

# TERNA PUBLIC CHARITABLE TRUST HOSPITAL

## UPGRADATION OF FIRE FIGHTING WORKS

### 1. TENDER NOTICE

Sealed tenders are invited on behalf of owner **TERNA PUBLIC CHARITABLE TRUST** for up gradation of fire fighting works of Hospital on Plot No-12, Sec-22, Nerul(W), Pin - 400 706, Navi Mumbai.

Blank tender forms will be available from the website <http://terna.org/tender> of the Client **TERNA PUBLIC CHARITABLE TRUST** on Plot no- 12, Sector-22, Nerul-(W), Pin - 400 706, Navi Mumbai on payment in cash of Rs.1,500/- (Rupees One Thousand Five Hundred Only Non-refundable) as tender fees along with EMD of **Rs. 1 Lac** against D.D. in favour of "Terna Public Charitable Trust" has to be pay while submission of tender..

Sealed tenders must be submitted to the Client at address mentioned below:

TERNA PUBLIC CHARITABLE TRUST,  
TERNA ENGINEERING COLLAGE, ROOM NO-206, 2<sup>ND</sup> FLOOR,  
PLOT NO- 12, SECTOR-22, NERUL,-(W), PIN – 400 706, NAVI MUMBAI.  
Phone No - 022-61115448 / 977 391 6672 / 842 497 1919 / 9930 164 758.

Last date of submission: - **10/11/2016** up to **3:00 PM**.

Prebid meeting : - **04/11/2016** at **3:00 PM** on site.

**NOTE: Neither the Owner nor the Consultant/Architect is bound to accept the lowest and can reject any or all the tenders without assigning any reason thereof.**

The Offer shall be valid for 180 days.

Date:

**TERNA PUBLIC CHARITABLE TRUST HOSPITAL**  
**UPGRADATION OF FIRE FIGHTING WORKS**

**2. TENDER FORM**

To,  
Dear Sirs,

With reference to the tenders invited by you on behalf of owner **TERNA PUBLIC CHARITABLE TRUST** "Up gradation of fire fighting works of Hospital on Plot No-12, Sec-22, Nerul (W), PIN - 400 706, Navi Mumbai.

I/We are pleased to quote for the work.

I/We do hereby offer to execute the above works comprised under the contract at the respective rates entered in the Schedule of Rates and signed by me/us.

I/We have carefully read the Tender Document comprising of Articles of Agreement, General terms and conditions, Special Conditions, Appendix, Specifications, etc and undertake to abide by the same.

I/We have also taken into consideration the nature and position of the site and surroundings and the conditions under which work will have to be carried out.

I/We undertake to finish the whole work within the stipulated time of 75 days from the date of receiving the order to commence the work.

My/our Tender shall be valid for a period of 180 days from the date of closing of tender.

I/We hereby agree to execute, at any time as may be fixed by you, the regular contract, the draft of which has been shown to me/us for the fulfillment of the work hereby tendered and I/We also arrange to pay all the charge of whatever nature connected with the preparation of Agreement stamping and execution of the same.

Yours faithfully,

Contractor's Signature:  
Address :

NOTE: Sealed Tenders to be submitted on or before on **10/11/16** up to **3.00pm**.

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### 3. INSTRUCTIONS TO TENDERERS

#### 3.1.0 **SCOPE OF BID**

3.1.1 **TERNA PUBLIC CHARITABLE TRUST** hereinafter referred to as the Owner / Employer / Client, invites Bid for up gradation of fire fighting works of Hospital on Plot No-12, Sec-22, Nerul (W), PIN - 400 706, Navi Mumbai.

3.1.2 The successful bidder is expected to complete the Works within the stipulated period of completion of the Works, reckoned from the date of issue of notice to proceed with the Works.

3.1.3 Throughout these bidding documents, the terms "Bid" and "Tender" and their derivatives (Bid / tender, bidder / tenderer, bidding/tendering, etc) are synonymous.

#### 3.2.0 **QUALIFICATIONS OF THE BIDDER**

To be qualified for bidding, bidder shall submit a valid written Power of Attorney authorizing the signatory of the bid to commit the bidder.

- a. Vendor must have done at least one work of more than 1.5 Core in last 2 years.
- b. Balance sheet of last 2 years duly stamped by C.A
- c. Manpower list.
- d. Equipment's list.
- e. License of fire fighting works.

#### 3.3.0 **PROFIL AND PERIOD OF COMPLETION OF WORKS**

##### Company Profile

The tender should be accompanied with a list of major Firefighting works carried out in the last five years, a company profile containing list of work carried out till date, concerned authority in charge of the said works with contact numbers, backed with list of equipments and personnel both technical and non technical at his disposal.

##### Period of Completion

The Works are to be executed within the period stipulated in APPENDIX I from the date of issue of notice to proceed with the works.

#### 3.4.0 **BIDDING**

The Tender shall be filled in English with a neat hand and all the figures and words shall be legible. Corrections, if any, shall be made by crossing out, initialing, dating and rewriting.

#### 3.5.0 **COST OF BIDDING**

The bidder shall bear all costs associated with the preparation and submission of his Bid, and the client will in no case be responsible and liable for those costs regardless of the conduct or outcome of the bidding process.

#### 3.6.0 **SITE VISIT**

The bidder is advised to visit and examine the Site of Works at address mentioned above and its surroundings and obtain for himself on his own responsibility and at his own risk and cost, all information that may be necessary for the preparation of the Bid and entering into a Contract for the execution of the Works. The cost of visiting the Site shall be at the bidder's own expense.

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### BIDDING DOCUMENTS

#### 3.7.0 CONTENT OF BIDDING DOCUMENTS

THE BIDDING DOCUMENTS ARE THOSE STATED BELOW AND SHOULD BE READ IN CONJUNCTION WITH ANY ADDENDA IF ANY ISSUED IN ACCORDANCE WITH CLAUSE 3.9.0:

SECTION NO	DESCRIPTION	PAGE NO.
SECTION 1	Tender Notice	1
SECTION 2	Tender Form	2
SECTION 3	Instructions to Tenderers & Safety Code	3 - 8
SECTION 4	General Conditions of Contract & Special condition of contract	9 - 23
SECTION 5	Special conditions	24 - 25
SECTION 6	Safety	26 - 28
SECTION 7	Appendix	29
SECTION 8	Approved Makes	30 - 32
SECTION 9	Technical Specifications	34 - 62
SECTION 10	PREFACE	62
SECTION 11	Bill Of Quantity	Separate Sheet
SECTION 12	Articles of Agreement.	64 - 65

The bidder is expected to examine carefully the contents of all the above documents. Failure to comply with the requirements of Bid submission will be at the bidder's own risk. Bids, which are not substantially responsive to the requirements of the bidding documents, will be rejected.

#### 3.8.0 CLARIFICATION OF BIDDING DOCUMENTS

A prospective bidder requiring any clarification on the bidding documents may notify the Consultants in writing or by fax. Copies of the Consultant's response will be forwarded to all the bidders, including a description of the enquiry, but without identifying its source.

#### 3.9.0 AMENDMENT OF BIDDING DOCUMENTS

- 9.1 At any time prior to the deadline for submission of Bids, the Employer may, for any reason, whether at his own initiative or in response to a clarification requested by a prospective bidder, modify the bidding documents by issuing Addenda.
- 9.2 Any Addendum thus issued shall be part of the bidding documents and shall be communicated in writing to all prospective bidders. The prospective bidders shall acknowledge receipt of each Addendum in writing to the Employer.
- 9.3 To give prospective bidders reasonable time in which to take Addenda into account in preparing their Bids, the client shall extend if necessary the deadline for submission of Bids, in accordance with Sub-Clause 3.16.2.

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### B) PREPARATION OF BIDS

#### 3.10.0 LANGUAGE OF BID

All documents relating to the Bid shall be in **English** language only.

#### 3.11.0 DOCUMENTS COMPRISING THE BID

The Bid submitted by the bidder shall comprise the following:

- Tender
- Priced Bid
  - a. Vendor must have done one work of more than 1.5 Core in last 2 years.
  - b. Balance sheet of last 2 years duly stamped by C.A
  - c. Manpower list.
  - d. Equipment's list.
  - e. License of fire fighting works.
  - f. Company profile.

12.1 The bidder shall quote rate for entire work as per Bill of quantities.

12.2 Scope of work.

12.3 All duties, taxes and other levies payable by the Contractor under the Contract, or for any other cause, shall be included in the rates and prices and the total contract price submitted by the bidder, and the evaluation and comparison of Bids by the Employer shall be made accordingly.

#### 3.12.0 BID VALIDITY

13.1 Bids shall remain valid for a period as stipulated in Appendix I. Bid valid for a shorter period may be rejected by the Employer as non-responsive.

13.2 In exceptional circumstances, prior to the expiry of the original time limit, the Employer may request the bidders to extend the period of validity for a specified additional period. The request and the bidder's responses shall be made in writing. A bidder agreeing to the request will not be required or permitted to modify his bid.

#### 3.14.0 FORMAT AND SIGNING OF BID

14.1 The bidder shall submit the original copy of the documents comprising the Bid as described in Clause 11.0 of these Instructions to Bidders.

14.2 The original and all copies of the Bid shall be written in indelible ink and shall be signed by a person or persons duly authorised to sign on behalf of the bidder pursuant to Sub- Clause 2.0. All pages of the Bid where entries or amendments have been made shall be initialled by the person or persons signing the Bid.

14.3 The Bid shall contain no alterations or additions, except those to comply with instructions issued by the Client or as necessary to correct errors made by the bidder, in that case corrections shall be initialled by the person signing the Bids.

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### C) SUBMISSION OF BIDS

#### 3.15.0 SEALING AND MARKING OF BIDS

3.15.1 The bidder shall seal the original copy of the Bid in envelopes along with supplementary documents required.

3.15.2 The envelopes shall

(a) Be addressed to the Employer:

(b) Bear the following identification:

Bid for up gradation of fire fighting works of hospital building for **Terna Public Charitable Trust** on Plot No-12, Sec-22, Nerul (W), PIN - 400 706, Navi Mumbai.

3.15.3 In addition to the identification required in Sub-Clause 3.15.2, the inner envelopes if any shall indicate the name and address of the bidder to enable the Bid to be returned unopened in case it is declared "late", pursuant to Clause 3.18.0, or for any other reason.

3.15.4 If the outer envelope is not sealed and marked as above, the Employer will assume no responsibility for the misplacement or premature opening of the Bid.

#### 3.16 DEADLINE FOR SUBMISSION OF THE BID

16.1 Bids must be received on or before **10/11/2016** up to **3.00 p.m.** In the event of the specified date for the submission of Bids being declared a holiday in Mumbai, the Bids will be received up to the appointed time on the next working day.

16.2 The Employer may extend the deadline for submission of Bids by issuing an amendment in accordance with Clause 9.0, in which case all rights and obligations of the Employer and the bidders previously subject to the original deadline will then be subject to the new deadline.

#### 3.17.0 LATE BIDS

17.1 Any Bid received by the Employer/Consultant after the deadline prescribed in Clause 3.16.1 will be summarily rejected and returned unopened to the bidder.

#### 3.18.0 MODIFICATION AND WITHDRAWAL OF BIDS

1. The bidder may modify or withdraw his Bid by giving notice in writing before the deadline prescribed in Clause 3.16.0.

2. Each bidder's modification or withdrawal notice shall be prepared, sealed, marked, and delivered in accordance with Clauses 3.15.0 and 3.16.0, and with the outer and inner envelopes additionally marked "MODIFICATIONS" or "WITHDRAWAL", as appropriate.

3. No Bid may be modified after the deadline for submission of Bids.

### D) BID OPENING AND EVALUATION

#### 3.19.0 BID OPENING

The client shall open the bids on on **10/11/2016** at **5.00 pm** in presence of all bidders.

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### **3.20.0 PROCESS TO BE CONFIDENTIAL**

1. Information relating to the examination, clarification, evaluation, and comparison of Bid and recommendations for the award of Contract shall not be disclosed to bidders or any other persons not officially concerned with such process until the award to the successful bidder has been announced. Any effort by bidder to influence the Employer's processing of Bids or award decisions may result in the rejection of his Bid.

### **3.21.0 CLARIFICATION OF BIDS**

1. To assist in the examination, evaluation and comparison of Bids, the Consultant may, at his discretion, ask any bidder for clarification of bidder's Bid, including breakdowns of unit rates. The request for clarification and the response shall be in writing but no change in the price or substance of the Bid shall be sought, offered, or permitted except as required to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the Bids in accordance with Clause 24.0.

### **3.22.0 EXAMINATION OF BIDS**

- 22.1 Prior to the detailed evaluation of Bids, the Consultant will assess whether each Bid
  - (a) meets the eligibility criteria defined in Clause 2.0;
  - (b) has been properly signed
  - (c) is substantially responsive to the requirements of the bidding documents;
  - (d) Provides any clarification and/or substantiation that the Employer may require.
- 22.2 A substantially responsive Bid is one, which conforms to all the terms, conditions and specifications of the bidding documents, without material deviation or reservation. A material deviation or reservation is one (a) which affects in any substantial way the scope, quality, or performance of the Works; (b) which limits in any substantial way, inconsistent with bidding documents, the Employer's rights or the bidder's obligations under the Contract; or (c) whose rectification would affect unfairly the competitive position of other bidders presenting substantially responsive Bids.
- 22.3 If a Bid is not substantially responsive, it will be rejected by the Employer and may not subsequently be made responsive by correction or withdrawal of the non-conforming deviation or reservation.

### **3.23.0 CORRECTION OF ERRORS**

- 3.23.1 The CONSULTANT for any arithmetic errors will check bids determined to be substantially responsive. Errors will be corrected by the Employer as follows:

Where there is a discrepancy between the amounts in figures and in words the amount in words will govern; and
- 3.23.2 The Consultant in accordance with the above procedure will adjust the amount stated in the Bid for the correction of errors and, with the concurrence of the bidder shall be considered as binding upon the bidder. If bidder does not accept the corrected amount, of Bid, his Bid will be rejected.

### **3.24.0 EVALUATION AND COMPARISON OF BIDS**

- 3.24.1 The CONSULTANT shall jointly evaluate and compare the bids, which are determined to be substantially responsive in accordance with Clause 3.22.0.
- 3.24.2 In evaluating the Bids, the CONSULTANT shall determine for each Bid, the Evaluated Contract Price by adjusting the Contract Price as follows:-
  - a) making any correction for errors pursuant to Clause 3.23.0; or

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b) Making an appropriate adjustment for any other discounts or other price modifications offered in accordance with Sub-Clause 3.18.0.

3.24.3 The Employer/Consultant reserves the right to accept or reject any variation, deviation, or alternative offer. Variations, deviations, and alternative offers and other factors, which are in excess of the requirements of the bidding documents or otherwise result in unsolicited benefits for the Employer, shall not be taken into account in Bid evaluation.

3.24.4 If the Bid of the successful bidder is seriously unbalanced in relation to the Consultant's estimate of the cost of work to be performed under the Contract, the Consultant may require the bidder to produce detailed price analysis for any or all items of the Bill of Quantities, to demonstrate the internal consistency of those prices with the construction methods and schedule proposed.

### **3.25.0 EMPLOYERS' RIGHT TO ACCEPT ANY BID AND TO REJECT ANY OR ALL BIDS**

The Employer does not bind himself to accept the lowest tender and reserves the right to accept or reject any Bid and to cancel the bidding process and reject all Bids, at any time prior to the award of Contract, without thereby incurring any liability to the affected bidder or bidders or any obligation to inform the affected bidder or bidders of the grounds for the Employer's action.

### **3. 26.0 NOTIFICATION OF AWARD AND SIGNING OF AGREEMENT**

The bidder whose Bid has been accepted will be notified of the award by the client, prior to expiration of the Bid Validity period by a letter hereinafter referred to as the "Work Order".

The notification of award will constitute the formation of the Contract.

The Agreement will incorporate all agreements between the Employer and the successful bidder. It will be signed by the Employer and sent to the successful bidder within 7 days following the notification of award along with the Letter of Acceptance. Within 7 days of receipt the successful bidder will sign the Agreement and deliver it to the client.

After the award of work to the successful bidder and signing of the Agreement, the Employer will promptly notify the other bidders that their Bids have been unsuccessful.

