PROPOSED TURNKEY INTERIOR WORK

AT KSSFCL DIVISION OFFICE BUILDING BELAGAVI AT #1119/B, AUTONAGAR INDUSTRIAL AREA KANABARGI, BELAGAVI

TENDER DOCUMENT

PART: 1 - TECHNICAL BID

TENDER DOCUMENT

INDEX

KARNATAKA STATE SOUHARDA FEDERAL CO – OPERATIVE LTD

NirmanBhavan, Dr.Rajkumar Road, 1st Block, Rajajinagar, Bengaluru 560010

INFORMATION TO BIDDER

NAME OF THE WORK**: PROPOSED TURNKEY INTERIOR WORK AT KSSFCL DIVISION OFFICE BUILDING AT 1119/B,AUTO NAGAR INDUSTRIAL AREA KANABARGI, BELAGAVI**

DATE OF NOTIFICATION	: 01 / 01 / 2022
LAST DATE OF ISSUE OF BLANK TENDER DOCUMENT	:09/01 / 2022 UP TO 4.00 PM
PLACE / DATE OF PREBID MEETING	:06/12/2022 @11:00 AM KSSFCL HEAD OFFICE BENGALURU
LAST DATE FOR SUBMISSION OF THE COMPLETED TENDER DOCUMENT	: 10 / 01 / 2022 up to 4.00 PM
DATE OF OPENING OF TECHNICAL BID	: ELIGIBLE CANDIDATES/FIRMS IN TECHNICAL BID WILL BE INFORMED LATER BY KSSFCL
OFFICER INVITING TENDERS	THE MANAGING DIRECTOR KSSFCL LTD
PLACE OF ISSUE OF BLANKS TENDER	KSSFCL WEBSITE
TENDER FEE	Rs 2000/- (TWO THOUSAND ONLY) BY CASH/ONLINE PAYMENT/DD IN FAVOUR OF KSSFCL
EMD FEE	Rs 2.00 LAKS BY ONLINE PAYMENT/DD IN FAVOUR OF KSSFCL

For CONTRACTOR
AUTHORISED SIGNATORY

FOR KSSFCL
AUTHORISED SIGNATORY

NOTICE INVITING TENDER

Ref :
Date :

To

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

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_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Dear Sir,

SUBJECT: NOTICE INVITING TENDER FOR TURNKEY INTERIOR WORK (Furniture's & Fixtures)

1. You are invited to Tender for the **Turnkey Interior Work (Furniture's & Fixtures)including, AC, Electrical, Networking & Voice, CCTV & PA System, Fire Detectors.**

2. **Period of completion :**
   The work shall be completed in all respects within 60+10 =70 days inclusive of mobilization of material and including snag list completion, from the date of issue of letter of indent(LOI) in a manner by the schedule laid down in the document.

3. **Obtaining Tender Document :**
   The Tender Document consists of Drawings, Specifications & BOQ along with a soft copy available at the office of KSSFCL.

4. **Scope of Work:** The scope of work under this Tender is briefly as Turnkey Interior(Furniture's & Fixtures)Work including, AC, Electrical, Networking & Voice, CCTV & PA System, Fire Detectors **AT KSSFCL DIVISION OFFICE BUILDING AT 1119/B, AUTO NAGAR INDUSTRIAL AREA KANABARGI, BELAGAVI**

5. **The Tender for Submission shall contain the following Documents:**

   a. Letter of Tender.
   b. Proposed Site Organisation with Qualification & Experience of key persons to be deployed for the execution of the work.
   c. Proposed deployment of Tools & equipment & site logistics.
   d. Project schedule & method statement.
   e. List of nominated sub-contractors.
   f. Priced schedule of quantity (both hard & soft copy).
   g. Drawings.

6. The Tenderer shall quote rates in words & figures in hard copy. The amount of each item should be worked out and stated against the item. The same is to be entered in figures in the soft copy.

7. The Tender Document should be signed on each page by the tenderer or his duly authorized representative. The Tender Document should be accompanied by a certified true copy of absolute power of attorney in favour of the signatory to the documents.

8. Any discrepancies, omissions, ambiguities or conflicts or any doubts as to their meaning in the Tender Documents should be brought to the attention of the consultant within 2 days of the issue of Tender. Where information's out is not indicated or specified, the consultant will issue a clarification letter which will become part of the tender. The consultant will not make any oral instructions.

9. **Pre - Bid Meeting :**
   Pre – Bid Meeting will be held with all the Bidders at KSSFCL head office Bangalore. The contracts, consultants along the client will coordinate with the Bidders for the above-said meetings. 06/01/2022 Time:11AM

10. **Tender Receipt :**
    The completed Tender Document in all respects in the form of a Hard copy and a soft copy shall be received at the office of KSSFCL Offices.

11. The Tender received after the said Date and time, whether sent by post or delivered in person will not be accepted.

12. **Validity :**
    The Tender shall be valid for **60 days (sixty days)** from the last day of the opening of Tender which includes the opening date of revised quotes.

Yours Faithfully

For KSSFCL

KARNATAKA STATE SOUHARDA FEDERAL CO – OPERATIVE LTD

NirmanBhavan, Dr.Rajkumar Road, 1st Block, Rajajinagar 560010

TECHNICAL BID

NOTE: SR No: 1, 5, 6 are compulsory requirements from Bidder.

SR. No.	REQUIREMENT	DOCUMENT TO BE SUBMITTED
1.	Should have valid Registered certificate issued by Govt Body	a. GSTIN No b. PAN No c. TDS No
2.	Should have successfully completed or executed at least one Turnkey Interior costing not less than 50.00 Lakhs in the last 5 (Five) financial years to till date.	a. Work Order / PO b. Completion Certificate issued by the client
3.	The annual Turnover of the company / Firm should be a minimum of 50/- Lakhs in the last 5 years.	Attach required evidence of certified balance sheet/profit loss account.
4.	Should submit the list of technical staff and establishment working with the firm/contractor and the proposed pattern of staff on this work.	Declaration of the bidder with details regarding their names, qualification, experience etc.
5.	Income tax clearance Certificate for the Financial year (The assessment year 2019-20, 2020-21)	Income tax clearance Certificate
6.	Sales Tax (GST) clearance certificate for the finical year (Assessment year 2019-20, 2020-21)	Sales Tax clearance certificate.

LETTER OF TENDER

To,

_____
_____
_____

SUBJECT: TENDER FOR TURNKEY INTERIOR WORK AT KSSFCL DIVISION OFFICE BUILDING AT 1119/B, AUTONAGAR INDUSTRIAL AREA KANABARGI,

Sir,

We have gone through the complete tender document for the above work including, conditions of contract, technical specifications, schedule of quantities and drawings. We have visited the site and familiarized with the site conditions.

KSSFCL has rendered all clarifications on the complete tender document. The decisions/ clarifications rendered to us vide letter no. _____ dated _____ have been duly received by us and form part of the tender as page no. _____ to _____. We confirm that no doubts/ ambiguities/ shortfalls now exist in the tender documents.

We the undersigned, offer to execute, complete and maintain the whole of the works as described therein and in conformity with the said tender documents, including addendum no. _____, for the sum of Rs. _____ (Rupees _____ only) in accordance with the contract.

We undertake, if our tender is accepted, to commence the work within specified mobilization period and to complete and deliver the works in accordance with the contract conditions specified in the tender document.

We agree to abide by this tender for a period of 45 (Forty Five) days from the latest date fixed for tender opening/revised tender quote opening and it shall remain binding upon us and may be accepted at any time before the expiry of that period.

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

Date

(Signature of Tenderer)
NAME:
DESIGNATION:

(Signature of witness)
NAME:
ADDRESS:

AGREEMENT FORM

Ref.No**:**…… Date**:**…….

An agreement made on …… between……, herein after called the Contractor, which expression shall where the contest so admits or implies be deemed to include his executrices, administrator, legal heirs on one part and Managing Director, KSSFCL Ltd and his authorized officer on the other part of the work specified in the underwritten Memorandum within in the time specified in such Memorandum amounting RS……...(Rupees in words) as per the rates by the contractor in Financial Bid.

MEMORANDUM

1. Name of work :Turnkey Interior Work (Furniture's & Fixtures) including , AC, Electrical, Networking & Voice, CCTV & PA System, Fire Detectors.

2.
   a) Estimate amount : **Rs. 2.0Cr**

   b) Amount put to tender : RS……...

   c) Approved amount : RS……

3. Earnest money deposit (1%) : **Rs. 2, 00, 000. 00/-**
   (Rupees Two Lakh only)

4. Security deposit : 5% Retention money shall be retained from every R.A. bill shall be reimbursed on virtual completion of project against Bank Guarantee of 5% (retention money value)on covering defects liability period.

5. Time allowed to complete the work from the date of issue of letter of Award including monsoon period of rainy season : **70 days (Seventy Days)**

6. Running Bills : The Running Bills will be Certified for the work completed and material in stock @ site for Rs. 30.00 Lakhs minimum for payments after deduction of TDS & Retention money of 5% from

each RA Bills.

7. The following document shall be deemed to form and be read construed as part of this Agreements, viz..:

a) Letter of Acceptance.
b) Contractor Bid.
c) General Conditions of Contract.
d) Specification
e) Drawings
f) Bill of Quantities
g) Pre-bid meeting minutes
h) Any other documents, Addendum, Corrigendum issued to the bid

I, hereby agree to abide fulfil all the terms and provision of the Conditions of contract annexed here to so far as applicable in default thereof to forfeit and pay to KSSFCL the sum of money mentioned in the conditions.

Name & Address of the Contractor

Signature of the Contractor
(Authorized Signatory duly authorized by a written Power of Attorney)

Name & Address of the witness

Signature of the witness

SIGNED BEFORE ME THE ABOVE AGREEMENT IS HEREBY ACCEPTED BY ME ON BEHALF OF M/s KSSFCL.

Managing Director.
Karnataka State Soharda Federal Co – Operative Ltd
NiramanBhavan, Dr.Rajkumar, Road,
1st Block, Rajajinagar,
Bengaluru 560010.

ELIGIBILITY CRITERIA

1. GENERAL

The Special Conditions of Contract are an extension of and are to be read in conjunction with the General Conditions of Contract. Should there be any contradictory requirements in the two, the requirement as per the Special Conditions of Contract shall prevail.

2. OWNER, ENGINEER-IN-CHARGE AND CONSULTANTS

The Owner, Engineer-in-charge and Consultants for the subject work are:
Owner shall mean M/s.Managing Director KSSFCL. NiramanBhavan, Dr.Rajkumar, Road, 1st Block, Rajajinagar, Bengaluru 560010. The term "owner" includes successors and assignees.

Engineer-in-charge (E-in-C) shall mean engineer duly appointed by the owner to act for and on his behalf for the operation of the contract.

3. SITE

The site is situated @ KSSFCL DIVISION OFFICE BUILDING AT 1119/B, AUTO NAGAR INDUSTRIAL AREA KANABARGI**,** BELAGAVI**.** The site is already in possession of the owner and will be made available to the contractor immediately on the award of the contract for execution of works.

4. SCOPE OF WORK

The scope of work under this contract will broadly include:
Turnkey Interior Work (Furniture's & Fixtures) including, AC, Electrical, Networking & Voice, CCTV &PA system, Smoke Detectors.

5. MOBILISATION

Mobilization period shall be 7 days from the date of issue of LOI said as complete after the following are mobilized:

6. TIME FOR VIRTUAL COMPLETION OF WORKS

The period and time limit for virtual completion of the works shall be**100 Days(90+5 days for mobilisation + 5 days for completing snag list before handing over the site)** from the date of commencement of work. In case the contractor fails to meet the above-stipulated completion period, the contractor shall be levied liquidated damages as specified in the general conditions of the contract.

7. QUALITY ASSURANCE

The contractor shall establish an effective quality control system and implement the same through a special cell consisting of qualified experienced engineers and technical personnel to enforce quality control on all items of work at all stages. The details of same shall be furnished as called for.

8. SAMPLES OF MATERIALS

The contractors shall procure at his cost & provide samples wherever necessary for the approval of owner/consultants and shall provide alternate samples until the approval has

been obtained. Samples approved shall be kept at the site under the custody of the EIC until completion of the project.

9. SAMPLES OF WORKMANSHIP

The contractor at his own expense shall prepare samples of any item of works prescribed in tender and shall obtain the approval of the Engineer-in-charge to the same before putting the work in hand. If so required by the consultants, the contractor at his own expense shall prepare the same and submit a second sample of each individual item of work. If the consultants require more than two samples to be made of any individual item of work, the contractor shall prepare the same and shall be paid the actual cost of preparing the third and any subsequent samples of such individual item.

10. DRILLING, CUTTING, ETC.

All cutting and drilling of walls or other elements of the building for the proper entry/ installation of pipes, cables, conduits, boxes and other equipment shall be carried out using electrically operated tools only. Manual drilling, cutting, chiselling, etc., shall be cut or chased with the written permission of the Engineer-in-charge.

11. WATER FOR CONSTRUCTION AND OTHER USE

The owner shall provide the water for construction free of cost. Whereas contractor has to make his own arrangements for the supply/distribution and storage of water for work and nothing shall be paid extra for the same.

The contractor shall arrange for adequate storage arrangements so that a sufficient quantity of water is available at all times to meet the contractor's construction, curing and all other requirements. The water proposed to be used should be tested by the contractor at his own cost and a test report to be submitted to the EIC/Consultant.

12. POWER (ELECTRICITY) SUPPLY

The owner shall be made Power (BESCOM) available at one source at the site. The contractor shall make his own arrangements for distribution, monthly electrical rental, shifting within the site. The contractor shall also be responsible for the periodical maintenance of such arrangements. The contractor is responsible for making adequate infrastructure and standby facilities for the continuous supply of electric power required for the satisfactory execution of the work without stoppage.

13. OWNER SUPPLY OF MATERIALS

When the owner chooses to supply materials on a ‘free basis’, the contractor shall quote his rates including, loading, unloading, safe storage, security, handling and shifting to a place of work, insurance, applicable taxes, etc.,

The contractor shall indent the material required well in advance.

14. RECONCILIATION, RECOVERY AND WASTAGE NORMS OF OWNER SUPPLIED MATERIALS

14.1 Reconciliation Statements:
Irrespective of the mode of supply of materials by the owner, the contractor shall prepare and submit monthly material indents based on the planned activities of work.

The contractor shall submit a material reconciliation statement, in a prescribed format, in respect of all materials issued to him by the owner for incorporation in the works. The reconciliation statement shall indicate the value and or quantity of materials incorporated in the works and the value and or quantity supplied by the owner.

The reconciliation statement shall be submitted without fail along with each running bill and the final bill.

15.2 Recovery of the cost of owner-supplied materials:
Based on the reconciliation statement submitted along with the bills, the value of the materials shall be recovered from each of the running account bills of the contractor.

15.3 Applicable wastage norms:
The applicable wastage norms will be considered while preparing the material reconciliation statement for owner-supplied materials and consumed.

15. ENVIRONMENT, HEALTH AND SAFETY

After entering into the contract the Environment, Health and Safety plan submitted by the contractor shall be revisited along with the method statements submitted for various works. The obligations of the contractors shall be strictly monitored for Environment, Health and Safety. The following documents shall be referred to for adherence to Environment, Health and Safety requirements at the site:

1. EHS requirements along with the tender.

2. EHS plan submitted along with the tender.

3. Approved method statement for various works to be executed at site.

4. Written instructions are given by the Engineer in charge/ owner at the site from time to time.

All the EHS measures as called for should be followed with due diligence. Contractor shall provide the following:

a. List of all the personal protective equipment deemed to use the site to be provided by the contractor.

b. Housekeeping should be treated on high priority, debris chutes to be provided at convenient locations, no accumulation of debris is allowed at the site.

c. If Debris is not removed by the contractor as per the EIC given time frame. The owner has full right to reserve to accomplish the same with other agencies at contractor risk & cost.

d. Contractor engineer/in charge to ensure that the Personal Protective Equipment (PPE) is provided to every individual at the site and same is efficiently utilized.

e. Safety signage's to be displayed at convenient locations all over the working area or as instructed by EIC.

f. The safety plan, safety policy and method statement are to be submitted.
g. Dedicated electrician to be deputed at the site. Sufficient lighting (general and focus lighting) to be provided at the site.

h. Fortnightly report on safety at the site to be submitted.

i. Cables to be routed on poles and not on the ground/ floor slabs.

j. Proper access is to be provided at the site for inspection.

k. Total safe man-hours or accident-free hours achieved to be displayed at the site (on daily basis).

l. Any accidents or incidents to be reported immediately to Engineer-in-charge.

m. First aid box to be provided at the site.

n. Pep-talk on safety to be given to the people working at the site before commencement of each day's work.

o. The diesel generator sets used during the construction phase should be of low Sulphur diesel type and should conform to Environment protection rules prescribed for air and noise emission standards.

p. Construction spoils, including bituminous material and other hazardous materials, must not be allowed to contaminate the watercourse and the dumpsites for such materials must be secured so that they should not leach into the groundwater.

q. Any violations and or deviations from the EHS plan/ instructions shall be penalized. Such penalties shall be deducted from the running bills. Despite such penalties, if the situation at the site does not improve, Environment, Health and Safety requirements shall be taken over by the owner and shall be executed by appointing separate agencies. The costs incurred by taking over of EHS shall be debited to the contractors at actual costs plus 25% towards overheads and taxes.

