | |
| | | | | | |