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### 4.0 GENERAL CONDITIONS OF CONTRACT

#### 4. Definitions :

The contract document (definition given below) shall contain following words and expression and their meaning is assigned below except where the contract otherwise requires.

- a) Owner / Trustee / Client means "TERNA PUBLIC CHARITABLE TRUST" Plot No-12, Sec-22, Nerul (W), Navi Mumbai, Pin - 400 706.
- b) "Contractor" means the person or firm or company or its representative, successors, etc whose tender has been accepted by the owner **Terna Public Charitable Trust**.
- c) "Consultant/Engineer/Consultant means Mr. UMESH THAMKE of M/s. UMESH THAMKE CONSULTING ENGINEER, Shop-39, Satya Sai Plaza, Sector- 11,Next to Cineraj Theater, New Panvel (E), Navi Mumbai - 410 206,Ph- 022 3271 3298, who have been appointed by the client for the work.
- d) "Contract Document /contract" means the Tender Notice, instructions to renderers, General and Special Conditions of Contract, Specifications, etc.
- e) "Site" means the site of the contract work on in or through which the works has to be carried out, material equipment's to be installed and stored and places provided by employer for purpose of work.

#### 4.2 Type of Contract:

The contractor shall be paid for actual quantity of work done, as measured at site by the Consultant and at rates quoted by him in the Bill of Quantities.

#### 4.3 Site Visit:

Before tendering, the contractor shall have visited and examined the site and satisfied himself as to the nature of the work, complexities, storage spaces/constraints, arrangements on account of traffic restrictions if any, arrangements for disposal of debris, means of communication etc and shall have obtained generally his own information on all matters affecting the continuation and progress of works.

Should the contractor after visiting the site find any discrepancies, omissions, ambiguities or conflicts in or among the Contact Document, or to be in doubt as to their meaning, he shall bring the question to the Consultant's attention, not later than 3 days before the last date for submission of the tender.

#### 4.4 Sufficiency to Tender:

The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his tender for the works and of rate and price stated in the priced bill of quantities which rates and prices shall cover all his obligations under the contract and all matters and things necessary for the completion and maintenance of the works.

The contractor shall not be entitled for any extra or additional payment nor to be relieved from any of his obligations there under for any of the following reasons namely; that there was any misunderstanding or misapprehension by the contractor in respect of any matter or that any incorrect information was given to the contractor whether in employment or representing the employer or not or that the contractor failed or was unable to obtain or was prevented from obtaining correct information or the contractor did not or could not foresee any matter which may in fact or have affected the execution or maintenance of work.

The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his tender for the works and of rate and price stated in the priced bill of

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quantities which rates and prices shall cover all his obligations under the contract and all matters and things necessary for the completion and maintenance of the works.

### 4.5 Possession:

The Contractor shall be allowed admittance to the site on the Date of Commencement stated in the appendix and he shall there upon and forthwith begin the work and shall regularly proceed with and complete the same on or before the Date of Completion stated in the appendix subject nevertheless to the provision for extension of time hereinafter contained.

### 4.6 Coordination:

The Contractor shall co-ordinate his works with **own sub civil contractor**, including the requirements for sleeves & slits, for internal and external **services, cutting of the road , making of civil work, cutting of False Ceiling and making it good and painting as per the installations in accordance with the requirements.**

The Contractor's attention is drawn to the fact that it is the intention that all holes, chases, etc. shall be left in the building work as it proceeds and not cut out subsequently.

The Contractor, therefore, shall prepare details required for Builder's work in such order and time as to enable them to be checked and get approved by all concerned at least 2 weeks in advance prior to respective program of builder's work.

### 4.7 Drawings:

Successful renderers shall submit detailed working & conduit drawings for general layout showing exact positions of equipment, details of foundations, if any, and obtain the approval of the Consultant. Contractor shall not commence any work until approvals as above are obtained.

Approval of the contractor's drawings shall not relieve the contractor or any part of his obligation to meet the intents of the specifications and drawings.

Six prints of each of the "As Built" completion drawings incorporating all modifications made from time to time shall be submitted, after completion of the work together with detailed literature, operating instruction list of recommended spares, test readings, test certificates, etc.

### 4.8 Extent & Intent of Contract:

**Extent:** The Contractor shall carry out and complete the work in every respect in accordance with this contract and with the directions of and to the reasonable satisfaction of the Consultant. The Consultant may in his absolute discretion and from time to time issue- further drawings, details and /or written instructions consistent with the tender document.

**Intent:** The intention of the Document is to include all labor and materials, equipment and transportation necessary for the proper execution of the work. The contract comprises the execution of the works as specified in the tender document and the provision of all labor, materials, construction plants, temporary works and every thing whether of a temporary or permanent nature required in and for such work.

### 4.9 Duties & Power of Consultant's Representative:

The duty of Consultant's Representative is to ensure the work is carried out as per the contract document. To check and supervise the work, test or examine any materials and the workmanship, verify the bills and measurements. He has no authority to relieve the contractor of any duties and

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obligations mentioned in the contract. Any written instruction given by the Consultants Representative in accordance to terms and conditions of contract shall be binding on both the owner and the contractor.

### 4.10 Works to the Satisfaction of the Consultant:

Save in so far as it is legally or physically impossible the contractor shall execute complete and maintain the works in strict accordance with the contract and shall comply with and adhere strictly to the Consultant's instructions and directions on any matter ( whether mentioned in the contract or not). The Contractor shall take instructions and directions only from the Consultant or (Subject to the limitation in Clause 11) from his representative.

### 4.11 Consultants Status & Decisions:

The Consultant shall be the Owner's representative during the Construction/Repair period. The Consultant shall periodically visit the site to familiarize himself generally with the progress and the quality of the work and to determine in general if the work is proceeding in accordance with the Contract Document. He shall not be required to make exhaustive or continuous inspections to check the quality and quantity of the work and he shall not be responsible for the contractor's failure to carry out the construction work in accordance with the tender documents.

During such visits and on the basis of his observations, while at the site he shall keep the Owner informed of the progress of the work and shall endeavor to guard the owner against defects and deficiencies in the work of the Contractor. He shall condemn work, which fails to conform the Contract Document. He shall have authority to stop the work whenever such stoppage may be necessary in his reasonable opinion to ensure the proper execution of the contract.

The Consultant shall be in the first instance the interpreter of the Conditions of this Contract and the judge of its performance. He shall side neither with the owner nor with the Contractor but shall use his powers under the Contract to enforce its faithful performance by both.

Decision: The Consultant shall within a reasonable time make decision on all claims of the Owner or the Contractor and all other matters relating to the extension and progress of the work or the interpretation of the Contract Document. The Consultant may in his absolute discretion and from time to time issue further:

- a. Variation or modifications of the design.
- b. The quality or quantity of works of the additions or omissions or substitution of any work.
- c. Any discrepancy in or divergence between the Drawings and/or specifications.
- d. The removal and/or re-execution of any works executed by the Contractor.
- e. The dismissal from the works of any persons employed thereon.
- f. The opening up for inspection of any work covered up.
- g. The amending and making good of any defects in Defects Liability Period.
- h. The removal from the site of any materials brought thereon by the Contractor and the substitution of any other material thereof.
- i. Assignment and sub-letting.
- j. Delay and extension time.
- k. The postponement of any work to be executed under the provision of this Contract.

### Dismissal:

The Contractor shall on the request of the Consultant immediately dismiss from the works any person employed thereon by him who may in the opinion of the Consultant be incompetent or misconduct's himself and such persons shall not be again employed on the work without the permission of the Consultant.

### 4.12 PMC:

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The term ' PMC' shall mean the person appointed and paid by the Owner and acting under the guidance of the Consultant to inspect the works in the absence of the Consultant. The contractor shall afford the PMC every facility and assistance for inspecting the works and materials and for checking and measuring time and materials. Neither the PMC or the Consultants Representative shall have power to set out or to revoke, alter enlarge or relax any requirements of the contract or to sanction any Day work, additions, alternations, deviations or omissions or any extra work.

The PMC shall have power to give notice to the contractor or his representative of non -approval of any work or materials and such work shall be suspended or the use of such materials shall be discontinued until the decision of Consultant is obtained. Subject to the limitation of this clause the contractor shall take instructions only from the Consultant.

#### 4.13 Performance Bond and Retention Amount:

A retention amount equal to 5% of the value of work done will be deducted from each interim bill certified by the Consultant. The Contractor would be paid 50% of the retention amount along with the Consultants certificate of virtual completion (as per clause 5.39) and balance 50% of Retention after defects liability period of 12 months after virtual completion of works. All the above deposits shall be non- interest bearing.

#### 4.14. Contractor's field Organization & Equipment:

- a). Staff: The Contractor should always depute for due execution and maintenance of work :
- i. A full time qualified and competent technical personal that will be responsible for carrying out the work as per the contract specifications and Consultants instructions. Any directions or instructions given to him by the Consultant shall be deemed to have been issued to the Contractor.
  - ii. Skilled, unskilled and semi-skilled workmen and apportionate the work in accordance to their skill and maintain enough force on the site required to finish the job in the prescribed time limit.
- b) Office Accommodation / Godown :  
The Contractor shall erect and maintain an office/godown for storage/accommodation of his staff and materials with no extra charge for the same. The deposit amounts of the contractor will not be released as long as these temporary sheds are removed from the site. The contractor shall make his own arrangement for guarding his plants, equipment's and materials at his own expense.

#### 4.15 Taxes:

**The rates quoted by the contractor shall be inclusive of all costs including labour, material, transport, equipment's, sales tax, etc or any other tax legally payable in force and no claim on this account will be entertained. Income tax as applicable will be deducted from each running bill and the owner will issue necessary certificate of tax deduction.**

#### 4.16 Water:

Water is required for the construction purposes shall be provided at one point inside the work premises to be charged. The contractor shall make necessary arrangements for further storing & distribution, lifting, pumping, carrying or conveying as may be required at his own cost. Contractor has to make his own arrangement for construction water in case of interruption in supply at no extra cost to the owner.

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### 4.17 Electricity:

Employer shall made power available for construction purposes from Supply co. at one point. For further distribution of power as required by him. The contractor shall make his own arrangement. The contractor shall arrange to provide meter and shall pay for the consumed power at the prevailing rate. The employer does not take responsibility of duration and continuity of power supply by Supply co. The contractor shall make his own arrangement of standby power in case of interruption of Supply co. power supply

Every effort will be made by the owner to provide uninterrupted power supply however; in case of interruption to power supply contractor has to make his own arrangement for supply of power to enable him to adhere to the time schedule at no extra cost to the owner.

### 4.18. Testing & Handing Over:

The contractor shall carry out tests on different equipment as specified in various sections, in the presence of representatives of Clients, and Consultants in order to enable them to determine whether the plant, equipment and installation in general comply with the specifications.

All equipment and space conditions shall be tested after carrying out necessary adjustments and balancing to establish equipment rating and indoor space conditions. Tests shall be conducted during design outside conditions. At least four sets of readings shall be taken for each item tested. Instruments required for testing shall be furnished by the contractor.

The plant shall be handed over after satisfactory testing along with 4 sets of documentation each consisting of:

- i. Detailed equipment data as approved by the Consulting Engineers.
- ii. Manufacturer's maintenance and operating instructions.
- iii. Set of As-Built Drawings
- iv. Approved test readings.
- v. List of recommended spares.

In case of test readings are not satisfactory, contractor shall carry out all modifications required to bring the plant upto the level of acceptability within a period not exceeding 3 months from the date the test readings are rejected and failure to do so, will entitle the Clients to forfeit the Security Deposit.

### 4.19 Statutory Obligations Notices, fees and charges:

The Contractor shall comply with and give all notices required by any Government authority, and instrument, rule or order made under any Act of Parliament or any regulation or Bye-law of any local authority relating to the work or with whose system the same is or will be connected. The contractor before making any variation in the contract necessitated by such compliance shall give to the Consultant a written notice specifying and giving reasons for such variations and the Consultant may issue instructions in regard thereto.

The Contractor shall pay and indemnify the Owner against liability in respect of any fees or charges including any rates and taxes legally demandable under any Act of Parliament, instrument, rule or order or any regulation or Bye-law or any local authority in respect of the work.

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### 4.20 Royalties and Patent Rights:

All royalties or other sums payable in respect of supply and use in carrying out the work as desired by or referred to in the Contract Bills of any patented articles, process or inventions shall be deemed to have been included in the Contract sum and the contractor shall indemnify the owner from and 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 in relation to any such articles, processes and inventions.

### 4.21 Assignment or Subletting or Sub-Contracting:

Sub-Contracting/ Subletting will not be permitted and preference for work will be given only to those contractors who do not subcontract or sublet the work.

### 4.22 Opportunities to other Contractors:

The Contractor shall on instructions from the Consultant provide opportunities to all the other agencies employed by the owner and their staff and workmen for carrying out works. The Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work and shall properly coordinate and connect his work with theirs. If any part of the Contractors or Nominated Sub Contractors work depend for proper execution or results of work of any other contractor or nominated sub contractor, the Contractor shall inspect and promptly report to the Consultant any defects in such work that render it unsuitable for such proper execution and results. Failures of the Contractor to so inspect and report shall constitute an acceptance of other Contractor's work as fit and proper.

### 4.23 Work Program/Work Schedule:

Immediately after acceptance of the tender the contractor shall furnish a detailed program/schedule indicating the order procedure/method and time required for carrying out the work. He should also enlist the construction plants and equipment's likely to be used for the work if asked. The program for internal works/business premises if any should be made in consultation with the owners to avoid inconvenience.

### 4.24 Insurances:

The Contractor shall maintain in the joint names of the Owner and the Contractor such insurances as may be required in respect of any expense, liability, loss, claim or proceedings which the Owner may incur or sustain by reason of injury or damage to property real or personal arising out of or in course of or by reason of the carrying out of the work, and caused otherwise than by the negligence, omission or default of the Contractor, his servants or agents. Any such insurance as is referred to in the immediately preceding paragraph shall be placed with the insurers to be approved by the Consultant and the Contractor shall have to deposit with him the policy or policies and the receipts in respect of premiums paid.

#### 1) Injury to persons and property Owner:

The Contractor shall be liable for and shall indemnify the owner against any liability, loss, claim or proceedings whatsoever arising under any statute or at common law in respect of personal injury to or the death of any person whomsoever arising out of or in course of or caused by carrying out of the works, unless due to any act or neglect of the Owner or of any person for whom the owner is responsible.

Except for such loss or damage on account of the Owner the contractor shall be liable for and shall indemnify the Owner against any expense, liability, loss, claim or proceedings in respect of any injury or damage whatsoever to any property real or personal in so far as such injury or damage

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arises out of or in course of or by the reason of carrying out of the works, and provided always that the same is due to negligence, omission or default of the contractor, his servants or agents.

### 2). Insurance against injury to Persons and Property:

Without prejudice to his liability to indemnify the Owner under clause 24(1) of these conditions the contractor shall maintain;

Such insurances as are necessary to cover the liability of the Contractor, in respect of personal injuries or deaths arising out of or in the course of or caused by the carrying out of the work; and Such insurances as may be specifically required by the Contract Bills in respect of injury or damage to property real or personal arising out of or in course or by reason of the carrying out of the work, and caused by any negligence or default of the contractor, his servants or agents.

The Contractor shall produce for inspection the relevant policy or policies of insurance together with receipts in respect of premiums paid under such policy or policies as and when required so to do by the Consultant provided always that as and when may be reasonably required by the Consultant the production by either the Contractor of a current certificate of insurance from the company or firm which shall have issued the policy or policies aforesaid shall be a good discharge of the contractors obligation to produce or to cause the production of the policy or policies and the receipts in respect of premiums paid.

Should the Contractor make default in continuing to insure as provided in clauses above the Owner may himself insure against any risk with respect to which the default shall have occurred and may deduct a sum equivalent to the amount paid in respect of the premiums from any monies due to or become due to the Contractor.

### 4.25. Safety Provisions:

The Contractor should ensure all the safety precautions are adhered by his staff during execution of works, implementation of plants and machinery, electrical equipment's at all heights and depths of work as per the applicable rules and regulations. Adequate precautions as prescribed by manufacturers to be taken by the workmen while handling with construction chemicals.

While working on scaffolding the workmen should wear helmets, safety belts, whatever required for safe execution of the work. Safety precautions such as Display boards indicating danger signs, cordoning off of the area undertaken for repairs etc. should be followed for general safety.