16. Progress reports/photographs to be submitted every fortnight

17. Professional Integrity and Team Spirit
The owner and the Consultants intend that this project will be executed in a spirit of teamwork and full professional integrity. The contractor shall fully co-operate with all agencies concerned to fulfil this objective.

18. Modification: Any modification in the project will be measured as per the BOQ items & paid the same price.

19. No escalation of price is permitted throughout the project till completion for whatsoever may be the reason.
20. Space for labour camps SHALL NOT BE PROVIDED IN PROJECT SITE.

GENERAL CONDITIONS OF CONTRACT

1. DEFINITIONS
In the contract (as hereinafter defined) the following words and expressions shall have meanings hereby assigned to them, except where the context otherwise requires.

2. THE CONTRACT
Contract' means the agreement between the owner and the contractor for the proper execution and successful completion of the works in accordance with the contract documents.

3. CONTRACT AGREEMENT
The contractor whose tender has been accepted shall enter into a formal agreement with the owner for the execution and completion of the works, in the format prescribed in the contract documents, within one week from the date of the work order.

4. CONTRACT DOCUMENT
The contract document means collectively notice inviting tenders, letter of tender, contract agreement, general conditions of contract, special conditions of contract and annexure, specifications, drawings, letter of acceptance, further documents as may be expressly incorporated in the letter of acceptance or contract agreement, priced schedule of quantities, work order and all modifications thereof and additions thereto incorporated in and made to the documents during the currency of the contract.

5. CONTRACTOR
The contractor means the person or persons, firm, company or consortium whose tender has been accepted by the owner and includes the contractor's legal representatives, successors and permitted assignee. (Wherever in the contract documents reference is made to the term "contractor" and the context therein applies to the stage prior to tender acceptance, this term shall mean the tenderer).

a. SUB-CONTRACTORS
Sub-contractors means the persons, firms, companies or agencies who after approval of the Engineer-in-charge, have entered into a direct contract with the contractor in respect of any part of the works and include the sub-contractors legal representatives, successors and permitted assignee.

As soon as practicable but at least two weeks before awarding any subcontract, the contractor shall submit to the Engineer-in-charge in writing the names of the sub-contractors proposed for any part of the works, for the approval of the Engineer-in-charge. The Contractor shall employ such sub-contractors only after he has received confirmation in writing of such approval from the consultant through the Engineer-in-charge. The Engineer-in-charge's approval, however, shall not relieve the contractor of any of his responsibilities, obligations and liabilities under the contract. The contractor shall be responsible for the acts, defaults and neglect of all sub-contractors and their agents, servants and workmen. The Contractor shall not employ any sub-contractor to whom or the Engineer-in-charge objects and or does not approve.

b. NOMINATED SUB-CONTRACTORS

Nominated sub-contractors refer to those specialist agencies, merchants, tradesmen and others, nominated by the owner for executing special works or supplying special equipment or goods or materials or services, for which prime cost and provisional sums are included in the contract documents. The contractor shall be required under the contract to sublet the execution of such special works or the supply of such special equipment or goods or materials or services to the nominated sub-contractors. Such nominated sub-contractors shall be deemed to have been employed by the contractor and the contractor shall sign a subcontract agreement with them. The contractor shall be responsible for the coordination of all work of such nominated sub-contractors, which work shall be to the approval and satisfaction of the Engineer-in-charge.

6. OWNER / CONSULTANT/ ENGINEER-IN-CHARGE

The Owner/ Consultant/ Engineer-in-charge shall be those mentioned as such in special conditions of contract and shall include all their consultants, representatives, permitted assignees and successors. They are treated throughout the contract documents as if they were of the singular number and masculine gender.

7. THE WORKS

The works shall mean the works in respect of which the tender by the contractor has been accepted and which are set out in the contract documents and shall be inclusive of all additions, substitutions and variations ordered by the Engineer-in-charge.

a. "**Works**" means the permanent works and the temporary works or either of them as appropriate.

b. "**Permanent Works**" means the permanent works to be executed (including plant) in accordance with the contract.

c. "**Temporary Works**" means all temporary works of every kind (other than contractor's equipment) required on-site for the execution and completion of the permanent works and remedying of any defects therein.

d. "**Plant**" means machinery, equipment and the like intended to form or forming part of the permanent works.

e. "**Contractor's Equipment**" means all appliances and things of whatsoever nature (other than temporary works) required for proper and successful execution and completion of the works and the remedying of any defects therein but does not include plant, materials or other things intended to form or forming part of the permanent works.

8. THE SITE

The site means the land and other places including any building and structures thereon, on, into, or through which work is to be executed under the contract or any adjacent land allotted or used for the purpose of carrying out the contract.

9. CONTRACT SUM

'Contract sum' shall be the sum stated in the letter of acceptance/ contract agreement which the owner has consented to pay to the contractor for the execution and completion of the works in conformity with the contract documents and shall initially be the sum at which the contract for the works has been awarded and which sum shall subsequently be amended and determined in accordance with the provisions contained in the contract documents.

10. WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual or to a member of the firm or to an officer of the corporation/ organization/ firm for whom it is intended, or if delivered at and a written delivery receipt obtained, or if sent by registered mail or if sent through e-mail to the last known business/ e-mail address.

11. WORKING DAY

A working day shall mean any day from Monday to Saturday (both days inclusive) excluding public holidays and locally recognized holidays.

No work shall be carried out on the site on public holidays and locally recognized holidays unless:

- Otherwise stated in the contract
- The Engineer-in-charge gives written consent or
- Work is unavoidable or necessary due to protection of life or property or for the safety of the work, in which case the contractor shall immediately advise the EIC.

a. NORMAL WORKING HOURS

The normal working hours shall be between 8:00 A.M. and 6:00 P.M. on all working days. May be extended beyond 6:00 P.M, or resources provided by KSSFCL.

b. OVERTIME WORK

If it is necessary for the contractor or any sub-contractor to work on other than working days or outside the normal working hours or staggered working hours in order to keep up to the time schedule and meet the construction programme, the contractor shall give due notice of his intention to do so and shall obtain the prior approval of the Engineer-in-charge in writing, which approval shall not be unreasonably withheld. The additional cost of wages and any other costs incurred as a result of overtime or any shift work shall be borne by the contractor.

12. APPROVED EQUAL

Approved equal shall mean an alternative product/ service approved by the Engineer-in-charge with prior approval of consultant as being equivalent to that specified in the contract documents.

a. APPROVED/ APPROVAL

Approved/ approval shall mean approved/ approval in writing.

b. INTERPRETATION

In the contract, except where the context requires otherwise:

i. Words indicating one gender include all genders.
ii. Words indicating the singular also include the plural and vice versa.
iii. Provisions including the word “agree”, “agreed” or “agreement” require the agreement to be recorded in writing and
iv. “Written” or “writing” means hand-written, typewritten, printed or electronically made and resulting in a permanent record.
v. The marginal words and other headings shall not be taken into consideration in the interpretation of these conditions.
vi.

13. COMMUNICATIONS

Wherever these conditions provide for the giving or issuing of approvals, certificates, consents, determinations, notices and requests, these communications shall be:
In writing and delivered by hand (against receipt), sent by mail or courier, or transmitted using any of the agreed systems of electronic transmission &
Delivered, sent or transmitted to the address for the recipient's communications.

14. DATE OF COMMENCEMENT

The date of commencement shall be the date as mentioned in the highlights of this document.

15. VIRTUAL COMPLETION

Virtual completion will be said to have been achieved upon a virtual completion certificate being issued by the E-in-C when the works, according to the owner, consultant and Engineer-in-charge have been completed in every respect in conformity with the contract documents and used for their intended purpose, complete with all systems and services having been tested and commissioned.

16. DEFECTS LIABILITY PERIOD

Defects liability period shall be the period between the virtual completion and the final completion of the works one year (12months) and during which period the contractor shall be bound to replace and or rectify and make good all defective materials, equipment and or workmanship that arise in the works or come to notice subsequent to the virtual completion of works and prior to the final completion of works.

17. FINAL COMPLETION

Final completion will be said to have been achieved when at the end of the defects liability period a final completion certificate has been issued by the Engineer-in-charge when all the requirements of the contract have been met and complied with and when all the defective items of work and defects have been replaced and or rectified and made good as directed by and to the satisfaction of the owner, consultant, Engineer-in-charge.

18. DRAWINGS

"Drawings" means all drawings and technical information of similar nature provided by the Engineer-in-charge to the contractor under the contract and all drawings, samples, patterns, models, operation and maintenance manuals and other technical information of like nature submitted by the contractor.

19. SCOPE, EXTENT, INTENT, ETC.

19.1 SCOPE

The general character and the scope of the works shall be as illustrated and defined in the drawings, specifications, schedule of quantities and other contract documents. The defined scope of work shall be as set out under special conditions of the contract.

19.2 EXTENT

The contractor shall carry out and complete the works under the contract in every respect and his work shall include the supply of all labour, equipment, materials plant and machinery, tools, transportation, formwork, scaffolding and everything else necessary for the proper execution and successful completion of the works in accordance with the contract

documents and to the directions and satisfaction of the Engineer-in-charge. The contractor shall be fully responsible and liable for everything and all matters in connection with or arising out of or being a result or consequence of his carrying out or omitting to carry out any work. Where sub-contractors may execute any parts of the works, such responsibility and liability of the contractor shall cover and extend to the work of all such sub-contractors

.

19.3 INTENT

The contract documents are complimentary and what is called for by anyone shall be binding as if called for by all. Wherever it is mentioned in the documents that the contractor shall perform certain work or provide certain facilities, it is understood that the contractor shall do so at his own cost. Materials or 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 are applicable.

19.4 PRIORITY OF DOCUMENTS

The documents forming the contract are to be taken as mutually explanatory of one another. For the purposes of interpretation, the priority of documents forming the contract shall be in accordance with the following sequence:

a. The contract agreement

b. The work order

c. The letter of tender

d. The construction drawings

e. Priced schedule of quantities

f. The technical specifications

g. The special conditions of the contract

h. The general conditions of contract

i.Any other document specified in the contract

If any ambiguity or discrepancy is found in the documents, the E-in-C shall issue necessary clarification or instruction.

19.5 INSTRUCTIONS OF ENGINEER-IN-CHARGE

The Engineer-in-charge may from time to time issue, further supplementary drawings, written instructions, details, directions and explanations which shall be collectively referred to as the instructions of the Engineer-in-charge. The contractor shall forthwith comply with and duly execute the work comprised in such instructions of Engineer-in-charge, provided always that verbal instructions, directions and explanations are given to the contractor or his works representative by the Engineer-in-charge shall, if involving a variation, be confirmed in writing by the contractor immediately thereafter.

19.6 APPROVAL OF CONSULTANTS AND ENGINEER-IN-CHARGE

Approval of the consultants and Engineer-in-charge shall always mean approval in writing. The onus shall be on the contractor to obtain all the necessary approvals in writing. Such approvals, however, shall not relieve the contractor of any of his responsibilities under the contract.

19.7 VARIATIONS

The owner in consultation with the consultant reserves the right to increase or decrease the scope of work on any or all items or to change the nature of work involved in any or all items or to completely delete any items of the works under the contract, subject to the limitation laid down in clause 32. The contractor shall not be entitled to claim for loss of anticipated profits for mobilisation of additional resources, or for any such reason on account of these variations.

The owner in consultation with the E-in-C reserves the right to get any deleted items of work executed by other agencies in the larger interest of the project.

19.8 ITEMS OF WORK FOR COMPLETION

The contractor is bound to carry out any items of work necessary for the completion of the project even though such items of work may not be included in the schedule of quantities. Instructions in respect of any such additional items of work and their quantities shall be issued in writing by the Engineer-in-charge, in consultation with the consultants and the rates for any such additional items of work shall be determined in accordance with the relevant clause.

20. ENGINEER-IN-CHARGE

STATUS

The owner will be represented for the purpose of the execution of the contract by the Engineer-in-charge. The Engineer in charge, along with his team shall be responsible for the day-to-day supervision, quality control checks, progress monitoring, coordination and direction of the works and generally to ensure that all work is carried out in strict conformity with the contract documents unless otherwise specified. The Engineer-in-charge shall have the authority to stop the work whenever such stoppage may be necessary to ensure the proper execution of the work. The contractor shall provide all the necessary facilities to the Engineer-in-charge in the performance of his duties. The contractor shall refer all matters relating to the performance of the contract to the Engineer-in-charge.

DECISIONS

The Engineer-in-charge shall make decisions on all matters relating to the execution and progress of the works. The Engineer-in-charge shall also make decisions, within a reasonable time, on the claims and queries of the contractor. The decision, opinion, direction and interpretation of the Engineer-in-charge, with respect to any or all of the following matters shall be final and binding on the contractor, except matters involving financial implications and matters mentioned under item (b), (c), (j), (k) which will be decided in consultation and with the prior written approval of the owner.

a. The quality and quantity of each item of the works.

b. Variation items.

c. Any discrepancy in the drawings or between the drawings and specifications.

d. The removal and or re-execution of any work executed by the contractor.

e. The dismissal from the site of any person employed upon the works.

f. The opening up for inspection of any work covered up.

g. All materials and workmanship.

h. Everything that must be provided or done by the contractor in order to properly execute and successfully complete the works under the contract.

i. Assignment and sub-letting.

j. Delay and extension of time.

k. The replacing and or rectifying and making good all defective items of work and defects during the defects liability period.

l. Removal of any material/ equipment/ plant and machinery brought by the contractor to the site of work for the execution of the works.

21. DISMISSAL OF CONTRACTOR'S STAFF

The contractor shall, on the instruction of the Engineer-in-charge, immediately dismiss from the works any person employed thereon by him who may, in the opinion of the Engineer-in-charge, be incompetent or who engages in unlawful or disorderly conduct and such persons shall not be re-employed on the works without the permission of the Engineer-in-charge.

22. ACCESS FOR OWNER, CONSULTANT AND ENGINEER-IN-CHARGE TO THE WORKS AND SITE

The owner, Engineer-in-charge and consultants and their representatives shall at all times have access to the works and the site and to the workshops or other places of the contractor where work is being prepared for the contract and when work is to be so prepared in workshops or other places of sub-contractors and suppliers, the contractor shall by a term in sub-contract so far as possible, secure a similar right of access to those workshops or places for the owner, Engineer-in-charge and consultants and their representatives and shall do everything for the purposes of carrying out inspections to ascertain and ensure that work is being carried out in conformity with the contract documents or for any other purpose in connection with the works under the contract.

23. COMMUNICATION PROTOCOL

The owner, consultants and E-in-C will be in a regular communication network with each other. All instructions to a contractor from owner/ consultants are communicated through E-in-C in written form. Main Drawings, samples approval should be obtained from the Engineer in charge.

24. SITE

Contractor to satisfy himself about site conditions before submitting his tender:

Before tendering for the works the contractor shall visit the site and satisfy himself about the site conditions for construction and for logistics and smooth flow of men and materials as well as permissions from authorities for this purpose. He shall examine the site and take note of existing roads and means of access and communication, the character of the soil

and of the excavations, the correct dimensions of the work, facilities for obtaining any special articles called for in the contract documents and also the contractor shall make his own assessment and obtain all information on site constraints and on all matters that will affect the execution, continuation and progress and completion of the works.