### 4.26 Labour:

**The rates quoted by the contractor shall be inclusive of all the materials, plants and equipment's, labor, supervision etc their transport to or from the site required for execution and completion of work.**

In respect of the labour engagement ; employment, paying, feeding, housing and working conditions of labour and of all the other matters connected herewith, the contractor shall at all times during the continuance of the Contract conformed in all respects with and carry out all obligations imposed on him by the provisions and requirements of any law and of any regulations or orders of any Government(Provincial/ Central/Local) or any authority which may be applicable including any such law, regulations or orders passed or made or coming into force after the date of Contractor's tender. In particular but without prejudice to the generality of the foregoing provisions the Contractor shall conform with and do refrain from doing by any Legislation or Ordinances so far as, applicable relating to the factories or relating to the industrial disputes and any regulations or Orders there under.

The contractor shall so far as is reasonable practicable having regard to local conditions provide on the site to the approval of the Consultant an adequate supply of drinking water for use of his staff and work people. The Contractor shall not employ any child labour. If female labour is engaged the

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Contractor shall make necessary provisions for safeguarding small children and keeping them clear of the site of operations. No laborer shall reside in the compound except authorized guards else permitted specifically so by the Trustee.

### 4.27 Materials & Workmanship:

**All the materials and workmanship shall be as per the relevant I.S codes and of approved type as mentioned in the contract and in accordance to the Consultant's instructions. The Contractor shall if required submit satisfactory evidence as to kind and quality of materials.**

All the material shall be delivered so as to insure a speedy and uninterrupted progress of the work. Such material shall be stored so as to cause no obstruction and so as to prevent overloading of any portion of the structure, and the Contractor shall be entirely responsible for damage or loss by weather or other cause. The Consultant reserves the right to reject any material and workmanship if found non-conforming to the specifications and may ask for inspection, examination and test reports or testing of materials as per the relevant IS methods. The contractor shall provide all such assistance required for carrying out the tests at no additional cost. The Consultant shall have right to reject defective material and workmanship or require its correction. If in opinion of the Consultant any work or part thereof is executed with improper materials or defective workmanship, the contractor shall when required by the Consultant, re-execute the work in accordance to the Consultants instructions, within a week from date of instruction or else the Consultant has full power to employ other persons or agency to re-execute the work at the risk and cost of the contractor.

### 4.28 Access to the Works and Notice before Covering of work:

The Consultant and his representative shall at all reasonable times have access to the work and to workshop or other places of the Contractor where work is being prepared for the contract and when the work is to be so prepared in the workshops or other places and shall afford every facility for and every assistance in or in obtaining the right to such access.

The Contractor should intimate the Consultant or his representative well in advance before covering up or otherwise placing beyond the reach of measurement any work in order that they may be measured, checked, inspected and correct dimensions recorded. Non- compliance of the same will entail no payment for the said works. The contractor should provide the necessary platforms as requested for access to the areas of work.

### 4.29 Commencement of work:

**The Contractor shall commence the work immediately mentioned in the Work Order issued to him on acceptance of his tender and execute the same in accordance to the prescribed time limit.**

### 4.30 Time for Completion:

Time is considered as an essence of contract the whole work as specified in tender shall be completed in **75 days** of stipulated time.

### 4.31 Extension of Time:

Subject to any extra or additional works or any new work of any kind other than those specified in tender propose to be executed, a suitable extension of time for the completion of these work shall be liable to the contractor by the Consultant. If the contractor desires an extension of time for completion of work on grounds of his having been unavoidably hindered in its execution or any other ground shall apply in writing within 15 days from the date of such hindrance caused or seen along with full details and the amount extension to be sought so as to fairly investigate at the time. The decision of the Consultant will be final and binding on both the parties. No escalation will be entailed during the extended period.

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Extension of time shall also be permitted to the contract for reasons beyond the delay provided the application in writing is made along with the days of extension proposed in following cases:

- a) By force major.
- b) By exceptionally inclement weather.
- c) By delay on part of contractors/workmen appointed directly by the owner for work not forming a part of his contract.
- d) Temporary suspension of work by Employer or Consultant or for inspection of work by the Consultant provided the results of inspection are in his favor.
- e) By reason of the Contractor not having received in due time necessary drawings, instructions or levels from the Consultant for which he specifically applied in writing on a date which having regard to the date for completion stated in the appendix to these conditions or to any extension of time then fixed under this clause was neither unreasonably distant from not unreasonably close to the date on which it was necessary for him to receive the same.

### 4.32 Suspension of Work:

1. The Contractor shall on written order of the Consultant suspend the progress of the works or any part thereof for such time or times and in such manner as the Consultant may consider necessary and shall during such suspension properly protect and secure the work so far as is necessary in the opinion of the Consultant. The extra cost if any incurred by the Contractor in giving effect to the Consultant's instructions under this clause shall be borne and paid by the Owner unless such suspension is;
  - a) Otherwise provided for in the Contractor
  - b) Necessary for the proper execution of the work or by reason of weather conditions affecting the safety or quality of the works or by some default on the part of the contract or
  - c) Necessary for the safety of the works or any part thereof, provided always that the Contractor shall not be entitled to recover any such extra cost unless he gives notice in writing of his intention to claim to the Consultant within 14 days of the Consultant's order. The Consultant shall settle and determine the extra payments to be made to the Contractor in respect of any such claim, as the Consultant shall consider fair and reasonable.
2. Suspension lasting more than 90 days;

If the progress of the works or any part thereof is suspended on the written order of Consultant/Engineer for more than 90 days, the Contractor may serve a written notice on the Consultant requiring permission within 28 days from the receipt thereof to proceed with the works or that part thereof in regard to which the progress is suspended and if such permission is not granted within that time, the Contractor by a written notice so served (but is not bound to) elect to treat the suspension where it affects part only of the works as an omission of such part under clause 5.41.2 hereof or where it affects the whole works as an abandonment of the contract by the Owner.

### 4.33 Nominated Sub Contractor:

All specialists merchants, artist, tradesmen and other executing any work or supplying any goods who may have been selected or nominated or approved by the Owner or Consultant and all the persons to whom by virtue of the provisions of the Bill of Quantities or Specification, the Contractor is required to sub-let any work shall in the execution of such work or the supply of such goods be deemed to be the subcontractor employed by the Contractor and are herein referred as Nominated Sub- Contractor. Provided always that the Contractor shall not be required to employ any nominated sub-contractor who shall decline to enter into a sub -contact with the Contractor containing provisions.

- i) That in respect of the works or goods the subject of the sub-contract, the Sub-Contractor will undertake towards the Contractor the like obligation and liabilities as are imposed upon the Contractor towards the Owner by the terms of Contract and will save harmless and indemnify the Contractor from and against the same and from all claims, damage, demands,

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proceedings, costs, charges and expenses whatsoever arising out of or in connection therewith or arising out of or in connection with any failure to perform such obligation and to fulfill such liabilities and,

- ii) That the sub-contractor will save harmless and indemnify the Contractor from and against, any negligence by The Sub-Contractor his agents, workmen and servants and from and against any issue by him or them of any constructional plant or Temporary work provided by the Contractor for the purposes of the Contract and from all claims as aforesaid.

Payment to Nominated Sub- Contractor:

Before issuing any certificates which under any payment in respect of work done or goods supplied by any Nominated Sub-Contractor Consultant shall be entitled to demand from Contractor reasonable proof that all payments (less retention) included in previous certificate in respect of works or goods of such Nominated Sub-Contractor has been paid of discharged by Contractor in default whereof unless the Contractor shall:

Inform the Consultant in writing that he has reasonable cause for withholding or refusing to make such payment and

Produce to Consultant reasonable proof that he has so informed such Nominated sub-Contractor in writing that the Owner shall be entitled to pay to such Nominated Sub-Contractor and to deduct by way of set off the amount so paid by the Employer from any sum due from the Owner to the Contractor.

#### 4.34 Alterations Additions and Omissions:

Consultant shall make any variation of the quality or quantity of the works or any part thereof that may in his opinion be necessary and for that purpose or if for any other reason it shall in his opinion be desirable shall have power to order the Contractor to do and the Contractor shall do any of the following:

- a. Increase or decrease the quantity of any work in the Contract.
- b. Omit any such work
- c. Change the Contractor or quality or kind of any such work
- d. Change the levels, position and dimension of any part of the work
- e. Execute additional work of any kind necessary for the completion of the works and no such variation shall in any way vitiate or invalidate the Contract but the value (if any) of all such variations shall be taken into account in ascertaining the amount of Contract price.

#### 4.35 Variations and its Valuation:

The Consultant may issue instruction requiring a variation and he may sanction in writing any variation made by the contractor otherwise than pursuant to an instruction of the Consultant. No variation required by the Consultant or subsequently sanctioned by him shall vitiate this contract.

The term " variation " used hereafter means the alteration or modification, of the design, quality and quantity of the work as shown in the drawings and desired by or referred in the Contact and includes omissions or additions or substitution of any work, the alternation of the kind of standard of any materials or goods to be used in the work, and the removal from the site of any works, materials or goods to be used in the work and the removal from the site any goods or works or materials executed or brought thereon by the Contractor for the purposes of the work other than the work, materials or goods which are not in accordance with this Contract and or as explained in Clause 5.27.

The value of variation shall be added or deducted as appropriate and determined by the Consultant based on the prevailing rates. The Consultant shall ascertain and determine this in accordance with rates and prices prevailing so far as the same may be applicable. In other cases reasonable price shall be fixed by the Consultant, which shall be the actual cost of execution to the Contractor as assessed by the Consultant increased by 15% for the Contractor's Overheads and profit. The Contractor shall furnish to Consultant such documents, receipts or vouchers as may be necessary to

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prove the amount paid and before ordering materials shall submit to the Consultant quotations for the same for their work.

### 4.36 Certificate & Payments:

At the period of interim certificate named in the appendix to these conditions the Consultant shall issue a certificate stating the amount due to the contractor from the Owner. The contractor will be entitled to payment thereof within the period for honoring certificate named in the appendix to these conditions. Interim valuations shall be made whenever the Consultant considers them to be necessary for the purpose of ascertaining the amount to be stated as due in an interim certificate.

The amount stated as due in an interim certificate shall subject to any agreement between the parties as to stage payments be the total value of the work properly executed less any amount which may be retained by the Owner and less any installments previously paid under this condition.

### 4.37 Defects:

The contractor shall make good at his own cost and to the satisfaction of the Consultant all defects, shrinkage or small faults, arising in the opinion of the Consultant from work or materials not being in accordance with the specifications, Bill of Quantities or the instructions of the Consultant which appear within "Defects Liability Period".

Such defects, shrinkage shall upon directions in writing of the Consultant and within such reasonable time as specified therein be amended and made good by the contractor, at his own cost unless the Consultant shall decide that he ought to be paid for such amending and making good and in case of default, the Owner may employ and pay other contractor to amend and make good such defects, shrinkage, settlements or other faults and all damages loss and expense consequent thereon or incidental thereto shall be made good and borne by the contractor. The Owner upon the Consultant's certificate in writing from any amount due or may become due to the contractor, deduct a sum to be equivalent to the cost of amending such work and in the event of the retention amount being insufficient recover the balance from the contractor, together with any expense he may have incurred in connection therewith.

### 4.38 Liquidated Damages:

If the contractor fails to complete the works by the date specified in these contract or within any permitted extended time fixed under clause 5.31 of these conditions and the Consultant certifies in writing that in his opinion the same ought reasonably so to have been completed, the contractor shall pay or allow to the owner a sum calculated at the rate stated in the appendix as agreed liquidated damages for the period during which the said work shall so remained or have remain incomplete, the owner may deduct such damages from any monies otherwise payable to the contractor under this contract.

### 4.39 Virtual Completion:

When in the opinion of the Consultant the Works are practically completed, he shall forthwith issue a certificate to that effect and Virtual completion shall be deemed for all the purpose of this contract to have taken place on the day named in such certificate.

If in the opinion of the Consultant the works are periodically completed, he shall forthwith issue a certificate to that effect and virtual completion shall be deemed to have occurred on the day the certificate has been issued and the Defects Liability Period shall commence from thereon, provided the Consultant may give such a certificate with respect to any part of work or on a written request from the contractor, issue a certificate for any substantial quantity of work executed and completed to the satisfaction of the Consultant. When such certificate is issued for a part work than the work for such part only shall be considered as virtually completed.

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4.40 **Defects Liability Period:** 12 months form day of the completion certificate issued by client / consultant.

Any defects or other faults as shall appear within the "Defects Liability Period " stated in the appendix to these conditions and which are due to materials and defective workmanship shall be specified by the Consultant in schedule of defects, which he shall deliver to the contractor not later than 14 days after the expiration of Defects Liability Period and within a reasonable time of receipt of such schedule of defects, and other faults, the same shall be made good by the contractor at his own cost.

If the contractor fails to execute any such aforesaid work within 15 days of receipt of Schedule of Defects then the Owner may engage his own workmen or other contractor to carryout such aforesaid work and deduct the amount for amending such work from the retention amount or from any monies due to the contractor or if the amount due to the contractor is insufficient may even recover the expenses incurred in connection therewith from the contractor.

Amounts due after the defects liability period shall be paid to the contractor only against a certificate from the Consultant stating that the works have been completed and maintained to his satisfaction. The certificate shall be issued within 20 days after the expiry of defects liability period for the works (or for part of work in case of different periods of defects liability refer clause 5.39)

Both the contractor and the owner shall be liable to fulfill the obligations mentioned in the contract before and after the issuing of this certificate and for purpose of determining any such obligation the contract shall be deemed to remain in force between both the partners.

4.41 **Determination of Contract:**

41.1) **Determination by the Owner:**

Default: If the contractor shall make default in any one or more of the following respects that is to say:

- a) If he without reasonable cause wholly suspends the carrying out of the works before completion thereof, or
- b) If he fails to proceed regularly and diligently with the works, or
- c) If he refuses or persistently neglects to comply with a written notice from the Consultant requiring him to remove defective work or improper materials or goods and by such refusal or neglect the work is materially affected or
- d) If he fails to comply with the provision of clause 5.26.

Then the Consultant may give him the notice by registered post or recorded delivery specifying the default, and if the Contractor either shall continue such a default for 14 days after the receipt of such a notice and shall at any time thereafter repeat such a default(whether previously repeated or not). The Owner without prejudice to any other rights or remedies may within 10days after such continuance or repetition of notice by registered post or recorded delivery forth with determine the employment of the Contractor under this Contract, provided that such notice shall not be given unreasonably.

**Bankruptcy of the Contractor:** In the event of the contractor becoming bankrupt or making a composition or arrangement with the creditors or being a company having a winding up order made or except for purpose of reconstruction a resolution for voluntary winding up passed or receiver or manager of his business or undertaking duly appointed or possession taken. By or on

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behalf of the holders of any debentures secured by a floating charge, of any property comprised in or subject to the floating charge, the employment of the contractor under this contract shall be forthwith automatically determined but the said employment may be reinstated and continued if the Owner and the Contractor, his trustee in Bankruptcy, liquidator, receiver or manager as the case may be shall so agree.

In the event of the employment of the contractor being determined as aforesaid and so long as it has not been reinstated and continued, the following shall be the respective rights and duties of the Owner and contractor.

The owner may employ and pay other persons to carry out and complete the works and he or they may enter upon the works and use (and may even sell if required) all temporary buildings, plant, machinery, appliances, goods and materials intended for delivered to and placed on or adjacent to the works and may purchase all materials and goods necessary for the carrying out and completion of the works.

The Consultant shall certify the amount of expense properly incurred by the owner and the amount of any direct loss and/or damage caused to the owner by the determination and if such amounts when added to the monies paid to the contractor before the date of determination exceed the total amount which would have been payable on due completion in accordance with this contract. The difference shall be a debt payable to the owner by the contractor, and if the said amounts, when added to the said monies be less than the said total amounts, the difference shall be a debt payable by the owner to the contractor.

The Contractor shall as and when required in writing by the Consultant so to do (but not before) remove the works any temporary buildings, plant, tool, equipment, goods and materials belonging to or hired by him. If within reasonable time after any such requirements has been made the Contractor, has not complied therewith then the owner may (but without being responsible for any loss or damage) remove and sell any such property of the Contractor, holding the proceeds less all cost incurred to the credit of the Contractors.

### 41.2 Determination by the Contractor:

Default: If the owner does makes any default in one or more of the following respects:

- a. The owner does not pay to the contractor the amount due on any certificates within the period of Honouring as named in the Appendix and continues such default for seven days after received by registered post or recorded delivery of a notice from the contractor stating that the notice of determination under this condition will be served if the payment is not made within seven days from receipt thereof.
- b. If the Owner interferes with or obstructs the issue of any certificate due under this contract, or
- c. If the work is suspended for a continuous period ,
- d. Force majeure,
- e. Civil Commotion,
- f. The Contractor not having received in due time necessary instructions, drawings, details or levels from the Consultant for which he specifically applied in writing on a date which having regard to the date of Completion stated in the appendix to these conditions Or to any extension of time then fixed under clause 5.31 of these conditions was neither unreasonably distant from nor unreasonably close to the date on which it was necessary for him to receive the same or,
- g. Delay on part of artisans or contractors deputed by the owner in executing work not forming part of their tender.
- h. The opening up for inspection any work covered up or of the testing of any of the work materials/goods (including making well in consequence of such opening up or testing) unless the inspection or test showed that the work materials or gods were not in accordance with his contract.

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The contractor may thereupon by notice by registered post or recorded delivery to the Owner or Consultant forthwith determine the employment of the contractor under this contract; provided such notice shall not be given unreasonably or vexatiously.

On such determination, then without prejudice to the accrued rights or remedies of either party or to any liability which may accrue either before the Contractor or any Sub-Contractor shall have removed his or theirs temporary buildings, plant, machinery, appliances, goods or materials or by reason of his or their so removing the same, the respective Liability of the Contractor and Owner shall be as follows:

1. The contractor shall with all reasonable dispatch and in such manner with such precautions as to avoid injuries, damage or death or damage of the classes in respect for which before the date of determination he was liable to indemnify the Owner under the clause 5.39 and 5.40 of these conditions remove from site all his temporary buildings, plant, machinery, appliances, goods or materials.
2. After taking into account the amounts previously paid under this contract the contractor will be paid by the owner the following
  - i. Total value of works completed
  - ii. The total value of works executed but not completed at the date of determination,
  - iii. Cost of materials and goods ordered by the contractor for the works, which the contractor has paid or is legally bound to be paid, will be payable to him by the owner and the materials and goods thereafter will be the property of the owner.
  - iv. The reasonable cost of removal as per (1) above.
3. Any direct loss and or damage caused to contractor by determination.

#### 4.42 Guarantee:

All equipment and the entire installation shall be guaranteed to yield the specified ratings and design conditions subject to specified tolerance. Any equipment found short of the specified ratings by more than the allowable tolerance as determined by the test readings shall be rejected. However, shortfall in air capacities will not be accepted.

#### 4.43 Arbitration:

All differences arising out of or in connection with the contract whether during the progress of work or after completion shall be referred to and settled by arbitration by two arbitrators, one to be nominated by the Contractor and the other by the Owner. In the event of arbitrators disagreeing, it shall be referred to an umpire, to be nominated by the two arbitrators before proceeding with arbitration. The decision of the umpire shall be final, conclusive and binding on both THE employer And the Contractor. For the purpose of this clause, the provisions of the India Arbitration Act, 1940 with the relevant amendments shall be applicable.

#### 4.44 Cares for Works:

From the commencement to the completion of the works, the contractor shall take full responsibility the care thereof and of all temporary works and in case any damage, loss or injury shall happen to the works or to any part thereof or to any Temporary Works from any cause whatsoever the Expected risks, so that at completion, the works shall be in good order and condition and in conformity in every respect with the requirements of the contract and Engineer's Instructions. The Contractor shall also be liable for any operations carried out by him for the purpose of complying with his obligations.

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4.45 Prices to be Firm:

Unless otherwise specified no increase or decrease in the contract price shall be made after the acceptance of the tender.

5.46 Contract Agreement:

The Contractor shall whenever called upon to do so, enter into and execute a Contract Agreement (to be prepared at the cost of the Contractor) with such modifications as necessary.

Witness Signature: \_\_\_\_\_

Contractor's Signature: \_\_\_\_\_

Name & Address: \_\_\_\_\_

Name & Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_

Employer: \_\_\_\_\_

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### 5.0. SPECIAL CONDITIONS OF CONTRACT

The Special Conditions shall be read in connection with the General Conditions of Contract given herein before. Where the two are at variance, the conditions herein below shall take necessary precedence over those in General Conditions and shall thus govern.

- 5.1 The tenderers should thoroughly acquaint himself with the conditions of the contract and all the matters concerning the execution of the work. Every tenderer is expected before quoting his rates visit the site and ascertain for himself the ground conditions.
- 5.2. The tenderers whose tender is accepted shall within seven days of the receipt of written intimation from the Architect of the acceptance of his/their tender is bound to execute the contract with the owner.

The written acceptance by the said owner of the tender will constitute a binding agreement between the said party and the person/firm so tendering whether such formal agreement, is or is not subsequently entered into.

- 5.3 Unless otherwise specified the rates quoted in tender shall include charges for scaffolding, temporary supports, formwork, hire for any tools and plants, service charges, sheds for materials, taxes in force and all such works necessary to execute the work as per the items mentioned in the tender. Income tax as applicable will be deducted at source as per the prevailing rates in force.
- 5.4 Information relating to the examination, clarification, evaluation, and comparison of Bid and recommendations for the award of Contract shall not be disclosed to bidders or any other persons not officially concerned with such process until the award to the successful bidder has been announced. Any effort by bidder to influence the Employer's processing of Bids or award decisions may result in the rejection of his Bid.
- 5.5 The Contractor should depute a full time technical staff for due execution as per specifications. The contractor should submit a work schedule to complete the work in specified time limit and accordingly arrange for material, labour and equipment.
- 5.6. The contractor shall attend the periodical meetings with the consultant and the owner's committee at a pre-scheduled time for smooth functioning and general con-ordination.
- 5.7 Extra Items: Extra items if any shall be got approved from the Consultant with due consent of the Owner before execution and the Consultant's decision shall be final and binding on both the owner and the contractor. The contractor will be paid as follows cost of material + cost of labour + 15% for overheads and profits + VAT + Service Tax.
- 5.8 The contractor shall maintain the following registers :
  - a. Muster Roll
  - b. Labour register
  - c. Material Register (Materials Account Statement)
  - d. Stock Register
  - e. Material Testing Register
  - f. Daily Works Register
  - g. Measurement Book
  - h. Site Instruction Book
  - i. Safety records. Quality records/ test results

# TERNA PUBLIC CHARITABLE TRUST HOSPITAL

## UPGRADATION OF FIRE FIGHTING WORKS

- 5.9 Payments to the contractor should be made only against a certificate from the consultant as specified in the Appendix.
- 5.10 The contractor shall whenever called upon to do so enter into an agreement as in the form annexed with modifications as felt to be necessary.
- 5.11 The contractor shall indemnify the Owner and the consultant against any damages, claims or liabilities etc on account of accidents and mishaps etc during the execution of the work in the prescribed format attached herewith. The contractor shall be held responsible for settlement of any claims on account of damage occurred to the existing structure or any other surrounding properties due to negligence.
- 5.12 If the performance of the selected Contractor is found to be unsatisfactory, the Owner in concurrence with the consultant reserves the right to cancel any part or whole of the Contract and get the works executed through alternate means at the entire risk and cost of the Contractor on whom the order was first placed. In such cases, the Contractor should make good all losses that the Owner may incur.
- 5.13 The Contractor should submit the Bills in triplicate and forward the copies to the consultant for certification.
- 5.14 The contractor will not be permitted to shift the materials out of the site unless a written permission of the Owner/consultant.

Witness Signature: \_\_\_\_\_

Contractor's Signature: \_\_\_\_\_

Name & Address: \_\_\_\_\_

Name & Address \_\_\_\_\_

\_\_\_\_\_

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\_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_

Employer: \_\_\_\_\_

# TERNA PUBLIC CHARITABLE TRUST HOSPITAL

## UPGRADATION OF FIRE FIGHTING WORKS

### 6. SAFETY CODE

#### **General**

The contractor shall ensure and arrange at his cost fire and safety provisions, as per safety code of CPWD, Indian Standards Institution for all labour, directly or indirectly employed in the works for performance of this contract and such as locally in force from time to time. Contractor will indemnify the Employer from any consequence arising due to contractor's failure in respect of safety code.

#### **6.01 First Aid and Injuries**

First aid facilities at easily accessible place shall be provided by the contractor as per provisions of Labour Act or Authority where work is carried out. The Contractor shall make outside arrangements with hospitals for ambulance service and for treatment of injuries to meet eventualities needing these facilities. The CONSULTANT shall be informed of their telephone numbers and addresses.

All critical injuries shall be reported promptly to the CONSULTANT. Report shall cover type, nature, cause, physician's report and actions for prevention of those types again.

#### **6.02 General Rules**

Smoking within site, restricted areas, near storage place of lubricant oil and fuel etc. are strictly prohibited.

#### **6.03 Display**

These safety provisions shall be brought to the notice of all concerned by display on a notice board at the prominent place at the work space persons responsible for ensuring compliance with the safety code shall be named therein by the Contractor.

#### **6.04 Scaffolding**

Suitable scaffolds shall be provided for workmen for all works that cannot safely be done from the ground or from solid construction except such short period work which can be done safely from ladders. When a ladder is used, extra labors shall be engaged for holding the ladder and if the ladder is used for carrying materials as well, suitable footholds be provided on the ladder and the ladder shall be given an inclination, not steeper than  $\frac{1}{4}$  to 1 (1/4 horizontal and 1 vertical). No portable single ladder shall be over 8 meter in length. The width between the side rails shall not be less than 30 cm.

#### **6.05 Guard Rails**

Scaffolding or staging more than 3.25meters above the ground or floors, swung or suspended from an overhead support or erected with stationary support, shall have guard rail property attached, bolted, braced and otherwise secured at least 1 meter high above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends. Therefore, with only such openings as may be necessary for the delivery of materials, such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.

#### **6.06 Working Platform**

Working platform, gangways, and staircase shall be so constructed that they do not sag or unequally, and if height of platform or gangway or stairway is more than 3.25 meters above the

# TERNA PUBLIC CHARITABLE TRUST HOSPITAL

## UPGRADATION OF FIRE FIGHTING WORKS

ground level or floor level, it shall be closely guarded, have adequate width and be suitably fenced as described in clause Guard Rails above.

### 6.07 Accident

No materials on the sites shall be so stacked or placed as to cause danger or inconveniences to any person or public.

- a. Motors, gearing transmission HVAC wiring and other dangerous parts of hoisting appliances shall be provided with efficient safeguards;
- b. Workers employed on energized electrical installation, will use insulated foot mats and in addition shall wear apparel such as gloves, sleeves and boots, which as may be necessary shall be provided. Workers shall not wear any rings, watches and keys or other materials, which are good conductors of electricity.

### 6.08 Maintenance

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

### 6.09 Electrical Equipment

All temporary and permanent Electrical installations, power distribution and supply required for execution of Work shall be carried out conforming to safety rules and regulations important specific points to be noted are as under:

- a. Meter room and main switches should be freely accessible at all times and fully protected against all weathers.
- b. Proper and adequate earthing connection to be provided for all installation, plant machinery and distribution system.
- c. Hand lamps and inspection lamps shall be adequately insulated and guarded with wire mesh and will have proper plugs for use.
- d. Security and illuminator light shall be secured firmly and protected to withstand all weather.

### 6.10 Personal Safety

All necessary personal safety equipment as considered adequate by the CONSULTANT shall be available for use of person employed on the site and maintained in a condition suitable for immediate use and the Contractor shall take adequate steps to ensure proper use of equipment by those concerned:

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

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### 6.11 Enforcement

To ensure effective enforcement of the rules and regulations relating to safety precautions, arrangements made by the Contractor shall be open to inspection by the CONSULTANT or his representatives and the inspecting officer as defined in the Contractor's Labour Regulations.

### 6.12 Rules in Force

**Notwithstanding** the conditions stated hereof, the Contractor is obliged to enforce other Rules in force or as required in the opinion of the CONSULTANT or his representative.

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## UPGRADATION OF FIRE FIGHTING WORKS

### 7. APPENDIX

- Date of Commencement : 03 days after the issue of work order.
- Date of Completion : **75 days.**
- Defects liability period : 12 months after the issue of virtual completion Certificate.
- Liquidated damages. : **1 percent / Week for maximum sealing of 10 %.**
- Period of final measurements. : 15 Days after issue of virtual completion Certificate.
- Retention percentage : **5 % (Five percent) for the period of 1 year.**
- Payment Terms : Rs. 5,00,000/- shall be 70 % of the material supplied on site against invoice.
  - 1) R.A. Bill - 1 - After completion of 20 % work.
  - 2) R.A. Bill - 2 - After completion of 40 % work.
  - 3) R.A. Bill - 3 - After completion of 60 % work.
  - 4) R.A. Bill - 4 - After completion of 80 % work.
  - 5) Final bill - After completion of 100 % work.
- Period for honoring interim Bills Certificate : Within 10 days from the date of issue of the by the Consultant.
- Validity of Tender : 180 days

Witness Signature: \_\_\_\_\_

Contractor's Signature: \_\_\_\_\_

Name & Address: \_\_\_\_\_

Name & Address: \_\_\_\_\_

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Date: \_\_\_\_\_

Date: \_\_\_\_\_

Client: \_\_\_\_\_

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## UPGRADATION OF FIRE FIGHTING WORKS

### 8. LIST OF APPROVED BRANDS:

#### LIST OF APPROVED MAKES/MANUFACTURES OF MATERIALS

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

<b>SR.NO.</b>	<b>MATERIAL</b>	<b>BRAND NAME/MANUFACTURERS</b>
<b>A. Pipes &amp; Fittings (ISI Marked or Approved Quality)</b>		
1.	Galvanized Iron Steel Pipes	a) Zenith b) Jindal (Hissar)
2.	Standard G.I. Fittings	a) Kirti c) Unik
<b>B) Valves</b>		
1.	C. I. Sluice Valves & Non-return Valves	a) Kirloskar b) I. V. C. c) Viking
2.	OS & Y Type C. I. Sluice Valves	a) Kirloskar b) Viking
3.	Butterfly Valves	a) Danfoss b) Audco c) KSB
4.	Butterfly Valves with temper switch	a) Viking b) Tyco
5.	Wafer Type Check Valve	a) Danfoss b) KSB
6.	Ball Valves	a) Itap b) Zoloto
7.	Air Release Valves	a) Zoloto b) RBM, Italy

# TERNA PUBLIC CHARITABLE TRUST HOSPITAL

## UPGRADATION OF FIRE FIGHTING WORKS

<b>S.NO.</b>	<b>MATERIAL</b>	<b>BRAND NAME/ MANUFACTURERS</b>
<b>C) Plant &amp; Equipment</b>		
1.	Fire Pumps	a) Kirloskar b) Mather Platt c) KSB
2.	Electric Motor	a) Kirloskar b) ABB c) Crompton Greaves
3.	Diesel Engines	a) Kirloskar b) Greaves c) Cummins
5.	MS Vessels	Custom Built as per The best Engineering Practices
<b>C) Gun Metal Fire Fighting Fittings &amp; Accessories</b>		
1.	Gunmetal Landing Valve, Branch Pipe Nozzle, Fireman Axe, Fire Brigade Connection, Male-Female Couplings etc. (ISI Marked)	a)Newage
<b>D) Hose Pipes &amp; First Aid Hose Reels</b>		
1.	Fire Hose Pipe (R.R.L)	a) Eversafe b) Newage
2.	First Aid Hose Reel Drum & Bracket	a) Newage b) Eversafe
3.	Rubber Hose Reel for above	a) Newage b) Jyoti c) Eversafe
4.	Thermoplastic Reinforced Hose Reel for above	a) Newage
<b>E) Sprinkler Heads &amp; Installations Valves</b>		
1.	Quartzoid Bulb type Sprinkler Heads (UL Listed and FM Approved)	a) Viking b) Tyco

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## UPGRADATION OF FIRE FIGHTING WORKS

S.NO.	MATERIAL	BRAND NAME/ MANUFACTURERS
2.	Installation Control Valve with Hydraulic Gong (UL Listed and FM Approved)	a) HD Fire b) Newage c) Viking d) Mather & Platt
<b>F) Fire Extinguishers</b>		a) Minimax b) Eversafe
<b>G) Miscellaneous</b>		
1.	Flow Switches (UL Listed and FM Approved)	a) System Sensor,U.S.A b) Viking c) Spraysafe
2.	Expansion Bolts	a) Hilti b) Canon
3.	G.I. Hangers for Pipes / Adjustable Hanger	a) Chilly b) GMGR
4.	Welding Rods	a) Advani b) Victor
5.	Pressure Gauges b)	a) H Guru Fiebig
6.	Underground Pipe Protection Wrapping	a) Pypkote b) IWL
<b>B. FIRE ALARM SYSTEM</b>		
1.	Smoke Detector	a) Morely / Honey well b) cooper c) Siemens
2.	Hooter	a) Morely / Honey well b) cooper c) Siemens
3.	Manual Call Point	a) Morely / Honey well b) cooper c) Siemens
4.	Automatic Addressable FAS PANEL	a) Morely / Honey well b) cooper c) Siemens
5.	Response Indicator	a) Morely / Honey well b) cooper c) Siemens
6.	Cable	a) Plolycab b) Finolex c) Century d) KEI.