The Engineer-in-charge will make available to the contractor such data on sub-surface conditions as having been obtained from investigations undertaken relevant to the works but the contractor shall be responsible for his own interpretations thereof.

Any extra claims made in consequence of any misunderstanding, incorrect information on any of these points or on the grounds of insufficient description or information shall not be entertained or allowed at any stage. Should the contractor after visiting the site find any discrepancies, omissions, ambiguities or conflicts in or among the contract documents or be in doubt as to their meaning, he shall bring this to the attention and seek written clarifications from the owner before submitting his tender.

25. PERMISSION TO WOK AT SITE

The permission to work at the site will be given immediately on the award of the contract to the contractor, temporarily and for the purpose of construction only and the site shall be shared with other contractors and sub-contractors as applicable. The contractor shall upon being given such permission, commence the works and diligently proceed with the execution of the works in accordance with the contract documents.

26. TREASURES, ANTIQUITIES FOUND ARE PROPERTY OF THE OWNER

All fossils, antiquities and other objects of interest or value which may be found on the site at the commencement or during the progress of the works shall be the property of the owner.

27. RIGHT OF ACCESS TO THE SITE

27.1 The right of access of the contractor to the site shall be merely as a licensee for carrying out the construction of the works under the contract and the contractor shall not by his being allowed such access to the premises, acquire any right, lien or interest either in the works carried out by him under the contract agreement or anything appurtenant or attached thereto or to any part of the site/ premises and his claim will only be in the nature of money claim found due and payable to him in accordance with the certificates issued by the Engineer-in-charge under the provisions contained herein. This clause shall also apply to all sub-contractors whether employed by the contractor or nominated by the owner.

27.2 SECURITY OF SITE

Unless otherwise stated in special conditions:

The contractor shall be responsible for keeping unauthorized persons off the site and authorized persons shall be limited to the contractor’s personnel and the owner’s personnel and to any other person notified to the contractor, by the owner or the Engineer-in-charge, as authorized personnel of the owner’s other contractors on the site.

28. TYPE OF CONTRACT

28.1 ITEM RATE CONTRACT

The contract shall be an "Item Rate Contract". The contract rates shall include the supply of all labour, equipment, materials, plant and machinery, tools, transportation, testing of materials, formwork, scaffolding, Environment, Health, Safety and everything else required. The rate quoted shall include for the payment of all applicable taxes, duties, levies, royalties, fees, insurance premiums, contributions towards employee benefits and funds and anything else stipulated and required, shall include for the contractor's establishment, infrastructure, overheads and all other charges, including taxes levied on day values of his sub-contractor's work done and shall generally be inclusive of every cost and expense necessary for the proper execution and successful completion of the works under the contract, in conformity with the contract documents and the best engineering and construction practices and to the satisfaction of the Engineer-in-charge. The contractor shall be paid at the contract unit rates for the actual quantities of work carried out, excluding all replacement and rectification work, carried out by him under the contract.

The actual quantities of work carried out by the contractor shall be those which are measured in accordance with the dimensions shown on drawings to which the work shall be carried out and which quantities are certified by the Engineer-in-charge. The methods and modes of measurements shall be as stipulated in the schedule of quantities and its preamble and in other contract documents and as prescribed by the Bureau of Indian Standards (where such methods and modes differ between such documents and standards, the methods and modes as stipulated in the schedule of quantities and its preamble shall prevail). The amount, payable to the contractor for an item of work shall equal the actual quantity of work carried out by him for that item multiplied by the contract unit rate for that item.

28.2 SCHEDULE OF QUANTITIES

The quantities given in the schedule of quantities are provisional and are meant only to indicate the intent of the work and provide a uniform basis for tendering. The actual quantities of individual items can vary to any extent stated hereinafter from such provisional quantities subject to the overall variation being limited to as stipulated below. The contractor shall be paid for the actual quantities of work carried out by him, in accordance with sub-clause 28.1 above. The owner reserves the right to alter the scope of works and to increase or decrease any of the quantities or to totally omit any item of work and the contractor shall not be entitled to claim for or receive any extras or compensation of any kind whatsoever on these grounds, subject to the overall contract sum (the overall contract sum for this purpose shall mean the signed contract amount) not being varied by more than plus or minus twenty per cent (± 10%). Should the variation in the overall contract sum exceed such limit of plus or minus twenty per cent (± 10%), then the owner may consider to re-negotiate on or in respect of only that sum by which such limit of plus-minus ten per cent (± 10%) is exceeded, subject to such limit not being exceeded due to termination of the contract in which case the matter shall be dealt with in accordance with stipulations of the appropriate clause as applicable.

Any errors in description and or omission of any item in the schedule of quantities shall not vitiate this contract but shall be deemed to be a variation as applicable.

29. TAXES, DUTIES, ETC.

The Contract Price quoted for all works and other services or activities to be performed under the contract, inclusive of all duties and taxes, such as Excise

Duty, Works Contract Tax, VAT, Royalty, Octroi, Service Tax, Labour Cess, Provident Fund, ESI, Freights and other local taxes and duties, levies etc. or any other cost payable for executing the works under the contract (hereinafter “Contract Price”) Contractor to pass on VAT input credit benefit to the Owner.

No claims on any account shall be entertained or allowed at any stage subsequently unless there is a change in tax or levy imposed by statute after the date of opening of the tender and within the entire period of execution authorized by E-in-C for the project.

Service tax and the payments made due to any change in statute as above shall be reimbursed to the contractor on the production of proof of payments made to the concerned authorities.
However, all tax components are to be shown separately.

30. NOTICES, FEES, BYE-LAWS, REGULATIONS

The contractor shall comply with all government acts including the bye-laws or regulations of local authorities relating to the works in so far as construction, fabrication and installation activities are concerned and he shall obtain from the local authorities all permissions and approvals required for the plying of trucks, use of construction machinery, etc.

31. LICENCES 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 his work shall be directly obtained by the contractor. The contractor shall include in his rates for all transportation charges and for the other expenses that may be incurred in this connection and he shall indemnify the owner against all claims in this regard.

32. 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 works as described by or referred to in the drawings, specifications, schedule of quantities and other documents, shall be deemed to have been included in the contractor’s rates and the contractor shall indemnify the owner against all claims, proceedings, damages, costs and expenses which may be brought or made against the owner or to which he may be put by reason of the contractor infringing or being held to have infringed any patent rights to any such articles, processes and inventions. The contractor shall also include in his rates for the payment of all levies and royalties, rent and other payments or compensation, if any, for getting stone, sand, gravel, soil or any other materials required for the works and the contractor shall submit proof of it to Engineer-in-charge on request.

33. INSURANCE

33.1 INSURANCE POLICIES

All insurance policies shall be taken in the name of the contractor and the original policies shall be submitted to the owner.

Before commencing the execution of works, the contractor, without limiting his obligations and responsibilities under this contract shall insure against his liability for any material or physical damage, loss or injury which may occur to any property, including that of the owner to any person including any employee of the owner or a member of the general public, by or arising out of the execution of the works or in carrying out the contract. It shall be obligatory for the contractor to obtain the insurance cover under the following policies:

a. Contractor's All Risk Insurance Policy to cover the following:

i. The entire contract value for the period of completion including the defects liability period.

ii. Third-party insurance to cover any damages to the third party. This shall be up to the end of the defects liability period and shall include any damage to the properties and or injury (including death) to the persons of the general/ public/ consultants/ owners personnel and anyone else deemed to be the third party.

iii. Civil commotion, riots, war and other disturbances.

b. Policy to cover contractor's liability under Workmen's Compensation Act 1923/ latest, Minimum Wages Act 1948/ latest, Contract Labour (Regulation and Abolition) Act 1970/ latest and other relevant Acts listed elsewhere. This shall be for the period up to Final completion of work, including the defects liability period.

c. Insurance cover against damage, theft or any other loss of all materials and Equipment brought to the site for which advance payment is claimed - Limit of liability not Less than the value of such materials at any stage of the contract.

d. Owner materials and all materials supplied by the client/ owner for incorporation in the Works.

The Contractor shall insure against all such liabilities and shall continue such insurance during the currency of the contract including defects liability period. The premium for all insurance policies shall be paid and borne by the contractor and shall not be reimbursable.

The contractor shall produce to the Engineer-in-charge all certificates of Insurance. These certificates shall be fully executed and shall state that the policies cannot be cancelled until ten (10) days after written notice of such cancellation has been given to the owner failing in this clause work order may be cancelled.

The contractor shall obtain written confirmation of similar certificates from all sub-contractors and thereby assume responsibility for any claims or losses to the owner resulting from the failure of any of the sub-contractors to obtain adequate insurance protection in connection with their work.

33.2 FAILURE TO INSURE

If the contractor fails to comply with the terms of this condition, the owner may procure the insurance and deduct the expenses from the amount that may be or becomes payable to the contractor or may, at his option, refuse payment of any certificate to the contractor until the contractor complies with this condition.

33.3. NO LIMIT TO LIABILITY

In addition to the liability imposed by law upon the contractor for injury (including death) to persons or damage to property or his agents, which liability is not impaired or otherwise affected hereby, the contractor hereby assumes liability for and agrees to save the owner harmless and indemnifies him from every expense, liability or payment by reason of any injury (including death) to persons or damage to property suffered through any act of omission of the contractor, or indirectly employed by any of them or from the conditions of the premises or any part of the premises which is in the control of the contractor or any of his

sub-contractors, or anyone directly or indirectly employed by either of them or arising in any way from the work called for by this contract.

34. CONTRACTOR'S SITE ORGANIZATION AND RESOURCES

a. PROJECT ENGINEER AND SUPERVISORY STAFF

The contractor shall at his cost provide and ensure continued effective supervision of his work with the help of his project engineer, assisted by qualified experienced and competent engineers, supervisors and adequate staff, to the satisfaction of the Engineer-in-charge for the entire duration of the works. The contractor shall submit his proposed site organisation chart for the approval of the Engineer-in-charge. The project engineer of the contractor shall be responsible for carrying out the work to the true meaning of the drawings, specifications, conditions of contract, schedule of quantities, the other contract documents and instructions and directions of the Engineer-in-charge. The instructions and directions given in writing to the project engineer or to any of his assistants at the site by the Engineer-in-charge shall be deemed to have been given to the contractor officially. Attention is called to the importance of the contractor requesting written instruction from the Engineer-in-charge before undertaking any work where the Engineer-in-charge's direction or instructions are required. Any such work done in advance of such instructions will be liable to be removed at the contractor's expense and will not be paid for unless specifically approved by the Engineer-in-charge.

All key staff employed at site by the contractor shall be to the approval of the Engineer-in-charge. However, such approval shall not relieve the contractor of any of his contractual obligations. No staff including the project engineer and other technical supervisory staff shall be removed or transferred from the works without the prior written permission of the Engineer-in-charge who shall, however, have the authority to order the removal from site of any undesirable personnel. The contractor shall at all times be fully responsible for the acts, defaults and neglect of all of his representatives, agents servants, workmen and suppliers and those of his sub-contractors and nominated sub-contractors.

b. MAN-POWER AND PLANT AND MACHINERY

The contractor shall at his cost provide and install all equipment, materials, plant, electro-mechanical hoists, ladders and scaffolding, necessary for the execution of the works and shall be functional at the site till the completion of works or as directed by the owner in conformity with the contract documents and to the satisfaction of the Engineer-in-charge. Also, all machinery, tools, trucks, formwork material, manpower and everything else necessary for the proper and satisfactory execution and completion of the works in accordance with the contract document shall be provided by the contractor at his own cost.

The contractor shall within two days of the award of contract submit a complete list of his man-power and plant and machinery for the approval of the Engineer-in-charge which approval however shall not relieve the contractor of any of his responsibilities, obligations and liabilities under the contract. The contractor shall augment his manpower and plant and machinery without extra cost to the owner whenever required or so directed by the Engineer-in-charge in order to conform to the approved construction programme for the achievement of milestones and virtual completion.

c. SITE OFFICE ACCOMMODATION/ STORES

The site office accommodation for the contractor shall be as per his own requirements and at his own cost, but shall be subject to the approval of the Engineer-in-charge regarding the location and size.

d. SECURITY
The contractor shall at his cost provide at all times an adequate number of watchmen to guard the materials and equipment, to the satisfaction of the Engineer-in-charge. The contractor shall at all times be fully responsible for the security of all materials (including client supplied materials) and equipment on-site, whether his own or those of any sub-contractor including the nominated sub-contractor. Owner shall not be responsible for any loss due to theft, pilferage, fire accident or any other reasons, whatsoever.

e. WATER AND SANITARY CONVENIENCES
The owner shall provide all necessary drinking water free of cost and the contractor shall be permitted to use toilets at the site for the staff and all workmen. The contractor shall maintain such convenience in a clean orderly condition and shall clean, sanitize and deodorize the ground after their removal and meet all statutory requirements.

f. SCAFFOLDING, STAGING, GUARDRAILS, BARRICADES
The contractor shall at his cost provide scaffolding, staging, guard rails, barricades and safety barriers around, all excavations, openings and at all edges temporary stairs and other temporary measures required during construction. The supports for the scaffolding, staging guard rails, barricades and safety barriers and temporary stairs shall be strong, adequate for the particular situations, tied together with horizontal pieces and braced properly. The temporary access to the various parts of the area under construction shall be rigid and strong enough to avoid any chance of mishaps. The entire scaffolding arrangement together with the staging, guard rails, barricades and safety barriers and temporary stairs shall be to the approval of the Engineer-in-charge which approval shall not relieve the contractor of any of his responsibilities, obligations and liabilities for safety and for timely completion of the works.

g. TEMPORARY LIGHTING
The contractor shall make his own arrangement in respect of the provision of adequate lighting at all places where his workmen are engaged for carrying out the work in a proper safe and satisfactory manner.

35. LABOUR REGULATIONS

a. REGULATIONS
The contractor shall be wholly and solely responsible for full compliance with the provisions under all labour laws and or regulations such as payment of Wages Act 1948/ latest, Employees Liability Act 1938/ latest, workmen's Compensation Act 1923/ latest, Industrial Disputes Act 1947/ latest, the Maternity Benefit Act 1961/ latest, the Contract Labour (Regulation and Abolition) Act 1970/ latest and the Factories Act 1948/ latest or any modifications thereof or any other law relating thereto and rules there under introduced from time to time. The contractor shall assume liability and shall indemnify the owner from every expense, liability or payment by reason of the application of any labour law, act, rules or regulations existing or to be introduced at a future date during the existing or to be introduced at a future date during the currency of the contract. Insurance cover towards the above shall be effected by the contractor as called for elsewhere.

In general, in respect of all labour directly or indirectly employed in the works for the performance of the contractor's part of the agreement, the contractor shall comply with all the rules framed by the government authorities concerned from time to time for the protection of the health and welfare of the workers. The contractor shall obtain a valid license under the Contract Labour (Regulation and Abolition) Act 1970/ latest and the

Contract Labour (Regulation and Abolition) Central Rules 1971/ latest and under any other applicable rules before the commencement of the work and continue to have a valid license until the completion of the work.

b. PAYMENT OF WAGES

The contractor shall pay to labour employed by him either directly or through subcontractors in time wages not less than fair wages as defined in the appropriate labour regulations act. He shall also abide by the minimum wages and other regulations applicable to the labour engaged in the works, as laid down by the concerned local authorities.

c. MODEL RULES

The contractor shall at his own expense comply with or cause to be complied with, Model Rules for labour welfare framed by government or other local bodies from time to time for the protection of health (spraying of pesticides every day) and for making sanitary arrangements, malaria control and other such epidemics, etc., for workers employed directly or indirectly on the works and in the worker's hutment area.

d. SAFETY NORMS

The contractor should strictly follow the safety guidelines as prescribed by the Consultant / Engineer-in-Charge and 3rd party safety agency should also be strictly adhered.

In respect of all labour, directly or indirectly employed on the works for the performance and execution of the contractor's work under the contract, the contractor shall at his own expense arrange for all the safety provisions as listed in (i) safety code forming part of the contract documents (ii) Bureau of Indian Standards (iii) The Electricity Act (iv) The Mines Act and (v) Rules & Regulations and orders made thereunder and such other acts as applicable.

Precautions, as stated in the safety clause, are the minimum necessary and shall not preclude the contractor from taking additional safety precautions as may be warranted for the particular type of work or situation. Also, mere observance of these precautions shall not absolve the contractor of his liability in case of loss or damage to property or injury to any person including the contractor's labour, the owner, consultant and Engineer-in-charge's representatives or any member of the public or resulting in the death of any of these.