**TERNA PUBLIC CHARITABLE TRUST HOSPITAL**  
UPGRADATION OF FIRE FIGHTING WORKS

**Notes:-**

The Contractor should quote the tender rates considering First make of materials given in above list.

Wherever contractor proposes to use 'equivalent' makes (i.e. other than specified) he shall obtain Client's prior approval. Client may consult Consultants before giving approval to the same. Any additional cost and time lost due to this will be on Contractor's account and no claims will be entertained.

The contractor should take approval for make & manufacturer from the consultants before using any material, which does not appear in the list of approved manufacturers.

Witness Signature: \_\_\_\_\_

Contractor's Signature: \_\_\_\_\_

Name & Address: \_\_\_\_\_

Name & Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_

Employer: \_\_\_\_\_

# TERNA PUBLIC CHARITABLE TRUST HOSPITAL

## UPGRADATION OF FIRE FIGHTING WORKS

### 9.0

#### TECHNICAL SPECIFICATIONS FOR

#### TECHNICAL SPECIFICATIONS AND SCOPE OF WORK

#### 1 SCOPE OF WORK

This contract shall include the following services:

- a) Installation of External and Internal Hydrant System and First Aid Hose Reels.
- b) Installation of Automatic Sprinkler System
- c) Installation of Portable Fire Extinguishers.
- d) Installation of Fire Fighting Pumping system and associated pipe work
- e) Identification and labeling of the pipe work and equipment under the scope of this contract.
- f) Installation of Addressable Automatic fire alarm system.
- g) Cutting of F/C where ever is required and making it good and painted as per the instruction of site in charge.

The Tenderer shall include for the supply, unless otherwise mentioned, delivery, installation, connection, commissioning and testing of all materials and equipment to provide a complete Fire Fighting Installation as described hereunder.

#### 2 STATUTORY APPROVALS

**Fire Fighting Installation shall be in conformity with the regulations of local Fire Department and TAC.**

**The Contractor shall be responsible for obtaining the approval of the Local Fire Department for the installation done under the scope of work. The work will not be considered as complete unless the N.O.C. from Chief Fire Officer is provided.**

#### 2.1 SITE CONDITIONS

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

#### 2.2 STANDARD AND CODES OF PRACTICE

The work shall be carried out as per the enclosed Specifications of Work and the construction drawings to be issued from time to time. These specifications shall be read in conjunction with National Building Code 1983, relevant Codes of Practice and Standards as issued by Bureau of Indian Standards (B.I.S. - all with the latest amendments) wherever applicable, Fire Protection Manual & Sprinkler Regulations of Tariff Advisory Committee (TAC) & NFPA (USA) Publications.

#### 2.3 WORKMANSHIP

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

#### 2.4 DRAWINGS AND DOCUMENTS

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## UPGRADATION OF FIRE FIGHTING WORKS

### 2.4.1 General

- i) The Drawings provided with the Specification shall be treated as confidential documents and must not be copied or loaned to any other party without the express permission of the Owner.
- ii) The Drawings are intended as a guide to the firms tendering and give approximate positions of pipes, conduits, cable runs and/or equipment only and in measuring from these drawings, the Tenderer must make due and proper allowance for all necessary diversions from the straight line, rises or falls as may be required for the proper execution of the works. Detail drawings in all cases shall be worked to in preference to those of a more general nature and figured dimensions where indicated shall be followed in preference to scale. Where necessary, the exact positions of plant and/or equipment will be decided by the issue of further drawings, but no claim for extra payment due to insufficient information on this scope will be entertained. In any case of doubt as to the interpretation of either Drawings and/or Specification, the Tenderer must refer the matter to the Owner prior to the submission of his Tender.
- iii) It is to be clearly understood that this Tender is to be absolutely inclusive for the proper completion of the whole of the works specified to the true intent and meaning of the specification and/or Drawings and the description therein contained shall be read conjointly and together and no error, inconsistency, discrepancy in the Drawings and/or Specification will relieve the Contractor of his obligations to include for an hand-over the work in the true meaning and intent of the Specification and/or Drawings, complete in every respect. Should any portion of the works which would reasonably and obviously be inferred as necessary for the installation as a whole not be expressly specified, the Contractor shall provide and execute such work as part of the Contract and shall not be entitled to any extra payment of that account.
- iv) The Contract Drawings and such other drawings as may be furnished to the Contractor during the progress of the Works shall be considered as illustrating between the Drawings and the Specification; the Contractor shall execute the work in accordance with the decision of the Owner. If modifications are necessary, the Contractor shall submit modifications to the Owner for approval before such modifications are executed.
- v) All Drawings and Specification are the property of the Owner.
- vi) The Contractor will be required to give and obtain all necessary site and other particulars and to agree such details with the Owner. The Contractor must also obtain details of any other Contractor's work affected by his work and shall work in close co-operation with all such firms or persons concerned.
- vii) The Contractor shall be responsible for any damage caused to buildings and contents and works by reason of, arising out of, or incidental to, or in connection with the execution of any work in the Contract Documents.

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

- viii) The Contractor shall submit to the Owner for approval, before the work is commenced, a copy of all working details and installation drawings and shall also supply sufficient copies for the use of the Builder and other interested parties.

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

# TERNA PUBLIC CHARITABLE TRUST HOSPITAL

## UPGRADATION OF FIRE FIGHTING WORKS

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

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

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

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

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

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

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

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

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

# TERNA PUBLIC CHARITABLE TRUST HOSPITAL

## UPGRADATION OF FIRE FIGHTING WORKS

### 2.4.2 Manufacturers' Data

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

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

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

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

### 2.4.3 Operating and Maintenance Manual

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

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

### 2.4.4 "As Installed" Drawings

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

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

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

## 2.5 RATES

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

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

**The quantities mentioned in BOQ may vary (increase or decrease) to any extent without any change in prices and it should not be treated as breach of contract..**

# **TERNA PUBLIC CHARITABLE TRUST HOSPITAL**

## **UPGRADATION OF FIRE FIGHTING WORKS**

### **2.6 FIRE FIGHTING INSTALLATION DRAWINGS**

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

### **2.7 DISCREPANCIES IN THE DRAWINGS**

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

### **2.8 INSTRUMENTS FOR MEASUREMENT AND TESTING**

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

### **2.9 CO-ORDINATION WITH OTHER TRADES**

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

### **2.10 PROTECTION**

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

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

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

## **B3 PIPE WORK**

### **3.1 MATERIALS**

**The pipe work shall be done in black mild steel pipes of 'Heavy' grade conforming to IS: 1239 (Part I)-1990 for up to 150 mm dia pipe and IS: 3589-1991 for pipes above 150 mm dia.**

**Fittings: All fittings up to 50 mm dia shall be black forged steel pipe fittings with threaded ends/ weld able socketed ends. Fittings above 50 mm dia shall be heavy duty mild steel with weld able ends. All fittings shall be conforming to relevant Indian Standards and shall have**

# TERNA PUBLIC CHARITABLE TRUST HOSPITAL

## UPGRADATION OF FIRE FIGHTING WORKS

**manufacturer's trade mark stamped on it. Fittings in M.S. pipe lines shall include elbows, tees, bends, reducers, nipples, union  
For welded joints forged steel fittings of approved type with "V" groove shall be used.**

Fabricated fittings shall not be permitted generally. However, if use of any fabricated fitting is found necessary by the Project Manager, fabrication of such fitting shall be taken up by the Contractor on the written directives of the Project Manager in a workshop following proper welding procedures. For fabricating a 'Tee' connection pipes shall be drilled and reamed and joint only welded. Gas cutting of pipes shall not be permitted. Fabricated 'Tee' out of M.S. plates shall not be used.

All fittings shall be tested at manufacturer's work. The Contractor may be required to produce certificate to this effect from the manufacturers.

### 3.2 JOINTING

The pipes and fittings up to 50 mm diameter shall be threaded joints using Teflon Tape on the threads. Joints for pipe and fittings above 50 mm diameter shall be welded joints. Care shall be taken to remove any burr from the end of the pipe after cutting..

#### 3.2.1 Welded Joints

##### General

The welding of pipes in the field should comply with IS: 816, 1969. Electrodes used for welding should comply with IS: 814, 1991.

Joints between M.S. pipes and fittings shall be made with pipes and fittings having "V" groove and welded with electrical resistance welding in an approved manner Butt welded joints shall not be acceptable. Care shall be taken to remove any burr from the end of the pipe after cutting.

All welders must be fully qualified and proof of an operator's qualification shall be either the Contractor's record of suitable tests passed within the previous six months or tests made before the commencement of the work.

The Contractor must submit to the Owner the names of the welders who will be employed on the work, together with documentary evidence of their competency.

Any welder considered by the Owner as not having the skill necessary for the work will at once be barred from further welding on the site or in the Contractor's workshop.

The Owner may instruct the Contractor to cut out typical welded joints for inspection and the Contractor shall include for the removal of such pieces and re-making joints to the satisfaction of the Owner. The Contractor shall include in his Tender for the cost of removing all such pieces for inspection and re-making joints.

Care must be exercised by the Contractor to ensure that the welding flux does not project into the bore of the tube. All welds shall be good, clean metal, free from slag inclusions and porosity, of even thickness and regular contour, well fused with the parent metal and finished smooth.

Where site welding is carried out in proximity to inflammable materials, the Contractor must take special precautions to protect the materials from risks of fire.

#### Testing of Welded Joints

The welded joints shall be tested in accordance with procedure laid down in IS: 3600 (Part I): 1985. One test specimen taken from at least one field joint out of any 10 shall be subjected to test.

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## UPGRADATION OF FIRE FIGHTING WORKS

If the results of the tensile test do not conform to the requirements specified, retests of two additional specimens from the same section shall be made, each of which shall conform to the required specifications. In case of failure of one or two, extensive gouging (scooping out) and repairing shall be carried out as directed by the authority.

If internal pressures exceed 1.5 MPa (15 kgf/cm<sup>2</sup>), special attention should be given to the assembly of the pipe and the first run of weld. Non-destructive testing of the completed weld may be carried out on pipe-lines by radiographic (see IS: 4853: 1982) or ultrasonic method (see IS: 4260, 1986)) as agreed upon between the Owner and the Contractor.

### 3.2.2 Screwed Joints

3.2.3 Joint for black steel pipes and fittings shall be metal to metal threaded joints using Teflon tape on the threads.

### 3.2.4 Flanged Joint

M. S. Flanges shall be as per IS: 6392 and shall be faced. Rubber or asbestos gasket shall be inserted between the joints.

Flange shall be provided for jointing all type of valve, appurtenances, pumps, connection with other type of pipes, to water tanks and other places necessary and required as per good for engineering practice.

Flanged joints shall be avoided on straight runs as far as possible.

### 3.2.5 Unions

Provide approved type of dismantable unions on pipes lines 65 mm and below in similar places as specified for flanges.

## 3.3 LAYING AND FIXING

a) Above Ground:

Exposed pipes on walls and ceilings shall be fixed with standard pattern G.I. holder bat clamps on angle iron frames embedded in walls or suspended from ceiling. The clamps shall be spaced at regular intervals in straight lengths as per the following table:-

(MM)	Dia of Pipe	Horizontal	Length
	Vertical Length	(M)	
25	(M)		3.0
32	2.4		3.0
40	2.7		3.6
50	3.0		3.6
65	3.0		4.5
80	3.6		4.5
100	3.6		4.5
150	4.0		5.4
	4.5		

Additional supports are to be provided at every change of directions and branch-offs

b) Under Ground:

The trenches for the underground mains shall be 75 cm wide at top and excavated to a depth so that a minimum 1 meter of cover above the crown of the pipe is available after backfilling. The pipes shall be evenly laid in the trenches after coating and wrapping as described hereinafter and covered with fine sand 150 mm all around. Any damage to coating and wrapping shall be made good before backfilling.

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c) Protection of Underground Pipes:

The underground steel pipes shall be protected by coating and wrapping. The coating and wrapping shall be done, in general, as per IS: 10221 – 1982 using Coal Tar Based Anticorrosion Tape conforming to IS: 15337 -- 2003.

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

d) Anchor Blocks

Suitably designed anchor blocks in cement concrete to encounter excess thrust due to water hammer and high pressure should be provided at all bends, tees and such other locations as directed by the Owner. Exact location, design, size and mix of the concrete block shall be approved by the Architect / Consultant prior to the execution of the work.

### 3.4 PAINTING AND FINISH

All pipe work and supports should be thoroughly cleaned applied with a coat of primer and minimum two coats of enamel paint of approved shade. The paint shall have a minimum two hours fire rating.

## 4 VALVES & OTHER ACCESSORIES

### 4.1 GENERAL

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

- a) The manufacturer's name or trade mark
- b) The size of the valve
- c) The guaranteed working pressure

Isolating valves on the water supply lines shall be full bore ball valve type for pipe diameters up to 50 mm. For 65 mm dia and above these shall be butterfly valves.

#### 4.1.1 Full Way Ball Valve

The valves shall be of full bore type and of quality approved by the Consultant/Project Manager. The body shall be hot pressed brass nickel plated. The ball shall be of brass, hard chromium plated, machined to a micro smooth finish. Handle shall be of hard aluminum alloy epoxy painted. Stem seat shall be of PTFE. The valve shall conform to EN 29000- ISO 9000.

#### 4.1.2 Butterfly Valves

The valve shall of cast iron conforming to relevant IS: 13095. The valve shall be of quality approved by the consultant/Owner.

#### 4.1.3 Non-Return Valves

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

#### 4.1.4 Full way Gate Valve / C.I.Sluice Valve

The Fullway Gate Valve shall be of quality approved by the Consultant/Owner and shall generally conform to IS: 778-1971.

The C.I.Sluice Valve of size 50 mm dia and above shall conform to IS: 14846.

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### 4.1.5 Air Release Valve

Air Valves are to be provided on all high points in the system. These shall be 25 mm dia screwed inlet forged brass/cast iron single acting air valves connected with ball valve on inlet side.

### 4.1.6 Drain Valve

Drain Valves are to be provided at all low points in the system for draining the water. These shall be 40 mm dia full way ball valve fixed on 40 mm dia black steel pipe.

### 4.1.7 Flow Switch

Flow switch shall be provided on sectional mains and branch lines of sprinkler systems as indicated on drawings or necessary and required and directed by the Project Manager.

Flow switch should be suitable to actuate at a minimum of flow of single sprinkler and shall be suitable for connection to a central annunciation panel.

## 4.2 PRESSURE SWITCHES

Pressure Switches shall be differential type for operation of all pumps and for the various duties and settings required. Pressure switches shall be for heavy duty operation and of approved make. All pressure switches shall be factory calibrated.