Protective gear such as safety helmets, safety boots, safety belts/harnesses and safety nets, etc. shall be provided by the contractor at his own cost to all his manpower at the site. The contractor shall impose such requirements on all sub-contractors also. It shall be the responsibility of the contractor to ensure that such protective gear is worn at all times by all personnel working at the site.

FIRE PRECAUTIONS: The contractors shall take all precautions and preventive measures against fire hazards at the site, in his stores, workshop, labour camp, etc. and shall assume full responsibility for the same.

The entire site shall be a tobacco-free zone. Usage of tobacco shall not be allowed within the site.

The Engineer-in-charge shall have the right to stop from working or impose a fine to any person violating any of the clauses mentioned above.

In case the contractor fails to make arrangements and provide necessary facilities as aforesaid, the owner shall be entitled to do so and recover the costs thereof from the contractor. The decision of the consultant/ Engineer-in-charge in this regard shall be final and binding on the contractor.

e. CHILD LABOUR

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 the safeguarding and care of small children and keeping them clear off the site of operations. No children shall be permitted on the construction site.

36. CONTRIBUTION TOWARD EMPLOYEE BENEFITS, FUNDS, ETC.

The contractor shall include in his rates for all expenses necessary to meet his obligations for making contributions toward employee benefits funds (such as Provident Fund, an old-age pension if any or any other benefits/ compensation payable by the contractor, etc.) in compliance with all the statutory regulations and requirements. All records in this connection shall be properly maintained by the contractor and produced for scrutiny by the concerned authorities and the consultant / Engineer-in-charge whenever called for.

37. SETTING OUT AND SITE SURVEYS

The contractor shall establish, maintain and assume responsibility for all benchmarks and gridlines and all other levels, lines, dimensions and grades that are necessary for the execution of his work, in conformity with the contract documents. The contractor shall establish his benchmarks and grid lines with reference to and in relation to the permanent benchmarks and boundary lines established at the site. The contractor shall verify and co-relate all the survey data available at the site before commencing his work and shall report any errors or inconsistencies to the Engineer-in-charge. Commencement of work by the contractor shall be regarded as his acceptance of the correctness of all survey and setting out data available at the site and no claims shall be entertained or allowed in respect of any errors or discrepancies found at a later date. If at any timing error in this regard appears during the progress of the works, the contractor shall at his own expense rectify such error to the satisfaction of the Engineer-in-charge.

The approval by the Engineer-in-charge of the setting out by the contractor shall not relieve the contractor of any of his responsibilities, obligations and liabilities under the contract.
The contractor shall be entirely and exclusively responsible for the horizontal, vertical and another alignment for all levels and dimensions and for the correctness of every part of the works and he shall rectify effectively any errors or imperfections therein. All such rectifications shall be carried out by the contractor at his own cost and to the instructions and satisfaction of the Engineer-in-charge.

The contractor shall employ qualified surveyors to carry out all the surveys and setting out works.

38. DRAWINGS, SPECIFICATIONS, INTERPRETATIONS, ETC.

After the contract agreement is signed, the contractor shall be furnished with three copies of the drawings or as mutually agreed and two copies of the contract document without cost to him for his own use and for the use of his sub-contractors until the completion of the contract. Additional copies of drawings and other contract documents over and above the mutually agreed number of copies will be supplied on payment at an actual cost basis.

REFERENCE DRAWINGS: The contractor shall maintain one set of all drawings issued to him as reference drawings. These shall not be used on site. All corrections, deviations and

changes made on-site shall be shown on these drawings for final incorporation in the completion drawings.

In general, the drawings shall indicate the dimensions, positions and type of construction, the specifications shall stipulate the qualities and the methods and performance criteria and the schedule of quantities shall indicate the provisional quantities and the rates for each item of work. However, the above documents being complementary, what is called for by anyone shall be as binding as if called for by all.

In case of contradictory requirements between specifications and the schedule of quantities, the requirements given in the schedule of quantities shall prevail.

Special conditions being mainly an amplification of general conditions, they shall be read in conjunction with each other. In case of contradictions, special conditions shall prevail over general conditions.

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.

From time to time during the progress of the works, the contractor will be issued with revisions of drawings as well as additional drawings and written instructions in connection with and necessary for the proper execution and successful completion of the works. All such revisions of drawings and additional drawings and written instructions shall be part of the contract documents and the contractor shall be bound to carry out the work that is shown and detailed on all such drawings and shall be bound to follow and comply with all such instructions.

All drawings and their subsequent revisions will be issued via listing on transmittals by the Engineer-in-charge to the contractor. The contractor shall maintain a drawing register listing all the drawings and their latest revisions. All superseded drawings shall be so stamped and withdrawn from circulation at the site. It shall be the responsibility of the contractor to ascertain and ensure that all the work is carried out in accordance with the latest revisions of the drawings issued to him. Should the contractor fail to do this, all the rectifications and remedial work that may be required to conform to the latest revision of the drawings shall be at the contractor's cost.

Whenever it is mentioned in the conditions of contract, specifications and other contract documents that the contractor shall perform certain work or provide certain facilities, it is understood that the contractor shall do so at his own cost, unless otherwise provided in the schedule of quantities.

No deviations shall be made by the contractor, in the execution of his work, from the drawings, specifications, schedule of quantities and other contract documents. The consultant's interpretation of these documents shall be final and binding on the contractor. Clarifications shall be issued only by the consultant, through the Engineer-in-charge. All the drawings issued from time to time by the Engineer-in-charge must bear the signatures and stamp of the consultant.

The contractor shall bring any errors or inconsistencies in the drawings and specifications to the attention of the Engineer-in-charge for interpretation or correction before proceeding with

the affected portion of the works and no claims or losses alleged to have been caused by such discrepancies shall be entertained or allowed at any stage.

Local conditions which may affect the work shall likewise be brought to the attention at once of Engineer-in-charge. If at any time it is discovered that work that has been done or is being done is not in accordance with the approved drawings and specifications, the contractor shall correct the work immediately. Correction of such work shall be at the expense of the contractor and shall not form a basis for any claims for payment or extension of time. The contractor shall carry out all the rectification work only after obtaining approval for the same from the Engineer-in-charge.

No scaling of any drawing shall be done to obtain the dimensions. Figured dimensions on the drawings shall be used for carrying out the work. Drawings with large scale details shall take precedence over small scale drawings. Where any drawings and details have not been provided but are necessary for the execution of the work, it shall be the responsibility of the contractor to seek these drawings and details in writing from the Engineer-in-charge at least four weeks prior to the latest date by which the contractor needs these drawings and details to suit the programmed execution of the works. No extension of time shall be allowed for any delays caused due to the contractor's failure to seek such details.

All drawings, schedule of quantities, specifications and other contract documents and all copies thereof furnished by the consultant are his property. They shall not be used on any other work and shall be returned to him at his request or at the completion of the contract.

39. ASSIGNMENT AND SUB-LETTING

The contractor shall not assign this contract or sub-let any part of the works without the written consent of the Engineer-in-charge. Any permission to sub-let parts of the works shall not relieve the contractor from any of his responsibilities, obligations and liabilities under this contract, including disorderly conduct by the sub-contractors.

40. SEPARATE CONTRACTS

The owner reserves the right to let other contracts in connection with the project works. The contractor shall afford other contractors reasonable opportunity for their access to the project works, for the storage of their materials and for the execution of their work, or if specified give assistance to such contractors for such purposes as are specified. The contractor shall properly connect and coordinate his work with that of the other contractors. If any part of the contractor's work depends for proper execution or results upon the work of any other contractor, the contractor shall inspect and promptly report to the Engineer-in-charge any defects in such work that render it unsuitable for such proper execution and results. The contractor's failure to so inspect and report shall constitute an acceptance of the other contractor's work as fit and proper for receiving the work of the contractor.

41. CO-ORDINATION OF WORK

At the commencement of work and from time to time, the contractor shall confer with other contractors, sub-contractors, persons engaged on separate contracts in connection with the project works, the suppliers, and with the Engineer-in-charge for the purpose of the coordination and execution of various phases of the project works. The contractor shall determine and ascertain from the other contractors, sub-contractors and persons engaged on separate contracts, in connection with the project work, the extent of all chasing, cutting and forming of all openings, holes, details of all inserts, sleeves, etc. that are required to accommodate the various services.

The contractor shall determine and ascertain the routes of all services and the positions of all floor and wall openings, outlets, traps, the details of all inserts, equipment and services and shall carry out the construction and making good of all “builder’s work” in accordance with and as shown, described and or measured in the drawings, specifications, schedule of quantities and other contract documents. Also, the contractor shall ensure that all required services, inserts, sleeves, embedment, etc. are in place/ position before he proceeds with his work. Should the contractor fail to comply with these requirements and the consequence of such failure necessitates the breaking, re-doing and making good of any work, then the cost of all such breaking, re-doing and making good of any work shall be to the account of the contractor and shall be borne by him. No breaking and cutting of completed work shall be done unless specifically authorised in writing by the Engineer-in-charge. 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, as determined by the Engineer-in-charge.

42. MATERIALS, WORKMANSHIP, STORAGE, INSPECTIONS, ETC.

42.1 MATERIALS AND WORKMANSHIP

All materials and equipment to be incorporated in the works shall be new. The materials, equipment and workmanship shall be of the best quality of the specified type, in conformity with contract documents and the best engineering and construction practices and to the complete satisfaction of the Engineer-in-charge. This requirement shall be strictly enforced at all times and stages of the works and no pleas whatsoever shall be entertained on the grounds of anything to the contrary being the prevailing practice. The contractor shall immediately remove from the works any materials, equipment and or workmanship which, in the opinion of the Engineer-in-charge, are defective or unsuitable or not in conformity with the contract documents and best engineering and construction practices and the contractor shall replace such rejected materials, equipment and or workmanship with proper, specified and approved materials, equipment and or workmanship, all at his own cost within a period of 7 (seven) days from the date of issuance of such notice. The contractor shall whenever required to do so by the Engineer-in-charge, submit satisfactory evidence and necessary test results as to the kind and quality of the materials and equipment.

42.2 SPECIAL MAKES OF BRANDS

Where special makes or brands are called for, they are mentioned as a standard. Others of equivalent quality may be used provided that the consultant considers the substituted materials as being equivalent to the brand specified and approval for the use of such substituted materials is obtained in writing from the consultant through the Engineer-in-charge. Unless substitutions are approved by the consultant, no deviations from the specifications and other contract documents shall be permitted.

Alternative equivalent brands if suggested by the contractor during construction may be considered provided the suggested brand fully meets the requirements and is subject to the conditions of the contract and is acceptable to the Engineer-in-charge.

42.3 PROPER SCHEDULING AND DELIVERY OF MATERIALS

All materials and equipment shall be scheduled and delivered so as to ensure speedy and uninterrupted progress of the work and the same shall be properly stored. Where after permission has been sought and obtained from the Engineer-in-charge, any material or equipment is kept on any portion of the structure, this shall be done in such a manner as to prevent any overloading whatsoever of the structure, to the complete satisfaction of the

Engineer-in-charge. The cost associated with any damage to any portion of the structure in this respect shall be to the account of the contractor and shall be borne by him.

42.3 LIST OF MATERIALS

Within one week of the signing of the contract agreement, the contractor shall submit for the approval of the consultant and the Engineer-in-charge a complete list of all materials and equipment the contractor and his sub-contractors propose to use in the works, of definite brands or makes, which differ in any respect from those specified, or the particular brand where more than one is specified as standard. The contractor shall also list items not specifically mentioned in the contract documents but which are reasonably inferred and are necessary for the proper execution and successful completion of the works.

42.4 STORAGE OF MATERIALS AND EQUIPMENT AT SITE

The contractor shall, at his own cost, provide adequate storage sheds and yards at the site, at locations approved by the Engineer-in-charge, for all materials and equipment that are to be incorporated in the works. This shall be for all the materials and equipment, supplied by the contractor or any sub-contractor. In addition to being water-tight and weatherproof, the storage facilities shall be of such a manner that all the materials and equipment are adequately protected in every way from any deterioration or contamination or damage whatsoever and to the complete satisfaction of the Engineer-in-charge.

Should any of the materials or equipment deteriorate or be contaminated or damaged in any way due to improper storage or for any other reason, such materials and equipment shall not be incorporated in the works and shall be removed forthwith from the site and the replacement of all such materials and equipment shall be entirely at the cost and expense of the contractor. The contractor shall be responsible for also providing, at his own cost, proper and adequate security for all the materials and equipment stored at the site so as to prevent any theft, pilferage, etc.

Should delays be caused on account of removal and replacement of any materials or equipment or on account of any lack of security, the contractor shall not be entitled to any extension of time.

Wherever applicable the storage of materials shall be in accordance with the relevant Indian Standard specifications.

The cement storage capacity of the contractor shall be adequate to store a substantial quantity of cement, keeping in view the schedule of work.

Coarse and fine aggregates shall be stored over hard concrete base or paved brick platforms. Reinforcement bars shall be stored diameter-wise over raised sleepers and protected from rain in a suitable manner as approved by the Engineer-in-charge.

42.6 OWNER-SUPPLIED MATERIALS

The owner reserves the right to supply any material at the site at one point being the contractor’s godown/ yard. These spaces shall be at locations and sizes jointly worked out by the contractors, E-in-C and owner.

For materials supplied by the owner, contractors shall work out the quantity of materials required and shall indent the same well in advance or as per mutually agreed periodicity.

The supply of materials by the owner shall be in the godown/ yard of the contractor. In the event that these materials cannot unload at the contractor's godown/ yard due to logistics, insufficient space, etc., then materials shall be unloaded at the appropriate place as deemed fit by the owner. Shifting of materials from such temporary spaces/ places to the workplace of the contractor's godown shall be done by the contractor at his own cost and risk.

The quantity of requirement for consumptions shall be based on the indents raised by the contractor with a mutually agreed lead time for procurement and periodicity. The owner thereupon shall procure such quantities of materials indented and issue the same to the contractors. Any excess materials indented after considering the wastages indicated elsewhere in the tender, shall be recovered at the highest purchase cost (landed at the site) with a markup of 25%.

The contractor shall be fully responsible for the safe custody including preservation and stacking of materials supplied to him by the owner for incorporation in the works. The onus of testing of all owner supplied materials shall rest with the contractor; the cost shall be borne by the contractor.

The contractor shall return all scraps, wastage, unused leftover materials at designated storage points indicated by the owner/ consultant, neatly stacked and accounted for any point before certification of the pre-final bill.

42.7 RIGHT TYPE OF WORKMEN, PLANT AND MACHINERY, JIGS, TOOLS, ETC.

The contractor shall employ the right type of workmen, plant and machinery, jigs, tools, etc. to fabricate and or install all materials and equipment. They shall be fabricated and or installed without any damage and in accordance with the manufacturer's instructions and manuals and to the satisfaction of the Engineer-in-charge.

42.8 INSPECTION

All materials, equipment and workmanship shall be subject to inspection, examination and testing at all times and stages during construction, manufacture and or installation, by the Engineer-in-charge, consultants and they shall have the right to reject and order the removal and replacement of any defective material, equipment and or workmanship or require its correction and rectification. The contractor shall not proceed with any operation or sequence or trade of the works until the previous operation or sequence or trade has been inspected and approved by the consultant/ Engineer-in-charge.

No embedded items or any other work shall be covered up unless these have been inspected and approved by the Engineer-in-charge. The onus shall be on the contractor to get such inspections carried out and obtain such approvals. Should the contractor fail to comply with these requirements, then all additional or redoing of work necessitated as a consequence thereof shall be at the contractor's cost and expense. No inspection or approval shall relieve the contractor of any of his responsibilities, obligations and liabilities under the contract. No defective workmanship shall be repaired or patched up in any way without inspection and direction of the Engineer-in-charge.

Rejected workmanship shall be corrected and rectified and rejected materials and equipment shall be removed and replaced with proper, specified and required materials and equipment by the contractor to the approval and satisfaction of the consultant and Engineer-in-charge. The cost of all such correction and rectification and such removal and replacement shall be

to the account of the contractor and shall be borne by him and also, the contractor shall be responsible for all delays in this regard.

The contractor shall furnish promptly and without any charge, all facilities, access, labour, materials, plant and tools required and necessary for enabling the Engineer-in-charge, consultants to carry out inspections and tests in a safe and convenient manner.