## 5. FIRE FIGHTING APPARATUS & FITTINGS

### 5.1 EXTERNAL YARD HYDRANT

- i. The external hydrants shall be controlled by a cast iron butterfly valve. Hydrants shall have instantaneous type 63mm dia outlets. The hydrants shall be single outlet conforming to I.S:908-1975 with flanged riser of required height to bring the hydrant to correct level above ground.
- ii. Contractor shall provide for each external fire hydrant two numbers of 63 mm dia. 15 mm long rubberized fabric linen hose pipe with gunmetal male and female instantaneous type couplings machine wound with G.I. wire (hose to I.S.:636 Type A and couplings to I.S:903 with M.S. certification), gunmetal branch pipe with nozzle to I.S:903.

### 5.2 INTERNAL HYDRANTS (LANDING VALVES)

- i. The internal hydrant shall be single headed gunmetal landing valve conforming to I.S:5290-1993, with individual shut off valves and cast iron wheels. Landing valve shall have flanged inlet and instantaneous type outlets as shown on the drawings.
- ii. Instantaneous 63 mm dia outlet conforming to I.S:903 for fire hydrants shall be of standard pattern approved and suitable for fire brigade hoses.
- iii. Contractor shall provide for each internal fire hydrant station two numbers of 63 mm dia. 15 mm long rubberized fabric linen hose pipes with gunmetal male and female instantaneous type coupling machine wound with G.I. wire (hose to I.S:636 Type A and couplings to I.S:903 with I.S certification), fire hose reel, gunmetal branch pipe with nozzle I.S:903.

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### 5.3. FIRST AID FIRE HOSE REEL

The First Aid Fire Hose Reels must be of type II and shall have 30 meter of 20 mm dia bore reinforced rubber hose fitted with shut-off gun metal nozzle. The hose reel shall be conforming to IS: 884 - 1985.

### 5.4. FIRE HOSE CABINET

The Fire Hose Cabinet of sizes suitable to accommodate equipment as specified in bill of quantities shall be fabricated of 16 gauges CRCA M.S. sheet and painted in fire red color. Its door shall be hinged type having lock and reinforced glass panel.

The fire hose cabinet for yard hydrants shall be weatherproof type of size suitable to accommodate 2 nos. of 15M long 63mm diameter R.R.L. hoses with female & male gunmetal coupling and branch pipes.

Wherever masonry shaft is available to house equipment, only the glazed front panel is to be fixed as required and as specified in bill of quantities.

### 5.5. SPRINKLER HEADS

Sprinkler heads shall be of gunmetal and quartz bulb type with a temperature rating of 68 deg. Centigrade or as specified in the bill of quantities. These shall be of type and quality approved by the local fire service and TAC.

### 5.6. INSTALLATION VALVE FOR SPRINKLER SYSTEM

- a) Installation valves shall be installed in the pump room.
- b) Installation valve shall comprise of a cast iron sluice valve with gunmetal trim, pressure gauge, double seated clapper check valves as alarm valve with pressure gauge, test valve and orifice Assembly and drain pipe with pressure gauge, bye pass on check valve to regulate differential pressure and false alarm, turbine water gong including all accessories necessary and required and as supplied by original equipment manufacturer and required for full and satisfactory performance of the system.
- c) Contractor shall submit his detailed shop drawings showing the exact location, details of installation of the valves and alarms.

### 5.7. SPRINKLER ANNUNCIATION PANEL

Supply and installation of Sprinkler Annunciation Panel is not in the scope of this contract. The control cables from the flow switches are to be terminated in the Automatic Fire Alarm System Control & Indicating Panel, the supply of which is in the scope other contract. However, the Contractor would responsible for coordinating with the other agency for connecting, testing and commissioning of the said panel.

### 5.8. PORTABLE FIRE EXTINGUISHERS

Portable Fire Extinguisher shall be of type and as mentioned in the Bills of Quantities. All fire extinguishers must conform to the relevant Indian Standards and must bear the ISI Certification Mark. These shall be installed and maintained in accordance with IS:2190 - 1971.

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## UPGRADATION OF FIRE FIGHTING WORKS

### 6. PUMPING SYSTEM

The Pumping System shall consist of electric motor driven as well as diesel engine driven fire pumps of duty as specified in the bill of quantities. The major items under this head shall be as follows:

#### 6.1 PUMPS

All fire pumps shall meet the following duty requirements:

- (i) Pumps should deliver at least 150% of the rated discharge at a head of 65% of the rated head
- (ii) The shut off head shall not exceed 120% of the rated level.

Pumps shall be centrifugal type driven by either an electric motor or a diesel engine. However, wherever specified in Bill of Quantities, the jockey pump may be vertical inline type of stainless steel construction.

The casing will be of the volute type designed to ensure correct velocity distribution manufactured in close grained cast iron and complete with air release cock, drain plug and delivery pressure gauge connection.

The impeller will be of the shrouded type manufactured in close grained gun metal/bronze and keyed to the shaft. It will have balancing holes to achieve hydraulic balance and reduce pressure in the stuffing box and prolong the packing life. The impellers shall be dynamically balanced. Connecting shaft shall be stainless steel with bronze sleeve and grease lubricated bearings. Close grained gun metal impeller wear rings will be fitted on both sides of the impeller to preserve running clearances.

Pumps shall be connected to the drive by means of spacer type love joy couplings, which shall be individually balanced dynamically and statically. The coupling jointing the prime movers with the pump shall be provided with a sheet metal guard.

Pumps shall be provided with approved type of mechanical seals.

The pumps shall have ratings as mentioned in Bill of Quantities. The pump shall meet the requirements of the Tariff Advisory Committee.

A Diesel Engine driven fire pump shall be provided as a standby arrangement. In the event of power supply not being available or non starting of Electric Motor driven pumps after the preset time, the Diesel Engine driven pump should start operating. If the diesel pump does not start, the system should be locked out and the audio visual alarm should be initiated.

#### 6.2 ELECTRIC MOTORS

Rating of the selected motor shall be equivalent to the motor required for a pump capable of 150% of the rated discharge.

Electrically driven pumps shall be provided with totally enclosed fan cooled induction motors or as specified in Bill of Materials. For fire pumps the motors should be rated not to draw starting current more than 3 times normal running current. Motors shall be wound for class B insulation and winding shall be vacuum impregnated with heat and moisture resistant varnish glass fiber insulated. Motors shall be suitable for 415 volts, 3 phase 50 cycles A/C supply and shall be designed for 38 deg C ambient temperature. Motors shall conform to I.S:325. Motors shall be capable of handling the required starting torque of the pumps.

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## UPGRADATION OF FIRE FIGHTING WORKS

Motors for fire pumps shall meet all requirements and specifications of the Tariff Advisory Committee.

### 6.3 DIESEL ENGINES

The diesel engine shall be water cooled type and capable of developing 150% more B.H.P at 1500 r.p.m. as required by the pump specified in the Bill of Quantities. The engine should be mounted along with the pump on suitable common robust MS channel on cast iron bed plate with vibration clamping arrangement with cushy foot or similar mountings. Engine exhaust pipe is to be insulated with asbestos taping followed by painting with aluminium paint.

The fuel tank shall be of welded steel construction conforming to relevant IS standard and having storage capacity sufficient to allow the engine to run on full load for 6 hrs. Including inter connecting fuel pipework fuel in the tank. The tank shall be mounted above the engine to provide or gravity feed. A hand operated pump connected to the fuel tank shall also be provided for transferring the fuel from the drum at floor level to the elevated storage tank.

Engine shall be direct injection type with low noise and exhaust emission levels. Noise level of the engine shall not exceed 105 DBA (free field sound pressure) at 3 meters distance.

The speed of the engine shall match the pump speed for direct drive.

The engine shall be self starting type up to 4 deg C and shall be provided with one 24 volts heavy duty DC battery, starter, cut-out, battery leads complete in all respects.

The engine shall be provided with an oil bath or dry type air cleaner as per manufacturer's design. Engine shall be suitable for running on high speed diesel oil.

The entire system shall be mounted on a common structural base plate with ant vibration mountings and flexible connections on the suction and delivery piping.

### 6.4 OPERATING SEQUENCE OF FIRE PUMPS

Fire pumps shall operate on drop of operating pressure in the fire mains in the following sequence:

- a) The operating pressure in the mains is to be maintained at 7.0 kg/cm<sup>2</sup>.
- b) The jockey pump shall start automatically the moment pressure drops to 6.0 kg/cm<sup>2</sup> and stop when the pressure reaches 7.0 kg/cm<sup>2</sup> again.
- c) In case, after the start of jockey pump, the pressure still keeps on falling, the main fire pump shall start at 5.5 kg/cm<sup>2</sup>. Jockey pump shall stop when main pump starts.
- d) In the event of electrical or mechanical failure of main fire pump to start, the diesel engine driven pump shall cut in when the pressure in the mains fall down to 4.5 kg/cm<sup>2</sup>.
- e) Both main fire pump and engine driven pumps should be stopped manually by starter push buttons only.
- f) Main Fire and Sprinkler pumps shall start independently and automatically on fall of pressure but stopping of the pump shall be shall be by manual push button from the MCC panel.

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### 6.5 AUDIO VISUAL ALARM

An electrically operated fire alarm system shall be provided which is connected to the fire & sprinkler pumps to indicate their operation visually by a blinker lamp and by an approved type of audible alarm.

### 7. PUMP CONTROL PANEL

#### 7.1 GENERAL

The Control Panel for firefighting system shall be housed in wall / floor mounted, dust and damp proof sheet steel cabinet with hinged front access door and shall have the suitable rating star-delta starters, timers, relays, necessary selector switch, for automatic and manual operation, indicating lamps, to show the status of each pump, single phase preventers, dry suction cut off, etc. and all other switch gear necessary for the satisfactory functioning of the hydrant system & sprinkler system.

Control Panels are to be suitable for 3 phase 4 wire 415 Volts 50 Hz system with a fault level of 31MVA at 415 volts.

Panel is to be metal clad, cubicle type totally enclosed, floor mounted and air insulated. The total height of the switchboard is to be not more than 2100 mm. Panels are to be extensible on both sides and shall conform to IP - 54 as per IS: 2147

#### 7.2 STANDARDS

The equipment shall be designed to conform to the requirements of:

- i) IS : 8623 - Factory built assemblies of switchgear and control gear.
- ii) IS : 13497 - General requirements for switchgear and control gear for voltages not exceeding 1000 Volts.
- iii) IS : 13947 - Degrees of protection provided by enclosures for low voltage switchgear and control gear.
- iv) IS : 375 - Marking and arrangement of busbars.

Individual equipment housed in control panel shall conform to the following IS specifications.

- |       |                                 |   |            |
|-------|---------------------------------|---|------------|
| i)    | Fuse Switch & Switch Fuse Units | - | IS : 13947 |
| ii)   | H.R.C. Fuse links               | - | IS : 9224  |
| iii)  | Current Transformers            | - | IS : 2705  |
| iv)   | Voltage Transformers            | - | IS : 3156  |
| v)    | Relays                          | - | IS : 3231  |
| vi)   | Indicating Instruments          | - | IS : 1248  |
| vii)  | Integrating Instruments         | - | IS : 722   |
| viii) | Control Switches & Push Buttons | - | IS : 6875  |
| ix)   | Contactors                      | - | IS : 13947 |
| x)    | MCCB                            | - | IS : 13947 |

#### 7.3 CONSTRUCTION DETAILS

Cubicle shall be mounted on a base folded channel of thickness 3 mm. All doors, side walls and interior separations shall be of CRCA MS sheet of thickness 2 mm. Insulation barriers and protective screens shall be provided wherever required.

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## UPGRADATION OF FIRE FIGHTING WORKS

Apparatus forming part of the control panel shall have the following minimum clearances:

i)	Between phases	-	25 mm.
ii)	Between phases and neutral	-	25 mm.
iii)	Between phases and earth	-	25 mm.
iv)	Between neutral and earth	-	19 mm.

Creepage distances shall comply with those specified in relevant standards.

### 7.4 MOULDED CASE CIRCUIT BREAKERS

MCCB shall conform to IS - 13947 and be rated for the currents as shown on the single line diagram. They shall have a short circuit rating as specified elsewhere.

All MCCB shall be provided with an adjustable thermal overload trip device together with an adjustable magnetic short circuit release. The MCCB shall have a trip free toggle mechanism, and dolly shall come to midway position and the trip operates.

The operating mechanism shall be quick make and quick break and trip free and contacts shall be single break type with arcing contacts located within arc chutes.

The MCCB shall be suitable for both vertical and horizontal mounting.

### 7.5 SWITCH FUSE UNITS / FUSE SWITCH UNITS

Fuse switch units shall be of the load break heavy duty type suitable for cubicle mounting with front operation. The switches shall conform to the requirements of IS: 13947 and shall be suitable for being fitted with HRC fuse links conforming to IS: 13703. The operating handles shall be interlocked with the opening of the door. The switches shall however be provided with a defeat interlock.

### 7.6 CURRENT TRANSFORMERS

Current transformers shall be of the ring type suitably fixed between insulating pieces and clamped. They shall conform to the requirement of IS: 2705 and shall have current ratio and outputs and accessories as specified.

### 7.7 INSTRUMENTS

Indicating instruments shall be flush mounting type square of required size and conforming to the requirement of IS: 1248.

### 7.8 BUS BARS

The bus bar shall be of Aluminum strip designed for a continuous current of specified rating and fabricated from bars conforming to grade E - 91 of IS : 5082. Each bar shall be provided with flexible expansion links as approved.

The bars shall be suitably supported with fiber glass reinforced epoxy supports to withstand the short circuit forces possible.

### 7.9 CONTROL WIRING

- i) All control wiring shall be carried out with 1100 / 660V grade single core PVC cable conforming to IS: 694 having stranded copper conductors of minimum 1.5 sq.mm. Section for potential circuits and 2.5 sq.mm. Section for current transformer circuits.

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- ii) Wiring shall be neatly bunched, adequately supported and properly routed to allow for easy access and maintenance.
- iii) Wires shall be identified by numbered ferrules at each end. The ferrules shall be of the ring type and of non-deteriorating material. They shall be firmly located on each wire so as to prevent free movement.
- iv) All control circuit fuses shall be mounted in front of the panel and shall be easily accessible.

### 7.10 LABELS

Labels shall be of anodized aluminum, with white engraving on black background. They shall be properly secured with fasteners.

### 7.11 TESTS

The design of the control panel shall have been type-tested in accordance with following sections of Cl.8: 1:1 of IS: 8623:

- a) Verification of temperature rise limits.
- b) Verification of dielectric properties.
- c) Verification of short circuit strength.

Routine tests shall be conducted on control panel in accordance with Cl. 8: 1: 2 of IS: 8623 and shall comprise:

- i) Inspection of the panel including inspection of wiring and electrical operational tests where necessary.
- ii) Dielectric tests.
- iii) Checking of Protective Measures and electrical continuity of the protective circuits.

### 7.12 METAL TREATMENT AND FINISH

All steelwork used in the construction of the switchboards should have undergone a rigorous metal treatment process as follows:

- i) Effective cleaning by hot alkaline degreasing solution followed by cold water rinsing to remove traces of alkaline solution.
- ii) Pickling in dilute sulphuric acid to remove oxide scales and rust formation, if any, followed by cold water rinsing to remove traces of acidic solution.
- iii) A recognized phosphate process to facilitate durable coating of the paint on the metal surfaces and also to prevent the spread of rusting in the event of the paint film being mechanically damaged. This again, shall be followed by hot water rinsing to remove traces of phosphate solution.
- iv) Passivating in de-oxalate solution to retain and augment the effects of phosphating.
- v) Drying with compressed air in a dust-free atmosphere.
- vi) Two coats of stoving synthetic enamel epoxy paint to the specified shade of IS: 5. the total thickness of paint should not be less than 25 microns.

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### 7.13 FIRE PANEL DRAWINGS

The contractor shall furnish the G.A. and control circuit wiring diagram drawings for approval

Detailed catalogues for all bought out equipment shall be made available for scrutiny and approval.

After completion of all works 3 sets of all final approved drawings covering G. A. Circuit diagrams, Single line diagrams for total system are to be made available

## 8 TESTING AND COMMISSIONING

### 8.1 GENERAL

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

Work under this section shall be executed without any additional cost. The rates quoted in this tender shall be inclusive of the works given in this section.

Contractor shall provide all tools, equipment, metering and testing devices required for the purposes.

The entire fire fighting piping system shall be tested at minimum 14 kg/cm<sup>2</sup> pressure. The test pressure shall be maintained for at least 2 hrs.

### 8.2 METHOD OF TESTING

The test on fire fighting installation shall be carried out as per the provisions of various Codes of Practice, fire protection manual of Tariff Advisory Committee and National Building Code.

The carrying out and recording of tests shall be agreed with the Consultant/Project Manages/Architect.

The following method of testing of hydrant and sprinkler installation shall be followed in general:

#### Fire Hydrant System

- i. Pressurize the fire hydrant installation by running the main fire pump and once the required pressure is achieved, switch off the pump.
- ii. Open bypass valve and allow the pressure to drop in the system. Check that the jockey pump cuts-in and cuts out at the pre-set pressures. If necessary adjust the pressure switch for the jockey pump. Close bye-pass valve.
- iii. Open hydrant valve and allow the water to flow into the fire water tank in order to avoid wastage of water. The main fire pump should cut-in at the pre-set pressure and should not cutout automatically on reaching the normal line pressure. The main fire pump should stop only by manual push button. However the jockey pump should cut-out as soon as the main pump starts.
- iv. Switch off the main fire pump and test check the diesel engine driven pump in the same manner as the electrically driven pump.
- v. When the fire pumps have been checked for satisfactory working on automatic controls, open fire hydrant valves simultaneously and allow the hose pipes to discharge water into the fire tank to avoid wastage. The electrically driven pump should run continuously for eight hours so that its performance can be checked.

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- vi. Diesel engine driven pump should also be checked in the same manner as given in Para above by running for eight hours.
- vi. Check each landing valve, male and female couplings and branch pipes for compatibility with each other. Any fitting which is found to be incompatible and does not fit into the other properly shall be replaced by the contractor. Landing valves shall also be checked by opening and closing under pressure.

### 8.3 WATER FOR TESTING

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

### 8.4 TEST RECORDS

The Contractor shall be responsible for the keeping all records of tests and on completion shall provide records and reports of the tests in triplicate. All test records shall clearly identify the item of the test and must be signed by a witness to the test.

### 8.5 UNSATISFACTORY WORKS

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

### 8.6 TESTING AT WORKS

All plants and equipments shall be tested at maker's works before dispatch and the test certificate in duplicate shall be forward to Owner/Architect.

The Contractor shall similarly provide a set of manufacturers certified test curves for any pump installed under the Contract. All tests shall be in accordance with the appropriate Indian Standards.

### 8.7 ON SITE TESTING

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

## 9 IDENTIFICATION OF PIPES LINES & EQUIPMENT

All pipeline installation shall be provided with a colour identification system. The system in general shall be as per IS: 2379-1983-Specification of Color Code for the Identification of Pipe Lines. The color identification system shall comprise of:

- a) Basic Identification Color over the whole length of pipe
- b) Code indication bands for precise determination of the contents being carried by the pipe

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The code indication bands shall be minimum 150mm wide and shall be placed at all junctions, at both sides of valves, service appliances, bulk heads, wall penetrations and at any other place where identification is necessary.

The color of code indication bands shall be as directed by the Owner/Architect.

The direction of flow shall be clearly marked on the pipe lines.

The equipment shall be identified with identification plates as directed by the Owner/Architect

### B10 PREAMBLE TO THE PRICING OF BILL OF QUANTITIES

#### B10.1 GENERAL

1. This section shall be applicable for item rate work and for variations.
2. This preamble covers installation of fire protection works.
3. This preamble shall be read in conjunction with the Specifications, Conditions of Contract and all other documents accompanying the tender papers.
4. For all items of work the rates shall be comprehensive and all inclusive. The rates shall include for all materials and things necessary for satisfactory completion and maintenance of the work in proper working order and to the satisfaction of the Architect/Project Manager, including testing, making samples etc., and all that have been indicated in the Specifications or other Tender Documents either directly or indirectly and cover for all obligations of the Contractor under the Contract. No claim for additional payment shall be allowed for any error or misunderstanding by the Contractor of the work involved.
5. Unless otherwise mentioned in the description of the item, this Schedule shall be applicable for work at any height, position or condition.
6. Unless otherwise stated, method of 'measurement' as described in the latest 'Specifications' of CPWD shall be followed. In case of any dispute in this regard, the Project Manager / Architect decision shall be final, binding and conclusive.
7. The following notations have been used throughout the Schedule of Quantities and Rates:

m/M	Running Meter
Sqm	Square Meter
Cum	Cubic Meter
mm/MM	Millimeter
No.	Number/Numbers
Dia.	Diameter
Kg.	Kilogram/s
T.	Tonne
L.S.	Lump Sum
Pt.	Point
Rs.	Indian Rupees
ND	Nominal internal Diameter of pipe
%	Percent.

#### B10.2 TRADE PREAMBLE - FIRE FIGHTING WORKS

1. Masonry chambers for Valves, Hydrants other Appurtenances. Masonry and other chambers shall and be measured in number. The rates Shall include -
  - a) Excavation in any kinds of soil including quick sand but excluding rock which requires blasting;
  - b) Protecting the excavation with all necessary shoring, strutting and keeping the excavation clear of water;

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- c) Providing and laying foundation concrete as shown on drawing and as specified;
  - d) Providing and constructing brick masonry walls in cement mortar as shown on drawing and as specified. The openings required to be left open for pipes and subsequent grouting shall also be included in the rates;
  - e) Providing and casting R.C.C cover as shown in drawing and as specified;
  - f) providing, fitting and fixing hinged Ductile Iron cover ( Grade B) with frame as shown in drawing and as specified and or directed at site by the Project Manager's and;
  - g) Providing cement plastering to the walls of chamber, internally as well as externally.
- 2. Pipe Work
  - M. S. PIPES FOR FIRE FIGHTING (INTERNAL).
    - a) Pipe work is to be measured in running meters nearest to a cm for the finished work, which shall include M. S. pipe and M. S. fittings such as bends, tees, elbows, reducers, crosses, plugs, sockets, nipples, flanges, nuts & bolts etc.
    - b) The rate shall be inclusive of cost of materials and labor, including providing and fixing metallic supports and suspension system for pipe work, cutting holes and chasing in walls and floors and making good the same, providing sleeves, applying two coats of anti-corrosive paint on buried and concealed pipe work and painting of exposed pipes with two coats of enamel paint over a coat of primer.
    - c) The rate shall be inclusive of providing 'Identification and Labeling' of pipes with the color coded bands.
- 3. Valves, Hydrants, hose reels, sprinklers and other Appurtenances

Appurtenances like valves, hydrants, hose reels etc. shall be measured in number. Rates shall include -

  - a) Testing and checking of appurtenances and fittings.
  - b) fixing/lowering the same into specified support (including providing the support) jointing, fitting and fixing true to line and

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level including repairing of protective coating, if necessary; and

- c) Providing all equipment labor and materials necessary to carry out the above works complete in all respect as specified and/or instructed.
- d) Painting and identification of the equipment.

### **B FIRE DETECTION AND ALARM SYSTEM**

#### **1.0 SCOPE OF WORK:**

1.1 The scope of work under this head shall include supply, installation, testing and handing over of Analogue Addressable Fire Detection cum Alarm System. The work under this system shall consist of furnishing all materials, equipment's and appliances and labour necessary to install the said system, complete with Detectors, Main Control Panel, Sounders, Manual Call Stations, relays etc. for interfacing with other systems.

1.2 It shall include laying of cabling duct, conduits and power supply etc., necessary for installation of the system with supply of detectors and appropriate type as indicated in the specification and Bill of Quantities. Any openings/chasing in the wall/ceiling required to be made for the installation shall be made good in appropriate manner.

1.3 The Bidder shall also undertake to trip from the Fire Alarm Panel through the use of Addressable Output Modules, individual AHU activated by the fire signal of specified detectors and Input Modules for monitoring water flow switches and other contacts like magnetic door contacts.

1.4 The Building shall have a multi zone panel with each area forming of one or more software programmed zones. All wiring shall be done using 2 x 1.5 mm<sup>2</sup> twisted pair shielded PVC insulated armoured copper cable.

#### **1.2 GLOSSARY OF TERMS:**

##### **1.2.1 FIRE ALARM PANEL (FACP):**

This refers to the microprocessor-based panel that shall be connected to the various detector/devices by means of 2 wire loops. The FACP shall be able to supervise individual detectors for proper performance as well as to give pinpoint location of fire alarm. Hooter Alarm as well as facility for cutting off of AHUs and electrical power shall also be included. The panel shall also have the facility for automatically dialing select phone numbers in case of fire.

##### **1.2.2 LOOP:**

A loop shall mean a 2-wire circuit connecting all addressable devices, which shall include Analogue detectors/devices, and Addressable Loop Powered Sounders. The loop card shall have built-in short circuit isolators to accommodate Class A wiring

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## UPGRADATION OF FIRE FIGHTING WORKS

### 1.2.3 ADDRESSABLE DEVICES:

This term indicates the complete group of addressable devices such as detectors, Manual call Stations, addressable output/input modules etc.

### 1.2.4 DETECTORS:

The Detector shall be analogue addressable type. The chamber should be easily removable for the purpose of easy maintenance. The address programming shall be done by a handheld programmer or from the FACP. The detectors shall have a common base to allow easy interchange of various types of detectors.

### 1.2.5 MANUAL CALL STATION:

The Manual Call Station shall be addressable type with input modules to define the Station. The function shall be similar to that of conventional Manual Call Box and should be resettable without replacing the glass.

### 1.2.6 INPUT / OUTPUT MODULE:

Output module shall mean addressable points from the FACP with potential free contacts for tripping of AHUs, power supply etc. as required. Any module shall be able to handle one input and operate two relay outputs powered from the loop and preferably consuming single address on the loop. The system shall also be able to handle separate modules to interface the speakers of the Public Address System.

### 1.2.7 INPUT MODULE:

The input modules shall be of dual/single channel type. The dual channel module shall be selectable for normally open or closed by a 2-bit DIL switch.

### 1.2.8 FAULT ISOLATOR:

This unit shall be placed on the loop preferably after every 20–30 devices and shall be able to isolate electrical short circuit in the wiring. All the other detectors shall remain functional because of the Class A wiring of the loop. The isolator shall not utilize an address and shall be built into the detector base wherever required.

### 1.2.9 SOUNDERS:

The sounders shall be of addressable type. The sounders shall derive power from the loop itself. It shall be capable of being directly mounted on the wall/ceiling or along with the detector. The sounder shall have an output of at least 90db at 1 Mtr. The sounder shall be programmed to get activated in event of an alarm from a single detector/device or a group of detectors/ devices.

## 1.3 SPECIFICATION:

1.3.1 The supply and installation and testing of the entire fire alarm system shall conform to BS: 5839 or NFPA 71 and 72. The detectors shall conform to relevant codes for Fire Alarm Systems.

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1.3.2 A general line diagram showing the circuit and spacing of detectors is to be enclosed. The quantity mentioned in the Price Schedule shall be quoted for. Unit rates shall apply in the event of any variance.

### **1.4 FIRE ALARM SYSTEM:**

1.4.1 The Fire Alarm System shall conform to BS: 5839 or NFPA 71/72 in respect of design and installation, and it shall give Audio/Visual Alarm Signals when the temperature in case of Heat Detector or smoke density in case of Smoke Detector exceeds the pre-set limit. The system shall give pinpoint location of fire with warning system and voice communication for commands and instruction if required.

1.4.2 The system shall have a microprocessor-based control and monitoring facility. The basic function of the system shall be able to achieve pinpoint location of alarm indication.

1.4.3 It shall be possible to program each loop with up to 126 detectors/devices and 50 addressable loop powered sounders in a circuit.

1.4.4 Annunciation facility shall also be inbuilt into the FACP, the panel being able to initiate alarm signal for any particular zone.

1.4.5 The system shall be fully supervised for all fault conditions with distinctive alarm operated for fault and fire conditions. Test buttons and software features shall be provided to test the electronic circuits and detector health.

1.4.6 The FACP shall be so programmed that when a particular detector or group of detectors gives a fire signal the FACP should be able to trip an individual AHU automatically. In case of Fire in an area handled by an AHU the FACP shall be able to trigger a Relay that shall shut off the AHU through an additional contact provided in the AHU panel by the AC contractor.

1.4.7 One-loop card shall be incorporated in the FACP at all times.

1.4.8 The FACP shall have facility to connect 126 addressable input/output devices in the peripheral RS 485 bus. These may be 8 way input card, 4 way relay card, 4 way sounder card, passive/active repeater panels and mimic driver cards.

1.4.9 The system shall be based on an open protocol to ensure flexibility. The option of using an alternate manufacturer panel with the detectors installed should be available, in case the user requires such an option at a later date.

### **1.5 FIRE ALARM CONTROL PANEL (FACP):**

1.5.1 The Fire Alarm Control Panel shall be micro processor based fully Analogue Addressable, Analogue Control Unit which shall control all Analogue Addressable Detectors, Manual Call Stations and Switching Systems (for disconnecting AHU and power supply) connected to it.

1.5.2 All addressable units shall be connected to the FACP through the Loop Cards and shall be addressed through individual numbers. The FACP shall be able to obtain analogue value for all detectors in the circuit through a pulsed digitalized current data. The FACP shall be able to analyze all analogue inputs from all addressable units, and through its own software and ambient level screening the FACP shall be able to identify fire, possible fire or fault conditions. The unit supervision shall be dynamic and continuous.

1.5.3 The FACP shall be a 1 loop panel. The loop shall be able to address 126 addressable detectors/devices and 50 addressable loop sounders.

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- 1.5.4 The FACP shall also give adequate warning signal whenever there is dust accumulation in detectors, and up to the point of its replacement it should be possible to change the level of ambient alarm calibration condition either by the use of software program operable by the owner or by resetting the detector.
- 1.5.5 Short / Open circuit units shall also be reported at the FACP In such cases, the system through the use of fault isolators shall be able to isolate that segment between the two fault isolators. The missing Detectors/Devices shall also be reported at the FACP with identification of the location.
- 1.5.6 The FACP shall have the facility to set each smoke sensor sensitivity remotely. It shall also be possible to set the sensitivity to a global high or global low based on night or day time.
- 1.5.7 When an alarm condition is sensed at the FACP from a smoke or heat detector, a delay time/alarm verification period shall be started. If the sensor is still in alarm after the delay time expires, an alarm condition is reported. The delay time shall be adjustable from 0 to 990 sec's.
- 1.5.8 The FACP shall have the facility to perform walk test such that an operation can be periodically checked out for all initiating devices. As each device is placed into alarm the FACP shall print the condition and automatically reset the device. Audible devices shall be initiated, if required at a preprogrammed time. If a zone is inadvertently left in walk test mode, it shall automatically reset to normal after the idle time is exceeded. During the walk test the zones other than the programmed zones shall be under continuous supervision (normal mode). In case of any alarm initiated by detector/devices the walk test shall get terminated automatically.
- 1.5.9 Programming functions shall include alarm/trouble type assignment, point descriptor assignment, alarm message assignment, etc.
- 1.5.10 Programming may be carried out from the FACP keyboard or utilizing the approval PC setup software via laptop/desktop computer.
- 1.5.11 The FACP shall have a Liquid Crystal Display of Alphanumeric type to indicate immediately all conditions. The display should be high resolution, backlit 2 (lines) x 40 character. In case of testing of the system from the FACP the Display shall be able to give readouts of analogue value of all detectors being tested. The FACP shall also be able to carry out continuous self-monitoring when in normal condition.
- 1.5.12 The FACP shall have the facility for external printer coupled to the FACP, which shall log all events with time. The printout shall clearly indicate the event - Fire/Pre Alarm/Fault etc. with the unit address and time.
- 1.5.13 The FACP shall also be able to discriminate between false alarms and fire conditions, as well as priority selection of alarm in case alarm activates in two or more remotely located units simultaneously. In such cases, the Manual Call stations shall have the highest priority.
- 1.5.14 The FACP also is able to actuate switches automatically in case of Fire condition that of AHU's and power supply or other systems such as piped pressurized gas supply.
- 1.5.15 In this respect the bidder is required to take note of clause relating to cutting off of AHUs given above. The bidder shall note that the Client shall provide no additional facilities for completion of this mechanism other than that specified in clause 1.4.6.