42.9 TESTING

All the tests on materials, including those that are supplied by the owner, equipment and workmanship that shall be necessary in connection with the execution of the work, as decided by the Engineer-in-charge and as called for in the contract documents, shall be carried out at the cost of the contractor at the place of work or of manufacture or fabrication or at the site or at an approved testing laboratory or at all or any such places. The contractor shall provide all assistance, instruments, machines, labour and materials as are required for the examining, measuring and testing as described above and all expenses connected with the tests and as described above shall be borne by the contractor.

42.10 TEST CERTIFICATES

The contractor shall furnish, at his own cost, test certificates for the various materials and equipment as called for by the Engineer-in-charge. Such test certificates shall be for the particular consignment/ lot/ piece as decided by the Engineer-in-charge. The details in respect of the test certificates shall be as decided by the Engineer-in-charge for the relevant items.

42.11QUALITY ASSURANCE

The contractor shall establish an effective quality control system and implement the same through a special cell consisting of qualified experienced engineers and technical personnel to enforce quality control on all items of work at all stages. The details of same shall be furnished as called for.

43. SAMPLES, SHOP DRAWINGS

After the award of the contract, the contractor shall furnish for the approval of the consultant through Engineer-in-charge, all samples of materials and shop drawings called for in contract documents or required by the Engineer-in-charge. The samples and shop drawings shall be delivered as directed by the Engineer-in-charge. No extra payment shall be due to the contractor for submission of material samples and preparation of shop drawings. A schedule giving dates of the submission of samples and shop drawings shall be included in the time schedule.

43.1SAMPLE: Samples**/** materials approved by Engineer-in-charge, consultant/ owner shall be kept at the site under safe custody of Engineer-in-charge and on completion of the work handed over to the owner.

43.2 SHOP DRAWINGS: The contractor shall submit shop drawings to the consultants through Engineer-in-charge for scrutiny and approval. Shop drawings shall be submitted generally for those items of works as indicated in the BOQ and Technical Specifications. The contractor shall submit catalogues, manufacturers' drawings, equipment characteristics data and performance charts, etc., as required by Engineer-in-charge.

44. CONSTRUCTION PROGRAMME AND PROGRESS REPORTS

44.1 INTEGRATED PROGRAMME CHART

The contractor shall prepare integrated programme charts for the execution of the works, showing clearly all the activities of work required to be carried out from the commencement of the works up to their completion, with details of manpower and plant and machinery required for the fulfilment of the programme and submit the same for approval to the Engineer-in-charge within 2 weeks of the award of contract. Such programme charts shall be based upon and be within the parameters and time schedules enumerated in the master programme prepared by the Engineer-in-charge for the execution and completion of the overall projects works.

The programme chart of the contractor shall incorporate the milestones shown in the master programme and shall include the following:

a. Descriptive notes explaining the sequence of various activities.

b. Construction materials - status and mobilisation programme (fortnightly) for next fortnight.

c. Schedule of submissions by the contractor of samples and shop drawings.

d. Progress digital photographs (fortnightly)

Every week, or sooner if required by the Engineer-in-charge, the approved programme charts shall be reviewed in relation to the actual progress of work and shall be updated as necessary. If at any time, it appears to the Engineer-in-charge that the actual progress of the work does not conform to the approved programme, the contractor shall produce a revised programme showing the modifications to the approved programme and the additional input of resources by the contractor necessary to ensure completion of the works within the time stipulated for completion.

The submission to and approval by the Engineer-in-charge of such programme or the furnishing of such particulars shall not relieve the contractor of any of his responsibilities, obligations and liabilities under the contract.

44.2 SITE REGISTER AND DAILY REPORTS

The contractor shall submit daily site reports to the Engineer-in-charge in a prescribed format. The contractor shall also maintain at the site a works diary showing an accurate record of the progress of the work item-wise, the number of men employed under each trade, plant and machinery at site, the weather, temperature and other aspects having a bearing on the work. The works diary shall be made available for inspection by the Engineer-in-charge whenever called for.

44.3 WEEKLY PROGRESS REPORT

The contractor shall submit in duplicate to the Engineer-in-charge, in a format approved by the Engineer-in-charge, a weekly report giving an accurate record of the progress of the work, the number of men employed in each trade, list of plant and machinery at site, the weather, temperature, visitors to the site and any other events influencing the progress of the work. Photographs shall be submitted along with all such reports, pictorially demonstrating the progress of the work, every fortnight.

45. BUREAU OF INDIAN STANDARDS

A reference made to any Indian Standard specifications in the contract documents shall imply reference to the latest version of that standard, including such revisions/ amendments as may be issued, during the currency of the contract, by the Bureau of Indian Standards and the corresponding clause/s therein shall hold valid in place of those referred to. The Contractor shall keep copies of all latest publications of relevant Indian Standard specifications applicable to the works at the site, as listed in the specifications.

Amendments to BIS codes announced before the finalisation of the contract shall be followed. Financial implications if any, due to the same, will be taken into consideration.

46. TOLERANCES

The contractor shall exercise every care to ensure that all structural members are plumb and true to line level and dimensions called for on the drawings, for the purposes of structural requirements as well as in order to receive finishes, equipment and similar items. The details of the finishing items are based upon allowing tolerances as per the most stringent requirements laid down in the contract documents/ Indian Standard specifications/ Best Trade Practices and the limits of tolerances shall be in strict conformity with such Documents and Standards. Any variations beyond such limits shall require, in accordance with the directions and to the approval of the Engineer-in-charge, rectifications in the structural members and or wall openings or the remaking or replacing of the finishing elements and or equipment, fabricated to fit into the openings or spaces shown on the drawings. All such rectification or remaking or replacing of work shall be carried out by the contractor at his own cost and expense and he shall be responsible for all delays in this regard. All such costs and expenses shall be recovered from the contractor and shall be deducted by the owner from any money that may be payable or that may become payable to the contractor.

In case of separate contracts and nominated sub-contracts, the contractor or sub-contractor whose work does not conform to the dimensions and limits of tolerances specified in the contract documents and or the Indian Standard specifications shall be liable for all costs and expenses incurred for rectifications and or replacements of any other contractor's and or sub-contractor's work required, in accordance with the directions of the Engineer-in-charge, for the proper installation of the finishing elements and or equipment, and or for this respect shall be final and binding on the contractors and sub-contractors, from the pertinent contractors and sub-contractors and shall be deducted by the owner from any money that may be payable or that may become payable under the contract to such pertinent contractors and sub-contractors.

47. PROTECTION AND CLEANING OF WORKS AND CLEARING OF SITE

47.1 PROTECTION OF WORKS

The contractor shall take full responsibility for the proper care and protection of the works from the commencement of work till completion and handing over of work to Engineer-in-charge. The contractor shall protect and preserve the works in every way from any damage, fire or accident, including by providing temporary roofs, boxing, suitable nets to protect against falling particles or other construction as required by the Engineer-in-charge. This protection shall be provided for all property on the site as well as adjacent to the site. The contractor shall adequately protect to the satisfaction of the Engineer-in-charge, all the items of finishing work to prevent any chipping, cracking, breaking of edges or any damage of any kind whatsoever and to prevent such work from getting marked or stained or dirty. Should the contractor fail to protect the works or any part thereof and should any damage be caused

to the same, the contractor shall be responsible for all replacement and rectification, as directed by the Engineer-in-charge and all costs and expenses in connection with such replacement and rectification shall be to the account of the contractor and shall be borne by him.

The contractor shall in connection with the works provide and maintain at his own cost all lights, security guards, fencing and anything else necessary for the protection of the works and for the safety of the public and everyone associated with the works, all to the approval and satisfaction of the Engineer-in-charge.

All operations necessary for the execution of the works shall be carried out so as not to interfere with the convenience of the public, or with the traffic, or the access to use and occupation of public or private roads and foot paths or of properties whether in the possession of the owner or of any other person. The contractor shall save harmless and indemnify the owner in respect of all claims, proceedings, damages, costs, charges, and expenses whatsoever arising out of or in relation to any such matters.

47.2 CLEANING OF WORKS AND CLEARING OF SITE

The contractor shall maintain the site and all works thereon in neat, clean and tidy conditions at all times. The contractor shall properly clean the work as it progresses and shall remove all rubbish and debris from the site at all levels on daily basis and as directed by the Engineer-in-charge.

Just prior to the virtual completion of the works, or whenever so directed by the Engineer-in-charge, the contractor shall carry out all the work necessary to ensure that the site is clear and the works are clean in every respect, the surplus materials, debris, sheds and all other temporary structures are removed from the site, the areas under floors are cleared of rubbish, the gutters and drains are cleared, the doors and sashes are eased, the locks and fastenings are oiled, all electrical, plumbing and other services are tested and commissioned, the keys are clearly labelled and handed to the Engineer-in-charge, so that at the time of virtual completion the whole site and the works are left fit for immediate occupation and use, to the approval and satisfaction of the Engineer-in-charge.

Should the contractor fail to comply with the cleaning requirements, whether progressively or before completion or fail to clear the site as directed and required, then the Engineer-in-charge, after giving due notice in writing to the contractor, shall have the right to employ other persons or agencies to carry out the cleaning and or clearing work and all costs incurred on such work shall be recovered from the contractor and shall be deducted by the owner from any money that may be payable or that may become payable to the contractor.

47.3 DEBRIS CHUTE

The contractor at his own cost shall construct a closed chute meant for dumping debris generated during construction activities. Chute shall be dismantled and cleared before handing over to the site. Debris collected shall be cleared off the site at regular intervals in order to keep the site free of debris.

48. METHOD OF MEASUREMENT

For measuring of all work, the standard method of measurement in accordance with the standards laid down by the Bureau of Indian Standards (IS: 1200 - latest version) shall be followed. However, if definite methods of measurements are stipulated in the schedule of

quantities or other documents, then the same shall supersede BIS methods and shall be followed. In the event of any dispute with regard to the method of measurement of any work, the decision of the consultant/ Engineer-in-charge shall be final and binding and no extra claims shall be entertained or allowed at any stage in this regard. Where measurements and or levels need to be verified and recorded by the Engineer-in-charge prior to the contractor proceeding with the work, the onus shall be on the contractor to get such measurements and or levels verified and recorded by the Engineer-in-charge.

49. COVERING UP

The contractor shall give at least seven working days clear notice to the Engineer-in-charge before covering up any of the work in foundations or any other such areas in order that proper measurements may be taken of the work as executed. In the event of the contractor failing to provide such notice he shall, at his own expense, uncover such work as required to allow the measurements be taken and thereafter shall reinstate the work to the satisfaction of the Engineer-in-charge.

50. PAYMENTS AND SECURED ADVANCE

50.1 PAYMENTS FOR EXECUTED WORK

a. The bill shall be duly supported by detailed measurements and sketches as required, if the bills are not submitted along with the supporting documents consisting of but not limited to reconciliation statement for owner-supplied materials, supporting checklists, drawings showing coloured portions for which bill is claimed, joint measurement records, etc., then the date of submission of all relevant supporting documents would be considered as the date of submission of the bill.

The contractor on submitting the bill is entitled to receive payment proportionate to the part-work thereof executed to the satisfaction of the Engineer-in-charge whose certificate of the sum so payable shall be final and conclusive against the contractor. All such intermediate payments shall be regarded as payments by way of advance against the final payment only and not as payments for work actually done and completed and shall not preclude the requiring of bad, unsound and imperfect or unskilled work to be removed and taken away and reconstructed or re-erected or be considered as an admission of the due performance of the contract or any part thereof in any respect or the accruing of any claim nor shall it conclude, determine or affect in any way the powers of the Engineer-in-charge under these conditions or any of them as to the final settlement and adjustment of the accounts or otherwise or in any other way vary or affect the contract.

The final bill shall be submitted by the contractor within one month of the date of the certificate of completion of the work or of the date of the certificate of completion furnished by the Engineer-in-charge and payment shall be made within a period of as stipulated elsewhere in the document.
The contractor shall submit a list of the disputed items within thirty days from the disallowance thereof and if he fails to do this his claim shall be deemed to have been fully waived and absolutely extinguished.

No further claim shall be made by the contractor after submission of the final bill and these shall be deemed to have been waived and extinguished.

b. From every interim bill, a sum equal to five per cent (5%) of the value of work done shall be deducted and held as retention money by the Engineer-in-charge. 50% of the retention money shall be released to the contractor after virtual completion of work against

submission of Bank guaranty equal to 5% of retention money.. The balance of 50% shall be released along after the expiry of the defects liability period. Such amounts withheld, as retention money by the Engineer-in-charge shall not carry any interest over the principal amount whatsoever.

c. The contractor shall submit all bills in the approved format (hard and soft copies) duly supported by detailed measurements and the charges in the bills shall always be entered at the rates specified in the contract or in the case of any extra work ordered in pursuance of these conditions and not mentioned or provided for in the tender at the rates hereinafter provided for such work.

All payments due under the contract shall be paid within 15 days of bill certification by means of the crossed cheque to the contractor account payee only.

51. WITHHOLDING OF PAYMENTS

The Engineer-in-charge may withhold payment or, on account of subsequently discovered evidence, nullify the whole or a part of any payment certificate to such extent as may be necessary to protect the owner from loss on account of the following:

1. Defective work was pointed out by the consultant and Engineer-in-charge and not remedied by the contractor.

2. Failure of the contractor to make payments properly and regularly to his own workers, to his sub-contractors, to his suppliers, or to nominated sub-contractors.

3. Damage by the contractor to the work of other contractors or sub-contractors.

4. A reasonable doubt that the contract cannot be completed for the balance unpaid amount.

5. A reasonable doubt that the contractor intends to leave work/items incomplete.

6. Failure of the contractor to execute the works in conformity with the contract documents.

7. Failure of the contractor to meet or keep up with the approved construction programme and the milestone events.

8. Failure of the contractor to comply with and fulfil all contractual obligations and liabilities stipulated in the contract documents.

9. Poor housekeeping.

10. Not adhering to safety norms.

52. RECTIFICATION OF IMPROPER WORK NOTIFIED BY AUTHORITIES

If it shall appear to the consultant or Engineer-in-charge that any work has been executed with unsound, imperfect or unskilful workmanship or with materials of any inferior description to that contracted for or otherwise not in accordance with the contract, the contractor shall on demand in writing forthwith rectify or remove and reconstruct the work so specified in whole, or in part as the case may require to remove the materials or articles so specified and provide other proper and suitable materials or articles at his own proper charge and cost.

53. VARIATIONS, ADDITIONS, DELETIONS IN THE WORKS

If at any time during the execution of the works, it is deemed expedient or necessary by the Engineer-in-charge, on the written instructions of the consultant, to order materials or work of a different description or nature from that specified, or to alter their situation, or vary the form or dimensions of the works or of any part thereof, or to substitute one class of work for another, or to change the sequence for the different portions of work to be executed, he shall have full powers to do so and to order and direct any such variations or additions or deletions in the works.

Such variations or additions or deletions in the works shall not annul this contract in any way. The time for the completion of the work shall be extended in the proportion that the altered, additional, substituted work bears to the original contract work as certified by Engineer-in-charge.

The rates for all additional, altered or substituted work shall be determined in accordance with the following provisions and order of precedence:

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

b. If the rates for the additional, altered or substituted work are not specifically provided in the contract for the works, then such rates shall be derived from the rates that are specified for a similar class of work in the contract. The Engineer-in-charge's interpretation as to what is a similar class of work and his decision on the method in which the rate is to derived shall be final and binding on the contractor.

c. If the rates for the additional, altered or substituted work cannot be determined in the manner specified in sub-clauses (a) and (b) above, then the rates for such work shall be determined on the basis of required consumption of materials and required use of labour and plant and machinery, as detailed below:

1. Cost of materials supplied by the contractor, at prevailing market rates, actually Incorporated in the work.

2. Cost of labour actually used at the site on the work, at prevailing rates of labour.

3. 3%(Three per cent) for plant, tools & tackles and types of machinery etc.,

4. 10% (Ten per cent) of the actual costs in respect of (i), (ii) and (iii) towards Contractor's establishment, safety, overheads and profit. Applicable taxes will be paid At the prevailing rate.

But if the contractor and the Engineer-in-charge cannot agree on a rate as determined in accordance with this sub-clause, then the Engineer-in-charge may order and direct the work to be carried out by such other persons or agencies as he may think fit and such other persons or agencies shall be permitted by the contractor to enter upon the works for the purpose of carrying out such work. The contractor shall not be entitled to any payment whatsoever in connection with such work.

The contractor should submit the analysis before commencement of works or within 7 days from the date of instruction given to him. Before any extra work or work of an altered value or class is undertaken by the contractor, he shall procure an order in writing from the Engineer-in-charge for carrying out such extra or variation work. The contractor shall not be entitled to any payment for such extras or variations unless he produces the written order for the same. The contractor shall not be entitled to plead that the Engineer-in-charge did not provide such written order, as it is to be distinctly understood that the responsibility for obtaining such order shall be that of the contractor.

Note: The KSSFCL will not accept any price/cost escalation whatever may be the reason other than the price/rate agreed in the work order.

The contractor shall not be entitled to any other rates than the rates in the contract for the works on any plea that the work was in a different position or of a different class from or in a more difficult position than that shown on the drawings or described in the specifications or schedule of quantities or carried out under circumstances not contemplated in the specifications or schedule of quantities or other contract documents, or for any other such reason.

The contractor shall at monthly intervals submit to the Engineer-in-charge an account giving particulars, as full and detailed as possible, of claims for any variations or additional work ordered in writing by the Engineer-in-charge and which the contractor has executed during the preceding month.

The Engineer-in-charge shall after carrying out the necessary checks in accordance with the terms of the contract, reject or alter or certify as the case may require, such claims. No claim for any such work will be considered which has not been included in such particulars. Any claim not included in the final bill shall be deemed to have been waived.
VIRTUAL COMPLETION OF WORKS

The works shall be considered as virtually complete only upon fulfilment of the procedure laid down in the relevant clause and only after the works have been completed in every respect in conformity with the contract documents and after all the systems and services have been tested and commissioned and after the site has been cleared and the works cleaned as called for and when the Engineer-in-charge has certified in writing that the works are virtually complete. The defects liability period shall commence from the date of such certificate of virtual completion.

Before virtual completion, should the owner decide to occupy any portion of the works or use any part of any equipment, the same shall not constitute an acceptance of any part of the works or of any equipment unless so stated in writing by the Engineer-in-charge.
Prior to the issue of the virtual completion certificate, the contractor shall submit and hand-over to the Engineer-in-charge the keys to all locks, all operation and maintenance manuals for systems and services, any spares called for in the contract and everything else necessary for the proper use and maintenance of the works complete with all systems and services.

55. TIME FOR COMPLETION

55.1 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 commencement of work. The work shall be carried out with due diligence throughout the stipulated period of the contract. The contractor shall prepare a time schedule keeping in view the completion period stipulated for specific portions of work and also the overall completion time and submit the proposed schedule for the approval of the Engineer-in-charge.

55.2 NO COMPENSATION FOR DELAYS

The contractor shall not be entitled to any compensation for any loss suffered by him on account of delays in commencing or in executing or in completing the works, whatever might be the cause of the delay. Such delays shall include but not be limited to delays for which extension of time may be granted or delays arising out of modification to the work entrusted to the contractor or in any sub-contracts connected therewith or delays in awarding contracts for other trades of the project or in commencement or completion of such works or in procuring government-controlled or other buildings materials or in obtaining water and power connections for construction purposes or for any other reason whatsoever, no claim in respect of compensation or otherwise, as the result of extension granted under above clause shall be admitted.

56. PROPRIETARY OF EXECUTED WORK

All executed work, whether in part or in whole, shall be the exclusive property of the owner. The contractor or any of his sub-contractors or their employees or workmen shall not be entitled to the use of any such work except for the purpose of carrying it out under the contract. The owner shall have the right to occupy and take over the works or any part thereof at any time during the progress of the works or upon their completion, irrespective of any pending claims or disputes that the contractor may have against the owner..

57. INDEMNITY

The contractor shall indemnify the owner from and against all actions, suits claims 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 nominated sub-contractor(s) or their employees or workmen in the execution of or in connection with the works of 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 nominated sub-contractor(s) or their employees or workmen for anything done or omitted to be done in the execution of the works under this contract.

58. CORRECTION OF WORK BEFORE VIRTUAL COMPLETION OF WORKS

The Engineer-in-charge, consultant and consultants and representative of the owner shall jointly conduct an extensive inspection just prior to the virtual completion of the works and shall prepare a list of materials, equipment and workmanship which are defective or damaged or of substandard quality or improperly executed or generally unacceptable due to not being in conformity with the requirements stipulated in the contract documents. The contractor shall promptly remove, replace, re-execute, rectify and make good, to conform to the requirements stipulated in the contract documents and to the satisfaction of all concerned, all such materials, equipment and or workmanship/ items included in the said list and the contractor shall bear and pay for all expenses in connection therewith and consequent thereon and incidental thereto, including the cost for all remedial work on the work of other contractors destroyed or damaged by such removal, replacement, re-execution, rectification and making good. If the contractor fails to remove, replace, re-execute, rectify and make good the rejected materials equipment and or workmanship within a reasonable time, fixed by written notice, Engineer-in-charge may employ and pay other

persons or agencies to carry out such removal, replacement, re-execution, rectification and making good and all expenses incurred in connection therewith, including all damages, losses and expenses consequent thereon and incidental thereto shall be recovered from the contractor and shall be deducted by Engineer-in-charge from any money that may be payable or that may become payable to the contractor.

59. DEDUCTIONS FOR UNCORRECTED WORK

If the Engineer-in-charge, deems it inexpedient to get corrected or rectified any work of the contractor which is defective or damaged or of substandard quality or is generally not in accordance with the contract documents, then an equitable and appropriate deduction shall be made therefore from the contract sum and the Engineer-in-charge's decision in this respect shall be final and binding on the contractor.

Furthermore if, by reason of any accident, or failure, or other event occurring to, in or in connection with the works, or any part thereof, either during the execution of the works or during the defects liability period, any remedial or other work or repair shall, in the opinion of the Engineer-in-charge, be urgently necessary for the safety of the works and the contractor is unable or unwilling to immediately do such work or repair, the owner may employ and pay other persons or agencies to carry out such work or repair as the Engineer-in-charge may consider necessary. If the work or repair so done by other persons or agencies is work which, in the opinion of the Engineer-in-charge, the contractor was liable to do at his own expenses under the contract, then all expenses incurred by the owner in connection with such work or repair shall be recovered from the contractor and shall be deducted by the owner from any money that may be payable or that may become payable to the contractor.

60. LIQUIDATED DAMAGES

The contractor shall pay the owner 1 (One) per cent of the contract sum per week of delay, limited to Five per cent. 1.5 (One and a half) per cent of the contract sum by way of liquidated damages for each week that the works remain incomplete in any way whatsoever after the contract date for virtual completion of the works Extension of date completion (if any) is granted for completing the balance works only. LD will be calculated based on the date of completion in the work order only, unless & otherwise clarified in writing by MD of IMTMA. The liquidated damages stated above shall be applicable separately for each phase of completion called for subject to the limitation on the total amount as specified above.

61. GUARANTEES

Besides the guarantees required and specified elsewhere in the contract documents, the contractor shall in general guarantee all work executed by the contractor and the sub-contractors and nominated sub-contractors for a period of one year from the date of issue of the virtual completion certificate. Those parts of the works or equipment or installations, for which extended guarantee periods are stipulated elsewhere in the contract documents, shall be guaranteed for such periods that are so stipulated. The duration of the defects liability period, unless specified otherwise, shall be the extent or length of such guarantee periods.

Where, during such guarantee periods as mentioned above, any material or equipment or workmanship or generally any item of work fails to comply or perform in conformity with the requirements stipulated in the contract documents or in accordance with the criteria and provisions of the guarantee, the contractor shall be responsible for and shall bear and pay all costs and expenses for replacing and or rectifying and making good such materials, equipment, workmanship and items of work and in addition, the contractor shall be also responsible for and shall bear and pay all costs and expenses in connection with any damages and or losses suffered as a consequence of such failure.

All guarantees required under the contract shall be in the format approved and submitted to the Engineer-in-charge by the contractor when requesting certification of the final bill.

62. DEFECTS LIABILITY

62.1 MAINTENANCE BY CONTRACTOR DURING DEFECTS LIABILITY PERIOD

All defective items of work and defects noticed and brought to the attention of the contractor during the defects liability period shall be promptly and expeditiously attended to and replaced and or rectified and made good by the contractor at his own cost, to the complete satisfaction of the Engineer-in-charge. In this connection, the contractor shall, during the defects liability period, maintain at all times at site a crew of supervisory staff and an adequate number of workmen of appropriate trades. The contractor shall replace and or rectify and make good, at his own cost and to the satisfaction of the Engineer-in- charge, all defective items of work and defects arising, in the opinion of the Engineer-in-charge, from materials, equipment and or workmanship not performing or being in accordance with the drawings or specifications or schedule of quantities or the instructions of the Engineer-in-charge or other contract documents or the best engineering and construction practices and which may appear or come to notice within one year after virtual completion of the works that is within the defects liability period of one year from the date of issue of the virtual completion certificate.

The contractor shall be also liable for all costs associated with damages and or losses which are a consequence of such defective items of work and defects and such costs shall be recouped by Engineer-in-charge from the contractor and shall be recovered from the retention held and or from the contractor's final bill (if the final bill has not been certified and paid for at the time).

In respect of those parts of the works for which extended guarantee periods are stipulated elsewhere in the contract documents, the defects liability period for such parts of the works shall be up till the end of the respective guarantee period that is stipulated for each such part.

63. FINAL COMPLETION OF WORKS

The works shall be considered as finally complete at the end of the defects liability period subject to the contractor having replaced and or rectified and made good all the defective items of work and defects in accordance with the clause above, to the satisfaction of the consultant and provided that the contractor has performed all his obligations and fulfilled all his liabilities under the contract and when the Engineer-in-charge has certified in writing that the works are finally complete. Such final completion in respect of those parts of the works, for which extended guarantee periods are stipulated elsewhere in the contract documents, shall be achieved at the end of such stipulated guarantee periods.

64. FORCE MAJEURE

The right of the contractor to proceed with the work shall not be terminated because of any delay, subject to the time limits set forth in this clause, in the execution of the work due to unforeseeable causes beyond the control and without the fault or negligence of the contractor, or the sub-contractors, defined under force majeure, as acts of God, or that of the public enemy, restraints of governing states, fires, floods and unprecedented extreme weather.

If the contractor is wholly prevented from the performance of the contract for a period in excess of 30 (thirty) consecutive days because of a force majeure, the owner may terminate this contract by 15 (fifteen) days written notice delivered to the contractor and if the period of the force majeure exceeds 120 (one hundred and twenty) consecutive days, the contractor may terminate this contract by 15 (fifteen) days written notice to the owner.

In the event this contract is so terminated, the contractor shall be paid for the costs of the work actually executed up to the date of termination. Such costs shall not include for loss of profits or for any other expenses of the contractor or sub-contractors such as salaries or wages of the employees or workers, hire charges for plant and machinery, expenses towards the maintenance of establishment, or any other expense. Failure to agree on an equitable settlement shall be deemed to be a dispute.

65. SUSPENSION OF WORKS

a. The contractor shall, on receipt of the order in writing of the Engineer-in-charge, suspend the progress of the works or any part thereof for such time and in such manner as the Engineer-in-charge may consider necessary for any of the following reasons:

i) On account of any default on the part of the contractor; or

ii) For proper execution of the works or part thereof for reasons other than the default of the contractor; or

iii) For the safety of the works or part thereof.

The contractor shall, during such suspension, properly protect and secure the works to the extent necessary and carry out the instructions given on that behalf by the Engineer-in-charge.

If the suspension is ordered for reasons (ii) and (iii) in sub-para (a) above. The contractor shall be entitled to an extension of time to be mutually agreed upon.

66. TERMINATION OF THE CONTRACT BY THE OWNER

If the contractor shall be adjudged bankrupt or if he should make a general assignment for the benefit of his creditors, or if a receiver shall be appointed on account of his insolvency, or if he should persistently or repeatedly refuse to carry out the work diligently, or if he should fail to provide enough properly skilled workmen or proper materials or equipment or plant and machinery or tools or anything else necessary for the progress of the works in accordance with the approved construction programme, or if he should fail to make prompt payments to sub-contractors or to suppliers for materials or equipment or to his workers, or if he should persistently disregard laws or ordinances or instructions of the Engineer-in-charge, or if he should be guilty of a violation of breach of any provision of the contract, or if he has abandoned the contract, or if he has failed to commence the works, or if he has suspended the works if he has not followed any statutory compliances, then the Engineer-in-charge on the basis that sufficient cause exists to justify such action, may without prejudice to any other right or remedy and after giving the contractor seven days' notice in writing, terminate the employment of the contractor and take possession of all materials, equipment, tools and plant and machinery thereon and use these as owner's property for the completion of the works if not removed from the site within 7 days of notice. In such case, the contractor shall not be entitled to receive any further payment until the work is completed.

If the amount due to the contractor for the work carried out by him as per the contract terms exceeds the expenses, including for additional management and administrative services, for completing the works and in respect of the damages and or losses suffered by the owner due to the contractor's default, then such excess shall be paid to the contractor within three months of the final completion of the works. If such expenses for completing of the works and in respect of the damages and or losses suffered exceed such amount due then the contractor shall pay the difference to the owner within one month of receiving the notification to that effect from the Engineer-in-charge. The expenses incurred by the Engineer-in-charge for completing the works and in respect of the damages and or losses suffered by him due to the contractor's default shall be certified by the Engineer-in-charge and his decision on this matter shall be final and binding on the contractor.

67. RESOLUTION OF DISPUTES/ ARBITRATION

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

Arbitration

The owner as the sole arbitrator shall finally settle all disputes arising in connection with the present "CONTRACT" which cannot be settled by mutual negotiations.

The venue of arbitration proceedings shall be **Bengaluru.**

It is also a term of this contract that if the contractor does not make any demand for appointment of an arbitrator in respect of claims in writing within 90 days of receiving the intimation that his final bill is ready for payment, the claim of the contractor will be deemed to have been waived and absolutely barred and the owner shall be discharged and released of all liabilities under the contract, in respect of the claims.

68. JURISDICTION

All matters arising out of or in any way connected with this contract shall be deemed to have arisen in Belagavi and only the courts in Belagavi shall have jurisdiction to determine the same.

69. CO-ORDINATION OF WORK

At the commencement of work, and from time to time, the Contractor shall confer with other contractors, sub-contractors, persons engaged on separate contracts in connection with the project works, the suppliers, and with consultant / Engineer-in-charge for the purpose of the Co-ordination and execution of various phases of the project works.

The contractor shall determine and ascertain from the other Contractors, sub-contractors and persons engaged on separate Contracts, in connection with the project Works, the extent of all chasing, cutting and forming of all openings, holes, details of all inserts, sleeves, etc. that are required to accommodate the various services.

The Contractor shall determine and ascertain the routes of all services and the positions of all floor and wall openings, outlets, traps, the details of all inserts, equipment and services and shall carry out the construction and making good of all "builder's work" in accordance with and as shown, described and/or measured in the Drawings, specifications, Schedule of Quantities and other Contract Documents. Also, the contractor shall ensure that all required services, inserts, sleeves, embedment etc. are in place/position before he proceeds with his work. Should the Contractor fail to comply with these requirements and the consequence of such failure necessitates the breaking, re-doing and making good of any work, then the cost of all such breaking, re-doing and making good of any work shall be to the account of the contractor and shall be borne by him. No breaking and cutting of completed work shall be done unless specifically authorised in writing by the consultant / Engineer-in-charge. 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, as determined by the Engineer-in-charge.

TENDER DOCUMENT

PART: 2 - FINANCIAL BID

SPECIFICATIONS OF THE MATERIALS: -

The Electrical contractor shall supply the materials of the following makes & shall quote the rates applicable to them. Fill in the last column about his makes to be used.

MATERIAL	MAKES RECOMMENDED
1) PVC wires- FRLS	Polycab / Finolex / RR
2) Cables	Polycab / Finolex / RR
3) Telephone & Coaxial Cable	Polycab / Finolex / RR
4) Casing & Capping	Modi / Presto-plast / Zeolite
5) PVC pipe/ accessories	Precision / Finolex / Jain
6) Al. lugs	Dowels / CTI / Jainsons
7) Cable glands	Dowels / Jainsons / Braco
8) Switches (Modular)	Legrand Arteior / Anchor Roma
9) Switches (regular)	Anchor Penta / Vinay calir 10
10) MCB/DB Indo	Legrand Lexic DX series/ Merlin-Gerin / Asia
11) Under floor Raceways or Cable Management System	Legrand / Honeywell

12)Light Fittings	Philips / Havells / Crompton / Wipro
13)Ceiling Fan - 28 W	Crompton / Havells / Usha (BLDC Only)
14)Exhaust Fan	Almonard / Crompton / Usha / Havells
15)Earth strip/wire	EC Grade only
16)CAT-6 Cable	D-link / Digisol
17)Cable Trays	Profab / Asian / Fabricated at site
18)MV Switchgear	
a) MCCB	ABB / Siemens / L & T/ Schnieder
b) S.F.Unit	ABB / Siemens / L & T / Schnieder
c) HRC Fuses	ABB / Siemens / L & T / Schnieder
d) Contactors	ABB / Siemens / L & T / Schnieder
19)Meters (digital)	Conserve / HPL / Enite / Selec
20)Indicating lamps (Only LED type)	Teknic / Telemecanique
21)CT S / PT S	Kappa / AE / Pragati / Reco
22) Capacitors	Ducati / Prabodhan / Subodhan
23)PF Relay	Syntron / Ducati
24)Connectors	Wago / Connect well.
25)Transformer	Power Engineer / Silverline/ Transfab

26)VCB	PCE / Megawin/ ABB (With all protections like HT Meters, Relays, Indicators, CT/PT, etc.)
27)Meter Cubical	Huppen
28) LBS	PCE / ABB / KEB Approved
29)Any other	TO BE APPROVED BY CONSULTANT

Above makes of materials are indicative. This shows the requirement of acceptable quality for work to be executed. The contractor shall get each & every material approved by the Electrical Consultant, before execution of the work. Some items listed above may not be in Contractors / Panel Builder scope.

Quantities mentioned in the BOQ are also indicative, may very to any tune at the time of execution. Any item in part or in whole may get deleted at the time of execution.

Test certificates of all materials are to be submitted by Contractor time to time used at site by him.

Liasioning means the Co-ordination of Electrical Inspector, Drawings to be submitted to the same Office, any submission to MSEDCL etc. shall be in the scope of the Electrical Contractor. In all respect contractor to get charging of connection at all respect.

LIST OF APPROVED BRANDS / MAKES INTERIOR & FURNISHING

The Interior Works Subject To Approval of Samples by the Consultants / KSSFCL
All the Materials Used Have to Confirm To Green Interior Norms of IGBC

Sl No	LIST OF MAKE	BRAND / MANUFACTURER
1	PLYWOOD	Century ply/ Greenply/Merino/Trojan Ply or Equivalent
2	FLEXIBLE PLYWOOD	Century ply/ Greenply/Merino/ Trojan Ply or Equivalent
3	LAMINATE	Merino/Archid/Century ply/ Greenply or approved FSC equivalent
4	FLUSH DOORS	Century ply/Ambi Ply Greenply or approved FSC equivalent
5	VENEER	Century ply/ Greenply/Merino or Equivalent
6	LOCKS	Dorma/Dorset/D-line/ IR/ Hager/ Hafele/ Union/ Hettich/ Blum or Approved Equivalent
7	DOOR CLOSURE/ FLOOR SPRINGS	Dorma /Ozone/Dorset/ D-line/ Union/ Hafele/ / or Approved Equivalent
8	HANDLES	Ozone/Godrej/Doorset/Assaalbay or Equivalent
9	HINGES	Ozon/ Dorma/ IR/ Union/ Hager /Hafele/Hettich/Blum or Approved Equivalent
10	PROPRIETARY SLIDDING/ FOLDING DOORS	Ozone/Dorma or approved equivalent
11	PATCH FITTINGS	Ozone/Dorma/ Union or Approved Equivalent
12	GLASS / MIRROR	Saint Gobain/ Modi float / Ashai or Approved Equivalent
13	SCREWS	Nettle fold make / Equivalent confirming to IS 1365
14	ALUMINIUM SECTIONS	Jindal/Bhoruka/Hindalco
15	ALUMINIUM CLEATS (3mm)	Jindal/ Bhoruka/ Hindalco
16	GRANITE\MARBLE SLABS	First Quality, Water-cut type of or Approved Equivalent
17	ITALIAN MARBLE SLABS	First Quality, Resin bonded, Imported or Approved Equivalent
18	ETCHING, FROSTING FILM/ VINYL SHEETS	3M or Approved Equivalent
19	DIGITAL PRINTED VINYL	3M or Approved Equivalent
20	EMULSION// LUSTER/ ENAMEL PAINTS/	Berger/ Nerolac/ Asian/ J & N/Jotun/ICI or Approved Equivalent
21	PRIMER	Berger/ Nerolac/ Asian/ J & N/Jotun/ICI or Approved Equivalent
22	PUTTY FOR PAINT	Asian / Birla Wall Putty, Epoxy, Thin coating Putty or Approved Equivalent
23	VINYL/ ANTI-STATIC FLOOR	Amstrong/ Gerflor/Tarkett/Forbo or Approved Equivalent

Sl No	LIST OF MAKE	BRAND / MANUFACTURER
24	RUBBERISED VINYL FLOOR	Amstrong/ Gerflor/Tarkett/Forbo or Approved Equivalent
25	OFFICE SEATINGS	Godrej / Featherlite / Eurosit or Equivalent
26	CORIAN HARD SURFACE	Merino Hanex / LG / or Equivalent
27	WRITING BOARD	White Mark Boards
28	ADHESIVES	Fevicol SH or Approved Equivalent
29	SLIDING CHANNELS	Hager/ Hettich/ Hafele or Approved Equivalent
30	POWDER COATING PAINT	MRF/ Marpol/ Berger
31	GRG, PLAIN GYPSUM BOARD, SUSPENSION	India Gypsum Ltd/Gyproc
32	UNIVERSAL GYP PLASTER	India Gypsum Ltd/Gyproc
33	PVC SPACERS/ CORNER BEADINGS	Arpitha Exports/ BOSS/Johnsonite or equivalent
34	GRG/ MR Grade/ GYPSUM BOARD WITH SUSPENSION SYM	India Gypsum Ltd/Gyproc
35	CALCIUM SILICATE BOARD WITH SUSPENSION SYM	Hilux - Ramco Industries Ltd
36	FALSE CEILING SUSPENSION SYSTEM	India Gypsum Ltd/Gyproc/ AMSTRONG
37	UNIVERSAL GYP PLASTER (PUNNING)	India Gypsum Ltd/Gyproc
38	STAINLESS STEEL SINK	AMC/ Nirali or Equivalent
39	CERAMIC TILES	Kajaria World/ H& R Johnson/ Somany/Nitco
40	VITRIFIED TILES	Johnson/ Nitco/ Bell/ Euro/Kajaria/Somany
41	SELF-LEVELLING COMPOUND FOR FLOOR	Roffee/ Fosroc or approved equivalent
42	POLYMER BASED CEMENTITOUS GROUTS	Laticrete/ Bal Endura or approved equivalent
43	FIRE RATED DOORS	Signum/ Promat or approved equivalent
44	STEEL FIRE RATED DOORS	Signum/ Shakti-Met-Dor or approved equivalent
45	PLASTER MESH	Arpitha Exports or Approved Equivalent
46	WHITE CEMENT	Birla White/ JK or approved equivalent
47	IMPORTED VITRIFIED TILES	Euro/ RAK or Approved Equivalent

TECHNICAL SPECIFICATIONS

This section includes Technical Specifications for following equipments/works.

1. VRV ODU System
2. High Wall Splits
3. Cassette Splits.
4. Insulation –Piping
5. Electrical
6. Standards

The section includes Data sheets. Bidders have to complete the data sheets & submit the same with the offer.

VARIABLE REFRIGERANT VOLUME SYSTEM (VRV)

SCOPE:

All variable Refrigerant Volume Air Conditioners shall be fully Factory assembled, charged with refrigerant wired, piped and tested at the factory.

The system shall comprise of Air Cooled Multi Split type Outdoor units, and a variety of indoor units connected by common Refrigerant piping and Power and Control Cabling.

The appropriate Indoor units are detailed below, however the Units offered shall be as per the Bill of Quantities. The out door unit configuration may be modified by the Bidder giving the same tonnage as specified.

SPECIFICATION OF VARIABLE REFRIGERANT VOLUME SYSTEM(VRV):

GENERAL:

The system selected is a modular system, with number of indoors connected to centrally located outdoor units, as per detailed design given in the tender. The outdoor units for all the system shall be air cooled type and mounted on the terrace of the building. Indoor units in various areas shall be as per enclosed drawings/Bill of Quantities.

Whenever feasible in open spaces or large rooms the indoor units shall be logically split and connected to separate outdoor units.

All the VRV air conditioners shall be fully factory assembled, wired, internally piped and tested. The outdoor unit shall be pre-charged with first charge of R 410 a refrigerant. Additional charge shall be added as per refrigerant piping at site. All the units shall be suitable for operation with 415 V +_ 10%, 50 Hz +_ 3%, 3 phase supply for outdoor units & 220 V +_ 10%, 50 Hz _+ 3%, 1 Phase supply for in door units.

The VRV system shall provide stable, trouble free & safe operation, with flexibility of operating desired indoor units. The outdoor units must be capable of delivering exact capacity proportional to the number of indoor units switched on & the heat load in the air conditioned area. The proportional operation shall be achieved by varying speed of the compressor in the outdoor units.

The system should have variable refrigerant temperature facility to reduce power consumption.

The operation of the VRV system shall be through independent remote controllers as specified. The entire system shall be controlled by a system controller and shall be compatible to be integrated through a BACNET protocol with an intelligent building management system. The system controller shall be able to control start/stop on time schedule and also provide common fault from the system. The BMS will be provided by others.

OUTDOOR UNITS:

The outdoor units of the VRV system shall be compact air cooled type.

All the compressors of the outdoor units must be hermetically sealed scroll type with ***smooth Sine wave DC inverter motor***, suitable to operate at heat load proportional to indoor requirement.

"Anti Corrosive "treatment (Blue Fins) for Al fins of Condenser Coils is mandatory. The treatment should be suitable for areas of high pollution and salt laden air.

The outdoor units must be suitable for minimum up to 150 m refrigerant piping between outdoor unit and the farthest indoor units, total piping of 1000m for all the indoor units. Allowable level difference between outdoor unit and indoor units shall be 90m in case of outdoor unit on top and 40 m in case of outdoor unit at bottom. Allowable level difference between various indoor units connected to one out door unit shall be up to 15m.

Back up operation, in case of failure of one of the compressors of outdoor unit, for single module outdoor units or failure of one of the modules in case of multiple module outdoor units shall be possible. The VRV outdoor unit shall always be supplying at least 33% of back up operation, of the full load capacity.

The outdoor unit shall employ system of equal run time for all the compressors, inverter or on/off type, within each outdoor unit-Single Module or Multi Module.

The outdoor units shall be suitable to operate within an ambient temperature range of -5 deg C to 43 deg C, in cooling mode.

Air cooled condenser shall have Axial Flow, upward throw fan, directly coupled to fan motors with minimum IP 55 protection. The outdoor unit condenser fan shall be able to develop external static pressure up to 8 mm of H2O.

The entire operation of outdoor units shall be through independent remotes of indoor units. No separate Start/Stop function shall be required.

Starter for the Outdoor unit compressor shall be "Direct on Line" type. Inverter compressor of the unit shall start first and at the minimum frequency, to reduce the inrush current during starting.

Refrigerant control in the outdoor unit shall be through Electronic Expansion Valve. Complete refrigerant circuit, oil balancing/equalizing circuit shall be factory assembled & tested.

Noise level of outdoor units shall not exceed 63 dB(A) at a distance of 1.5 m from the unit.

The outdoor units shall confirm to Technological Guideline for Harmonic Suppression – JAEG 9702-1995. High Harmonic Environmental Target Level for Power Distribution system shall be 5%.

Outdoor units shall be complete with following safety devices:

- High pressure switch
- Fan driver overload protector
- Over current relay
- Inverter Overload Protector
- Fusible Plug

Monitoring from BMS

Necessary relays and contacts shall be provided for monitoring the status of the outdoor units from the building management system. The outdoor units shall provide necessary volt free contacts for this purpose. Status shall include start/stop/run and trip.

Unit shall be supplied with

- Connection pipes
- Clamps
- Necessary relays for hard wired points to BMS For providing ON/OFF status And trip alarm

Units shall be available in following configuration 6 HP, 8 HP to 60 HP, within increments of 2 HP.

Outdoor Air Processing Unit:

For fresh air treatment an outdoor air processing unit shall be provided. Size will be as per BOQ. The unit shall be complete with long life filters and a wired remote controller. The unit shall be capable of cooling Mumbai ambient air of 37.7 deg C to a temperature of 18deg C.

The indoor processing unit shall be connected to VRV outdoor units of the specified capacities.

Where required drain pumps shall be provided.

The unit must include as standard equipment, maintenance free long- life filter, resin net with mold resistant.

Specification for Controls System for VRV air conditioning system:

Wired Remote Controller:

Wired remote controller shall be supplied as specified in the “Bill of Quantities”

The controller must have large crystal display screen, which displays complete operating status.

The digital display must allow setting of temperature with 1 deg C interval.

Remote shall be able to individually program by timer the respective times for operation start and stop for a period of 1 week.

Remote shall have 24 hrs. clock function.

Programming can be enabled or disabled. Provide scheduling of start/ stop and temperature limit- 5 settings per day.

Remote must be equipped with thermostat sensor in the remote controller that will make possible more comfortable room temperature control

The remote shall be able to monitor room temperature & preset temperature by microcomputer and can select cool/heat operation mode automatically.

The remote must constantly monitor malfunctions in the system & must be equipped with s "self diagnosis function" that let know by a message immediately when a malfunction occurs.

It shall be possible to wire the remote upto 500Rmt

Intelligent Control system:

Intelligent control system controller shall be supplied as specified in the "Bill of Quantities".

The System supplied must integrate with the VRV system.

The VRV system supplied must be provided with a control system, from the supplier of VRV equipments. The required hard ware must be selected, suitable for up to minimum 128 indoor units.

Complete operation & monitoring of VRV air conditioning system shall be possible through the control system.

Following functions shall be possible Control shall be capable of following

- Controlling 128 indoor units
- Zone control
- Malfunction code display
- All the functions available with wired remote controller
- It should be possible to write the remote to 1000m
- Scheduling of indoor units,24hrs.clock & programming.
- Remote start/ stop of indoor units
- Graphical report
- Energy saving function
- Mal function report
- Monitor and report from remote side
- Interface for using BAC net or Lon works at Client's option

- Colour LCD touch panel icon display
- Multi language (English,French,Italian,German,Spnaish & Chinese)
- Yearly schedule
- P.P.D. (Power Proportional Distribution Function)
- History of 500 actions
- Simple Interlock Function
- Fire Alarm System interface.

Following major functions shall be provided:

Monitoring	Air conditioning status monitoring Indoor unit error monitoring Indoor air inlet temperature monitoring Filters choke sign monitoring.
Control, Operation & Setting	Start/Stop Control Temperature adjustment mode setting Remote control setting Temperature setting Filter sign reset
Display	Air Conditioner operation setting & Status Set temperature Indoor unit error Indoor air inlet temperature Filter Sign
Measurement	Accurate operation time Number of switching times Power consumption with KWH meter Room temperature Outdoor temperature
Alarm	Fire Alarm interface

Necessary data cabling and connections shall be provided for remote monitoring and Control of the complete VRV System.

- Remote monitoring of the complete HVAC system shall be possible.
- System shall be capable to take external signal like Security/Fire for forced shut off.
- Required hardware shall be suitable for operation between-10 Deg C to Deg C & humidity range, of 0% To 98%, without condensation.

Refrigerant Piping:

Piping shall be refrigerant grade hard copper piping as required. Pipe jointing shall be done using special fittings. Refnet joints supplied by VRV manufacturer shall be provided where required. Piping shall be suitable for the high pressure of R410a and piping thickness shall be increased accordingly.

Piping jointing shall be of the brazed type. The piping shall be tested at38.5kg/cm2.

The indoor and outdoor units shall be connected with refrigerant piping. All piping connections for the units should be performed inside the unit. The refrigerant piping should be insulated with Armaflex/equivalent insulation as specified under insulation.

Brazing shall be carried out to the requirements of relevant code of practice using silver soldered brazing rods. Compression fittings will be accepted on refrigerant pipe work. After installation of the complete piping the same shall be tested with nitrogen at 38.5 Kg.cm2.

After successfully pressure testing the pipe work the same shall be vacuumed to 7mm Hg and vacuum shall be maintained for 4 hours, vacuuming shall be achieved using a vacuum

pump. Use of compressor for vacuuming shall not be permitted. Vacuum shall then be broken with R-410 a gas to atmospheric pressure. The pipe shall once again be vacuumed to 7mm Hg pressure. This exercise shall be carried out twice before the owner's representative before charging the refrigerant in the circuit.

Material Specifications

S No.	Item Description	Specification			Make
1.	Copper Pipe: Phosphoric acid De-Oxidized seamless copper pipe 1. Suitable for R410 A refrigerant 2. Tested as per JIS H3300 3. Should have clean inner surface and capped before delivery	**Size φ (mm)**	**Temper**	**Thick (mm)**	1. Mandev Tubes, 2. Rajco Metal Industries P Ltd. 3.MEXFLOW– MEHTA TUBES
		6.4	O	0.80	
		9.5	O	0.80	
		12.7	O	0.80	
		15.9	O	1.00	
		19.1	½H	0.80	
		22.2	½H	0.80	
		25.4	½H	0.88	
		28.6	½H	1.00	
		31.8	½H	1.10	
		34.9	½H	1.21	
		38.1	½H	1.32	
		41.3	½H	1.43	

<table>
<tr><td>2.</td><td>Brazing Rod: Hard Solder, Phosphor Copper Solder</td><td></td><td>Harris</td></tr>
<tr><td>3.</td><td>Drain Pipe- PVC with 10 kg/sqcm pressure rating</td><td>Pipe size 32 mm dia and 3 mm thick for individual connections</td><td>1. Finolex,
2. Supreme</td></tr>
<tr><td>4.</td><td>Insulation-
1. Closed cell Elastomeric Foam insulation basis Nitrile Rubber with Temperature range -40 degC ~ 120 degC</td><td><table><tr><td></td><td>Gas Line (mm)</td><td>Liquid Line (mm)</td><td>Drain Line (mm)</td><td>Humidity</td></tr><tr><td>Pune</td><td>19</td><td>13</td><td>6</td><td>Low</td></tr></table></td><td>1. Armaflex,
2. Superlon
3. Aeroflex.
4. Kflex</td></tr>
<tr><td>5.</td><td>Protection on Outdoor Piping</td><td>1. Stainless Steel Covering;
2. Galvanized tray with cover;
3. Epoxy paint over woven 100 GSM GRP mat covering over insulation. The pipe should run in GI tray covered with sheet.</td><td></td></tr>
<tr><td>6.</td><td>Adhesive for Insulation (Bond)</td><td>SR type: SR 998/SR505, Armaflex 520 adhesive
Covering:
Daikin: Nitrile Rubber Tape of Armaflex or AEROTAPE equivalent</td><td>1. Pidilite,
2. Armacell</td></tr>
<tr><td>S No.</td><td>Item Description</td><td>Specification</td><td>Make</td></tr>
<tr><td>7.</td><td>Supports for pipe</td><td>1. Steel Band type for any size, as shown in picture with hard covering (like PVC Sleeve) over insulation. Insulation used should be of same thickness as used on pipe line.

2. Clamp shaped with hard covering (like PVC Sleeve) over insulation. Insulation used should be of same thickness as used on pipe line.</td><td></td></tr>
</table>

8.	Supporting Rods	Fully threaded rod: 1. For Units Installation: 10~12 mm thick with direct insertion in to the fastener **2. 10mm for idu upto 4TR and above it 12mm** 3. For Pipe Installation: 6~8 mm thick with direct insertion in to the fastener	
9.	Power Cables: 1. Cable Size should be selected on larger of Minimum Circuit Amps or Total Over Current Amps. 2. Max. allowable voltage unbalance between phases is 2%.		1. Finolex, 2. Polycab
10.	Control Cables: 1. Control Wire should pass through 25mm PVC conduit.	Control Cable: Copper sheathed with proper earthing 2C x 0.75mm^2~ 2C x 1.25mm^2	1. Finolex, 2. Polycab
11.	R410a Refrigerant	Refer to saturation chart for R410a temperature and pressure relation.	1. Dupont 2. Honeywell

Submittals:

Manufacturer's Data: Submit certified dimensioned drawings, including total weight and support points.

Product Data: Submit fan curves, coil performance and acoustic data for each unit.

Testing

Inspect fan scrolls and remove objects or debris. Inspect and flush coils and remove debris or obstructions. Verify that all fire dampers are open and control dampers are to their proper position.

Record the following design requirement for fans and fan motors from the design drawings and reviewed shop drawings:

A. Manufacturer, model and size.
B. Air quantities-cubic feet per minute.
C. Approximate fan speed- revolutions per minute.
D. Fan static pressure (total or external) 0 inches of water
E. Outlet velocity-feet per minute.
F. Fan brake horsepower.
G. Motor horsepower
H. Volts, hertz, amperes and service factor at design conditions.
I. Record the following data from fans and fan motors installed at the projects
J. Manufacture, model and size.
K. Motor horsepower, service factor and revolutions per minute.
L. Volts, hertz, full load ampere and service factor.
M. Motor starter and heater size.
N. Equipment location.
O. Completely adjust fans and duct systems by the adjustment of sheaves, dampers, and other volume and diverting control devices, to obtain the air quantities indicated in the Contract Documents. Integral dampers in terminal outlets and inlets are not to be used for adjustment of duct branches. Adjust outside air and return air modulating dampers to admit the specified quantities of air under all cycles of operation. Adjust final air quantities within 5% of the design requirements. Balance air outlets, with air pattern as shown on the Drawings.
P. Record the following test data for fans and fan motors installed at project at final balanced conditions:
   1. Fan speed –revolution per minute.
   2. Fan suction, discharge and total static pressure (external or total)- inches of water Static pressure drops across filters, dampers, coils washers, and eliminators in the
   3. Supply fan casing in inches of water.
   4. Motor operating amperes and voltage per phase at operating conditions.
   5. Fan cubic feet per minute as required above.
   6. Calculated brake horsepower.

Q. CASSETTE SPLIT A/C UNIT

R.

S. The units shall be used for cooling and dehumidifying air.

T. The units, with capacities as per Bill of Quantities, should be factory assembled and tested prior to dispatch to site. Units should be Cassettte type with indoor unit housing evaporator coil, blower, and outdoor unit housing the condensers and fans.

U.

V. Indoor Unit:

W. Indoor unit should be designed for the ceiling suspended and the grille should be fitted on false ceiling. It should comprise of plastic cabinet, evaporator coil & centrifugal fan with drive. Indoor unit shall have fresh air connection capability.

X.

Y. Blower:

Z. The blower should be designed for rated flow at a low noise level (Below 46 dBA at full speed. It should have settings for operating at three different speeds.)

AA.

BB. Grill:

CC. A grill manufactured out of tough grade of plastic should cover the unit from lower side. It should be provided with swinging type supply air louvers and fixed type return air louvers. Central core should be removable with synthetic filters clipped on it.

DD.

EE. Remote Control:

FF. The unit should be fitted with a remote sensor having facility to receive signal from a wireless remote to control ON/OFF, thermostat setting, fan speed and swing operations.

GG.

HH. Outdoor Unit:

II. Outdoor unit should comprise of hermetically sealed compressor of capacity matching with the evaporator. The compressor should be capable of continuous operation at an ambient DBT of 45^0 C. Inverter Type Compressor to be provided. ***Gas has to be Green gas.***

JJ.

KK. Condenser:

LL. Air-cooled condenser of adequate heat rejection capacity and condenser fan with motor should be housed within a weather proof sheet metal cabinet, along with compressor. Sufficient louvers should be provided for air movement over condenser & fan motor. The unit should have access panels to facilitate clearing & maintenance of internal components.

MM. DRAIN PIPING

NN. The drain piping shall be Heavy grade PVC. Pipe crosses shall be provided at bends, to permit easy cleaning of drain line. The drain line shall be provided up to the nearest drain trap and pitched towards the trap.

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

PP. Drain valves for main lines up to 300 mm dia shall be 25 mm in size and for line sizes above 300 mm dia the drain valve size shall be 40 mm.

QQ.

RR. PAINTING

SS.

TT. All pipes supports, hangers, etc., shall be given two coats of red oxide primer.

UU. All pipes, which are not to be insulated, shall then be given two coats of finish paint, of a type and Internationally approved colour, as approved by the Engineer-in- charge.

VV.

WW. Whatever the location (in a dedicated room, outside, under a canopy) the pumps, electrical cabinets, water tanks will be installed on metallic structures/supports. All the complementary necessary supports, fixings and accessories are in the scope of work of this lot.

IN

SU

LA

TI

ON

Piping Insulation :

All chilled water, refrigerant and condensate drain pipe shall be insulated in the manner specified herein. An air gap of 25 mm shall be present between adjacent insulation surfaces carrying chilled water or refrigerant. Before applying insulation, all pipes shall be brushed and cleaned. All Pipe surfaces shall be free from dirt, dust, mortar, grease, oil, etc. All MS pipes should be provided with a coat of zinc chromate primer, followed by two coats of cold setting adhesive compound. The cladding should have an overlapping portion with self adhesive. For

all places where the pipe is supported in pipe hangers, proper rubber or readymade insulated supports should be used.

Nitrile Rubber insulation shall be applied as follows:

- Insulating material in tube form shall be sleeved on the pipes.
- On existing piping, slit opened tube of the insulating material shall be placed over the pipe and adhesive shall be applied as suggested by the manufacturer.
- Adhesive must be allowed to tack dry and then press surface firmly together starting from butt ends and working towards centre.
- The protective tape on the overlapping portion of the cladding should be peeled off and then applied.
- Wherever flat sheets shall be used it shall be cut out in correct dimension. All longitudinal and transverse joints shall be sealed as per manufacturer recommendations.
- The insulation shall be continuous over the entire run of piping, fittings and valves.
- All valves, fittings, joints, strainers, etc. in chilled water piping shall be insulated to the same thickness as specified for the main run of piping and application shall be same as above. Valves bonnet, yokes and spindles shall be insulated in such a manner as not to cause damage to insulation when the valve is used or serviced.
- For mechanical protection of the insulation the same should be covered along the complete length with kora cloth ot suitable fibre cloth.

For False ceiling insulation:

For insulation of false ceiling surface, Phenotherm should be cut in the exact shape of the top surface of the tile and then stuck to individual tiles. Alternatively for using Fiberglass, Fiberglass slabs of density 48kg/cu.m. shall be inserted in high density polythene bags and then spread over the false ceiling and held into place by proper adhesive tape.

ELECTRICAL PANELS & CABLE

Conduits: Conduits shall be of mild steel and shall be Hard drawn, stove enameled inside and outside with minimum wall thickness of 1.6 mm for conduits upto 32 mm diameter and 2 mm wall thickness for conduits above 32 mm diameter. GI pull wires shall be installed in the conduit while laying the conduit.

Cables: M. V. Cables shall be PVC insulated aluminium conductor and armoured cables conforming to BIS Codes. Cables shall be armoured and suitable for laying in trenches, duct,

and on cable trays as required. M. V. Cables shall be termite resistant. Control cables and indicating panel cables shall be multi core PVC insulated copper conductor and armoured cables.

Wires: 415 volts grade PVC insulated copper conductor wires in conduit shall be used. Cable

Laying:

Cable shall be laid generally in accordance with BIS Code of Practice.

Wire Sizes:

For all single phase/ 3 phase wiring, 415 volts grade PVC insulated copper conductor wires shall be used. The equipment inside plant room and AHU / Fan rooms shall be connected to the control panel by means of insulated copper conductor wires of adequate size in exposed conduits.

Drawings:

Shop drawings for control panels and wiring of equipment showing the route of conduit cable shall be submitted by the contractor for approval of Client & Consultant before starting the fabrication of panel and starting the work. On completion, four sets of complete "As-installed" drawings incorporating all details like, conduits routes, number of wires in conduit, location of panels, switches, junction/ pull boxes and cables route etc. shall be furnished by the Contractor.

Testing:

Before commissioning of the equipment, the entire electrical installation shall be tested in accordance with relevant BIS codes and test report furnished by a qualified and authorized person. All tests shall be carried out in the presence of the Client's engineers

LIST OF BUREAU OF INDIAN STANDARDS CODES

IS : 277 - 1992	Galvanized steel sheet (Plain & Corrugated) wire for fencing.
IS : 554 - 1985 (Reaffirmed 1996)	Dimensions for pipe threads

	where pressure tight joints are required on the threads.
IS : 655 - 1963 (Reaffirmed 1991)	Metal air ducts.
IS : 659 – 1964 (Reaffirmed 1991)	Air conditioning (Safety Code)
IS : 660 – 1963 (Reaffirmed 1991)	Mechanical Refrigeration (Safety Code)
IS : 694 - 1990 (Reaffirmed 1994)	PVC insulated (HD) electric cables for working voltage upto and including 1100 volts.
IS : 732 - 1989	Code of practice for electrical wiring.
IS : 780 - 1984	Sluice valves for water works purposes.
IS : 822-1970 (Reaffirmed 1991)	Code of procedure for inspection of welds.
IS : 1239 (Part - I) - 1990	Mild steel tube
IS : 1239 (Part - II) - 1992	Mild steel Tubulars and other wrought steel pipe fittings.
IS : 1255 - 1983	Code of Practice for installation and maintenance of Power Cables upto And including 33 KV rating (Second Revision)
IS : 1554 - 1988 (Part – I)	PVC insulated (Heavy Duty) electric Cables for working voltages upto and including 1100 volts.
IS : 1897 - 1983 (Reaffirmed 1991)	Copper bus bar / strip for electrical purposes
IS : 2379 - 1990	Colour code for the identification of pipeline
IS : 2551 - 1982	Danger notice plate

IS : 3043 - 1987	Code of practice for earthing.
IS : 3103 – 1975 (Reaffirmed 1999)	Code of practice for Industrial Ventilation.
IS : 3837 - 1976 (Reaffirmed 1990)	Accessories for rigid steel conduit for electrical wiring.
IS : 4736 – 1986 (Reaffirmed 1998)	Hot-dip zinc coatings on steel tubes.
IS : 4894 - 1987	Centrifugal Fan.
IS : 5133 - 1969 (Part-I) (Reaffirmed 1990)	Boxes for the enclosure of Electrical accessories.
IS : 5216 - 1982 (Part-I) (Reaffirmed 1990)	Guide for safety procedure and practices in elec. work.
IS : 5312 (Part-I) - 1984 (Reaffirmed 1990)	Swing - check type reflux Non return valves for water works
IS : 5424 – 1989 (Reaffirmed 1994)	Rubber mats for electrical purposes.
IS : 5578 & 11353-1985	Marking and identification of conductors
IS : 6392 - 1971 (Reaffirmed 1988)	Steel pipe flanges.
IS : 8623 - 1993	Low voltage switchgear and control gear Assemblies (Requirement for type / partly type tested assemblies)
IS : 8623 - 1993 system (Part - II)	Bus Bar trunking
IS : 8828 - 1996	Circuit Breakers for over current protection For house hold and similar installation.

IS : 9537 - 1981 (Part II)	Rigid Steel Conduits for electrical wiring
IS : 10810 - 1988	Methods of test for cables.
IS : 13947-1993 (Part-I)	General rules for low voltage swtich Gears and control gears.
IS : 13947-1993 (Part-II) Breakers IEC 947 - 2	Circuit
IS : 13947 - 1993 (Part-III)	Switches, disconnectors and fuse for low voltage switch gear and control gear.
IS : 13947 - 1993 (Part-IV)	Low voltage switch gear and control Gear for contactors and motor starters
IS : 13947 – 1993 (Part-V)	Control Circuit Devices.
BS : EN:779 – 1993	Filters
ASHRAE Hand Books	American Society of Heating Refrigeration & Airconditioning application 2003. Fundamentals 2001. Systems & Equipment 2000. ASHRAE Indoor air quality Standard 62- 1999.
IEC	Relevant Sections.