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- 1.5.16 The System shall be fail safe and adequate safe guards should be under taken that in the event of a failure of a part of the System it shall not handicap the complete System. The Loop Cards shall be of Modular Construction.
- 1.5.17 The Bidder shall undertake the responsibility of the complete installation, commissioning, user trials, training and maintenance of the System as required. The Bidder shall take all responsibility for preparation and installation of System Software into the FACP. The Software shall be such so as to be easily operated by the Client's Personnel and secured against Software errors, ability to be upgraded so as to incorporate more features at a later date.
- 1.5.18 The FACP shall have its own Battery Backup of a minimum of 48 hours in normal run and then half an hour in alarm condition. The backup time calculation shall be done as per IS 2189 standards. The Battery shall be 2\*12V (24V) DC and of sealed lead acid rechargeable maintenance free type, housed inside the FACP.
- 1.5.19 It shall be able to withstand temperature variations from 0<sup>0</sup> centigrade to 55<sup>0</sup> centigrade. Further, Relative Humidity (non-condensing type) up to 95% shall not hamper its performance. The voltage rating shall be from 17V DC to 31V DC, though the voltage may be change depending upon the working voltages of a proprietary FACP.
- 1.5.20 The FACP shall be totally enclosed dust and vermin proof type made of minimum 16 gauge dust inhibited sheet with even baked finish. The FACP shall be of completely solid stage design.
- 1.5.21 The logic circuitry shall be based on high noise immunity solid state hardware employing modular construction. Logic cards shall be of epoxy fibber glass construction.
- 1.5.22 The FACP shall have EN 54/UL/FM approval.
- 1.5.23 The system shall be designed such that it shall be possible to add at least 20% of the Detectors for future expansion without extra cost on the panel.
- 1.5.24 The FACP shall have provision for interfacing with the Public Address System.
- 1.5.25 The Panel should have a minimum of 20 zones and each zone shall have an LED's to indicate independently fire and fault conditions on the panel fascia.**
- 1.5.26 The panel should have the facility to interface with an automatic two-channel programmable speech dialer for verbal reporting of fire. It shall be able to call four telephone numbers per channel. The programmable speech dialer shall have two alarm inputs and shall provide listen-in capabilities through the built-in microphone. The dialer shall have a built-in keypad for easy operation, programming and voice recording.
- 1.6 ADDRESSABLE DETECTORS :**
- 1.6.1 SMOKE DETECTOR :**
- 1.6.1.1 All detectors are fitted with plug-in system type connections, from the maintenance and compatibility point of views. An alarm release will not effect a detector's good functioning. After resetting the alarm, the detector will resume operations without readjustment of any kind.
- 1.6.1.2 The detector shall have a linear response over all types of fire. It shall be possible to use only a single detector type/model for both above and below false ceiling applications. The detector shall be capable of detecting fast flaming fires and slow smoldering fires equally well.

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The detector shall therefore be a multi technology detector or shall be of unique design whereby a single type/model can be used in applications where either ISD/OSD would be normally used. Detectors using radioactive elements shall have BARC approval.

- 1.6.1.3 The detector shall be able to sense incipient fire by detecting the presence of visible and invisible products of combustion. The detector shall be suitable for low voltage (17 to 31V DC) two-wire supply. The detector shall be provided with Twin LED indication and the sensitivity of the detector shall not vary with change in ambient temperature, humidity, pressure or voltage variation.
- 1.6.1.4 Neither its performance shall be affected by air current up to 1.52mtr per second. The detector shall be suitably protected against dust accumulation/ ingress and it shall be free from maintenance and functionally tested at intervals. All detectors shall be identical in construction design and characteristic to facilitate easy replacement.
- 1.6.1.5 The coverage per smoke detector shall strictly follow IS 2189 standards. It shall be possible to connect Smoke Detector with Heat Detector or Manual Push Button in the same circuit. The sensitivity of detector shall be set from the FACP to suit the site requirement.
- 1.6.1.6 It shall have in-built locking mechanism to check the removal and pilferage of the detector. The quiescent current flow must not exceed 400 micro amps and alarm condition current shall be maximum 40 mille amps.
- 1.6.1.7 The Photoelectric type Smoke Detector shall be Analogue Addressable type and be able to send analogue output to the FACP regarding its condition. It shall be able to communicate with the FACP by the pulses emitted from the FACP. The detector should be programmed using a hand-held programmer and address stored in a non-volatile memory within the sensor or by a decade switch.
- 1.6.1.8 The base of the Detector shall be electronics free and interchangeable with other smoke or heat detectors. The enclosure shall meet IP 42 protection grade.
- 1.6.1.9 It shall be able to withstand temperature variations from - 10 degree centigrade to 50 degree centigrade. Further, Relative Humidity (non-condensing type) up to 80% shall not hamper its performance. The voltage rating shall be from 17V -31V DC though the voltage may be changed depending upon the working voltages of a proprietary FACP.
- 1.6.1.10 The Detector shall have UL/FM approval. It shall be possible to test the Detectors working both from the FACP as well as locally by means of a handheld programmer tester.
- 1.6.1.11 It shall be possible to mount the detectors in Duct Casting Unit for sampling of Supplying Air from the AHUs.

Secondary response indicators shall be provided for all the Above False Ceiling Detectors.

- 1.6.1.12 The detector shall have twin LED's for 360 degree viewing angle. LED on the detector shall blink each time the sensor is scanned by the IFAS. If the FACP determines that the sensor is in alarm, the FACP will command the sensor LED to remain on to indicate the same. Each sensor will be capable of being tested for alarm via command from the FACP. Each sensor shall respond to FACP scan with the information about its type for identification.
- 1.6.1.13 It shall be possible to connect loop powered base sounders on the detector loop. The sounder shall have a sound output of at least 85db and will not require a separate cable for power supply.

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## UPGRADATION OF FIRE FIGHTING WORKS

### 1.6.2 HEAT DETECTOR:

**1.6.2.1 Heat detector shall provide temperature measurement when it reaches pre-alarm in normal course. However the operator shall have the option of calling up the temperature measured by the specific detector as and when required.**

1.6.2.2 It shall have in-built locking mechanism to check the removal and pilferage of the detector. The quiescent current flow must not exceed 400 micro amps and alarm condition current shall be maximum 40 mille amps.

1.6.2.3 The heat detector shall be Analogue Addressable type and be able to send analogue output to the FACP regarding its condition. It shall be able to communicate with the FACP by the pulses emitted from the FACP. The detector should be programmed using a hand-held programmer and address stored in a non-volatile memory within the sensor or by a decade switch.

1.6.2.4 The base of the Detector shall be electronics free and interchangeable with other smoke or heat detectors. The enclosure shall meet IP 42 protection grade.

1.6.2.5 It shall be able to withstand temperature variations from - 10 degree centigrade to 50 degree centigrade. Further, Relative Humidity (non-condensing type) up to 80% shall not hamper its performance. The voltage rating shall be from 17V -31V DC though the voltage may be changed depending upon the working voltages of a proprietary FACP.

1.6.2.6 The Detector shall have UL/FM approval. It shall be possible to test the Detectors working both from the FACP as well as locally by means of a handheld programmer tester.

1.6.2.7 The detector shall have twin LED's for 360 degree viewing angle. LED on the detector shall blink each time the sensor is scanned by the IFAS. If the FACP determines that the sensor is in alarm, the FACP will command the sensor LED to remain on to indicate the same. Each sensor will be capable of being tested for alarm via command from the FACP. Each sensor shall respond to FACP scan with the information about its type for identification.

1.6.2.8 It shall be possible to connect loop powered base sounders on the detector loop. The sounder shall have a sound output of at least 85db and will not require a separate cable for power supply.

### 1.7 MANUAL CALL STATIONS :

1.7.1 The manual station shall be a press to break type. The device shall be red in colour and suitable for surface or flush mounting. Manual stations shall be interfacial to an addressable input module that can be accommodated within the device. The manual station shall have normally open fire alarm and annunciator contacts and these contacts shall close on activation. Contacts shall remain closed until station is manually reset.

**1.7.2 The Manual Call Station shall be fully addressable with its own addressable module and operated by digitized signals from the FACP. The voltage range shall be from 17V to 31V. It shall have protection as per IP33. The operating temperature range shall be from 0 degree C to 50 degree C. Relative Humidity (noncondensing) range of performance parameters shall be between 0 to 95%.**

### 1.8 FIRE ALARM REPEATER / ANNUNCIATOR PANEL:

1.8.1 The Alarm Repeater/Annunciator Panel shall display fire/fault messages simultaneously with the FACP. It shall be capable of interfacing with the FACP on a single RS 485 Bus. The panel shall be capable of operating on 24 V DC supply.

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## UPGRADATION OF FIRE FIGHTING WORKS

- 1.8.2 The panel shall have a 2 x 40 character backlit alphanumeric LCD display which shall display date, time & description of alarm/trouble events that are displayed in the FACP with an inbuilt buzzer to indicate fault/fire alarm.
- 1.8.3 The panel shall be powered from the FACP.
- 1.8.4 It shall have control keys for Sound, Silence, Mute and to reset the FACP from the repeater station.
- 1.8.5 The repeater panel shall have the following LED's indications
- a. Supply
  - b. Fault
  - c. Mute
  - d. Silent
  - e. Disabled
  - f. Fire
- 1.9 LOOP POWERED SOUNDER:**
- 1.9.1 The sounder shall be addressable electronic type and shall give discontinuous/ intermittent audible alarm whenever any detector or call box operates.
- 1.9.2 The sound output from the Hooter should not be less than 85 decibels at the source point.
- 1.9.3 The sounder shall be powered from the 2 wire detector loop itself and no separate power supply or additional cable should be used.
- 1.10 FIRE ALARM SYSTEM TESTING:**
- 1.10.1 FACP:
- a. The FACP shall be checked for basic tests such as visually checking input voltage and amperage. All zones one by one shall be de wired to check for fault signal indication in the FACP.
  - b. The Power Source shall be cut off and checked for stand by Supply from the Batteries. After six hours the FACP Source shall be switched on to check for auto switch over to the Mains mode.
  - c. Tests shall be conducted for AC fail, charger fail, DC fail, Battery Disconnect or Battery fail. In all such cases the relevant L E D should glow and the piezo sound shall also give sound output.
- 1.10.2 SMOKE DETECTOR :
- a. The testing shall be carried out for each loop / zone, initially one detector in a zone and subsequently 2 or more disassociated detectors in each zone with time lapse between the detectors to test for Alarm Priority, Alarm Queuing and Call Logging.
  - b. An identified detector will be subjected to smoke aspiration from burning paper/cigarette puffs, rubber and other materials which give dense smoke held at 0.3 M distance from the detector. The FACP should indicate increased analogue output for that address and after the programmed delay time, a fire alarm signal shall be indicated. This delay shall be utilized for alarm verification.

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## UPGRADATION OF FIRE FIGHTING WORKS

- c. The same test shall be carried out for two detectors in the same Loop but in different rooms. The FACP shall indicate Pre Alarm higher analogue levels for both detectors in its display with separate identification for both fires. One of the detectors in question be subjected to higher and longer levels of smoke aspiration. The FACP should give priority alarm for this address. The printout shall indicate individual addresses of the detectors with achieved analogue values and the time of event.
- d. This test shall be carried out for different Loops as well as for 2 Loops simultaneously.

### 1.10.3 HEAT DETECTOR:

- a. The same tests in the same sequence shall be carried out for this Detector but with the application of hot air from a hair dryer held at approximately 60 cm distance.

### 1.10.4 COMBINED TEST:

- a. The next test will be in combination of Photoelectric / Heat Detectors simultaneously with time lapse between application of smoke or heat or as required by the Client.

### 1.10.5 ADDITIONAL TEST:

- a. One detector of each type will be disconnected and subjected to slow dust build - up by means as desired by the Bidder and again connected in the circuit.
- b. The FACP shall indicate the changed ambient levels and automatically adjust the analogue values for the same. These Detectors shall then be replaced by new Detectors of identical type and the FACP shall then be programmed accordingly and checked. The Bidder will take custody of the removed detectors without additional cost to the Owner.
- c. Any part of the Loop shall be short circuited. The FACP shall indicate the communication failure of all the devices connected in the short circuited segment. After the short circuit is corrected, the Fault Isolator shall return to its normal status automatically, this being reflected in the FACP. The Loop shall then be in normal operation again. Any part of the Loop shall be de wired and tested as given above.

### 1.10.6 All other tests as required by the client at the time of handing over.

## **2.0 DOCUMENTATION:**

**2.1 The System Company should provide, as part of handing over, the six sets of, the as-built drawing, operation manual and maintenance manual, Name address and contact No. of the equipment supplier. The as-built drawing shall exactly match the Isometric drawing submitted with the flow calculation prior to commencement of work.**

**2.2 The bidder shall also submit the make of all equipment offer at the time of bid documents.**

**2.3 The bidder shall also submit the refilling cost of NAF SIII & FM 200 along with Name, address and contact No. of the supplier.**

# TERNA PUBLIC CHARITABLE TRUST HOSPITAL

## UPGRADATION OF FIRE FIGHTING WORKS

### 10. PREFACE

Up gradation of firefighting works for Hospital of Terna Public Charitable Trust on Plot No-12, Sec-22, Nerul, Navi Mumbai, Pin - 400 706.

### 2. TECHNICAL SPECIFICATIONS

Witness Signature: \_\_\_\_\_

Name & Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Date: \_\_\_\_\_

Contractor's Signature: \_\_\_\_\_

Name & Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Date: \_\_\_\_\_

Employer: \_\_\_\_\_

**TERNA PUBLIC CHARITABLE TRUST HOSPITAL**  
UPGRADATION OF FIRE FIGHTING WORKS

**11.0 BILL OF QUANTITIES**

AS PER ATTACHED SHEET

**TERNA PUBLIC CHARITABLE TRUST HOSPITAL**  
UPGRADATION OF FIRE FIGHTING WORKS

**12.0 ARTICLES OF AGREEMENT**

This Agreement made the \_\_\_\_\_ day of \_\_\_\_\_ 20 \_\_\_\_\_

between \_\_\_\_\_

\_\_\_\_\_

(Hereinafter called "the Owner") of the one part and \_\_\_\_\_

\_\_\_\_\_

Of (or whose registered office is situated at) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(Hereinafter called "the Contractor") of the other part.

WHEREAS the Owner is desirous of \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(Hereinafter called "the Work") at \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

And has caused Drawings and Bills of Quantities showing and describing the work to  
Be done to be prepared by or under the direction of \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

AND WHEREAS the Contractor has supplied the Owner with a fully priced copy of the said Bills of  
Quantities (which copy is hereinafter referred to as "the Contract Bills") AND WHEREAS the said Drawings  
(hereinafter referred to as "the Contract Drawings") and the Contract Bills have been signed by or on  
behalf of the parties hereto: AND WHEREAS the Contractor has deposited the sum of Rupees

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

With the Architect/Owner for the due performance of this Agreement.

# TERNA PUBLIC CHARITABLE TRUST HOSPITAL

## UPGRADATION OF FIRE FIGHTING WORKS

NOW IT IS HEREBY AGREED AS FOLLOWS:-

1. For the consideration hereinafter mentioned the Contractor will upon and subject to the Conditions annexed carry out and complete the Work shown upon the Contract Drawings and described by or referred to in the Contract Bills and in the said Conditions.

2. The Owner will pay the Contractor the sum of Rupees \_\_\_\_\_

\_\_\_\_\_  
(Hereinafter referred to as "the Contract Sum") or such other sum as shall become payable hereunder at the times and in the manner specified in the said Conditions.

3. The term "the Architect in the said Conditions shall mean the said

\_\_\_\_\_

\_\_\_\_\_ Or in  
The event of his death or ceasing to be the Architect for the Purpose of this Contract, such other person as the Owner shall nominate for that purpose, not being a person to whom the Contractor shall object for reasons considered to be sufficient by an arbitrator appointed in accordance with the said Conditions. Provided always that no person subsequently appointed to be the Architect under this Contract shall be entitled to disregard or overrule any certificate or opinion or decision or approval or instruction given or expressed by the Architect for the time being.

4. The said Condition and appendix thereto shall be read and construed as forming part of this Agreement, and the parties hereto shall respectively abide by, submit themselves to the Conditions and perform the agreements on their parts respectively in such Conditions contained.

AS WITNESS the hands of the said Parties.

Signed by the said  
In the presence of

Witness  
Name:  
Address:

Signed by the said  
In the presence of

Contractor

Witness  
Name:  
Address: