ASIAN UNIVERSITY FOR WOMEN

Request for Proposal (RFP)
Fire Management System
Asian University for Women (AUW), Arefin Nagar Campus
Summary Sheet

Name of the company	Asian University for Women
Procurement Reference Number	Package4/Firemgtsystem/25_26
Date of issue of the RFP	15th October, 2025
Date and Closing Time for RFP submission	20th November 2025 (12:01 pm) (GMT +6)
Quotation submission mail address	tender130@auw.edu.bd
Address for Communication	**Asian University for Women** 20/A M. M. Ali Road Chattogram 4000, Bangladesh Tel: +880-31-285-4980 Fax: +880-31-285-4988

Bidders are invited to submit their proposals in accordance with the terms outlined in the enclosed Request for Proposal (RFP).

AUW reserves the right to reject any or all offers without providing any reason.

Confidentiality must be strictly maintained. The information provided here should only be used for its intended purpose and scope. By retaining this RFP, you agree to treat all information as confidential.

All communications regarding this Request for Proposal should be directed to AUW, with copies sent to the email addresses listed in the RFP email.

For any further queries, please contact:

- **Primary Point of Contact for RFP Process and Technical Queries:**
  Mohammed Ishrat Bin Mahbub
  Director of Supply Chain Management
  Email: mohammed.mahbub@auw.edu.bd
  Contact Number: +8801926673027; Whatsapp: +8801671470348

Proposals should be submitted only to the following email: tender130@auw.edu.bd
No other AUW email address should be used in the "To," "CC," or "BCC" fields. Any proposal that violates this instruction may be disqualified.

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Proposal Summary

Executive Summary

This Request for Proposal (RFP) seeks qualified and experienced firms to design, supply, install, test, and commission a complete Fire Management System for the Asian University for Women (AUW) Main Academic Building. The project aims to ensure the facility is equipped with a comprehensive and compliant fire protection, detection, and alarm system in accordance with national and international fire safety standards.

Project Implementation Schedule

The successful bidder shall complete the works within the stipulated time frame stated in the Letter of Award. The indicative timeline for implementation is as follows:

- Design submission and approval: within 20 working days from award.
- Material delivery and installation: within 60 working days from design approval.
- Testing and commissioning: within 30 working days after installation.
- Total completion period: 300 working days from the date of contract signing.

Proposal Evaluation Methodology

All proposals will be evaluated in accordance with AUW procurement procedures and applicable regulations. Evaluation will be conducted based on the following criteria:

- Technical compliance with specifications (60%)
- Relevant experience and qualifications (20%)
- Financial proposal and competitiveness (20%)

The contract will be awarded to the bidder offering the most advantageous proposal, technically compliant and commercially competitive.

Warranty and Post-Installation Support

The contractor shall provide a minimum one (1) year warranty according to the section 4 ITA 2.7 covering all materials, equipment, and workmanship. During this period, the contractor shall perform preventive and corrective maintenance at no additional cost. The contractor shall also ensure availability of spare parts and service personnel as required.

Training and Handover

Upon completion, the contractor shall conduct a comprehensive training session for AUW's designated staff on system operation, troubleshooting, and maintenance. The contractor shall submit the following documents prior to handover:

- As-built drawings
- Operation and Maintenance (O&M) manuals
- Test reports and commissioning certificates
- Warranty certificates

Confidentiality and Compliance

The contractor shall maintain strict confidentiality of all information and documents provided by AUW. All works shall comply with Bangladesh National Building Code (BNBC), NFPA standards, and local fire safety regulations. The contractor shall be responsible for obtaining necessary clearances and ensuring safety during execution.

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Scope of Work

The **CONTRACTOR** shall be responsible for the complete design, supply, installation, testing, commissioning, and handover of a **Fire Management System** in accordance with international codes and standards. The scope includes, but is not limited to, the following:

1. Site Assessment and Mobilization

- Conduct site visits and assessments as required.
- Mobilize resources and set up utility service connections for the site office (if required).

2. Design and Documentation

- Prepare fire safety plan drawings and obtain approval from the **Fire Services and Civil Defense (FSCD)**.
- Prepare fire evacuation plan drawings.
- Develop shop drawings based on the **GFC layout**; obtain approval from the Client and Consultant before execution.
- Submit actual execution schedule, considering imported and local materials.
- Submit material samples (from BOQ brand list) for approval.
- Prepare all documentation, including as-built drawings, calculations, and handover documents, in compliance with relevant codes.

3. Supply and Installation

- Provision and installation of equipment and accessories as per drawings and specifications.
- Include any necessary electrical, mechanical, civil, or other items not explicitly covered in the supporting BOQ or technical specifications.
- Manage on-site storage of imported and local materials with proper records maintained by the storekeeper.
- Execute works strictly in accordance with approved shop drawings.

4. Testing, Commissioning, and Balancing

- Perform testing, commissioning, and balancing of all installed systems.
- Ensure quality and compliance with all relevant codes and standards.

5. Technical Team Assignment

- Assign a dedicated technical team (Project Manager, Project Engineer, Safety Officer, etc.) to be continuously available during execution.

6. Reporting and Progress Monitoring

- Prepare and submit supporting documents including:
    - Daily field reports
    - Monthly progress reports
    - Material inspection reports

- Requests for inspection throughout execution

7. Post-Handover Documentation and Training

- Prepare and submit all post-handover documentation for MEP systems, including:
  - Operation & Maintenance (O&M) Manuals
  - As-built drawings
  - Warranties
  - Commissioning reports and test certificates
  - Training manuals
  - Spare parts lists
- Conduct training for client personnel on all installed systems.

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Summary of Qualification of Tenderers

The Applicant must meet the following qualification criteria:

1. A minimum of ten (10) years of experience in firefighting system installations and operations.
2. Specific experience as a Prime Contractor in firefighting system installations and operations, with at least one (01) contract of similar nature, complexity, and construction methods/technology successfully completed within the last five (05) years, having a minimum value of Tk. 4 (four) crore.
3. Experience in completing firefighting system installations and operations for a building with a total built-up area of at least 9,000 square meters.
4. The average annual turnover shall be greater than Tk. 3 (three) crore, calculated over the best three (3) years within the last five (5) years.
5. The minimum amount of liquid assets, i.e., working capital or credit line(s), of the Tenderer shall be Tk. 1.00 (one) crore.
6. Proven reputation as a constructor in both the public and private sectors, supported by a detailed company profile, client list, and work accomplishment certificates.
7. The applicant must not have any record of contract non-performance in the **last 5 years** from the RFP publication date.
8. All pending litigation must not exceed **15% of the applicant's net worth**.
9. At least **1 contract** of similar nature and complexity in **Fire Management System**, completed within the last **3 years**.
10. Applicants must demonstrate: Relevant **professional and technical qualifications, Managerial capability,** A **reliable reputation** for contract performance, Adequate and **skilled personnel**
11. The successful Applicant, who later becomes the Tenderer, is required to perform the works and services as described in the subsequent Tender.
12. Applicants must have access to the **necessary equipment and physical facilities** to perform the work, either by: **Owning** the equipment; Having **proven access** through a **contractual arrangement** (e.g., lease or hire); Or having **assured access** to such equipment for the required duration. All required equipment must be in **full working condition**

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Section 1. Instructions to Applicants

1. Interpretation 1.1 Throughout this qualification Document:

(a) the term **"in writing"** means communication written by hand or machine duly signed and includes properly authenticated messages by facsimile or electronic mail;

(b) if the context so requires, **singular** means plural and vice versa;

(c) **"day"** means calendar days unless otherwise specified as working days;

(d) **"Qualification Document"** means the Document provided by the Employer to an Applicant as a basis for preparation of the Application; and

(e) **"Application"** depending on the context, means an application submitted by an Applicant for Qualification to participate in the subsequent Tenders and to perform the Contract, in response to an Invitation for Qualification.

2. Corrupt, Fraudulent, Collusive or Coercive Practices 2.1 It is the Employer's policy to require that Employer's staff, as well as Applicants/Tenderers, suppliers, and contractors and their subcontractors observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, the Authority-.

(a) defines, for the purposes of this provision, the terms set forth below as follows:

(i) **"corrupt practice"** is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;

(ii) "fraudulent practice" is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;

(iii) "collusive practice" is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;

(iv) "coercive practice" is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;

(v) "obstructive practice" is (aa) deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or (bb) acts intended to materially impede the exercise of the Authority's inspection and audit rights provided.

(b) will reject a proposal for award if it determines that the Tenderer recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for the contract in question;

(c) will sanction a firm or individual, including declaring ineligible, either indefinitely or for a stated period of time, to be awarded a contract if it at any time determines that the firm has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for, or in executing, a contract.

3. Source of Funds

3.1 The Employer will arrange fund towards the cost of the project named in the ADS. The Employer intends to apply a portion of that funds to eligible payments under the contract(s) resulting from the Tendering for which this prequalification is conducted.

4 Eligible Applicants

4.1 This Invitation for Qualification is open to all potential Applicants from all countries, except Israel. An Applicant will be eligible if it is a citizen, or is constituted, registered and operates in conformity with the provisions of the laws of that country.

4.2 Applicants may be a physical or juridical individual or body of individuals, or company, association or any combination of them in the form of a Joint Venture, Consortium or Association (JVCA) invited to take part in public procurement or seeking to be so invited or submitting an Applicant in response to an Invitation for Qualification.

4.3 Applicants shall have the legal capacity to enter into the Contract under the Applicable Law.

4.4 Applicants and all parties constituting the Applicant shall not have a Conflict of Interest. Applicants in its own name or its other names or also in the case of its Persons in different names shall not be under a declaration of ineligibility for corrupt, fraudulent, collusive or coercive practices.

4.5 Applicants with a poor performance, consistent history of litigation or arbitration awards against it shall not be eligible for Qualification.

4.6 Applicants shall not be insolvent, be in receivership, be bankrupt, be in the process of bankruptcy, be not temporarily barred from undertaking business and it shall not be the subject of legal proceedings for any of the foregoing.

4.7 Applicants shall have fulfilled its obligations to pay taxes and social security contributions under the provisions of laws and regulations of the country of its origin.

4.8 Applicants shall provide such evidence of their continued eligibility satisfactory to the Employer, as the Employer will reasonably request.

4.9 Applicants' requirements for eligibility will extend, as applicable, to each JV partner and Specialist Subcontractor proposed by the Applicant.

5 Eligible Materials, Equipment and Associated Services

5.1 All materials, equipment and associated services to be supplied under the Contract are from eligible sources, unless their origin is from Israel.

5.2 For the purposes of this Clause, **"origin"** means the place where the Materials and Equipment's are mined, grown, cultivated, produced or manufactured or processed, or through manufacturing, processing, or assembly, another commercially recognized new product results that differs substantially in its basic characteristics from its components or the place from which the associated services are supplied.

6 Site Visit

6.1 Applicants are advised to visit and examine the Site of Works and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the Application, submission of subsequent Tender and entering into a contract.

6.2 Applicants and any of its personnel or agents will be granted permission by the Employer to enter into its premises and lands for the purpose of such visit, but only upon the express condition that the Applicant, its personnel, and agents will release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof, and will be responsible for death or personal injury, loss of or damage to property, and any other loss, damage, costs, and expenses incurred as a result of the inspection.

6.3 The costs of visiting the Site shall be at the Applicants' own expense.

7 Qualification: General

Qualification Document

7.1 The Sections comprising the Qualification Document are listed below, and should be read in conjunction with any Addendum issued under ITA Clause 11.

- Section 1 Instructions to Applicants (ITA)
- Section 2 Application Data Sheet (ADS)
- Section 3 Application Forms
- Section 4 Scope of Works

7.2 Applicants are expected to examine all instructions, forms, terms, and specifications in the Qualification Document as well as in Addendum to Qualification, if any.

8 Clarification of Qualification Document

8.1 Applicants requiring any clarification of the qualifications Document shall contact the Employer in writing at the Employer's address indicated in the RFP before **two-third** of the time allowed for preparation and submission of Application elapses.

8.2 Non-performance of a contract shall not occur within the last years, prior to the deadline for Application submission based on all information on fully settled disputes or litigation.

9 Litigation History

9.1 For the purpose, a fully settled dispute or litigation is one that has been resolved in accordance with the Dispute Resolution Mechanism under the respective contract and where all appeal instances have been exhausted.

9.2 For a Joint Venture under ITA Sub Clause 18.1, the precise minimum requirements of Leading Partner and other partners shall be as specified in the ADS.

10 Joint Venture, Consortium or Association (JVCA)

10.1 Applicants may participate in the qualification process and subsequent procurement proceedings by forming a Joint Venture, Consortium or Associations (JVCA) or alternately with the intent to enter into such an agreement supported by a Letter of Intent.

10.2 The JV agreement, indicating at least the parts of the Works to be executed by the respective partners, shall be legally entered into case-by-case in the Applicant's Leading Partner's country of origin, as specified in the ADS, duly signed by all legally authorized representatives of the Persons who are parties to such agreement.

10.3 Applicants, as an alternate to ITA Sub Clause 9.2, may intend to enter into a JV agreement case-by-case in the form of a Letter of Intent along with the proposed agreement, indicating at least the parts of the Works to be executed by the respective partners, duly signed by all partners of the intended JV and authenticated by an authority of the Applicant's Leading Partner's country of origin, as stated in the ADS, with the declaration that the partners will execute the Joint Venture agreement in the event the Applicant, in the first place pre-qualified and then successful in the subsequent Tender.

10.4 Applicants shall submit the Letter of Intent and the proposed JV agreement along with the Application.

10.5 For a Joint Venture under ITA Sub Clause 9.1, the precise minimum qualification requirements of Leading Partner and other partners shall be as specified in the ADS.

10.6 In cases where a JV partner's, personnel capacity, equipment capacity and financial capacity individually fulfils the precise minimum qualifying requirement of that particular component as specified, capacities of such partner(s) in the JV will be combined together for summation to determine the total precise minimum qualifying requirements criterion of that JV as stated under ITA Sub Clause 9.5.

10.7 Each partner of the JV shall be jointly and severally liable for the execution of the Contract, all liabilities and ethical and legal obligations in accordance with the Contract terms.

10.8 The JV shall nominate a Representative (partner-in-charge) who shall have the authority to conduct all business for and on behalf of any and all the partners of the JV during the tendering process and, in the event the JV is awarded the Contract, during contract execution including the receipt of payments for and on behalf of the JV.

10.9 The composition or the constitution of a JV once formed shall not be allowed to be altered prior to signing of the Contract.

10.10 Alteration of partners to the composition or constitution at a date later than the signing of the Contract during execution shall be allowed by the Employer only when any of such partners is found to be incompetent or has serious difficulties which may impact the overall implementation of the proposed Works, where the incoming partner shall require to have qualifications higher than that of the outgoing partner.

10.11 Each partner of the JV shall complete the JV Partner Information (Form F3) for submission with the Application.

11 Contents of Application

11.1 The Application prepared by the Applicants shall comprise the following:

11.1.1 Application Submission Letter (**Form F-1**);

11.1.2 Applicant Information (**Form F-2**);

11.1.3 documents demonstrating that they are enrolled in the relevant professional or trade organizations registered in their country of origin;

11.1.4 written confirmation authorizing the signatory of the Application to commit the Applicant;

11.1.5 documents confirming the legal capacity stating that there are no existing orders of any judicial court that prevents either the Applicant or employees of that Applicant subsequently entering into or signing a Contract with the Employer;

11.1.6 documents confirming that the Applicant is not insolvent, in receivership, bankrupt or in the process of bankruptcy, temporarily barred from undertaking business and shall not be the subject of legal proceedings for any of the foregoing;

11.1.7 documents confirming that all claims, arbitration or other litigation cases have been satisfactorily resolved, and if not, they shall have no serious negative impact on the financial capacity of the Applicant;

11.1.8 documents confirming that the Applicant has fulfilled its obligations to pay taxes and social security contributions under the provisions of laws and regulations of its country of origin as a proof of fulfilment of taxation obligations;

11.1.9 documents establishing the Applicant's eligibility to perform the contract;

11.1.10 documents establishing the origin of all Materials, Equipment and services to be supplied under the Contract, as stated under ITA Clause 26;

11.1.11 documents establishing the minimum qualifications of the Applicant required to be met for due performance of the Works and physical services under the contract;

11.1.12 any other document as specified in the ADS.

11.2 In addition to the requirements stated under ITA Sub Clause 9.1, Applications submitted by a JV or proposing a Specialized Subcontractor shall include:

11.2.1 Joint Venture Agreement legally entered into in the Applicant's Leading Partner's country of origin, by all partners, as stated under ITA Sub Clause 18.2;

Or,

11.2.2 Letter of Intent along with the proposed agreement duly signed by all partners of the intended JV and authenticated by an authority of the Applicant's Leading Partner's country of origin with the declaration that it will execute the Joint Venture Agreement in the event the Applicant and the Tenderer is successful in the subsequent Tender, as stated under ITA Sub Clause 18.3;

11.2.3 the JV Partner Information (**Form F-3**), as stated under ITA Sub Clause 18.11;

11.2.4 the Specialist Subcontractor Information (**Form F-4**), as stated under ITA Sub Clause 19.6.

12 **Documents Establishing the Applicant's Qualification**

12.1 Applicants shall complete and submit the Applicant Information (**Form F-2**) and shall include documentary evidence, as applicable to satisfy the following:

12.1.1 details on the financial standing of the Tenderer, such as profit and loss statements and corresponding auditor's report establishing the liabilities and assets;

12.1.2 details of general experience in Fire management works on case-by-case procurement proceedings performed for each of the last years along with the sums, dates and recipients;

12.1.3 details of specific experience in construction works of similar nature and size on case-by-case procurement proceedings performed for each of the last years along with the sums, dates and recipients;

12.1.4 details of average annual turnover for a period;

12.1.5 details of existing commitments and works to assess the minimum Tender Capacity;

12.1.6 details of adequacy of working capital for the subsequent Tender i.e., access to line(s) of credit and availability of other financial resources;

12.1.7 details of numbers of technical and administrative personnel along with their qualification and experience proposed for the subsequent Tender;

12.1.8 details of Applicant's technical facilities, available major construction equipment's, measures for ensuring quality such as, ISO certification and design, research and development facilities proposed to carry out the Contract;

12.1.9 details of Procuring Entities who may be contacted, if necessary, by the Employer; and authority to seek references from the Applicant's bankers or any other sources.

12.2 Applicants, if applying as an existing or intended JV, shall submit documentary evidence to establish its qualifications as stated under ITT and, in particular, it shall submit an affidavit nominating one of the JV partners as the REPRESENTATIVE (partner-in-charge) who shall have the authority to conduct all business for and on behalf of any and all the partners of the JV during the tendering process and, in the event the JV is awarded the Contract, during contract execution including the receipt of payments for and on behalf of the JV.

13 Bank Guarantees

13.1 Performance Bank Guarantee Clause

13.1.1 The successful bidder, upon receiving the Notification of Award (NoA), shall furnish an unconditional and irrevocable **Performance Bank Guarantee** in favor of *Asian University for Women (AUW)*.

13.1.2 The amount of the Performance Bank Guarantee shall be **ten percent (10%) of the total Contract Price**, issued from any scheduled bank operating in Bangladesh and acceptable to AUW.

13.1.3 The Performance Bank Guarantee shall remain **valid until twenty-eight (28) days after the completion of the Defects Liability Period** or final acceptance of the works, whichever is later.

13.1.4 Failure to submit the Performance Bank Guarantee within the stipulated time may result in the cancellation of the award and forfeiture of any right to the contract.

13.1.5 The Performance Bank Guarantee shall be returned to the Contractor upon satisfactory completion of all contractual obligations and submission of all completion documents as per AUW's satisfaction.

13.1.6 AUW reserves the right to **invoke the Performance Bank Guarantee**, in whole or in part, in the event of the Contractor's default, non-performance, or breach of any contractual terms.

13.2 Advance Payment Bank Guarantee (if applicable)

13.2.1 If the Employer provides any **advance payment** to the Contractor, the Contractor shall furnish an **unconditional and irrevocable bank guarantee** for the full amount of the advance, valid until the advance is fully recovered.

13.2.2 The Employer may encash the bank guarantee in the event the Contractor **fails to utilize the advance for the purpose of contract execution**.

13.3 Invocation of Bank Guarantee

13.3.1 The Bank Guarantee shall be **payable on demand** and **irrevocable**, and the Employer's written statement regarding Contractor's default shall be **conclusive** for the purpose of encashment.

13.3.2 The Bank Guarantee shall remain valid regardless of any disputes under the Contract, until it is **released in writing by the Employer**.

14 Liquidated Damages

14.1 If the Contractor fails to complete the Works or any part thereof within the time specified in the Contract, the Contractor shall be liable to pay **liquidated damages** at the rate of **1% (one percent) of the Contract Price per week** of delay, unless otherwise specified in the Contract.

14.2 The total amount of liquidated damages shall not exceed **10% (ten percent) of the Contract Price**.

14.3 Liquidated damages shall be **deducted from any payments due to the Contractor**, including the Performance Security, without prejudice to any other rights of the Employer under this Contract.

14 Termination

14.1**Termination for Default**

14.1.1 If the Contractor:

a. Fails to commence, continue, or complete the Works in accordance with the Contract; or

b. Fails to remedy any breach, delay, or defect within the period specified in a written notice from the Employer; the Employer may, at its sole discretion, **terminate the Contract for default**, in whole or in part.

14.1.2 Upon termination for default, the Employer shall have the right to:

a. **Cancel the Contract** immediately;

b. **Engage another Contractor** to complete the Works at the risk and cost of the defaulting Contractor;

c. **Recover from the Contractor all additional costs, losses, and damages** incurred as a result of the Contractor's

failure, including legal and administrative expenses;

d. **Forfeit any Performance Security or other guarantees** provided by the Contractor;

e. **Restrict or debar the Contractor** from future contracts with the Employer for a period as deemed appropriate.

14.1.3 Termination under this Clause shall be **without prejudice to any other remedies** available to the Employer under the Contract or applicable law, including claims for additional damages or specific performance.

14.2 **Termination for Convenience**

14.2.1 The Employer may, at any time, **terminate the Contract, in whole or in part, for convenience**, without assigning any reason.

14.2.2 In such cases, the Contractor shall be entitled to payment for:

a. Work executed up to the date of termination; and

b. Reasonable costs incurred for materials or commitments directly related to the terminated portion, but **shall not be entitled to any loss of profit or unperformed work**.

14.3 **Termination for Insolvency or Bankruptcy**

14.3.1 If the Contractor becomes **insolvent, bankrupt, or enters into receivership or liquidation**, the Employer may **terminate the Contract immediately**.

14.3.2 The Employer shall have the right to **recover costs incurred to complete the Works** from any outstanding payments or Performance Security.

14.4 **Termination for Force Majeure**

14.4.1 If a **Force Majeure event** persists for a period exceeding [insert period, e.g., 90 days], the Employer or Contractor may terminate the Contract by giving written notice.

14.4.2 Upon termination due to Force Majeure:

a. Neither party shall be liable for damages resulting directly from the termination;

b. The Contractor shall be paid for all work executed up to the date of termination.

14.5 **Acceleration and Material Breach**

14.5.1 In case of delays or partial non-performance, the Employer may issue a **directive for accelerated performance**.

14.5.2 Failure to comply with the acceleration directive shall constitute a **material breach**, justifying immediate termination under Clause 14.1

14.6 **Effect of Termination**

14.6.1 Termination of the Contract under any of the above clauses shall be **without prejudice to any other rights or remedies** of the Employer under the Contract or applicable law.

14.6.2 All obligations of the Contractor regarding **confidentiality, indemnity, and warranty** shall survive termination.

14.7 **Acceleration of Completion**

14.7.1 In the event of any delay or failure to accomplish the task, the Employer may issue a **written directive for accelerated performance**, specifying the revised timeline and milestones.

14.7.2 Failure to comply with the acceleration directive shall be treated as a **material breach**, justifying immediate termination and enforcement of ITA 14.2.

15. Descope and Backcharge

15.1 Descope of Work

15.1.1 The Employer reserves the right to **descope, reduce, or modify the scope of work** under the Contract, in whole or in part, by giving written notice to the Contractor.

15.1.2 Upon receiving a descope notice, the Contractor shall:

a. Immediately **stop work on the descoped items**;

b. Submit a **revised work plan, cost estimate, and schedule** within 7 working days; and

c. **Deliver any completed work, materials, or documentation** related to the descoped items.

15.1.3 The Employer shall **adjust the Contract Price** proportionally to reflect the descoped work. Such adjustment shall include:

a. Reduction of contract payment corresponding to the value of descoped items; and

b. Recovery of any **unapproved costs incurred by the Contractor** on the descoped items.

15.2 Backcharge

15.2.1 The Employer may **backcharge the Contractor** for costs or damages incurred due to:

a. Non-performance, defective work, or delay caused by the Contractor;

b. Failure to comply with specifications, drawings, or contractual obligations; or

c. Additional work or remedial work carried out by the Employer or third parties to complete the Contractor's scope.

15.2.2 Backcharge amounts shall be:

a. **Deducted from any payment due** to the Contractor, including Performance Bank Guarantee; or

b. **Payable by the Contractor directly** within 15 days of written notice.

15.2.3 The Contractor shall **not be entitled to any extension of time, additional payment, or claim** for costs related to the backcharged items.

15.3 Procedure for Issuing Descope or Backcharge Notices

15.3.1 The Employer shall issue **written notice specifying**:

a. The descoped work or backcharged items;

b. The reason for descope or backcharge;

c. The monetary amount, if applicable; and

d. The time for compliance or payment.

15.3.2 The Contractor shall **acknowledge receipt of the notice** and comply with all instructions without delay.

15.4 Survival of Rights

All rights of the Employer to descope, backcharge, recover costs, or enforce compliance under this Clause shall **survive the termination or completion of the Contract**.

16 Employer's Entitlement to Remedy Default

If the Contractor fails to execute any part of the Works, to remedy a defect, or to complete outstanding work within a reasonable time following notice from the Employer, the Employer shall be entitled to carry out all necessary work at the Contractor's cost by employing other persons. All necessary costs so incurred shall constitute a debt due from the Contractor to the Employer, recoverable by deduction from payments due or otherwise; provided always that the Contractor's liability and obligations under the Contract shall not be affected or diminished by the exercise of this right by the Employer.

17 DISPUTES

In no event shall AUW be liable to the Contractor for payments for any extra work the Contractor performs in addition to that required under the Statement of Work above unless the Contractor performs such work by written directive of AUW and unless the contract is amended accordingly. No officer, director, employee, or agent of AUW is authorized to direct any extra work by oral order. In the event of any claims or disputes arising from or relating to this Purchase Order, the parties shall use their best efforts to settle the claims or disputes. To this effect, they shall consult and negotiate with each other in good faith and, recognizing their mutual interests, attempt to reach a just and equitable solution satisfactory to both parties. If they fail to reach such a solution within THIRTY (30) days, either Party may refer the matter to arbitration, as per the law of Bangladesh, which shall be the exclusive method of resolving such disputes. The arbitration shall be conducted in Chattogram, Bangladesh. The results of arbitration shall be final and binding on the Parties and shall be in lieu of any other remedy.

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Section 2. Application Data Sheet

ITA Clause	Amendments of, and Supplements to, Clauses in the Instructions to Applicants
	RFP IDENTIFICATION NO: _____
A. General	
ITA 1.1	The Employer is ***Asian University for Women represented by Deputy Project Director, Asian University for women, 20/A, M.M Ali Road, Chattogram-4000, Bangladesh.***
	The Name of the Subsequent Tender is: ***Fire Management System works for three storied with a semi- basement Academic Building for Asian University for women.*** Application Ref:..... Package No:..... *[if there is more than one(1) lot, individual lots are to be identified]*
ITA3.1	The source of public funds is: ***AUW own fund.***
ITA3.3	The name of the Development Partner is: ***None***
ITA6.1	Materials, Equipment's and associated services from the following countries are not eligible: ***Israel***

B. Qualification Criteria	
ITA13.1	Non-performance of a contract shall not occur within the last ***5 (five)*** years. [*years counting backward from the date of publication of IFP]*
ITA13.2	All pending litigation shall in total not represent more than ***15 (fifteen)*** percent of the Applicant's net worth.
ITA 14.1 (a)	The minimum number of years of general experience of the Applicant in public or private Fire management works as Prime Contractor shall be ***10 (ten)*** years. [*years counting backward from the date of publication of RFP]*
ITA14.1 (b)	The minimum specific experience as a Fire Management System works of at least ***1 (one)*** contract(s) of similar nature, complexity and methods/technology completed over a period of ***3 (three)*** years shall be required. *[years counting backward from the date of publication of RFP.]*
ITA 14.1(c)	A satisfactory completion of similar works of at least BDT ***4 (Four) crore*** under a single contract over a period of ***3 (three)*** years shall be required. *[years counting backward from the date of publication of RFP.]*

<table>
<tr><td>ITA 15.1</td><td>The required average annual Fire Management Works turnover shall be greater than BDT 10 (Five) crore over the last 5 (five)years.
[years counting backward from the date of publication of RFP.]</td></tr>
<tr><td>ITA 15.1(c)</td><td>The minimum amount of liquid assets or working capital or credit facilities of the Applicant shall be greater than BDT 1.50 (one point five zero) crore on a day after publication of RFP.</td></tr>
<tr><td>ITA 16.1(a)</td><td>A Project Manager shall have the following qualifications and experience:
<table>
<tr><th>No</th><th>Position</th><th>Total Works Experience (years)</th><th>In Similar Works Experience(years)</th></tr>
<tr><td>1.</td><td>Project Manager</td><td>10 yrs</td><td>8 yrs</td></tr>
</table></td></tr>
<tr><td>ITA 16.1(b)</td><td>The minimum number of Engineers with qualifications and experience shall be as follows:
<table>
<tr><th>No.</th><th>Position</th><th>Total Works Experience (years)</th><th>In Similar Works Experience (years)</th></tr>
<tr><td>1.</td><td>Project Engineer, B.Sc. Engr. (Civil)</td><td>Min. 5 yrs</td><td>Min. 3 yrs</td></tr>
<tr><td>2.</td><td>Project Engineer, B.Sc. Engr. (MEP)</td><td>Min. 5 yrs</td><td>Min. 3 yrs</td></tr>
</table></td></tr>
<tr><td>ITA 16.1(c)</td><td>Other key staff with qualifications and experience shall be as follows[state requirements]:
<table>
<tr><th>No.</th><th>Position</th><th>Total Works Experience (years)</th><th>In Similar Works Experience (years)</th></tr>
<tr><td>1.</td><td>Material Engineer, Dip-in Engr. (Civil)</td><td>Min. 5 yrs.</td><td>Min. 03 yrs</td></tr>
</table></td></tr>
<tr><td>ITA 17.1</td><td>The Applicant shall own or have proven access to hire or lease of the major equipments to accomplish the tasks, Mention the equipment lists to accomplish the tasks as below:
<table>
<tr><th>No</th><th>Equipment Type and Characteristics</th><th>Minimum Number Required</th></tr>
<tr><td>1.</td><td>Essential tools & equipment</td><td></td></tr>
<tr><td>2.</td><td>Essential tools & equipment for small scale metal works</td><td></td></tr>
<tr><td>3.</td><td></td><td></td></tr>
<tr><td>4.</td><td></td><td></td></tr>
<tr><td>5.</td><td></td><td></td></tr>
<tr><td>6.</td><td></td><td></td></tr>
<tr><td>7.</td><td></td><td></td></tr>
</table></td></tr>
<tr><td>ITA 18.2</td><td>In the case the Applicant’s Leading Partner’s country of origin is Bangladesh, the value of non-judicial stamp for execution of the Joint Venture agreement shall be BDT BDT 300 (three hundred) only</td></tr>
<tr><td>ITA 18.3</td><td>In the case the Applicant’s Leading Partner’s country of origin is Bangladesh, the Letter of Intent along with the proposed agreement shall be authenticated by a Notary Public.</td></tr>
</table>

ITA 18.5

The **minimum qualification** requirements of Leading Partner and other Partner(s) of a JV shall be as follows:

ADS Clauses References	Requirements by summation	Requirements for Leading Partner	Requirements for another Partner(s
ITA-14.1(a)	Summation not applicable	Same as stated in ADS	Same as for Leading Partner
ITA-14.1(b)	100%	At least one characteristic	Not applicable
ITA-14.1(c)	100%	At least one characteristic	Not applicable
ITA-15.1(a)	100%	40%	25%
ITA-15.1(b)	100%	40%	25%
ITA-15.1(c)	100%	40%	25%
ITA-16.1(a)	Summation not applicable	To be appointed by lead partner	Not applicable
ITA-16.1(b)	100%	At least one characteristic	Not applicable
ITA-16.1(c)	100%	At least one characteristic	Not applicable
ITA-17.1	100%	At least one characteristic	Not applicable

ITA 19.4	The Employer intends to execute the following specific components of the proposed Works by the Nominated Subcontractor(s): ***None***
ITA 20.1	Domestic Preference ***shall not*** be applicable for eligible National Tenderers
D. Application Preparation	
ITA 23.4	Use of Qualification Document posted in the website ***is not*** permitted for preparation of Applications.
ITA 25.1	The Applicant shall provide with its Application the following additional documents: ***None***

E. Application Submission	
ITA31.1	For ***Application submission purposes*** only, the Employer's address is: For ***Tender submission purposes*** only, the Procuring Entity's address is: TO AUW PROCURMENT COMMITTEE Email address: tender130@auw.edu.bd The deadline for the submission of Applications is: *Time & Date: 12:01pm. 25 /11/2025*

ASIAN UNIVERSITY FOR WOMEN

Section 3. Application Forms

Form	Title
	Application Forms
F – 1	Application Submission Letter
F – 2	Applicant Information
F – 3	JV Partner Information (*if applicable*)
F – 4	Subcontractor Information (*if applicable*)
F – 5	Historical Contract Non-Performance
F – 6	Personnel Information

ASIAN UNIVERSITY FOR WOMEN

Application Submission Letter (Form F-1)

[This letter should be completed and signed by the Authorised Signatory preferably on the Letter-Head Pad of the Applicant]

To: **Date:[dd/mm/yy]**

[Contact Person]

[Name of Employer]

[Address of Employer]

Invitation for Qualification No: ***[indicate RFP No]***

Tender Package No: ***[indicate Package No]***

This Package is divided into the following Number of Lots ***[indicate number of Lot(s)]***

We, the undersigned, apply to be qualified for the referenced Works and Physical Services and declare that:

(a) we have examined and have no reservations to the Qualification Document, issued by you on *[insert date];* including [*state numbers*].

(b) we, including as applicable, any JVCA partner or Specialist Subcontractor for any part of the contract resulting from this Qualification process, have nationalities from eligible countries according to the ITA.
[insert the nationality of the Applicant, including that of all partners in case of a Joint Venture, and the nationality of each already identified subcontractor, if applicable];

(c) we are submitting this Application as a sole Applicant;
or
we are submitting this Application as the partners of a JVCA, comprising the following other partners;

Sl. No	Name of Partner	Address of Partner
1		
2		
3		

or

(e) we, including as applicable any JVCA partner, declare that we are not associated, nor have been associated in the past, directly or indirectly, with a consultant or any other entity that has prepared the design, specifications and other documents in accordance with ITA;

(f) we intend to subcontract an activity or part of the Works, to the following Specialist Subcontractor(s);

Activity or part of the Works	Name of Specialist Subcontractor with Address

(g) we, including as applicable any JVCA partner, confirm that we do not have a record of poor performance, such as abandoning the works, not properly completing contracts, inordinate delays, or financial failure as stated in ITA, and that we do not have, or have had, any litigation against us, other than that stated in the Applicant Information (**Form -2**);

(h) we, including as applicable any JVCA partner, confirm that we do not have a record of insolvency, receivership, bankrupt or being wound up, our business activities were not been suspended, and it was not been the subject of legal proceedings in accordance with ITA;

(i) we, including as applicable any JVCA partner, confirm that we have fulfilled our obligations to pay taxes and social security contributions applicable under the relevant national laws and regulations of our country(s) of origin in accordance with;

(j) we, including as applicable any JVCA partner or Specialist Subcontractor for any part of the contract resulting from this Qualification process, have not been declared ineligible by any International Development Agency or the Government of Bangladesh on charges of engaging in corrupt, fraudulent, collusive or coercive practices in accordance with ITA; orby an act of compliance with a decision of the United Nations Security Council.

(k) furthermore, we are aware of ITA concerning such practices and pledge not to indulge in such practices in competing for or in executing the Contract;

(l) we are not participating as Applicants in more than one Application in this pre-qualification process;

(m) we understand that you may cancel the prequalification process at any time and that you are neither bound to accept any Application that you may receive nor to invite the pre-qualified Applicants to tender for the contract subject of this prequalification, without incurring any liability to the Applicants.

Signature:	*[insert signature of authorised signatory of the Applicant]*
Name:	*[insert full name of signatory with National ID Number]*
In the capacity of:	*[insert capacity of signatory]*

Duly authorized to sign the Application for and on behalf of the Applicant

[If there is more than one (1) signatory, or in the case of a JVCA, add other boxes and sign accordingly]

Attachment 1:

Written confirmation authorizing the above signatory to commit the Applicant and the subsequent Tenderer
[and, if applicable]

Attachment 2:

JV Agreement / Letter of Intent to form JV with draft proposed Agreement

ASIAN UNIVERSITY FOR WOMEN

Applicant Information (Form -2)

[This Form should be completed only by the Applicant, preferably on its Letter-Head Pad]

Invitation for Qualification No: *[indicate IFP No]*

Tender Package No: *[indicate Package No]*

This Package is divided into the following Number of Lots: *[indicate number of Lot(s)]*

1.	**Eligibility Information of the Applicant [According to ITT]**	
1.1	Nationality of individual or country of registration	
1.2	Applicant's legal title	
1.3	Applicant's registered address	
1.4	Applicant's legal status *[complete the relevant box]*	
	Proprietorship	
	Partnership	
	Limited Liability Concern	
	Government-owned Enterprise	
	Others [please describe, if applicable]	
1.5	Applicant's year of registration	
1.6	Applicant's authorised representative details	
	Name	
	National ID number, if any	
	Address	
	Telephone / Fax numbers	
	e-mail address	
1.7	Litigation ITT	
	Information on non-performance of contract and pending litigation furnished in Form ***F-5***	
1.8	Applicant to attach photocopies of the original documents mentioned aside	[All documents required under ITT Clauses]
The following two information are applicable for national Applicants		

1.9	Applicant's Value Added Tax Registration (VAT) Number	
1.10	Applicant's Tax Identification Number(TIN)	

[The foreign Applicants, in accordance with ITT Clause 5, shall provide evidence by a written declaration to that effect to demonstrate that it meets the criterion]

2. Qualification Information of the Applicant [According to ITT Clause]

2.1 General Experience in Fire Management Works of Applicant

Start Month Year	End Month Year	Years	Contract No and Name of Contract Name and Address of Employer Brief description of Works	Role of Applicant [Prime/Sub/Management]

2.2 Specific Experience in Fire Management Works of Applicant
Completed Contracts of similar nature, complexity and methods/ technology

Contract No **Name of Contract**	[insert reference no] of [insert year] [insert name]		
Role in Contract ***[tick relevant box].***	Prime Contractor	Subcontractor	Management Contractor
Award date **Completion date** **Total Contract Value**	[insert date] [insert date] [insert amount]		
Employer's Name **Address** **Tel / Fax** **e-mail** **Brief description with justifications of the similarity compared to this Employer's requirements**	[state justification in support of its similarity compared to the proposed works]		

2.3 Average annual turnover
[total certified payments received for contracts in progress or completed for each year of works in progress or completed; using selling exchange rate quoted by the source being Bangladesh Bank on the date reported, if applicable]

Year	Amount & Currency	

2.4	**Existing commitments and works** **[targeted to be completed by the Intended Completion Date of the proposed works]**			
	Name of Contract **Contract No [reference] of [year]** **Name of Employer** **Contact Address** **Tel/fax** **e-mail**	**Target Completion Date**	**Value of Existing Commitments and Works**	
			Amount & Currency	

2.5	**Financial Resources available to meet the Fire Management System cash flow**			
	No	**Source of Financing**	**Amount Available**	
			Amount & Currency	

In order to confirm the above statements the Applicant shall submit, as applicable, the documents

2.6	**Contact Details [According to ITT]**
	Name, address, and other contact details of Applicant's Bankers and other Employer(s) that may provide references, if contacted by this Employer
2.7	**Qualifications and experience of key technical and administrative personnel proposed for Contract administration and management [According to ITT]**

	Position Name Years of General Experience	Years of Specific Experience

[*Tenderer to complete details of as many personnel as are applicable .Each personnel listed above should complete the Personnel Information (**Form-6***]

2.8	Major Construction Equipment's proposed to carry out the Contract [According to ITT]		
	Item of Equipment	Condition (new, good, average, poor)	Owned, leased or to be purchased (state owner, lessor or seller)

*[*Applicant to list details of each item of major construction equipment, as applicable]

ASIAN UNIVERSITY FOR WOMEN

JVCA Partner Information (Form -3)

[This Form should be completed by each JVCA partner].

Invitation for Qualification No: *[indicate IFP No]*

Tender Package No *[indicate Package No]*

This Package is divided into the following Number of Lots

1.	**Eligibility Information of the JVCA Partner [*According to ITT*]**	
1.1	Nationality of Individual or country of Registration	
1.2	JVCA Partner's legal title	
1.3	JVCA Partner's registered address	
1.4	JVCA Partner's legal status *[complete the relevant box]*	
	Proprietorship	
	Partnership	
	Limited Liability Concern	
	Government-owned Enterprise	
	Other (please describe, if applicable)	
1.5	JVCA Partner's year of registration	
1.6	JVCA Partner's authorised representative details	
	Name	
	National ID number, if any	
	Address	
	Telephone / Fax numbers	
	e-mail address	
1.7	Litigation	
	Information on non-performance of contract and pending litigation furnished in ***Form-5***	
1.8	JVCA Partner to attach copies of the original documents mentioned aside	[All documents required under ITT Clauses]
The following two information are applicable for national JVCA Partners only		
1.9	JVCA Partner's Value Added Tax Registration (VAT) Number	

1.10	JVCA Partner's Tax Identification Number(TIN)	
[The foreign JVCA Partners, in accordance with ITT, shall provide evidence by a written declaration to that effect to demonstrate that it meets the criterion]		
2.	**Key Activity(ies) for which it is intended to be joint ventured [According to ITT]**	
	Elements of Activity	**Brief description of Activity**

3.	**Qualification Information of the JVCA Partner [ITT]**				
3.1	**General Experience in Construction Works of JVCA Partner**				
	Start Month Year	**End Month Year**	**Years**	**Contract No and & Name of Contract Name and Address of Procuring Entity Brief description of Works**	**Role of JVCA Partner [Prime/Sub/Management]**

3.2	**Specific Experience in Construction Works of JVCA Partner Completed Contracts of similar nature, complexity and methods/construction technology**			
	Contract No **Name of Contract**	[insert reference no] of [insert year] [insert name]		
	Role in Contract [tick relevant box]	Prime Contractor	Subcontractor	Management Contractor
	Award date **Completion date** **Total Contract Amount**	[insert date] [insert date] [insert amount]		
	If partner in a JV, specify participation of the total Contract Amount	_____%	Amount & Currency [insert amount] USD/GBP/EUR/JPY Equivalent [insert amount] delete not appropriate	
	Employer's Name **Address** **Tel / Fax** **e-mail** **Brief description with justifications of the similarity compared to this Employer's requirements**	[state justification in support of its similarity compared to the proposed works]		

3.3	**Average annual construction turnover** ***[total certified payments received for contracts in progress or completed for each year of works in progress or completed; using selling exchange rate quoted by the source being Bangladesh Bank on the date reported, if applicable]***		
	Year	**Amount & Currency**	

3.4	**Existing commitments and works** **[targeted to be completed by the Intended Completion Date of the proposed works;]**			
	Name of Contract **Contract no [reference] of [year]** **Name of Employer** **Contact Address** **Tel/fax** **e-mail**	**Target Completion Date**	**Value of Existing Commitments and Works**	
			Amount & Currency	
3.5	**Financial Resources available to meet the construction cash flow**			
	No	**Source of financing**	**Amount Available**	
			Amount & Currency	
	In order to confirm the above statements the JVCA Partner shall submit, as applicable, the documents mentioned in ITT Clause 28.			
3.6	**Contact Details**			
	Name, address, and contact details of Tenderer's Bankers and other Employer(s) that may provide references if contacted by this Employer			

3.7	**Qualifications and experience of key technical and administrative personnel proposed for Contract administration and management**		
	Position Name Years of General Experience	Years of Specific Experience	
	*[Tenderer to complete details of as many personnel as are applicable. Each personnel listed above should complete the Personnel Information (**Form -6**)]*		
3.8	Major items of Construction Equipment proposed for carrying out the works [ITT Clause 28]		
	Item of Equipment	Condition (new, good, average, poor)	Owned, leased or to be purchased (state owner, leaser or seller)
	[Tenderer to list details of each item of Major equipment, as applicable]		

_____

Signatur
e (Name of Authorized Signatory of the JVCA Partner)

ASIAN UNIVERSITY FOR WOMEN

Specialist Subcontractor Information (Form F-4)

[This Form should be completed by each Subcontractor, preferably on its Letter-Head Pad]

Invitation for Qualification No: *[indicate IFP No]*

Tender Package No *[indicate Package No]*

This Package is divided into the following Number of Lots

1.	**Eligibility Information of the Subcontractor [*ITT*]**	
1.1	Nationality of Individual or country of Registration	
1.2	Subcontractor's legal title	
1.3	Subcontractor's registered address	
1.4	Subcontractor's legal status *[complete the relevant box]*	
	Proprietorship	
	Partnership	
	Limited Liability Concern	
	Government-owned Enterprise	
	Other (please describe)	
1.5	Subcontractor's year of registration	
1.6	Subcontractor's authorized representative details	
	Name	
	Address	
	Telephone / Fax numbers	
	e-mail address	
1.7	Subcontractor to attach copies of the following original documents	All documents to the extent relevant to ITT Clause in support of its qualifications
The following two information are applicable for national Subcontractors		
1.8	Subcontractor's Value Added Tax Registration (VAT) Number	
1.9	Subcontractor's Tax Identification Number (TIN)	

[The foreign Subcontractors, in accordance with ITT, shall provide evidence by a written declaration to that effect to demonstrate that it meets the criterion]		
2. Key Activity(ies) for which it is intended to be Subcontracted		
2.1	**Elements of Activity**	**Brief description of Activity**
2.2	**List of Similar Contracts in which the proposed Subcontractor had been engaged**	
	Name of Contract and Year of Execution **Value of Contract** **Name of Employer** **Contact Person and Contact details** **Type of Work Performed**	

Signature (Name of Authorized Signatory of the Proposed Sub-Contractor)

ASIAN UNIVERSITY FOR WOMEN

Historical Contract Non-Performance (Form F-5)

[The following table shall be filled in for the Applicant and for each partner of a Joint Venture]

Applicant's Legal Name: *[insert full name]*
Date: *[dd/mm/yy]*
Joint Venture Party Legal Name:*[insertfull name]* IFP No. and title: *[insert RFP number and title]*
Page *[insert page number]* of *[insert total number]* pages

Non-Performing Contracts in accordance with Qualification Criteria and Requirements			
☐ Contract non-performance did not occur during the *[number]* years specified in Qualification Criteria and Requirements, ☐ Contract(s) not performed during the *[number]* years specified in Qualification Criteria and Requirements,			
Year	**Non performed portion of contract**	**Contract Identification**	**Total Contract Amount (Current value)**
[insert year]	*[insert amount and percentage]*	Contract Identification: *[indicate complete contract name/ number, and any other identification]* Name of Employer: *[insert full name]* Address of Employer: *[insert street/city/country]* Reason(s) for non performance: *[indicate main reason(s)]*	
Pending Litigation, in accordance with Qualification Criteria and Requirements			
☐ No pending litigation in accordance with Qualification Criteria and Requirements,. ☐ Pending litigation in accordance with Qualification Criteria and Requirements, as indicated below.			
Year	**Outcome as Percentage of Total Assets**	**Contract Identification**	**Total Contract Amount (current value)**
[insert year]	*[insert percentage]*	Contract Identification: [indicate complete contract name, number, and any other identification] Name of Employer: *[insert full name]* Address of Employer: *[insert street/city/country]* Matter in dispute: *[indicate main issues in dispute]*	**Total Contract Amount (current value)**

ASIAN UNIVERSITY FOR WOMEN

Personnel Information (Form -6)

[This Form should be completed for each person proposed by the Tenderer on Form PW5-2& PW5-3, where applicable]

Name of the Applicant:	*[insert Title]*
Invitation for Tender No:	*[indicate RFP No]*
Tender Package No	*[indicate Package No]*
This Package is divided into the following Number of Lots	*[indicate number of Lot(s)]*

A. **Proposed Position** (tick the relevant box)		
▫ Fire Management Engineer	▫ Prime Candidate	▫ Alternative Candidate
▫ Key Personnel	▫ Prime Candidate	▫ Alternative Candidate
B. **Personal Data**		
Name:		
Date of Birth:		
Years overall experience:		
National ID Number:		
Years of employment with the Tenderer:		
Professional Qualifications: 1. 2. 3. 4.		
C. **Present Employment** *[to be completed only if not employed by the Applicant]*		
Name of the Employer:		
Address of the Employer:		
Present Job Title:		
Years with the present Employer:		
Tel No:	Fax No:	e-mail address:

Contact *[manager/personnel officer]:*

D. Professional Experience			
Summaries professional experience over the last twenty (**20**) years, in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.			
	From	To	Company / Project / Position / Relevant technical and management experience.
1			
2			
3			
4			
5			

(Name and Signature of the Proposed Personnel)

ASIAN UNIVERSITY FOR WOMEN

TECHNICAL SPECIFICATIONS FIRE MANAGEMENT SYSTEM
Package-04

ASIAN UNIVERSITY FOR WOMEN

TABLE OF CONTENT

SECTION – 04

DETAIL SPECIFICATIONS
FOR
FIRE PROTECTION SYSTEM

1.0 SPECIAL CONDITIONS:

1.1 General

The general conditions of the Contract shall apply to all work included in this section of the works and shall form part of this specification.

These Special Conditions are complementary to the Contract document wherever applicable to the work of the Air Conditioning services. In the event that any variance occurs between the Contract Conditions and these Special Conditions, then the Contract Conditions shall prevail.

Where items of the above documents are repeated in this specification, it is intended to call particular attention to or qualify them. It is not intended that any part shall be omitted, if not repeated herein.

Special care has to be taken by the equipment supplier and the contractor that all the steel materials which is subjected to contract with air shall be specially protected from corrosion as the environment at site is with sea salty air. All MS materials shall be either hot deep galvanized or 40micron film galvanized.

1.1.1 Drawings:

Refer to the appendix for a schedule of drawings, which will form part of this contract and referred to herein, Tendered drawing (to be provided at the time of contract) shall be a reference drawing only. The Contractor has to prepare working drawing before execution of work. The tendered drawing is an indicating one and good for assessment of quantity. At the time of construction variation may be done by the Authority within the stipulated budget.

1.2 Intent

1.2.1 General

It is the intent of this specification and drawings to call for the full supply; installation, testing and commissioning of air-conditioning and ventilation system complete with plant, equipment and associated services.

The contractor shall provide the whole of the labor and all materials necessary for the complete installation and for such tests, adjustments, commissioning and maintenance as prescribed, including all items of plant and equipment shown or specified, and all incidental sundry components necessary for the complete execution of the work and for the proper

operation of the installation, with their labor charges, whether or not these sundry components are mentioned in detail in the specification and drawings. *Where disagreements occur between the drawings and the specification or within either document, the item or arrangement of better quality, greater quantity, or higher cost shall be deemed to be included in this contract within the stipulated budget*.

1.2.2 ***Manufacturers***

Equipment and controls shall be supplied and installed strictly in accordance with the relevant clauses of this specification and incorporating components from the Schedule of Approved Country of origin/Manufacturers. The contractor shall submit a list of manufacturers of the equipment.

The contractor shall assure that the equipment and materials offered in the tender are obtainable from the local or foreign market and that delivery will conform to the working program.

1.3 Works Program and Schedule

The contract works shall be completed according to the agreed program.

The works program shall include start and completion dates and the man-days of the various operations including:

a. Preparation and Submission of Shop Drawings.
b. Manufacturing of Pump and other imported items.
c. Supply of Imported materials at site.
d. Installation of imported items
e. Installation of local items
f. Installation of pipe work including pressure test
g. installation of plant and equipment
h. installation of Pipe accessories & fittings
i. Installation of electrical works
j. Installation of automatic controls
k. Testing & commissioning of piping system
l. Testing & commissioning of plant and equipment
m. Testing & commissioning of control systems

1.4 General Items

All pipes, equipment, cable shown on the drawings are diagrammatic. The contractor should consult the architect's details and construction drawings for actual spaces available and for building details before installing pipes, ducts, conduits, cable trays and equipment and apparatus. He should make such offsets and deviations from work shown on the drawings as may become necessary to fit the actual space conditions and to accommodate apparatus and equipment installed by other trades.

The contractor shall locate all equipment, which must be serviced, operated or maintained in fully accessible positions. Supply access doors as required for this purpose. If any equipment cannot be so located inform the Consultant / Authority immediately.

The contractor shall at all times be fully responsible for the correct positioning and installation of all work and equipment installed by him in accordance with this specification and in consultation and co-operation with all other trades. No extras of any kind shall be

allowed if work and equipment has to be removed and replaced due to incorrect installation, and lack of co-ordination by the contractor.

All materials and apparatus required for the work shall be new, of first class quality, and shall be supplied, delivered, erected, connected and finished in every detail. Where no specific kind or quality of materials is specified or shown, first class articles as approved by the Authority/Consultant shall be supplied, and at no extra cost.

The contractor shall co-ordinate his work with the others and shall, in the preparation of shop and working drawings and ensure that these are co-ordinate with all other relevant trades and latest drawings.

1.5 Codes and Standards

Otherwise specified elsewhere in the Contract, the entire system shall be manufactured, installed, tested and balanced conforming to the latest issue of the following standards:

ANSI	:	American National Standard Institute
ASPE	:	American Society of Plumbing Engineering
AWWA	:	American Water Works Association
BNBC	:	Bangladesh National Building Code
BS	:	British Standard
FM	:	Factory Mutual
WASA	:	Water Works Authority
NFPA	:	National Fire Protection Association
	:	Dhaka Fire Department
UL	:	Underwriter's Laboratory. Inc

1.6 Cutting, Providing Openings and Making Good

The contractor shall supply accurate and dimensioned drawings showing the locations and sizes of all openings, sleeves, inserts, etc. required for the installation of his work, not less than 30 days before the relevant floors and walls are built. The Contractor shall make all openings, shall supply and install all sleeves and inserts, required for the work and shall make good the damages at his own cost.

The contractor shall be held responsible for all costs incurred in the repositioning and/or relocation of any sleeves or inserts initially incorrectly positioned and/or omitted by him. The contractor shall check and verify the correct positioning of all openings required for the work of his contract.

No structural member shall be cut without the written agreement of the Authority/Consultant and all such cutting shall be done in a manner approved by the Consultant / the Authority.

1.7 Foundations, Supports, Piers

The contractor shall supply and install all necessary and specified concrete and steel foundations, supports, pads, bases, required for all piping, tanks, conduit, panels, racks etc. and for all other equipment supplied under this contract.

For all equipment where foundations and concrete inertia blocks are specified to be provided, furnish and install such foundations and inertia blocks by the contractor in accordance with the details on the drawings. Insert 150 mm steel dowel rods into floors to anchor fixed pads and kerbs prior to pouring of the structural floor slabs. In all foundations, pads and inertia blocks supporting equipment, set machinery anchor bolts as necessary for the equipment may be used. The exact positioning of all pads and reinforcing shall be the responsibility of the contractor.
The contractor shall furnish for approval, shop drawings of all foundations, bases and inertia blocks showing all details of mounting and operating weight.

The finishing of such foundations, supports, pads, bases and piers, where mounted on the floor, shall be of the same as materials and same quality of finish like as the adjacent and surrounding flooring material.

1.8 Contractors, Equipment and Materials Acceptance

The contractor shall comply with the following in order to obtain approval of Authority for the use of contractor's equipment and materials.

The contractor shall submit a list, which includes a list of the manufacturer equipment of materials proposed for the contracted works. Each item of equipment shall be a standard catalogue product of an established, reputable, approved manufacturer. All similar equipment shall be of the same manufacturer, type, class and finish, unless otherwise specified.

Where no alternative materials are noted in this specification or on the drawings and where the words "equal", "approved equal" or "as approved" etc do not appear, the exact make specified must be supplied and installed.

1.9 Equipment Deviations

The dimensions and ratings of equipment specified herein or indicated on the drawings are intended to establish the outlines and characteristics of equipment furnished by the particular manufacturer or manufacturers, specified.

Where a contractor intends to use an item of equipment other than that specified or shown on the drawings or in the schedules, approval from the Authority must be obtained in writing within the stipulated budget.

The Contractor shall give all necessary notices, make all applications, obtain all permits, perform all tests and pay all fees and other costs in connection with the work. The Contractor shall file all necessary plans and obtain all necessary approvals from all statutory authorities having jurisdiction over the work.

2.0 SHOP DRAWING:

2.1 Shop Drawings and Details

The Contractor shall prepare and submit shop drawings for approval before commencing manufacture or installation, from which the relevant works shall be built. Any deviations or variations on the approved shop drawings must be endorsed by the Consultant. The contractor shall provide a schedule of shop drawings with submission dates within two weeks after the award of the tender.

Drawings shall be generally accordance to the specification drawings, which refer to the general principle of design only. Identify any errors, omissions and interference where noticed to the Consultant/ Authority. Any deviation and variations on the shop drawings must be endorsed by the Consultant and the contractor before submission to the Client.

Shop drawing submissions shall be in print form with **4 copies (A3) and 1 copy of (A2) only for execution,** all be on the same size drawing sheets and to a scale of not less than 1:100 (A3) and larger where necessary.

The contractor may submit shop drawings progressively and allow five working days for examination by the Consultant for each submission of drawings. Drawings returned for amendment shall be amended and re-submitted within sufficient time to prevent delay to the programmed works. Re-submission shall be made until the drawings are considered satisfactory.

2.2 Record Drawings, As-Built Drawings

The contractor shall keep a complete set of contract drawings and specifications on site with all latest amendments, revisions and the like.

As the work progresses, the contractor shall make all deviations and changes from the contract drawings thereon, due to site conditions, variations, and other reasons, keeping an accurate record of work as actually installed.

After consultation with the Authority/Consultant for correct presentation and contents of "as-built" drawings, the contractor shall supply a full set of prints of these documents to the Authority within 30 days of practical completion. The prints shall show in detail the full extent of existing and new installations in a logical sequence. Shop drawings, unless suitable shall not be used as record drawings or as-built drawings. No reference shall be made on record drawings or as-built drawings to any item as being supplied and or installed "by others".

Upon approval of these record drawings, the contractor shall present the drawings in the following formats and quantities to the Authority.

(a) Six (6) sets of full sized paper (A3) prints.
(b) One (1) set of full sized transparencies.
(c) One (1) set of reduced A1 sized prints.

The prints shall be neatly bound with cover sheet and index and shall incorporate all existing and new installation conditions.
All drawings and prints shall be at the contractor's expense.

2.3 Operation and Maintenance - Instructions and Manuals

Upon completion of all works and after completion of all tests furnish the necessary skilled labors and helpers for operating and maintaining all systems and equipment for a period of seven (7) days of eight hours each within 3 days of the issue of the Certificate of Practical Completion.

During this period, The contractor shall instruct the Authority/Consultant or his representative fully in the operation, adjustment, and maintenance of all equipment, systems and controllers and shall give 2 days prior notice to the Authority.

The contractor shall be fully responsible for the operation of all plant and equipment supplied and installed by him until the Authority/Consultant acknowledges having received all necessary instructions in the operation of equipment and systems.

Operating and maintenance instruction manuals shall be submitted by the contractor as drafts for examination prior to final issue and shall be ready for issue prior to Practical Completion.

Six (6) copies of each operating and maintenance manual shall be supplied by the contractor concerned to the Client.

Manufacturer's advertising literature or advertising catalogues shall not be accepted for operating and maintenance instructions, but may be included for classification purposes.

Operating and maintenance instruction manuals shall take generally the following form:
The manuals shall be bound by the contractor in hard cover with the name and the title of the installation clearly marked thereon. They shall contain all material in A4 size pages in loose- leaf form and shall be sufficiently sized to prevent crimping or binding. The manuals shall be properly indexed and shall contain dividers with tabs between each section. All data shall be organized in a neat and concise manner. The sections shall generally consist of, but not be limited to the following:
General description of systems and equipment:
The Contractor shall include brief overall description of systems, design references and description of each individual system and equipment involved.

Operation of system and equipment:
The Contractor shall include general operation of plant, operation of each system and the equipment involved, starting and shutting down of all systems, location of starting gear, etc.

Manufacturer's Literature:

The Contractor shall include manufacturer's data on maintenance and operation of all equipment. Do not include irrelevant data or data that does not pertain to the model of equipment actually installed.

Miscellaneous:

The Contractor shall include any miscellaneous charts, graphs, descriptions, data, etc. needed for complete maintenance and operating instructions of all systems and equipment installed.

Nameplates Schedule:

A schedule of nameplates for all equipment installed shall be provided. The schedule of nameplate data shall clearly indicate the operating characteristics of each item of equipment. Where items of equipment contain separate components (e.g. fans and motors), each component is to be individually scheduled. Submit schedule of nameplates for approval prior to making them.

2.4 Certificates of Conformity

Prior to the issue of the Certificate of Practical Completion, the contractor shall deliver to the Authority for approval, a draft copy, of the operating and maintenance instructions for the equipment specified.

Within 30 days of the issue of the Certificate of Practical Completion, the contractor shall deliver the following documents to the Client for approval as appropriate to the work required to be carried out for Practical Completion.

Acknowledgement from the Authority/Consultant authorized representative of having received instruction in operation of the equipment and systems.

- As-built record drawings.
- Operation and maintenance manuals.

2.5 Operation and Maintenance

Preventative and breakdown maintenance of equipment supplied and installed under this contract shall be carried out by the contractor during the 52-week defects liability period.

The cost for preventative maintenance during the defect liability period shall be deemed to have been included in the contract sum under separate item. The contractor shall supply all necessary replacement parts, free of charge, excepting for lubricating oils, indicator lamps and filter media, which shall be provided by the Authority as consumable.

Preventative maintenance shall be carried out by the contractor in accordance with the provisions of the maintenance manuals and the specification on all equipment and systems supplied by the contractor.

The Contractor shall have to confirm that all the safely protection for all the equipment are in good condition and functioning well. He has to submit written confirmation at the end of monthly maintenance of the system.

The proforma to be used and the full details of maintenance procedures shall be subjected to the approval of the Authority/Consultant and shall be submitted at tender stage.

2.6 Commissioning Data

The contractor shall carry out all commissioning as specified and shall provide a complete schedule of all commissioning results within 30 days of the issue of the Certificate of Practical Completion.

2.7 Maintenance & Warranty Period

After completion of the defects liability period, the operation and maintenance of all plant, equipment and services shall become the responsibility of the Authority and a full preventative maintenance program shall be brought into effect.
Prior to the end of the Defects Liability Period (01 years), the contractor shall submit a proposal to the Client for an ongoing annual preventative maintenance schedule/programmed, in accordance with the operating and maintenance instructions.

3.0 CO-ORDINATION WITH OTHER SERVICES

The contractor shall be responsible for co-ordination with the inspection Authorities, the Building contractor and all other contractors working on the project.

4.0 SCOPE OF WORK

4.1 The Scope of Work

- The scope of work of the CONTRACTOR shall include provision, installation, testing and balancing, commissioning, training of equipment and accessories as per drawings and specification along with sub heading of working scope to achieve a complete fire management system as per international code & standard.
- Conduct site visits and assessments as required.
- Mobilization (if required) and utility service connection for the site office.
- Prepare fire safety plan drawings and obtain fire safety plan approval from the Fire Services and Civil Defense (FSCD).
- Prepare fire evacuation plan drawings.
- Prepare shop drawings based on the GFC layout, and need to be approved by the client and consultant prior to commencement of execution.
- Submit the actual execution schedule, taking into account both imported and local materials.
- Prepare documentation works including as-built drawings and handover documents, testing, commissioning, balancing and all types of calculation in compliance with relevant codes upon completion of execution.
- Submit material samples based on the BOQ brand list for approval by the client's technical team and consultant.
- Manage on-site storage for imported and local materials with proper record by the store keeper.
- Include any necessary items (i.e, electrical. mechanical, civil etc.) which is not included in the supporting BOQ and technical specifications should be considered in the shop drawings before execution.
- Execution works must be carried out in accordance with the approved shop drawings.
- Assign a dedicated technical team/engineers (i.e, Project Manager, Project Engineer,

Safety Officer etc.) to be continuously available during execution.

- Ensure the quality of execution meets all compliance and code requirements.
- Prepare and submit all necessary supporting documents such as daily field reports, monthly progress reports, material inspection reports, and requests for inspection throughout the execution period.
- Prepare post-handover documents for Mechanical, Electrical, and Plumbing (MEP) systems include Operation & Maintenance (O&M) Manuals, as-built drawings, warranties, commissioning reports, test certificates, training manuals, and spare parts lists for all installed systems.

4.2 The fire protection system shall include the followings

a) Fire Pump(Electric & Driven) and Jockey Pump System
b) Stand Pipe and Fire Hose Systems
c) Sprinkler System
d) Portable Fire Extinguisher System
e) Electrical Power and Controls

4.3 Instructions

- Provide instruction as required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.
- The contractor and/or the systems manufacturer's representatives shall provide a Type written "Sequence of Operation."

4.4 Certified Institutes

In case testing or certifying is called for equipment and accessories which the Contractor intends to use for the Project, the Contractor shall be responsible at his own expense to submit test reports and certificates from the following institutes:

a) BUET, Bangladesh University of Engineering and Technology
b)
c) Any other reputable institutes accepted by the Employer.

5.0 FIRE PUMPS:

5.1 Fire Pump (Diesel Engine Drive)

General:

Pumps shall be designed and installed in accordance with the latest NFPA 20 "Standard for the Installation of Centrifugal Fire Pumps". Each unit shall be tested as per UL and/or FM.

Diesel engine fire pumps and associated control equipment will be supplied by the owner and will be made available to the contractor on site within the respective pump rooms. The contractor shall be responsible for all installation, testing and commissioning of the fire pumps as outlined in this specification.

Type:

Pumps shall be of the non-overloading, centrifugal, volute type. They shall be of the horizontally split, double suction type with suction and discharge connections in the lower half of the casing, allowing removal of the rotating element without disturbing pipe connections and operating at not over 2900 rpm.

Casing:

Casing of horizontally split pumps shall be capable of withstanding a hydrostatic test pressure of 20 kg/cm^2 (300 psig) or 150% of rated operating pressure (rated head), whichever is greater.

Pressure classification of flange connections shall correspond to casing working pressure.

Casing material shall be cast-iron, precision-manufactured for best performance and long-term duty.

Wearing Ring:

Wearing rings shall be suitable for an individual application. Rings shall be replaceable, and positively keyed to prevent rotation.

Impeller:

Impellers shall be one-piece, cast-bronze and dynamically balanced. Impellers of pumps shall be fully enclosed and hydraulically balanced. Impellers shall be accurately keyed to the shaft sleeves and separate snap rings. Impellers shall be fully protected against damage from reverse rotation.

Shaft:

Shafts for pumps with stuffing boxes shall be of stainless steel, chrome-iron or nickel-iron extending through the stuffing boxes. Where stuffing boxes are used, shafts shall be provided with water slingers. Shafts shall be designed with high safety precautions to

easily withstand the torsion loads with other stresses to which they may be subjected. They shall be so designed that there will be no detrimental vibration stresses. All shaft threading shall be external to the water passage and stuffing boxes. Shaft sleeves shall be keyed to the shafts and extend through the stuffing boxes. O-rings or gaskets shall be provided at sleeve ends to protect the shafts from water corrosion. They shall be so designed that no dismantling of the pump casings is required to replace the sleeves.

Bearing:

Bearings shall be heavy-duty ball bearings with a minimum average life of 100,000 hours. The bearing shall be self-sealed and housed in malleable-iron housings aligned to a bearing bracket by means of large precision registers. Bearings shall be removable without dismantling any rotating elements or pumps.

Stuffing Boxes:

Stuffing boxes shall be deep enough for not less than 4 rings of packing and shall have bronze glands.

Packing shall be suitable in all cases for the service required with proper consideration of water pressure, temperature, temperature changes and sediments carried in the water.

Couplings:

All pumps, other than close coupled pumps, shall be provided with urethane flexible couplings with a service factor of at least 1.5 for an individual application. Couplings shall impose no restriction of normal end play or expansion. Suitable coupling guards shall also be provided.

Base Plate:

Each flexible coupled pump shall be provided with a cast-iron or fabricated steel base plate to hold both the pump and the motor in correct alignment. Pumps and motors shall be accurately aligned.

Miscellaneous Fittings:

High points of pump casings shall be provided with automatic air vent. Low points of casings shall be provided with valve drains and both inlet and outlet connections with properly located gauge tapings.

Relief Valve:

Each pump except engine-driven pump shall be provided with a 20mm (3/4 inch) in diameter circulation relief valve for pump overheat protection. Furthermore. Relief valves for over pressure protection shall be provided with sizes conforming to table 2.20 in NFPA 20-1993. Relief water pipes shall terminate at the fire reservoir.

Pressure Switch:

Switches shall be used for pump control and shall be able to withstand 28 kg/cm^2 (400 psig) working pressure without any damage.

Anti-Vibration:

Each pump shall be mounted on approved vibration isolators which are, in turn, placed on a concrete base. The isolators shall be selected and installed in accordance with the manufacturer's recommendation such that no disturbing vibration and noise is being transmitted to the nearby structure.

Diesel Engine:

The engine brake horse power shall be rated at least 1.10 times the maximum power required. The engine shall be of a reputable manufacturer from which spare parts can be obtained easily.

Governor:

The engine shall be provided with an adjustable governor capable of regulating engine speed within a range of 10% between shut-off and maximum load conditions of the pump. The engine shall be of a reputable manufacturer from which spare parts can be obtained easily.

Over speeds Shut-Down Device:

The device shall be arranged such that the engine is shut down at a speed approximately 20% above the rated engine speed and that it can be manually reset.

The position of the over speed shut-down device shall be indicated at the controller and will continue to show an over speed trouble signal until the device is manually reset to normal operating position.

Tachometer:

A tachometer shall be providing to indicate revolutions per minute of the engine. An hour meter shall be provided to record total time of engine operation.

Oil Pressure Gauge:

The engine shall be provided with oil pressure gauges indicating lubricating oil pressure.

Temperature Gauge:

The engine shall be provided with a temperature gauge to indicate cooling water temperature.

Instrument Panel:

All engine instruments shall be placed on a suitable panel secured to the engine at a suitable point, both to the Supervisor approval.

Automatic Controller Wiring:

All connecting wires for automatic controllers shall be hardness or flexibly enclosed, mounted on the engine and connected in an engine junction box to terminals numbered to correspond with numbered terminals in the controller, for ready wiring in the field between the two sets of terminals.

Battery and Charger:

The engine shall be provided with two maintenance free storage battery units, each having sufficient capacity, at 5°C (41°F) to maintain cranking speed recommended by the engine manufacturer through a 6-minute cycle (15 second cranking and 15 second rest, in 12 consecutive cycles).

Two means for recharging shall be provided. One shall be the generator furnished with the engine. The offer shall be an automatically controlled charger taking power from the building power supply.

Signal for Engine Running and Crank Termination:

The engine shall be provided with a speed sensitive switch to signal engine running and crank termination. Power for these signals shall be taken from a source other than the engine generator.

Cooling System:

A completely closed-circuit cooling water circulation system shall be provided.

Engine Exhaust Pipe:

The exhaust pipe shall be galvanized steel sized in accordance with the manufacturer's recommendations. The exhaust pipe shall be insulated with 40mm (1½") thick calcium silicate and 0.6mm (0.024") thick aluminum jacket.

Stainless steel flexible connection shall be made between the engine exhaust outlet and the exhaust pipe.

Fuel Tank (For Fire Pump Engine):

The tank shall be fabricated from at least 3mm thick steel sheet, rigid frame shall be steel angle and the tank's support legs shall be fabricated from suitable steel pipe of which overall steel surface shall be treated with anti-corrosive materials and painted according to "Painting" Chapter, except inside the tank which is unnecessary for prime coat and paint. Fuel tank shall have a capacity of at least equal to 1 gallon per horsepower (5.07l/kw) plus 5% volume for expansion and 5% volume for sump. Large capacity tank may be required and shall be determined by prevailing conditions, such as refill cycle and fuel heating due to circulation and be subject to special conditions in each case.

Fuel tank shall be equipped with fuel supply line, return line, fill, drain, overflow, air vent and sight glass. Level switch shall send a signal to the control box together with a hand pump and a set of fuel waste basin reservoir.

In case of multiple pumps, individual fuel supply tank with accessories shall be required for each engine.

Before test run and after test run, the fuel must be filled in the fuel tank.

Controller:

The controller shall be UL listed or FM approved, completely assembled and wired from the factory.

The following items shall be included.

a) Pressure switch
b) Weekly test program timer
c) Automatic test run program
d) Solid state crank cycle control
e) Battery Charger
f) Pressure Recorder
g) Stop Button
h) Rest button
i) Ammeter, voltmeter
j) Alarm devices such as for oil pressure, low fuel level, water temperature, failure to start, over speed, battery no. 1 failure, battery no. 2 failure, and charger loss.
k) Other standard control accessories such as relays, pilot lamps, fuses, pushbuttons and alarm bell.

5.2 Electric Driven Pump

The pump shall be Horizontal pump, end suction, split case centrifugal type and shall be certified for use as Fire pump.

Pump Casing

The casing shall be Top centerline discharge, self venting type and shall have sufficient strength to withstand a minimum 140% of the total dynamic head. The casing shall have cast-in mounting feet directly under the center of the casing, providing maximum rigidity to prevent distortion and misalignment.

Impeller

The impeller shall be designed for high efficiency and low noise level. It shall be dynamically balanced for vibration-free operation and hydraulically balanced to reduce stuffing box pressure and minimize thrust loads on the bearings. The impeller shall be keyed to the shaft and held with a cap screw.

Replaceable Casing rings

Replaceable casing rings shall be provided at both the front and back impeller clearances to protect the casing.

Shaft and Renewable Shaft sleeve

The shaft shall be designed for minimum deflection at stuffing box face. The replaceable shaft sleeve shall take all the stuffing box wear. The sleeve shall be keyed to the shaft and shall be easily replaceable.

Stuffing Box

The stuffing box cover shall enclose back of casing and contain stuffing box chamber. The extra deep stuffing box shall be completely machined and shall have double mechanical seals.

Frame Adapter

It shall be deep precision-machined rabbet fit to stuffing box cover to assure positive alignment of shaft with stuffing box cover and pump casing. The frame adapter shall contain stuffing box drip basin, non sparking rotating deflectors and inboard bearing oil seal.

Bearing Frame

The Bearing frame shall be of heavy cast iron construction and shall contain a large oil reservoir. Oil seals on each end and breather shall fully protect the oil from contamination. Dowel pins between frame and adapter shall provide precision alignment.

Bearings

The inboard bearing shall be pressed on shaft and free to float axially in frame and shall carry radial load only. The outboard bearing shall be shouldered and locked on shaft with locknut and washer and in bearing housing to carry radial and any unbalanced thrust load. All bearing fits shall be precision bored.

Motor

The electric motor shall be of the cage rotor induction type, drip-proof and wound for operation on 3 phases, 50 Hz, 400 volt power with a degree of protection not inferior to IP54. The motor shall be totally enclosed, Fan ventilated. The motor shall be adequately sized for 150% rated pump capacity operating at 65% of rated total dynamic head. The motor shall be rated for continuous running.

Fire Pump Controller

The electric motor controller for the fire pump shall be as per NFPA 20 and specifically approved for fire pump service and shall have a degree of protection not inferior to IP54. The Controller shall be fully tropicalized and suitable for use in climate like Bangladesh.

The controller shall automatically start the pump on a drop in system pressure to 80 psig. The control equipment shall be completely assembled, wired and factory tested.

All control equipment shall be housed in a drip-proof and moisture resistant housing and labeled "Electric Fire Pump Controller." The cabinet shall have hinged lockable access doors and shall be dimensioned to provide ready access to internal components. Low and extra-low voltage components and associated wiring and terminal strips shall be located in separate compartments within the fire pump controller.

An Isolating switch at the incoming shall be provided in the cabinet. The switch shall be capable of being operated externally, and capable of being locked in the "ON" position. In addition to the isolating switch, the controller shall have externally operable manual START and STOP. The operation of the manual START switch shall override the automatic start facility. Operation of the manual STOP switch shall automatically return the fire pump controller to the automatic start position. An ammeter shall be provided on the face of the cabinet to selectively indicate phase current of the motor.

Motor starter

The motor starter shall be auto Star-Delta type and the motor shall attain full speed within 15s of receipt of start signal. Thermal overload relay shall not be connected to trip the starter. The starter shall be rated for intermittent duty.

Indicating lights

Indicator lights shall be LED type and color-coded as follows:

a. Power supply to pump present (all phases)	
b. Phase failure	
c. Pump running (alarm condition)	
d. Battery charger supply failure	

Alarms

A local alarm at the pump house and a remote aural alarm at the Western Gatehouse shall be provided with the remote alarm protected against an over current of 150%. The alarm shall operate simultaneously with the lights indicating power failure, phase failure and pump running indications. A test facility shall be provided for the testing of indicator lights and audible alarms. The audible Alarm Bell shall be 150 mm dia and shall produce a sound level of 85 dBA at 3 m.

Alarm power supply

Power supply for indicator lights and alarms shall be from a battery having a capacity sufficient to energize these for a minimum period of 72 hrs. The battery shall have a separate ventilated enclosure and shall be nickel-cadmium type and suitable for float/trickle charge without breakdown or reduction in its service life. The service life shall be rated not less than 5 years. A battery charger of the constant potential type, compatible with the battery shall be provided. The charger shall have capacity to fully recharge the battery from

50% capacity within a period of 24 hrs. The battery charger, complete with associated ammeter and voltmeter, shall be incorporated in the fire pump controller cabinet.

Termination

Numbered terminal blocks (tunnel type) with studs or screws shall be provided for all internal and outgoing conductors. Conductors shall be correspondingly numbered and provided with compatible terminals, the shanks of which shall be insulated.

Wiring diagram

A complete wiring diagram including the driver detail shall be provided. In addition, the diagram shall be permanently attached to the inside of the cabinet enclosure and protected by a transparent durable cover.

Manuals

Each pump set shall be supplied with one set of manual(s) incorporating performance curves, relevant data, together with operating and maintenance requirements for the particular driver, pump, and controller.

6.0 JOCKEY PUMPS (PRESSURE MAINTENANCE PUMP):

6.1 General

Both electric jockey fire pumps and associated control equipment will be supplied by the owner and will be made available to the contractor on site within the respective pump rooms. The contractor shall be responsible for all installation, testing and commissioning of the fire pumps as outlined in this specification.

6.2 Type

Pumps shall be regenerative turbine pumps with suction arrangement suitable for suction of water from the water reservoir.

6.3 Motor

Each pump shall be driven not over 3,000 rpm, 415V/3Ø/50 Hz totally enclosed fan-cooled Class-F insulation motor. The rated HP shall be at least 1.15 times the maximum power required.

6.4 Casing

Casing of jockey pump shall be designed for a working pressure of 20 kg/cm^2 (300 psig) or 1.5 times the actual discharge pressure, whichever is greater.

Pressure classification of flange connections shall correspond to casing working pressure.

Casing material shall be cast-iron, precision manufactured for best performance and long-term duty.

6.5 Wearing Ring

Wearing rings shall be suitable for an individual application. Rings shall be replaceable and positively keyed to prevent rotation.

6.6 Impeller

Impellers shall be one-piece, cast-bronze and dynamically balanced. Impellers of pumps shall be fully enclosed and hydraulically balanced. Impellers shall be accurately keyed to the shaft and fixed in an axial position by shaft sleeves and separate snap rings. Impellers shall be fully protected against damage from reverse rotation.

6.7 Shaft

Shafts for pumps with stuffing boxes shall be of stainless steel, chrome-iron or nickel-iron extending through the stuffing boxes. Where stuffing boxes are used, shafts shall be provided with water slingers. Shafts shall be designed with high safety precautions to easily withstand the torsion loads with other stresses to which they may be subjected. They shall be so designed that there will be no detrimental vibration stresses. All shaft threading shall be external to the water passage and stuffing boxes. Shaft sleeves shall be keyed to the shafts and extend through the stuffing boxes. O-rings or gaskets shall be provided at sleeve ends to protect the shafts from water corrosion. They shall be so designed that no dismantling of the pump casings is required to replace the sleeves.

6.8 Bearing

Bearings shall be heavy-duty ball bearings with a minimum average life of 100,000 hours. The bearing shall be self-sealed, and housed in malleable-iron housings aligned to a bearing bracket by means of large precision registers. Bearings shall be removable without dismantling any rotating elements or pumps.

6.9 Stuffing Boxes

Stuffing boxes shall be deep enough for not less than 4 rings of packing and shall have bronze glands.

Mechanical seal shall be suitable in all cases for the service required with proper consideration of water pressure, temperature, temperature changes and sediments carried in the water.

6.10 Coupling

All pumps, other than close coupled pumps, shall be provided with urethane flexible couplings with a service factor of at least 1.5 for an individual application. Couplings shall impose no restriction on normal end play or expansion. Suitable coupling guards shall also be provided.

6.11 Base Plate

Each flexible coupled pump shall be provided with a cast iron or fabricated steel base plate to hold both the pump and the motor in correct alignment. Pumps and motors shall be accurately aligned.

6.12 Miscellaneous Fittings

High points of pump casings shall be provided with automatic air vent and valve. Low points of casings shall be provided with valve drains and both inlet and outlet connections with properly located gauge tapings.

Casing brackets of pumps equipped with stuffing boxes shall be arranged to form drip pockets. A drip pipe shall be run from each drip pocket to the nearest drip funnel or floor drain.

6.13 Circulation Relief Valve

Each pump shall be provided with a 20mm (¾") in diameter circulation valve for pump overheat protection. Furthermore. Relief valves for over pressure protection shall be provided with sizes conforming to table 2.20 in NFPA 20-1987. Relief water pipes shall terminate at the fire reservoir.

6.14 Pressure Test of Fire MS 40SCH Black Steel Pipe

All pipes in the fire protection system shall be schedule 40 black steel pipes conforming to ASTM A53 or equivalent, factory tested to at least 50 bar pressure, considering maximum working pressure, probable surge pressure and long service life.

All pipes and fittings shall be marked with manufacturer's name, model designation or schedule. Internal and external surfaces of the pipes and fittings shall be chemically cleaned so that internal loose materials/flakes do not choke the sprinklers. External surfaces of pipes shall be factory painted with standard anticorrosive paints. All firefighting pipes and fittings shall be 100% leak proof and colored red. The color must be smooth, attractive, weather resistant and wrinkle-free. Joints may be mechanical coupling/cut groove, welded or threaded joints. All mechanical coupling/cut groove fittings shall be listed by UL or approved by FM. All threads shall be cut as per ASME B 1.20.1. For welded joints, welding must be done as per requirements of AWS B2.1. Welders must have currently valid (within 12 months) certificates from recognized testing laboratories and/or industries and they must be registered with those laboratories and/or industries. Black Steel pipe suitable to with stand a test pressure of 290 PSI of water complete with pipe support, hanger, and brackets shall be painted with red-oxide primer. All pipes shall be adequately supported with properly designed hangers, brackets, clamps and floor/wall covers. All bends and Tees shall be restrained from free movement. Earthquake resistant hangers shall be provided where needed.

All supports and hangers shall be designed as per NFPA 13. All hangers and supports shall be painted with anti-corrosive paints.

6.15 Pressure Switch

Switches shall be used for pump control and shall be able to withstand 28 kg/cm^2 (400 psig) working pressure without any damage.

6.16 Anti Vibration

Each pump shall be mounted on approved vibration isolators which are, in turn, placed on a concrete base. The isolators shall be selected and installed in accordance with the manufacturer's recommendation such that no disturbing vibration and noise is being transmitted to the nearby structure.

6.17 Controller

The controller shall be UL listed of FM approved, completely assembled and wired from the factory.

The following items shall be included:

a) Isolating switch
b) Circuit breaker
c) Direct on line motor starter with overload relay and external reset.
d) Pressure switch
e) Other standard control accessories such as relays, pilot lamps, fuses and push buttons.
f) Minimum running timer.

7.0 FIRE PROTECTION EQUIPMENT

7.1 General

The fire protection equipment and accessories shall be either by Underwriters' Laboratories (UL) or equivalent approved by the Owner except instantaneous fire hose couplings, fire hose reels and nozzles which shall conform to BS or approved standard.

7.2 Fire Hose Cabinet

Fire hose cabinets shall be fabricated from steel sheet of at least 1.2mm. after fabrication, the surface shall be cleaned with acidic solution and then neutralized with an alkaline solution. After priming with a phosphate solution, all surfaces shall be finished with red baked enamel paint. The cabinets shall be suitable for accommodating the fire fighting equipment as specified on the drawing and shall be complete with internal hinges, door locks and letter signs. The door can be open to 180°. Types of mounting shall be wall mounted.

7.3 Fire Hose Box

Fire hose box shall be fabricated from steel sheet of at least 1.2mm. The cabinets shall be suitable for accommodating the fire fighting equipment as specified on the drawing and shall be complete with internal hinges, door locks and letter signs. The door can be open to 180°. Types of mounting shall be either free standing or wall mounted as indicated on the drawings.

Fire hose box shall be clearly and neatly marked with the words "Fire Hose Box" in red color on all facing sides.

7.4 Fire Hose Fittings

All fittings and couplings shall be constructed of aluminium alloy or gunmetal, with a high standard of finish to ensure a long life under tough condition of usage. Instantaneous coupling of 65mm standard size shall be used on all hydrants, standpipes system and fire department connections. All fittings shall be permanently installed to landing hose valve, fire hose and fire department connection. All 65mm hose connections shall be equipped with instantaneous plugs and chains. The standard hose fitting shall be as specified hereafter.

a)	Hydrant hose outlet & outlet fire hose connections	-	Female threaded inlet to female instantaneous outlet with plugs & chains.
b)	Fire hose connections	-	Male instantaneous to hose and female instantaneous to hose.
c)	Fire hose reducer	-	Male instantaneous inlet (DN 65) to female instantaneous outlet (DN 40)
d)	Fire department connections	-	Male threaded outlet to male instantaneous inlet with caps and chains.

7.5 Fire Hose

Fire hoses shall be single jacket lined which consist of a synthetic rubber liner, woven jacket and treated to abrasion resistant, mildew proof.

Fire hoses for fire hydrant or outdoor used shall be intrusion covered of synthetic red rubber for highly ozone resistant.

7.6 Automatic Fire Hose Reel Set

Automatic fire hose reel sets shall be constructed and assembled according to BS 5274-1985, shall be steel polyester powder-coated red.

Hose reel tube shall be red rubber and reinforcement with high strength textile yarn and coat with red thermoplastic polymer, conforming to BS 3169 - 1986 class B type 1.

Automatic fire hose reel shall have the following components:

a) Automatic fire hose reel complete set shall be withstand the pressure test of 20 bar (300 ps) minimum.
b) Automatic valve shall be rustproof steel, when pulled the hose reel tube out of the cabinet of 1.5m (5'), the water shall spread out of the hose reel tube automatically.
c) Hose reel tube shall be withstood the working pressure of 15 bar (220 psi), test pressure of 24 bar (350 psi) and average bursting pressure shall be 48 bar (700 psi).

d) Plastic nozzle shall be adjustable (jet/spray/shut-off nozzle), hose tube shall be 25mm (1"), 30m (100 ft) long, the orifice shall be 6mm (¼") or 9mm (3/8") according to the approval.

Material Specification:

- Side Plates	:	1.2mm steel polyester powder coated red.
- Centre Hub	:	Glass-filledpolypropylene/brass insert
- Axle/Automatic Valve Housing	:	Brass to BS 2872
- Hose Tail	:	Plumbing grade acetyl homopolymer
- Automatic Valves	:	Stainless steel and brass with nitrile seal, stainless steel springs.
- Gate Valve	:	To BS 5154
- Inlet Pipe	:	Steel to BS 1387 threaded male 1" BSP
- Swinging Reels		
- Support Arm	:	6mm steel, black polyester powder coat.
- Spindle	:	Stainless Steel
- Swinging Arm	:	Stainless Steel
- Feed Pipe	:	Mild steel tube BS 1387
- Cover	:	1mm steel. This cover is over the swinging arm and now carries the operating instructions for the reel.

7.7 Co2 Portable Fire Extinguishers

CO_2 portable fire extinguishers shall be provided and mounted as and where indicated on the drawings. The storage cylinder shall be constructed according to the pressure vessels containing carbon dioxide and designed for 124 bar or higher pressure. The operation and storage temperature range is from-40° to 49°C. A discharge horn of non conductive type with reinforced rubber hose shall be provided. Each unit shall have CO_2 capacity of 4.5kg.

7.8 Dry Chemical Portable Fire Extinguishers

The extinguishers shall be ABC multi-purpose dry chemical fire extinguishers with 4.5 kg capacity. The body shall be constructed of low carbon steel, coated with primer and finished with stove baked enamel red paint. It shall, furthermore, withstand hydrostatic test pressure of 34.5 bar. Nitrogen gas shall be used as expellant. Pressure gauges, corrosion – resistant nozzles, head caps and reinforced hoses shall be provided.

7.9 Fire Department Connection

The fire department connection shall be cast brass body with three-way male instantaneous inlet connections, including caps and chains. The unit shall be either free standing or wall mounted as indicated on the drawings. Floor plate or wall plate shall be included with outlet of approximately 0.70m high.

7.10 Flow Switch

The unit shall have temper proof switch housing with flexible flow paddle, micro switches and retard feature to minimize false alarm. Retard setting shall be adjustable.

7.11 Supervisory Switch (Monitor Switch)

Supervisory switch or monitor switch are designed for mounting to most outside screw and Yoke (O.S. & Y) gate valves. The monitor switch are intended to be used for the supervision of the open position of O.S. & Y gate valves which control water supplies to automatic sprinkler or stand pipe fire protection system. Supervision of the open position of a main control valve is recommended to indicate a condition, i.e., closing of the valve, that could prevent the required operation of a fire protection system.

Supervision switches or monitor switches are operated by movement of the trip rod or by removal of the cover. The trip rod is spring loaded and double action, consequently, lateral movement of the trip rod, in either direction from its normally installed position, will result in operation of the switching components.

The monitor switch has one single pole double throw snap-action switch.

The switching components are enclosed in NEMA type 1 general purpose indoor rated housing. The electrical switch contacts are rated at 240 VAC, 15A.

The monitor switches are used in conjunction with proprietary and central station alarm systems to provide a supervisory signal indicating unauthorized closing of the O. S. & Y

gate valve, as well as removal of the monitor switch from the gate valve. A supervisory signal is also initiated by the unauthorized removal of a monitor switch cover, due to the release of the cover taper tab which is linked to the switching components and normally held depressed by the cover.

7.12 Sprinkler Head

Ceiling sprinkler heads shall be of the recessed type with an outstanding architectural appearance. They shall, furthermore, have the following feature.

a) Applicable for guest room area in the where ceiling sprinkler cannot be used.
b) Frangible link type.
c) Upright style.
d) 12.7mm (1/2") in diameter nominal orifice, K factor shall not be less than 5.6 gpm/(psi) $^{1/2}$
e) Chrome-plated with ceiling plate finish.
f) Temperature rating shall be 68.3°C (155ºF) for general area and 121.1°C (250ºF) for kitchen area.

7.13 Spare Sprinkler Heads

Sprinkler heads of every type utilized in the hotel two sprinkler wrenches, and a sprinkler stopper shall be provided for the system. The number of spare heads provided shall be in accordance with NFPA 13

7.14 Wet Pipe Alarm Valve

Alarm valves shall be of the vertical or horizontal pattern as indicated on the drawings.

The valves shall be designed for a wet pipe water sprinkler system and actuated by breaking sprinkler heads.

7.15 Graphic Annunciator Panel

The flush mounting graphic annunciator panel provides a graphic display by using RED L.E.D's to indicate the location of valves supervisory switch in the fire pump room as shown in the drawing.

The 300mm x 450mm (12"x18") front display window shall be constructed of cast aluminum frame or stainless steel frame. The housing shall be constructed of 18 gauge steel and completed with all the modules required by the designed panel. The graphic annunciator panel shall be provided toggle lamp test switch and two auxiliary contacts for signal remoting to BMS.

8.0 FIRE PROTECTION VALVE:

8.1 General

The fire protection valves shall be either listed by underwriters' laboratories (UL) or approved equivalent.

All valves shall be rated at 12 kg/cm² (175 psig) working pressure or unless otherwise specified valves for discharge side of the fire pump and jockey pump. Valves used in the high zone shall be rated at 20 kg/ cm² (300 psig)

The diameter of hand wheels for valves shall be of a suitable size so as to allow tight closure by hand with the application of reasonable force so that neither additional leverage nor damage shall be imposed upon the stem, seat and disc. Where indicated or required, for inaccessible overhead valves, chain - operated hand wheels including rust proof chain and chain guide shall be provided.

At the completion of the work an approved UL pattern valve tag shall be attached to each valve. The tag shall be securely fastened to the handle or spindle of the valve by a brass chain. The contractor shall provide the hotel engineering staff four sets of valve schedules and diagrammatic charts showing schematics for the complete sprinkler system indicting all control valves and tag designations.

8.2 Gate Valves

Valves of sizes up to 50mm (2") in diameter shall be bronze with threaded ends, solid wedges and rising stems. Valves of sizes 65mm (2½") in diameter and larger shall be cast iron with flanged ends, solid wedges and rising stems. Working pressure: 16 bar, 232 PSI (WOG) Body test pressure: 24 bar Seat test pressure: 17.6 bar should be maintained

8.3 Silent Check Valves

Silent check valves shall be installed as indicated on the drawing and t the location where noise and water hammer would cause a problem, normally installed at the discharge of the pump. The valve shall be of a spring closed type.

Seats, discs, and spring shall be bronze or stainless steel, whichever is appropriated.

a) Valve of sizes up to 50mm (2") in diameter shall be bronze with threaded ends.
b) Valve of sizes 65mm (2½") in diameter and larger shall be cast iron where appropriated with flanged connection.

8.4 Water Type Check Valves

Wafer type check valve shall be of the dual discs or dual plates, wafer style with torsion spring induced closure. Dual discs check valve can be used for horizontal flow or vertical flow up application only, for horizontal flow applications. Valve must be installed with the disc hinge pin in the vertical position to insure proper operation.

Discs and springs shall be bronze or stainless steel, whichever is appropriated.

Valve of size 50mm (2") in diameter and larger shall be cast iron where appropriated, with flanged connection.

8.5 Pressure Relief Valve

Pressure relief valve shall modulate to relieve excess pressure in a fire protection system. It shall maintain constant pressure in the system regardless of demand changes.

It shall be pilot controlled and back pressure shall not affect its set point. It shall be actuated by line pressure through a pilot control system and open fast in order to maintain steady system pressure as system demand decreases. It shall close gradually to control surges and shall re-seat drip-tight within 5% of its pressure setting. The regulated outlet pressure ranges from 3.5 bars to 8.0 bars and the inlet pressure from 5.7 bars to 20 bars.

8.6 Butterfly Valve

A butterfly valve can be used instead of gate valve if its size is over or equal 75mm (3") in diameter it shall be fully lug type body can be fitted between flanges for easy installation and be drilled to suit precisely the piping flange. The body shall be cast iron with aluminium bronze disc of sufficient rigidity and strength to resist distortion.

Compound rubber seat rings shall have excellent elasticity as well as wear resistance to ensure positive water shut-off under the designed working pressure. Molded-in "O" rings shall provide positive flange sealing to eliminate need for gaskets. All rubber parts shall be of the type suitable for the specified working fluid. Level operated valves shall be used for sizes up to 150mm (6") in diameter. Position indicators shall be provided to indicate valve disc position.

8.7 Flexible Pipe Connector

Body: Polarized Rubber Lining: Nylon Cord Fabric Frame: Hard Steel Wire Flanged: Mild Steel BS 10 Table E Working Pressure: 16 bar Gasket or packing not required Temperature range: (-) 10º C to 105º C should be maintained.

8.8 Non Return Valve

Working pressure: 16 bar, Factory pressure test: 24 bar, Body material: Cast Iron BS 1452, Disc materials: Ductile iron Seat: EPDM Suitable for BS 10, BS 4504 and ANSI 150 Flange

8.9 Y Strainer

Body and bonnet material: Cast Iron to BS 1452 GR 220, Screen material: Stainless Steel Flanged: BS10 table E Working pressure: 16 bar, Test pressure: 20 bar, Screen size: 2 mm diameter

8.10 Foot Valve

Rising stem - Outside screw and yoke BS 5152 Flanged to BS 4504 PN16 Pressure/Temperature Ratings: Working Pressure: 16 bar Testing Pressure Shell: 24 bar Seat: 17.6 bar Working Temperature: (-)10˚C to 120˚C Suitable Media Water, Oil & Gas

8.11 Pressure Reducing Valves

Pressure reducing valves shall be flanged end type suitable to reduce pressure of delivery

water at presented point. Inlet pressure of the valves shall be 150 psi to 250 psi and out let pressure shall be 65 psi. Valve shall be adjustable tube and shall be with pressure gauge.

8.12 Auto Air Vent Valves

Automatic vent valve shall be free floating type having test cock, threaded outlets to accept drain line and threaded inlet connection. Vent valve shall be free floating type complete with test cock, 20mm dia. Threaded outlet to accept drain line and vent inlet connection. Vent valves shall be installed at highest point if the G.I. fire stand pipe as per direction and complete with consumable materials etc.

8.13 Hose Valves

- ***Angle Hose Valve*:**

  a) Valve of size 65mm (2½") in diameter shall be cast brass with female thread at both inlet and outlet sides.
  b) Valve shall be installed within the inlet pressure is equal to or less than 670kPA (100psi)

- ***Pressure Restricting Angle Hose Valve*:**

  a) Valve of size 65mm (V) in diameter shall be cast brass with female thread at both inlet and outlet sides.
  b) Valve shall be used to control the inlet water pressure to be at 448-670 kPa (65-100 psi) when it is exceed 670 kPa (100 psi)
  c) The outlet pressure shall be controlled by breakable link setting which shall be adjusted and locked the desire outlet pressure.

9.0 FIRE PROTECTION PIPE:

9.1 General

All piping shall be installed parallel to, or at right angles with, the building walls and partitions. A pitch in the direction of flow and drain shall be not less than 1:500. Branches from water mains shall be taken in a manner that facilitates venting and draining. Reductions in bore shall be formed eccentrically to facilitate venting, except on vertical pipes where concentric reduction may be used.

All water piping shall be installed in such a way that all circuits can be completely drained off and all air pockets in the water circuits shall be suitably vented.

Pipes shall be installed in continuous lengths as long as possible. Except where required to be connected to fitting outlets or headers, they shall be joined by welding, solvent welding, screwing or soldering as approved or indicated in the specification.

9.2 Above Ground Level Pipes

All fire protection pipes and fittings installed above ground level or installed inside the building shall be black steel pipes, seamed, schedule 40, conforming to ASTM A53, grade-B.

9.3 Underground Level Pipes

All fire protection pipes and fitting to be buried underground shall be black steel pies, seamed, schedule 40, conforming to ASTM A53, grade B and stall be externally coated in the mill of the fabricator. Material shall conform to AWWA C214 – Tape coating system for the exterior of special sections, connections and fittings for steel water pipelines section-2. Application, testing and inspection shall be in accordance with AWWA C214 and AWWA C209.

Underground pipe supports attached to the building structure shall be made of stainless steel. Back fill and under fill shall be made with sand.

9.4 Drain Pipes

Drain pipes shall be galvanized steel pipe class medium conforming to BS 1387.

Fittings for galvanized steel pipes shall be galvanized malleable cast iron, conforming to ASTM.

10.0 PIPING ACCESSORIES:

10.1 Flexible Connections

Flexible connections at outlets of pumps shall be of stainless steel corrugated inner tube and stainless steel wire braid outside the tube with flanged ends. The flexible connectors shall be designed for excellent vibration and noise protection. Isolated tension members shall be provided to prevent excessive elongation. The end flange connection shall be rated at 20kg/cm^2 (300 psi).

Flexible connections shall be suitable for the specified working fluid or specified working pressure and temperature.

10.2 Expansion Joints

Pack less type expansion connectors shall be used where the expansion and contraction of the pipe is excessive or cannot be compensated by expansion loops or offsets.

Anchors and pipe guides shall be provided and installed at the recommended locations. All expansion connectors shall have flanged ends with working pressure corresponding with the piping system.

10.3 Strainers

Water strainer shall be of the Y type. Strainers of 50mm (2") in diameter and smaller shall have bronze or iron bodies with screwed connections while 65mm (2½") in diameter strainers and larger shall have iron bodies and flanged connections. They shall have the same rating as the piping system.

Water strainers shall comply with the requirements of the ASTM standards.

Screens shall be stainless steel with perforations as follows:

Strainer mm (inch)	Perforation mm (inch)
20 (¾) to 50 (2)	0.76 (0.03)
65 (2½") to 150 (6)	1.52 (0.06)
200 (8) to 300 (12)	3.05 (0.12)
Over 300 (12)	6.10 (0.24)

The free area of each screen shall be not less than three times the area of the strainers of 65mm (2½") in diameter and larger shall be provided with 15mm (½") in diameter valve drains.

10.4 Air Vent and Drain

Manual air vent shall be furnished as required for purging air or other gases from the water circuit during filling up. The outlet shall be piped to the nearest drain.

Automatic air vents, conforming to ASA standards, shall be furnished at the tip of main risers. A shut off valve shall be provided at the inlet of each automatic air vent. The outlet shall be piped to the nearest drain.

A plug type drain cock shall be provided at all low points of pipe work systems.

Drains shall be installed to ensure easy access and convenience for maintenance and removal of all piping, valves, fittings and equipment without undue spillage.

Drainage facilities shall be providing and suitably sized to drain expeditiously the entire system equipment involved.

10.5 Pressure Gauges

Pressure gauges shall be of the bourdon type, stainless steel casing, round type of 100 mm (4") dial and scale range of approximately 150% of the normal operation. Pressure readings shall be in kg/cm^2 and psig.

A shut off valves and snubber with working pressure corresponding with the piping system shall be provided for each pressure gauge.

Oil filled pressure gauges shall be selected where there are excessive vibration.

10.6 Flow Measuring Equipment

Flow measuring devices shall be annular flow measuring stations and a portable meter set complete with master chart for direct conversion of meter readings to m^3/h (or gpm), carrying case, two 4-m hoses, equalizer manifold, check seal, installation and operating instructions. Meters shall become the property of the owner.

Meters shall be approved factory assembled Eagle Eye flow meters or equal approved.

Each station shall be completed with safety shut-off valves and quick connect coupling connections.

Annubar elements shall be made of stainless steel and rated to 20 kg/cm^2 (300 psig) at 204°C (400°F).

The flow measuring equipment shall be the product of Annubar by Ellison Instrument Division, Dietrich Standard Copr., or approved equivalent.

Each station shall be tagged by means of a brass tag, attached with a chain that indicates the station number, meter setting and m^3/h (or gpm).

Welding sockets shall be supplied by the flow meter manufacturer.

Where required, the flow meters shall be equipped with a built-in electronic totalized, a square-root extractor, and a power unit for the transmitter to the central control panel.

11.0 PIPING INSTALLATION:

11.1 General

All piping shall be installed parallel to, or at right angles with, the building walls and partitions. A pitch in the direction of flow and drain shall be not less than 1:500. Branches from water mains shall be taken in a manner that facilitates venting and draining. Reductions in bore shall be formed eccentrically to facilitate venting, except on vertical pipes where concentric reduction may be used.

All water piping shall be installed in such a way that all circuits can be completely drained off and all air pockets in the water circuits shall be suitably vented.

Clearance between pipe works and equipment or machinery shall be adequately provided to facilitate maintenance. Overhead clearance shall be at least 600mm (24") over access ways, and where possible the projection of valve stems into access ways shall be avoided. Pipe works and pumps shall be so arranged that the removal for maintenance of the equipment can be carried out with minimum dismantling. Provision of all pipe fittings and accessories necessary for the efficient functioning of the various systems shall be included.

Pipes shall be installed in continuous lengths as long as possible. Except where required to be connected to fitting outlets or headers, they shall be joined by welding, solvent welding, screwing or soldering as approved or indicated in the specification.

11.2 Cross Connections and Interconnections

The equipment or piping shall be installed so that it will not provide a cross connection or interconnection between a distributing supply for drinking or domestic purpose and a polluted supply such as a drainage system or a soil or waste pipe that will permit or make possible the backflow of sewage, polluted water or waste into the water supply system. Where crossing a sewer or waste line is inevitable, the water line shall be not less than 30cm (12") above the sewer line, which shall be cast iron soil pipe for not less than 30 cm (12") on each side of the crossing.

11.3 Appearance

All pipes shall be installed in an appropriate manner to present a neat and orderly appearance, using fittings for all changes of direction, and arranging pipe runs parallel to or at right angles with structural members of the building, to provide utmost head – room and to clear lights and other obstructions. In general, suspended pipes shall be installed as closely as possible to the overhead structure.

11.4 Workmanship

All pipes shall be cut accurately to measurements established the site and shall be worked into place without springing or forcing. Piping shall be installed so that it may expand and contract freely without injury to itself or other work.

Steel and wrought-iron pipe shall be cut with pipe cutters and threaded with sharp, clean dies. All cut sections shall be reamed to remove all burrs and to restore the pipe to full diameter. All changes in size shall be made with reducing fittings. Pipe bends and bushings are prohibited.

11.5 Location of Devices

All valves, cleanouts, equipment, accessories and devices shall be so located that they are accessible for repair and replacement.

11.6 Storage and Cleaning

Pipes shall be delivered and stored with plugged ends. Ends shall be kept closed with temporary covers during erection. Before any pipe is installed, it shall be opened and pounded to remove any foreign substances, or swabbed, if necessary, for thorough cleaning.

Pipes shall be stored on racks in a suitable warehouse or cover to avoid rusting. If necessary, carbon steel pipes shall be coated with anodic rust converter or red lead primer.

During the course of installation, the Contractor shall take every precaution to prevent any debris from being left in the pipes. He shall be responsible for any damage that may occur.

Immediately after erection, exposed threads at all fittings shall be painted with zinc-chromate paint, and after welding each joint shall be wire brushed and then painted with zinc-chromate paint.

Before start-up, all piping systems shall be thoroughly flushed with water until it runs clear.

11.7 Connections to Equipment

Connections to equipment shall be made in such a manner that undue strains between pipes and equipment are eliminated.

Unions and/or flanges shall be used to facilitate the removal of the equipment.

11.8 Expansion and Contraction

The piping systems shall be installed so that there will be no damage due to expansion and contraction during operation.

Pack less type expansion connectors shall be used where the expansion and contraction of the pipe is excessive or cannot be compensated by expansion loops or offsets.

11.9 Differential Settlement

The piping systems shall be installed so that there will be no damage due to differential settlement of the pipe supports after installation. The contractor shall provide flexible connections, offsets, or expansion lops where required to guard against differential settlement.

11.10 Sleeves

Vertical pipes passing through floors shall be provided with sleeves of black steel pipes. Sleeves shall be of proper length to pass through the entire floor construction and shall terminate 40mm (1½”) above the finished floor level.
Horizontal pipes passing through walls and partitions shall be provided with full thickness sleeves made of standard weight black steel pipes. Sleeves shall be large enough to leave

not less than 12.5mm (½") clearance around the pipe and covering insulation, if there is any. Sleeves shall be set in place where the walls and partitions are built.

Sleeves in concrete work shall be flanged at the bottom or provided with temporary centering caps and securely nailed or screwed to formwork before the concrete is poured.

Provide chromium plated escutcheon where exposed pipes pass through walls or floors.

When sleeves are installed through a fire wall, the clearance between sleeves and pipes shall be filled with fire resistant material. The fire rating of the fire-resistant material shall be at least equivalent to that of the fire wall.

When pipes pass through waterproof walls, water retaining rings with approved type of sealant shall be applied.

11.11 Pipe Joints

Joint for Threaded Pipe:

Joints for threaded pipes shall be made with an approved Teflon tape or graphite compound applied to the male threads only. Threads exposed after joints are made up shall be mopped with compound. Threads shall be of the cleanout, tapered threads with the ends being reamed before installation.

Joint for Flanged Pipe:
Flanged joints shall be installed at all valves larger than 50mm (2") and at other places where necessary.

Jointing flanges shall be truly parallel to each other so that bolts are used only to tighten joints. Rather than correct alignment. Flanges shall be chosen to suit the maximum working pressure of the system. Bolts, nuts and washers shall be cadmium plated steel.

11.12 Welded Pipe Joint

The edges of the pipe to be welded shall be machine beveled wherever possible. Gas cuts shall be true and free of all burnt metal. Before welding, the surfaces shall be thoroughly cleaned and degreased. The welding technique shall be such as such as to ensure penetration to the full thickness of the pipe wall and through fusion of the deposited metal with the parent metal. During welding the ends of the pipes shall be held firmly together by suitable lugs, welded on bridge pieces or adequate tack welding. Special care shall be taken to prevent formation of welded obstructions and lodgment of welding residue inside the pipes. Cracks, pinholes, excessive under cutting, etc. shall be removed and the joints re-welded. Welding materials and workmanship shall be in accordance with AWS (American Welding Standard).

Welders must be entirely competent and may be required to perform site tests. Should the SUPERVISOR not be satisfied, the welder must be replaces. The SUPERVISOR reserves the right to order the cutout for inspection of up to 1% of the total number of welds. In the event of any inspected welds being, in the SUPERVISOR opinion, unsatisfactory he

reserves the right too order the removal of further welds which in his opinion indicate faulty workmanship. Welds removed for inspection shall be reinstalled at no cost to the OWNER.

Either the electric arc or the oxy-acetylene welding method may be used. Welding rods or electrodes shall have such composition that the welds produced by them shall have the same analysis as the parent metal and shall be of an approved type and brand.

11.13 Hanger and Supports

All pipes shall be securely supported. Horizontal piping shall be supported by adjustable clevis type hangers with solid rods securely attached to the building structure. Where several pipes run in a parallel fashion, trapeze hangers may be used in lieu of separate hangers. All hangers shall have turnbuckles or other approved means of adjustment. Where pipes, such as those from individual toilet rooms to main stacks, are not low enough to permit the use of turnbuckles, other means of adjustment shall be used. Chains, straps, perforated bars, or wire hangers will not be accepted. The maximum distances between hangers and supports for horizontally mounted and vertically mounted pipes shall be as indicated below.

For all pipes where the hanger clips bear directly on pipes and for hangers of dissimilar metals, suitable separation with a layer of felt shall be provided to prevent corrosion. Hangers on structural steel must be clamped in position with hook bolts. Drilling holes in or welding to structural steel is absolutely prohibited, unless with the express approval from the SUPERVISOR.

Anchors for steel pipes shall be welded directly to the pipe wall and securely bolted to the building structure. Anchors for copper and PVC pipes shall be of the split ring type.

Supporting brackets shall be fastened to concrete by means of inserts or expansion bolts, to brickwork by means of expansion bolts, and to hollow masonry by means of toggle bolts.

Two fixings per bracket shall be provided as follows:

Nominal Pipe size mm (inch)	Fixing Size mm (inch)
Up to 65 (2½")	6.4 (¼)
80 (3) to 150 (6)	9.5 (3/8)
200 (8) to 300 (12)	12.7 (½")

Steel Hangers and Supports:

a) The Contractor shall provide all labor, material, equipment and incidentals necessary to furnish and install hangers and supports.
b) The Contractor shall submit shop drawing of all hangers and supports for approval.
c) Hangers and supports shall be adequate to maintain the supported load in proper position under all operation condition.
d) The hangers and supports shall be of the adjustable type.
e) All pipes shall be rigidly supported from the steel or concrete structures by approved hanger, inserts or supports with adequate provision for expansion and contraction.

f) All metal hangers and supports shall be ship primed and painted as specified in this specification.
g) Hangers and supports where installed surrounding cooling tower area shall be all hot dip galvanized.

Bolts, nuts, washers and band straps shall be made of stainless steel.

Where the hangers and support members are cut, (sheared, punched, drilled etc) or deformed, which may cause subsequent peeling of the galvanized coating, the hangers and support members shall be recoated with two coated of approved zinc rich paint.

a) Hangers and supports installed outdoor but above ground level or on the pipe bridge shall be hot dip galvanized.
b) Hangers, supports and accessories installed underground shall be all stainless steel.
c) Steel channels, steel angles or pipe supports where installed in concrete trench shall be hot-dip galvanized.

Bolts, nuts, washers and band straps shall be made of stainless steel.

a) Hangers and supports installed indoor but in humid-area or corrosive area, such as (batteries room, boiler room, chiller room, dishwashing room, kitchen and laundry room etc) the steel hangers and supports shall be painted with two coats of epoxy red lead primer and one coat of epoxy black finishing paint.

In general area inside the building, hangers and supports shall be painted with two coats of red lead primer and one coat of alkyd grey finishing paint.

Bolts, nuts and washers shall be electro-deposited zinc coating or cadmium-plated steel.

a) Hangers and supported installed in plant room shall be supported on spring vibration isolator.

11.14 Schedule Of Pipe Supports

Nominal Pipe Size (mm)	Hanger Rod Min. Size (mm)	Maximum Interval (m)					
		Steel Pipe		PVC Pipe		Copper Pipe	
		Horiz	Vert	Horiz	Vert	Horiz	Vert
15	9	2.0	2.4	0.9	1.2	1.5	1.8
20	9	2.4	3.0	1.0	1.2	1.8	2.4
25	9	2.4	3.0	1.0	1.2	1.8	2.4
32	9	2.4	3.0	1.2	1.8	2.0	3.0
40	9	3.0	3.6	1.3	1.8	2.4	3.0
50	9	3.0	3.6	1.5	1.8	2.4	3.6
65	12	3.0	4.5	1.8	2.4	3.0	3.6
80	12	3.6	4.5	2.0	2.4	3.0	3.6

100	15	4.0	4.5	2.4	2.4	3.6	3.6
125	15	48	4.5	2.4	3.0		
150	22	4.8	4.5	2.4	3.0		
200	22	6.0	4.8	3.0	3.6		
250	22	6.0	48				
300	22	6.0	4.8				

11.15 Cutting and Repairing

The work shall be carefully laid out in advance. Cutting of structural works shall be done only with specific approval from the Supervisor. Damage from the cutting shall be carefully repaired by skilled workmen of the trade involved.

11.16 Invert Elevation

The Contractor shall verify the proposed invert elevations prior to laying pipes.

11.17 Termination of Water and Drainage Piping

Water and drainage pipes extended to points 1.50 meters (5') beyond the building structure shall be capped or plugged for future connection, or connection under other sections of this specification. If trenches are closed or the pipes are otherwise covered before being connected to the utility systems, the locations of the end of each pipe shall be marked with a stake properly tagged or otherwise identified.

11.18 Piping Preparation

a) Ream pipe and tube ends. Remove burrs.
b) Remove scale and dirt on inside and outside before assembly.
c) Prepare piping connections to equipment with flanges or unions.
d) After completion, fill clean and treat systems. Refer to chemical (water) treatment.

11.19 Piping Installation

a) Route piping in orderly manner, plumb and parallel to building structure and maintain gradient.
b) Install piping to conserve building space and not interfere with use of space and other work.
c) Group piping whenever practical at common elevations.
d) Install piping to allow for expansion and contraction without stressing pipe, joints or connected equipment.
e) Provide clearance for installation of insulation and access to valves and fittings.
f) Provide access where valves and fittings are not exposed.
g) Where pipe support members are welded to structural building framing, scrape, brush clean and apply one coat of zinc rich primer to welding.
h) Prepare pipe, fittings, supports, and accessories for finish painting. Refer to chapter "Painting".
i) Pipe shall be cut accurately to measurements established at the jobsite, worked into place without springing or forcing and properly clear windows, doors and other

openings, cutting or other weakening of the building structure to facilitate piping installation will not be permitted.

j) Pipes shall have burrs removed by reaming and shall be installed so as to permit free expansion and contraction without causing damage to building structure, pipe, joint or hangers.

k) Changes in direction shall be made with fittings, except that bending of pipe up to 100 mm (4") will be permitted, provided a pipe bender is used and wide sweep bends are formed. The center line radius for bends shall be not less than six diameters of the pipe. Bent pipe showing kinks, wrinkles, flattening or other malformations will not be accepted.

l) Reducing fittings shall be used for changes in pipe sizes.

m) Open ends of pipelines and equipment shall be properly capped or plugged during installation to keep dirt or other foreign materials out of the systems.

12.0 Brand & Country of Origin:

Say, for MS 40SCH pipe, support & thread Brand: National Tubes/Hebei Huayang /Mech /Vaolai /TPMC /Shield or Equivalent, Country of Origin: UK,China,Bangladesh or Equivalent, For fire pump & hydrant unit Brand:Naffco/Falcon/SRI/Emaco/Sffeco or Equivalent Country of Origin: UAE/Singapor/Malaysia or Equivalent, For fire door; Brand:Sffeco/Naffco/PCJ/Padilla or Equivalent Country of Origin: UAE/Thailand/Spain or Equivalent, for portable extinguishers; Brand:Naffco/Ironman/A&S/Eversafe/SRI or Equivalent, Country of Origin: UAE/Malaysia/China or Equivalent and standard should be UL listed & FM approved.

13.0 TESTING:

13.1 General

All piping shall be tested by the Contractor and approved by the supervisor before acceptance. All equipment, materials, labor etc. required for testing the fire protection system or the part thereof shall be furnished by the Contractor at no additional cost.

13.2 Exposure of Work

All new, altered, extended or replaced plumbing shall be left uncovered and unconcealed until it has been tested and approved. Where such work has been covered or concealed before it is tested and approved, it shall be exposed for testing. Underground plumbing shall be tested and approved before back filling.

13.3 Hydrostatic Test

Al piping shall be capable of withstand the hydrostatic test pressure of 13.8 kg/cm^2 (200 psig) or at 3.5 kg/cm^2 (50 psig) in excess when the system pressure is more than 103 kg/cm^2 (150 psig), whichever is greater. Care shall be taken to avoid putting excessive pressure on mechanical seals, safety devices etc. these delicate control mechanisms shall be removed during the test to prevent shock damage. The system shall be tested when water temperatures and average ambient temperatures are approximately equal and constant. Test pressure shall be maintained for not less than 2 hours without an appreciable drop after the force pump has been disconnected.

Piping may be tested a section at a time in order to facilitate the construction.

Leaks in screwed fittings shall be corrected by remaking the joints. Leaks in welded joints shall be cutout and re-welded. Caulking of leaks will not be permitted.

13.4 Fire Pump Test

Fire pumps shall be tested to the requirements of the latest edition of NFPA 20

a) The electric and diesel fire pumps are to be tested each at a time, through the flow meter to check capacity and pressure against manufacturer's certified curve.
b) Operate all alarm, power supply failure, low oil pressure, high water temperature, and engine over speed, failure to start etc. devices.
c) Check automatic and manual starting of each pump. Check automatic stopping of each pump.

Test jockey pumps for operation and pressure:
a) Check automatic and manual starting of each pump
b) Check automatic stopping of each pump

13.5 Report

After instillations are completed all equipment shall be test run. Any adjustments that are needed shall be made to assure that all equipment will operate with the required performance. Test run reports with all necessary data such as pressure, temperature, flow rate, current, voltage etc. shall be recorded.

14.0 ELECTRICAL INSTALLATION FOR FIRE PROTECTION SYSTEM:

14.1 General

This part of the specification describes all electrical equipment and installations including connections thereof for the aforementioned systems.

An electrical contractor will be responsible for bringing in the supply cable or wiring to the Contractor's panels at the locations indicated on the drawings. The contractor shall connect the cable from the indicated location to the isolator or circuit breaker in the mechanical work panels. The connections and installation thereof shall form a part of the contract

All items of a similar nature shall be products of one manufacturer.

All electrical equipment shall be suitable for operation at the indicated system voltages and operating conditions.

All equipment, wiring methods and the installation shall conform to the latest applicable standards as specified in this specification.

14.2 Earthing

The equipment grounding system shall be designed and installed such that all metallic structures, raised floor structures, enclosure's raceway, junction boxes, outlet boxes, cabinets, machine frames, portable equipment and other conductive items in close proximity with electrical circuits operate continuously at ground potential.

The equipment grounding system shall provide a low impedance path for possible ground fault currents. The system shall consist of a separate green insulated equipment grounding conductor for each feeder and each branch circuit. The required grounding conductor shall

be installed in the common conduit with the related phase and/or neutral conductors. Each electrical expansion fitting shall be provided with an external flexible copper ground strap securely bonded on each end of the fitting. The required equipment grounding conductors shall be sized in accordance with NEC, Table 250-95, or approved equivalent.

Unless otherwise specified, the grounding connectors shall be of a type specifically manufactured for grounding purposes, made of copper alloy and assembled with high strength silicon bronze hardware. Where grounding or bonding conductors connect to structural cables, connections shall be made with mechanical devices; welded connections shall not be made at these points. All mechanical connections shall be completely encapsulated in no hardening, conductive epoxy. The epoxy shall be applicable for wet locations or for ambient temperatures of 10°-55°C (50°-131°F).

Jumper material shall be copper wire. Copper straps shall be soft drawn copper.

Grounding of all fire pumps and equipment shall be done by means of separate green insulated equipment grounding conductor for each feeder or each branch circuit.

14.3 Motor Control Centers

General Requirement:

This provision covers the design and construction of motor control centre of floor or wall mounting type. Applicable standards of NEMA, ANSI, IEC JIS and VDE shall be complied.

Ratings of Equipment in Motor Control Centre:

The ratings of the equipment shall be as follows:

Rates Voltage	415V/240V
System Wiring	3-Phase, 4-Wire (Solid grounded neutral)
Rated Frequency	50 Hz
Rated Current	As shown in drawing.
Rated Short Time Withstand Current rated Power Frequency Voltage	50 kA rms
Withstand Test (50 Hz x 1 min)	2.5 kV rms

The Construction of Motor Control Central:

a) Motor Control centre shall consist of one or more vertical sections bolted together to form a totally enclosed rigid construction. The vertical section shall be made of sheet steel (minimum thickness of 2mm). Each vertical section shall consist of three compartments, viz, busbar, cable, terminal and control unit compartment, and each compartment shall be separated by sheet steel barrier. The motor control center shall be designed to permit easy addition and removal in the future.

b) Each control unit compartment shall be the combination of starter, circuit breaker and other accessories for each motor. The unit shall be completely enclosed and isolated from all other units. Unit side plates shall be permanently attached. Each unit shall have a single door mounted on removable pin hinges. Each door shall be

provided with a removable panel suitable for mounting push button, selector or switch and pilot lamp.

c) Efficient ventilation opening shall be provided on the panel. The opening shall be screened so as to be insect proof.

d) Each panel shall undergo a treatment of degreasing and de-rusting by electro galvanized or other equivalent method for antirust and shall be coated by an oven baked enamel paint finished.

e) All doors shall be provided with dust protection gaskets of neoprene or any other approved materials. All doors shall be equipped with locks operated by keys.

f) Plastic nameplate with engraved letters of al least 3mm thick shall be placed at every circuit breaker and starter indicating their uses.

g) Mimic bus diagram shall be applied for each motor control center.

h) Ground bus shall be full length of the motor control center.

i) Uniform height and depth shall be adopted for the cubicles.

Circuit Breakers:

a) All circuit breakers shall comply with NEMA or JIS or IEC standard and shall be manually operated, trip free.

b) Main circuit breaker shall be equipped with the following protection devices.
- Over current and short circuit protection
- Phase sequence protection
- Over and Under voltage protection
- Time delay relay

c) All circuit breakers shall be equipped with operating handle and pad locked mechanism.

d) The rated current and rated breaking capacities shall be as shown on the drawings.

Motor Starters:

a) Motor starters shall comply with NEMA, IEC or JIS standard

b) Each starter shall be of an air break type and provided with thermal trip unit (one on each phase). In case of intervention of the above trip units, an auxiliary contact shall cut the starter coil off and give an alarm signal.

c) The thermal trip units shall be hand reset, and a suitable push/button shall be provided on the door of each unit.

d) At least 2 normally open and 2 normally closed free contacts for both starting and tripping signals shall be provided. These free contacts shall be wired to the terminal blocks for remote indicator.

e) The starter contacts shall be able to interrupt a current equal to 10 times the rated current of the motor.

f) Automatic direct on line starters are allowable for various motor sizes lower than 22 kW (30 HP) and closed circuit transition reduced voltage starter shall be used for those 22 kW (30HP) and larger.

Measuring Instrument and Current Transformer:

a) All measuring instruments and current transformers shall comply with IEC or ANSI or JIS standards.
b) All metering shall be the flush mounted type with a dimension approximately 96 x 96mm accuracy class 1.5. the overload capacity is 1.2 times of the normal continuous load, except for motor circuit where the overload capacity of ammeter shall be 2 times the normal continuous load. The voltmeters shall be provided with selector switch.
c) Current transformers shall be the single phase insulated type and can withstand a continuous overload of 20%. The accuracy class of the transformer shall be class 1 for metering winding and class 3 for instrument winding. The insulation of the current transformer shall be of class 600 volts.

Busbar & Busbar Holder:

a) Busbar shall be of copper conductor (purity 98%) the size and capacity of busbar shall comply with DIN standard and also shall comply with regulation.
b) Busbar spacing shall comply with regulation.
c) Busbar holder shall be of fiberglass reinforced polyester or epoxy resin (flame-proof material) and shall withstand the short circuit stresses.
d) Each busbar shall have a color identification, conforming to the color coding or the cable.

Control Wiring:

a) Control wire in the motor control center shall be flexible annealed copper wire 750V PVC insulated.
b) The size of control wire shall be as follows:

- $4mm^2$ for current circuit
- $2.5mm^2$ for voltage circuit
- $1.5mm^2$ for control circuit
- $10mm^2$ for ground wire for door

c) All Control wiring shall be run in cable trunk or flexible conduit and no splicing.
d) Wire marker approved by the supervisor shall be applied on both ends of the control wiring.
e) All wirings shall be terminated at the terminal blocks.

Installation:

a) All motor control centers and electrical system shall be installed in accordance with regulation, NEC standard and/or the manufacture's recommendation.
b) All metal parts and non carrying current of motor control center shall be grounded.

Testing and Inspection:

All motor control centers shall be not only tested at the manufactory but also checked at the site for the follow performances:

- Insulation of al cables.

- Operation and protecting of the equipment
- Grounding.

15.0 MOTORS

All Motors shall conform to the latest ANSI or IEC standards or approved equivalent. They shall have ample margin on their rating for the required duty with due allowance for ambient temperature. All motors shall be induction type suitable for 50 Hz. Motors shall be of totally enclosed fan cooled squirrel cage screen protect drip proof type. High starting torque motors and low speed machines shall be started by reduced voltage starters.

Motors sizes 22 kW and larger shall be started by reduces voltage starters unless otherwise specified. Motors shall normally be supplied by the manufacturer of the equipment driven by the motors. Motors shall normally be supplied by the manufacturer of the equipment driven by the Motor.

Control devices shall be provided for all motors. Single or double pole snap switches, specifically designed for alternating current operation only, may be used as manual controllers for single phase motors having a current rating not in excess of 80% of the switch rating. Automatic control devices such as thermostats may control the starting and stopping of motors directly, provided the devices used are designed for that purpose and have such a rating. Otherwise magnetic starters shall be uses, with the automatic control device actuating the control circuit.
Overload protection shall be provided with running-over current (overload) protection in accordance with the NEC. The overload protection device shall be provided either integrally with the motor or controller or shall be mounted in a separate enclosure. Unless otherwise specified the protective device shall be of the manually reset type.

All motors shall be provided with a disconnection means. All 3-phase and single phase motors above 1 kW shall be provided with a safety type disconnecting switch. For single phase motors below 1 kW, a general use snap switch, rated for alternating current only shall be acceptable, provided the ampere rating or the switch is at least 125 % of the full load current rating of the associated motor. Switches shall disconnect all ungrounded conductors.

15.1 System Voltage and Color Code

The distribution system for the low voltage shall be 415/240 V, 3-phase, 4-wire, 50 Hz and as specified on the drawings. The rating of the equipment in this system shall be as mentioned in the specification and on the drawings.

All cables, wires, terminals, etc. shall be color coded as flows:

Color Coded	Phase
Black	R
Red	S
Blue	T
White or Grey	Neutral
Green	Ground

Large wires, cables and bus bars shall be color coded with suitable heat shrinkage sleeves.

15.2 Low Voltage Cables

All cables shall conform to the international standard. All conductors of the insulated cables shall be copper wire.

The rating of current carrying capacity of the cables shall comply with the regulation.

The conductor size is to be determined by taking into consideration the following factors:

a) The rated load (permissible permanent overload being 25%)
b) The limit voltage regulation of 5% for all types of loads.
c) The effects of short circuit current.

The types of low-tension cables to be installed shall be as follows:
a) Annealed copper conductor with polyvinyl chloride insulation and sheath or Type NYY for direct burial or exposed wiring, or cable trench.
b) Annealed copper conductor with 750V, 70°C polyvinyl chloride insulation cable for running in conduit, cable tray or wire way.

No conductor shall be smaller than the 2.5mm^2 wires, except for the control wiring. Wiring to switches shall not be considered as control wiring.

All conductors 6mm^2 or larger shall be stranded. In all lug connections for main feeders, sub feeders and branches made in switchboards and panels etc. copper solder less connectors having either a 2-bolt cast copper clamp or an indent compression attachment shall be used.

Branch taps form feeders shall be made in junction boxes or pull boxes, with approved cast copper alloy solder less connectors in a high impact phenolic insulting cover, having at least two spring clip fasteners.

Splicing shall be allowed only in the proper junction box with an approved method of insulation. No splice shall be made in conductors for instrument circuits or control circuits.

Terminations and splices for conductors of 6mm^2 and larger shall be of the pressure or bolted type. No splices shall be made in conductors except at outlets or accessible junction boxes. Splices in branch circuit wiring shall be made mechanically and electrically secured with solder less connectors and if insulated they shall be rated 750 volts.

If connectors are not of the insulated type. Splices shall be rated 750 volts and insulated by taping so that the insulating value is equal to that of the conductors being jointed.

In splicing, connectors shall be brought up securely on the conductors in a workmanlike manner so that all conductors are equally engaged and the insulation is not ruptured.

No bare wires are to be exposed or shall have “backed off” due to the application of pressure nor shall it happen that the connector will loosen due to cycling or vibration.

Immediately prior to the installation of each cable or cable group, the raceway route to be followed shall be inspected and ascertained to be completed in installation.

If at any time during the progress of work the Contactor finds conduits appear to inadequately accommodate the assigned cables with a space factor of 40%, he shall notify the Supervisor at once and discontinue any further work on the questionable conduit until advised by the supervisor as to how he shall proceed. In general, the number of cables in conduit shall conform to the figure tabulated in Table-1.

PVC, (mm^2)	Conduit or Tubing Diameter mm (Inches)									
	12.7 (½)	19 (¾)	25 (1)	32 (1¼)	38(1 ½)	50 (2)	60 (2½)	75 (3)	90 (3½)	100 (4)
2.5	3	5	9	16	-	-	-	-	-	-
4	3	5	7	13	-	-	-	-	-	-
6	2	4	5	10	14	-	-	-	-	-
10	1	3	4	6	9	15	-	-	-	-
16	1	2	3	4	5	9	-	-	-	-
25	-	-	-	3	4	7	11	16	-	-
35	-	-	-	2	3	5	8	13	-	-
50	-	-	-	1	2	4	6	9	13	16
70	-	-	-	1	1	3	5	8	10	13
95	-	-	-	1	1	2	3	6	8	10
120	-	-	-	1	1	2	3	6	8	10
150	-	-	-	1	1	2	3	5	7	9
185	-	-	-	1	1	1	2	4	5	7
240	-	-	-	1	1	1	1	3	4	6
300	-	-	-	-	1	1	1	3	4	5
400	-	-	-	-	-	1	1	1	3	4
500	-	-	-	-	-	1	1	1	2	3

All cables shall be carefully checked as to size and length before being pulled into conduits, cables pulled into the wrong conduit or cut too short shall be removed and replaced. Cables removed from conduits shall not be installed in another conduit without permission of the Supervisor.

Finishing or pulling shall be done with a nylon rope or other approved devices.

The contractor shall identify the ends of all power and control conductors, circuits and pull boxes. Each marker shall bear the circuit schedule of the drawings. Where cables are multiple runs, labels shall be provided at 10m intervals. Labels shall show the size of the cable, phase and the equipment being fed.

15.3 Raceway

The cables are to be laid in conduits, in cable trays, wire way underground or in cable trenches as indicated on the drawings.

Conduit:

Al conduits shall be as specified herein, unless otherwise noted. All materials and workmanship shall conform to the DESA regulations and as stipulated in this Specification.

Rigid steel conduits (RSC) and intermediate metal conduits (IMC) shall be galvanized rigid steel with a minimum size of 12.7mm (½"), unless otherwise noted. Rigid steel conduits and intermediate metal conduits shall be installed for the following services and locations; service entrance, underground (in contact with earth), in concrete, panel feeders, for motor feeders over 7.5 kW (10HP), for electrical equipment feeders over 16 kW (21 HP) and in 'wet' locations.

Electrical metallic tubing (EMT) shall be galvanized steel with a minimum size of 12.7mm (½"). Electrical metallic tubing shall be used in all locations not otherwise specified for rigid or flexible conduits.

A short piece of flexible metal conduit shall be used in connecting all motors and vibrating equipment, and as otherwise noted, provided the use meets the requirements of the VDE, NEC and/or the local codes.

PVC conduit for electrical wiring wherever specified on the drawings shall be rigid PVC conduit and comply with the local industrial standard. PVc conduit shall be used in the corrosive area both underground and above ground installation. The corrosive area shall be where expressly indicated on the drawing or as directed by the supervisor.

PVC conduit installation shall conform to DESA or other local regulations.

Supports and connections for each conduit run shall be completed prior to the pull in of any pulling line or conductor.

All conduits shall be run as shown on the drawings and shall be located at least 150mm (6") from hot water pipes and other hot surfaces.
Moisture pockets shall be eliminated from the conduits before installation.

Bends in conduits shall be made without reducing the internal diameter of conduits. The use of pipe tees for bending will not be permitted. The inside radius of bends shall not be less than six times the inside diameter of the conduits. Conduits deformed or crushed in any way shall be removed from the job site.

The plane of all conduit ends shall be squared with the centerline. Where threads are required, they shall be cut and cleaned prior to conduit reaming. The ends of all conduits shall be reamed to remove all rough edges and burrs.

Conduits shall be securely fastened to all boxes and cabinets. Threads on metallic conduits shall project through the wall of the box to allow the bushing to butt against the end to the conduit, after which the locknuts, both inside and outside, shall be tightened sufficiently to bond the conduit securely to the box.

Precautions shall be taken to prevent the accumulation of water, dirt or concrete in the conduits. Conduits in which water has accumulated shall be thoroughly cleaned. If the cleaning is not possible, the conduits shall be replaced.

Junction boxes shall be aluminum or cadmium plated cast iron and shall be utilized where required.

Double locknuts shall be provided on all conduit terminations not provided with threaded hubs and couplings. Locknuts shall be designed to bond securely the conduit to the box when tightened and shall not loosen through vibration.

Steel lined sleeves shall be provided wherever a wire way or conduit passes through a floor slab or beam.

Sleeves in floor slabs or beams for conduits shall be made of galvanized sheet steel, securely fastened in position. Floor sleeves shall be with their top end set at least 5 cm (2") above finished floor. Sleeves in beams shall be finished flush with the surface of the beam. Sleeves in telephone and electric rooms shall be filled with approved materials to provide a fire barrier. Both used and unused sleeves shall be filled.

Cable Tray and Wire way:

All cable trays and wire way shall be of hot dip galvanized steel. The housing of the cable trays and wire way shall be suitable and strong enough to protect the cables from mechanical damage.

The dimension and details of installation of the cable trays and wire way have been shown on the drawings and/or in the specification. The trays shall be securely supported at intervals not exceeding 1.5m (5') unless specially approved for supports at maximum interval, but in no case shall distances between supports exceed 2.40m (8').

The supports and hanger clamps, fastening hardware and pins shall be of hot dip galvanized steel. Steel accessories shall be galvanized.

Trays and supports shall be installed level, plumb, square, and free from twists and at the correct grade. Any necessary cutting, fitting, or drilling required to install trays shall be performed in a neat workmanlike manner.

Where power control and communication cables run in the same tray, sheet metal barriers shall be installed between each class of cables. Cables shall be fastened to cable trays at suitable intervals.

15.4 Safety Switch

Safety switches shall be installed as indicated on the drawings or as required. All safety switches shall be of the NEMA Heavy Duty Type or approved equivalent. The switches shall be withering fused safety switches (FSS) or Non Fused Safety Switches (NFSS) as shown on the drawings or as required.

Switches shall have a quick make and quick break operating handle and mechanism which shall be an integral part of the box. Padlocking provisions shall be provided in the Off position with at least three padlocks. Switches shall be horsepower rated for 415/240V as required. Lugs shall be for copper conductors.

Switches shall be furnished in NEMA 1 general purpose enclosure with knockouts unless otherwise noted or required. Switches located on the exterior of the building or in "wet" locations shall have NEMA 3R enclosures.

The safety switches shall be securely mounted in accordance with the NEC. The Contractor shall provide all mounting material including fuses it specified in the FSS.

All fuses for 'fused load break switch" shall be of the high rupturing capacity (HRC) type of voltage rating up to 500 Volts. Current rating shall be as specified on the drawings.

15.5 Distribution Boards

The distribution boards shall be used for the 415/240V, 3Ø, 4W, 50 Hz systems.

Molded case circuit breaker of frame, trip rating, and interrupting capacity (including blank spaces for future addition) as shown in the drawings shall be provided. The circuit breakers shall be quick make, quick break, thermal magnetic, trip indicating, and have a common trip on all multiple breakers with internal tie mechanism.

Busbar connections to the branch circuit breakers shall be in the phase-sequence type. Three phase, four wire bussing shall be such that any three adjacent single pole breakers are individually connected to each of the three different phases in such a manner that two or three pole breakers can be installed at any location. All current carrying parts of the busbar assembly shall be plated. Main rating shall be as shown in the panel board schedule on the drawings. A solid neutral (S/N) assembly shall be provided when required.

Terminals for feeder conductors to the distribution board's mains and neutral shall be suitable for the type of the conductor specified. Terminals for branch circuit wiring, both breaker and neutral, shall be suitable for the type of the conductor specified.

The distribution board busbar assembly shall be enclosed in a steel cabinet. The box shall be fabricated from galvanized steel or equivalent rust resistant steel. Fronts shall include doors and have flush, brushed stainless steel, spring-loaded door pulls. The flush lock shall not protrude beyond the front of the door. All panel board locks shall be keyed alike. Fronts shall not be removable with doors in the locked position.

Before installing a distribution board the Contractor shall check all the architectural drawings for possible conflicts of space, and adjust the occasion of the panel board to prevent such conflicts with other items.

When the cabinet is recessed into a wall serving an area with accessible ceiling space, the Contractor shall provide and install an empty conduit system for future wiring. 1 32mm (1¼") diameter conduits shall be stubbed into the ceiling space above and under the panel board if such accessible ceiling space exists.

The Contractor shall furnish all materials for mounting the cabinets. In general, the cabinet shall be installed 1.80m (6') above finished floor measure from the top of the cabinet.

15.6 Outlet Boxes

All outlet boxes for concealed work shall be of hot dip galvanized stamped steel. All wall boxes on exposed work shall be of aluminum or cadmium plated cast iron.

15.7 Pull Boxes

Pull boxes shall be installed at al necessary points, whether indicated on the drawings or not to prevent injury to the insulation or other damage that might result form pulling resistance or for other reasons related to improper installation. Pull box locations shall be approved by the Supervisor prior to installation. All pull boxes shall be constructed of galvanized sheet steel not les than 2 mm thick. Where boxes are used in connection with exposed conduits, plain covers attached to the box with a suitable number of countersunk flathead machine screws may be used.

Where so indicated, certain pull boxes shall be provided with barriers, these pull boxes shall have a single cover plate, and the barriers shall be of the same gauge as the pull boxes. Each circuit in pull boxes shall be marked with a tag guide denoting panels to which they connect.

Exposed pull boxes will not be permitted in areas normally occupied or regularly used by staff and/or visitors.

16.0 FIRE BARRIER SYSTEM

16.1 General

After erection of materials and equipment through wall and opening had been completed, it is the responsibility of the contractor to fill up voids and openings with fire resistant materials which conform to NEC article 300-21 and ASTM to protect fire or smoke from spreading out from one room to another room through these voids and openings.

This applied to wall considered to be a fire or acoustical protection wall, unless otherwise specified. Cover or escutcheon plates shall be provided, wherever exposed, and shall be neatly placed to the satisfaction of the supervisor.

Also, after the erection of all conduits, wirings, and raceways in the shaft, block out or any floor openings, the voids must be sealed with 2-hour fire rating materials, as approved by the Supervisor unless specified otherwise.

16.2 The Specification of Fire Barrier Materials

The fire barrier materials shall be based on the standards of Under writer's Laboratory Inc.
The fire barrier materials shall be of minimum 2-hour fire resistant rating.
The fire barrier materials must not be toxic during installation or incase of fire.
Easy to be dismantled and replaced in case of rearrangement.
Withstand over vibration.

Easy installation.
Before and after fire spreads, the fire barrier materials must be strong enough.
The fire barrier materials must be submitted to the supervisor for approval before installation.

16.3 Installation

At every voids and openings, fire barrier materials shall be installed where:

a) Every voids, sleeves and openings appear on wall, floor, beam and pipe shaft, provided for piping, ducting and raceway installation, must be sealed after the erection work had been completed.
b) Voids, sleeves and openings which are provided for future installation.
c) Voids between electrical conduits and sleeves.
d) Voids between electrical cabling and raceway on fire wall and floor.
e) Voids between piping, ducting, raceway and sleeves on fire wall and floor.

The method of fire barrier material installations must be submitted to the supervisor for approval before installation.

17.0 PAINTING

17.1 General

Prior to equipment installation all metal surfaces shall be treated with anticorrosive materials and/or painted according to this specification.

The preparation and application of the painting materials shall adhere strictly to the manufacturer's recommendations.

The equipment or materials that have previously been treated with anticorrosive materials and painted form the factory must be inspected for their workmanship. Any defects, such as scratches, peels and rust shall be repaired and repainted to the approval of the Supervisor.

During the progress of the paint work the Contractor shall avoid spotting of the floors, walls, and other adjacent equipment. All spotting, if any, shall be cleaned immediately. Any damages, which may result from painting shall be under the C contractor's responsibility.

17.2 Preparation and Cleaning of Surface to be Painted

Metal or Ferrous Metal Surfaces:
Rust at welding joints and other defects shall be removed by scraping.
Wire brushes or sand papers shall be used to clean the surfaces and to remove rust. Sand blasting may be used to remove loose rust and other foreign substances. Mordant solution such as thinner, gas, turpentine shall be used to remove grease, oil or organic coating. Then the surfaces shall be cleaned with water and thoroughly dried or blow dried.

The application of prime coats which follows shall adhere strictly to the manufacturer's recommendations.

Old paint coats shall be removed by scraping before application of new paint.

Non-Ferrous Metal Surfaces:

Non-ferrous metal surfaces shall be cleaned with sand paper and turpentine before prime coating. Wire brushing or sand blasting shall never be used.

Zinc and Zinc Annealed Surfaces;

Before prime coating, grease and dirt shall be removed with proper solution.

Copper, Lead, Plastic and Brass surfaces:

Before the application of prime coats the surface shall be cleaned with sand paper, then proper solution shall be used to remove dust.

17.3 Brush or Spray Painting

Each paint coat shall be left until completely dry before subsequent applications. Painting a be classified into 2 coats:

Prime coat for rust prevention and/or adhesion of the finishing coat.
Finishing coat for final appearance or for symbolizing the system codes. Types of paint used shall depend on the materials as well as on the environment.

17.4 Types of Paint for Various Surfaces

Black steel pipe, black steel hanger and support, black steel sheet, switchboard, and panel. 1st coat: Red Lead Primer. 2nd coat: Red Lead primer. 3rd coat: Alkyd finishing paint. 4th coat: Alkyd finishing paint.

Note: In case where there is a paint repair resulting from welding, cutting, drilling, polishing or threading, zinc rich primer shall be used prior to the application of finishing paint.

17.5 Color Code

All pipes shall be color coded except insulated pipes where only priming coats shall be applied to the pipe surface.

In the electrical system, color coding shall be only at the conduit clamps and the cover of junction boxes. In the fire protection system, however, all conduits shall be color coded.

Strip sizes of color codes (for insulated pipes) and the letter size are as follows:

Pipe Size mm (Inches)	Width of Color Strip (mm)	Letter Size (mm)
20 (¾) – 32 (1¼)	200	12
40 (1½) – 50 (2)	200	20
65 (2½) – 150 (6)	300	32
200 (8) – 250 (10)	300	65
300 (12) and larger	500	100

Location of color codes, symbols and arrows indicating directions are as follows:

a) Every 6 meter (20') interval of straight line pipe.
b) Near all valves
c) Every change of direction and/or separation
d) Where pipes passing through walls or floors.
e) Near service pipe.

Color Codes of Various Systems

The identifications previously mentioned shall have colors as follows:

Sl. No.	Description	Letters	Color Code	Color Symbol
a)	Fire water pipe	FP	Red	White
b)	Drain Pipe	D	Green	Black
c)	Conduit for electrical system - Power (normal) - Emergency (essential) - Control - Signal	 N E FP FA	 Red Yellow Orange Orange	 Black Red Red Red
d)	For BAS system	BAS	Blue	Black
e)	Conduit clamp	-	Dark	Grey
f)	Distribution board and motor control board (normal power)	-	Ivory	Black
g)	Distribution board and motor control board (essential power)	-	Ivory	Red
h)	Pipe hanger and support	-	Red	-

All fire protection water pipe shall be painted all over the pipe surface conforming to this color codes.

18.0 BUILDING MONITORING AND CONTROL SYSTEM (BMC)

18.1 General

The building monitoring and control system will be supplied and installed by a BMC Specialist Contractor.

The Fire Protection Contractor shall provide all information as required and shall pay full cooperation to the BMC Specialist Contractor, until work is completed as specified in the drawing and in this Specification.

18.2 Scope of Work

The Fire Protection Contractor shall provide the auxiliary contacts 2 NO + 2NC and or sensors for remote monitoring or control and internal wiring with input terminals for remote monitoring and control as specified in the list shown hereafter.

Instrument for remote metering shall have output signal of 4-20mADC or 0-10 VDC (analog signal) and power supply shall be 240 VAC, 50 Hz or 24 VDC.

The Fire Protection Contractor shall also provide and installed all mark wiring form this auxiliary contacts and sensors to specified terminal boxes (marshaling boxes) of BMC system. (These wiring shall be connected to terminal boxes by the Electrical Contractor).

All wiring installation shall comply with DESA regulation and NEC code.

The Fire Protection Contractor shall provide by-pass switch to by-pass the command from BMC system to manual operated or maintenance.

By-pass switch shall have one auxiliary contact which shall send signal to show the status on BMC

SECTION – 05

DETAIL SPECIFICATION
FOR
FIRE DETECTION SYSTEM

CHAPTER-1: FIRE ALARM SYSTEM

1.0 General:

The fire alarm system shall utilize supervised multiplex data communications circuits, closed loop initiation circuits, individual zone supervision individual audio and visual signal circuit supervision.

The system wiring shall use digital, full duplex multiplex communication techniques over all communication network and multi-addressable peripheries network.

The system shall include at least the following:

a) Central Fire Alarm Control Panel with graphic generation feature.
b) Sub-Fire Alarm Control Panel
c) Graphic Annunciator
d) Remote Graphic Annunciators
e) Manual Stations and Key Switches.
f) Smoke Detectors.
g) Heat Detectors.
h) Strobe Light.
i) 14" color monitor with keyboard and 80 columns, dot-matrix printer.
j) Fire Man Telephone.
k) Message Generator.
l) Other equipment necessary for a complete installation and operation of the system.

2.0 Standards, Codes:

All interior wiring shall be strictly in accordance with NFPA 71 & 72, NEC and other relevant local standards.

3.0 System Operation:

A multi-alarm or pre-signal system has been designed to control the initial operation of any manual or automatic alarm initiating device, to obtain the primary alarm sound at the control panel. From any manual station, authorized personnel with special keys may reset or initiate a general evacuation alarm with at least the following functions:

a) The source of alarm shall be annunciated and displayed at the control panel and CRT (color graphic display). Each event shall be recorded into system CPU. Logged sheet report can be obtained via the printer.

b) All alarm conditions and zone indicators shall be shown on system control panel, Local enunciator and also on remote enunciators.

c) All strobe lights and loudspeakers of voice evacuation system on that floor, below and above that floor shall be activated.

d) After the pre-setting time all loudspeakers in the building shall be activated as the general alarm condition.

e) One set of alarm contacts and alarm signals cable shall be wired to all elevator control panels for fire condition elevator control which will bring down all the elevators and prevent them from stopping at the alarm floor. Other set of alarm contacts and alarm signal cables shall be wired to all exhaust fan or pressurized fan control panels to start the fans.

f) One set of alarm contacts and alarm signals cable shall be wired to Pump House in Basement-02 control panels.

g) One set of alarm contacts and alarm signals cable shall be wired to Generator room on Level-01, South Blocks.

h) One set of alarm contacts and alarm signals cable shall be wired to shunt coil of power out let from sub-station to different floor for power cut-off. Only the generator dedicated for fire shall run.

When a trouble condition is detected by one of the system initiating devices, the following functions shall immediately occur at the control panel and remote annunciators.

a) The system trouble LED indicator shall flash.
b) A local sounding device in the panel shall be activated.
c) The system CPU & CRT shall indicate all pertinent information associated with the trouble condition and its location. However, unacknowledged alarm messages shall have priority over trouble messages.
d) The appropriate message shall be reported via printer(s).
e) The system trouble indicator on remote annunciators shall be illuminated.

Activation of the acknowledge switch of the control panel shall silence the panel sounding device and change the “System Alarm” or “Trouble LED” from flashing to a steady “ON” condition. In case additional new alarm or trouble conditions exists in the system, activation of this switch shall advance the display to the next alarm or trouble condition that exists, and shall not silence the local audible device or change the flashing LED to steady “ON” until all new conditions have been so acknowledged. New alarm conditions shall always be displayed before new trouble conditions.

Activation of the acknowledge switch shall also cause a corresponding (time stamped) message to be displayed on CRT system and printer. Occurrence of a new alarm or trouble condition shall cause the panel to “Resound” and again repeat the sequence.

Activation of the “Signal Silence Switch” shall cause all appropriate indicating appliances and relays to return to the normal condition after an alarm condition. The selection of

indicating circuits and relays silenced by this switch shall be fully programmable and changeable in the field.

Activation of the "System Switch" shall cause all electronically-latched initiating devices or zones, as well as all associated output devices and circuits, to return to the normal state. If alarm continuous still exists in the system after the "System Reset Switch" activation, the system shall then re-sound the alarm conditions.

Activation of the "Test Switch" of the system shall initiate an automatic test of all intelligent detectors in the system. Such test shall activate the electronics in each intelligent device, simulating an alarm condition. A report summarizing the results of this test shall be displayed automatically on the front panel, as well as on any CRT or printer of the system.

Activation of the "Lamp Test Switch" shall turn "ON" all LED indicators.

4.0 Field Programming:

The system shall be fully programmable, configurable and expandable in the field without the need of special tools or form programmers and shall not require replacement of IC memory. All programming may be accomplished through the standard control panel keyboard and CRT. All programs shall be stored in non-volatile memory.

The programming function shall be entered with a special password that may be selected when the system is installed. The password may be changed in the field to a new value at any time by entering the old password and requesting a password change. In the event that the programmer may enter a password and then lose or forget it, the system shall be designed such that the password may be determined by special procedures available from the manufacturer of the system. A separate password shall be used for changes in system status (e.g. turning a control point ON or OFF). The system therefore provides 3 levels of security.

5.0 Fire Alarm Equipment:

Fire Alarm Control Panel (FACP):
The fire alarm control panel for fire monitoring and alarm system shall be complete with all control modules, control switches, annunciators and others for a complete system operation and as specified herein.

The Central Processing Unit (CPU) shall communicate with the monitor and shall control all other modules in the panel. Removal, Disconnection or Failure of any control panel modules shall be detected and reported by the Central Processing Unit.

The Central Processing Unit (CPU) shall contain and execute all control-by-event programs for specific action to be taken if a fire situation is detected in the system. Such control by event programs shall be held in non volatile programmable memory and shall not be lost even if the primary and secondary power failures of the system occur.

The Central Processing Unit (CPU) shall also provide a real time clock to execute custom time control programs except in fire situations.

The loop interface module shall be provided to monitor and control each loop of the addressable peripheral devices. This module shall communicate and provide power to all devices on its loop over a single pair of wires.

The display interface modules shall be provided for all controls and indicators.

The printer shall provide hard copy printout of all changes in status of the system and shall time stamp such printouts with the current time of day and date. The printer shall be enclosed in a separate cabinet suitable for placement on a desk top or table. The printer shall communicate with the control panel using a fully supervised interface device.

The graphic annunciator panels shall provide visual display of alarm/normal status for the specified zones of the required system.

The remote graphic annunciators shall be the same as the graphic annunciator panel which shall be located at central control room or SUPERVISOR room. The wiring from control panel to remoter graphic annunciators shall be multiplexing technique.

The power supply for the panel and all fire monitor and alarm peripherals shall be integral to the control panel. The power supply shall provide all control panel and peripheral power needs. The audio-visual power may be increased as needed by adding additional modular expansion power supplies. All power supplies shall be designed to meet complete requirements for power-limit operation on all external signaling lines, including initiating circuits and indicating circuits.

Fuses, circuit breakers or other over current protection shall be provided on all power outputs.

Input power shall be 240 VAC, 50 HZ. The power supply shall provide internal batteries and charger.

The battery shall be of sealed lead maintenance free type with a capacity of not less than 4 hours for full system normal operation.

FACP shall be expandable model in order to accommodate the additional zone for future expansion.

Communication and Paging Control Center CPCC):

This control center shall include all required control switches with status indicators for voice evacuation system and also for fireman communication system. If there is any other equipment to be controlled, the control switches for such equipment shall be integrated into the control center.

All switches and indicator shall be of modular type.
At least 6 sets of fireman portable telephone handset with cabinet shall be provided.
Message generator to evacuation system shall be at least 2 different languages in English and Bangla.
Addressable Peripheral Devices:

The addressable peripheral devices shall compose of SFCP and the addressable detector or switch.

The SFCP shall be microprocessor based, housed in an all metal cabinet suitable for wall mounting. The circuit shall have the ability to detect losses of communication with the system CPU.

The SFCP shall supervise the detector and signaling circuits in accordance with NFPA 72A requirement.

The SFCP receives digital signal from either detector or switch and by multiplexing technique, the signal will be sent to system CPU. By the same way, the control signal can be sent from system CPU through SFCP to the final control equipment.

Voice and communication signal can be transmitted and received by the SFCP.

The SFCP shall provide address setting means using rotary decimal or other kinds of switches and shall also store an internal identifying code which the control panel shall use to identify the type and address of the devices. An LED shall be provided which shall flash under normal conditions, indicating that the module is operational and in regular communication with the control panel.

The control module shall be used in connecting a supervised zone of conventional indicating devices (any 24V polarized audio/visual indicating appliance) to the communication loop. The control module shall be mounted in a standard square electrical box. The control module may also be wired as dry contact relay. Power for the relay actuation shall be provided by the detector loop to reduce wiring connection requirements. Audio/visual power shall be provided by a separate loop from the main control panel or from the supervised remote power supplies.

The control module shall provide address setting means, and shall also store an internal identifying code which the control panel shall use to identify the type and address of each device. An LED shall be provided which shall flash under normal conditions, indicating that the control module is operational and in regular communication with the control panel.

Conventional Peripheral Devices:

The smoke detector shall be of the dual chamber ionization type. One chamber shall be isolated from the products of combustion and, shall monitor internal sensitivity, and the other chamber shall measure the level of the combustion products. Both chambers shall be ionized by a single Americium 241 radioactive source of not more than 1.0 micro curie. The detector head shall have a stainless steel screen to prevent foreign objects from entering the dual chamber. Each detector shall have a flashing status indicating LED for visual supervision. The detector shall be operable in a temperature range of 0ºF to 100ºF (-18ºC to 38ºC), with a maximum air flow of 1,050 feet (320 meters) per minute.

The thermal fire detector or heat detector shall be of dual thermal element using two distinct and independent methods of heat detection. The detectors shall operate on the combination of “Rate-of-Rise” and “Fixed Temperature” principles. The rate of rise method shall detect fires when the rate of heat rises, exceeding 15ºF (8ºC) per minute. The fixed temperature method shall detect fires that build temperature to a high level at a slow rate,

by responding to a temperature setting normally at 135°F or at 200°F when specified on the drawings at kitchen/tee rooms.

Photoelectric beam smoke detector, if required, shall compose of an infrared beam transmitter and receiver. The receiver will measure the beam intensity at the normal condition compared to the fire with smoke condition. The system will generate the alarm signal output when the measuring infrared intensity value falls below the setting point the detectors shall be provided with the features of temperature compensation, automatic gain control, detector alarm, normal and trouble indicator. The sensitivity of the unit shall be adjustable at least 4 steps.

Both smoke and heat detectors shall be ceiling mounted and shall include a twist lock base.

The manual pull station shall be single action, non-coded, pull lever type with key switch for pre-signal/general alarm requirement. The station shall be constructed of metal and be of red color. When the manual station is activated, the station shall remain open for easy identification. The unit shall be suitable for semi – flush mounting on a standard metal box.

The sprinkler water flow alarm switches shall be provided by other contract or for wet sprinkler pipe systems. The Contractor shall do the cabling and the switches connected to the fire alarm system such that the activation of the sprinkler system shall sound an alarm at the center console.

Sprinkler supervisory devices shall be connected to the fire alarm system such that the movement of a valve form the normal (open) position shall sound a supervisory trouble signal at the center console.

Conduits and Wiring System:

All hard-wire cable shall be of fire resistance, flexible stranded annealed copper cable. Sizing of cable shall be use as follows:

For initiating device	>= 1.5mm^2
For indicating device	>= 2.5mm^2

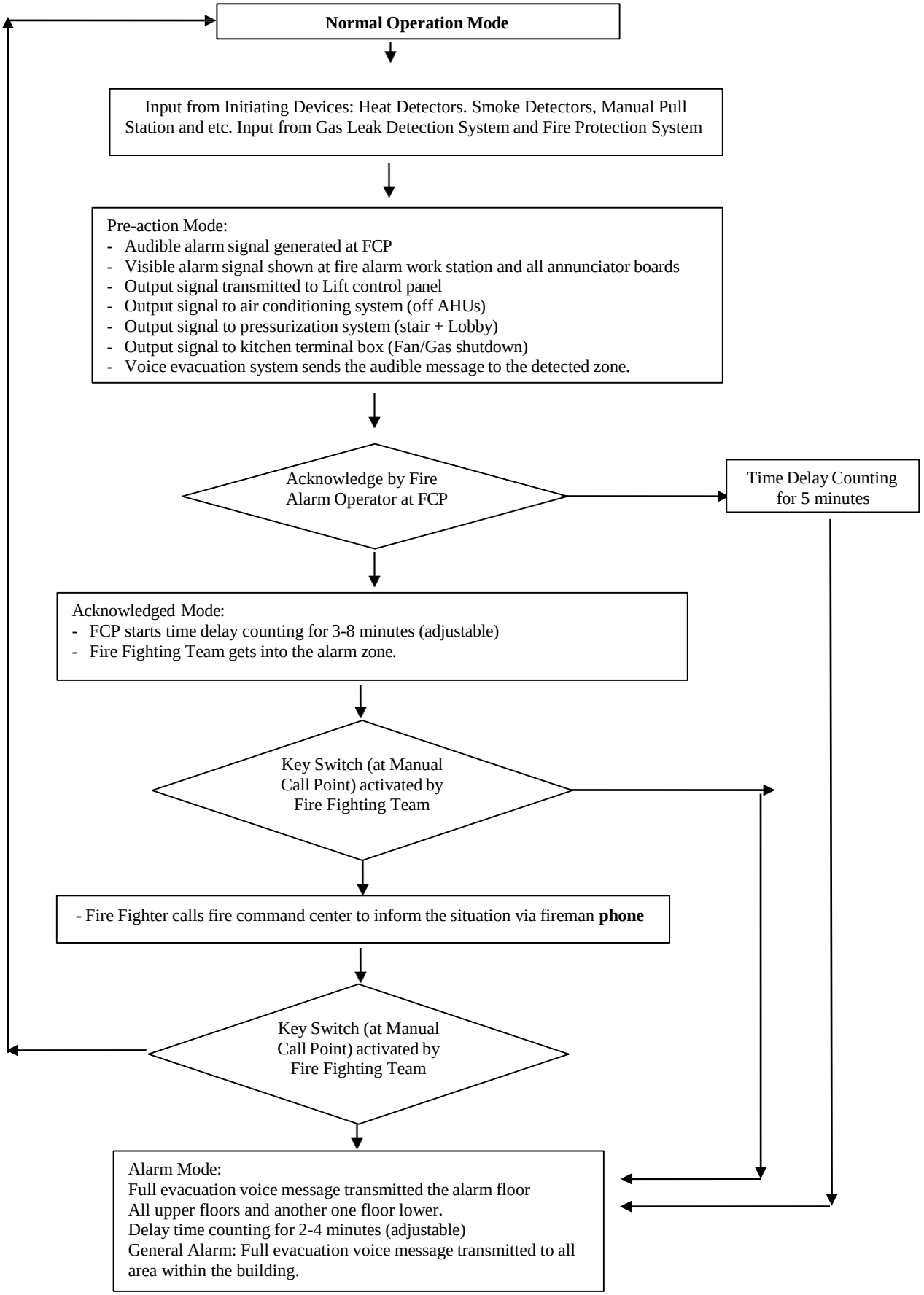
The communication cable shall be of co-axial cable or twisted pair with screen cable as recommended by the manufacturer. The color code shall be as follows:

Strobe Light	>= 1.5mm^2
Key Switch	>= 2.5mm^2
Manual switch	
Smoke Detector	
Heat Detector	
Other Switch	

The size of conduit shall be as specified in the chapter of electrical system.

6.0 Fire Alarm System Operational Flow Chart and Table:

For initiating device


Normal Operation Mode
Input from Initiating Devices: Heat Detectors. Smoke Detectors, Manual Pull Station and etc. Input from Gas Leak Detection System and Fire Protection System
Pre-action Mode:
- Audible alarm signal generated at FCP
- Visible alarm signal shown at fire alarm work station and all annunciator boards
- Output signal transmitted to Lift control panel
- Output signal to air conditioning system (off AHUs)
- Output signal to pressurization system (stair + Lobby)
- Output signal to kitchen terminal box (Fan/Gas shutdown)
- Voice evacuation system sends the audible message to the detected zone.
Acknowledge by Fire Alarm Operator at FCP
Time Delay Counting for 5 minutes
Acknowledged Mode:
- FCP starts time delay counting for 3-8 minutes (adjustable)
- Fire Fighting Team gets into the alarm zone.
Key Switch (at Manual Call Point) activated by Fire Fighting Team
- Fire Fighter calls fire command center to inform the situation via fireman phone
Key Switch (at Manual Call Point) activated by Fire Fighting Team
Alarm Mode:
Full evacuation voice message transmitted the alarm floor
All upper floors and another one floor lower.
Delay time counting for 2-4 minutes (adjustable)
General Alarm: Full evacuation voice message transmitted to all area within the building.

Initiating Devices Action Taken		Recall Elevators	Transmit Alarm Fire	Transmit Alarm to	Activate Evacuation	Release Hold Op	Activate Fire Pump	Activate Smoke Control	HVAC System to Emergency	Transmit Trouble Signal to	Sound Local Alarm in Sleep	Unlock Doors	Transmit Supervisory Signal to Fire
Alarm Signals	Manual Alarm Station	☐	☐	☐	☐	☐						☐	
	Sprinkler Water Flow	☐	☐	☐	☐	☐	☐	☐	☐			☐	
	System Connected Heat	☐	☐	☐	☐	☐		☐	☐			☐	
	System Connected Smoke	☐	☐	☐	☐	☐		☐				☐	
	System Connected										☐		☐
	Single Station Smoke										☐		
Trouble and Supervisory Signals	Kitchen Hood & Duct		☐										
	Sprinkler Valve Tamper												☐
	Standpipe Water Flow												☐
	Fire Pump Power Plant												☐
	Fire Pump Running												☐
	Low water supply												☐
	Fire Alarm Circuit Fault										☐		
	Fire Alarm AC Power										☐		
	Manual Control at Fire								☐	☐			
	Duct Type Smoke		☐										
	Freeze Protection of Fire												☐
	Low fire Protection												☐

CHAPTER-2: VOICE EVACUATION SYSTEM

1.0 General:

The Contractor shall furnish and install the voice evacuation equipment as shown on the drawings and as herein specified.

2.0 Installation:

All items of the equipment shall be installed conforming to the manufacturer's recommendations. All wiring shall be run in conduits.

3.0 Voice Evacuation Equipment:

The voice evacuation equipment shall consist of the following items:

a) Power amplifier.
b) Microphone
c) Loudspeaker
d) Zone Selector switch
e) Message Generator

3.1 *Power Amplifier*:

The power amplifier shall have the following characteristics:

-	Standard	:	IEC or Equal
-	Amplification	:	As per schedule.
-	Output voltage	;	100 V
-	Total harmonic distortion	:	Less than 1%
-	Frequency response	:	60-18,000 Hz
-	S/N Ratio	:	Not less than 60 dB
-	Accessories (for central sound)	:	Zone selector switch 2-tone chimes volume controls switch housing.

Output circuit protection devices shall be provided for each output zone.

3.2 *Microphone:*

The microphone shall be condenser microphone and have the following characteristics;-

-	Type	:	Gooseneck Cardioids
-	Frequency range	:	120-16,000 Hz
-	Output impedance	:	200 ohms
-	Sensitivity	:	1.5 mV/Pa
-	Front to rear ratio	:	14 dB at 1,000 Hz
-	Cable	:	2-core screened, 3m length
-	Accessories	:	Microphone stand, desk type on-off switch connector or adaptor for amplifier connection.

3.3 *Loud Speaker:*

The ceiling loud speaker shall have the following characteristic:

-	Type office and public area	:	4" diameter round type with 100V matching transformer and mounting grille for flush mounted.
-	Power Cap: - Office and public area/guest room	:	3W, can be step down to 1.5W, 0.75W
-	Input voltage	:	100V
-	Sound Level	:	90 dB at 1W/1m
	- Office and Public area		

3.4 *Zone Selector:*

Zone selector shall be provided for routing the amplified signals to the loud speaker zones. One unit of zone selector shall be able to route 2 amplified individual input signals to 32 separated speaker zones included by pass switch for each zone. The minimum numbers of 36 separated speakers must be served per one speaker zone.

3.5 *Conduit and Wiring:*

The wiring for the loud speaker shall be of fire resistance cable with cross section area of not less than 1.5mm^2.

Grounding system and protective devices (over load and over voltage) shall be provided. All installation shall comply with the manufacturer's recommendation.

ASIAN UNIVERSITY FOR WOMEN

COST ABSTRACT

PACKAGE-4

Fire Detection & Protection System for Three Storied with a Semi-Basement Academic Building for Asian University for Women, Pahartoli, Chattogram.

Sl. No.	Description of Items	Amount in Taka
A	BILL NO.-1:-GENERAL WORKS	
B	BILL NO.-2:-FIRE DETECTION AND COMMUNICATION SYSTEM	
	i. FIRE DETECTION SYSTEM	
	ii. VOICE COMMUNICATION SYSTEM	
C	BILL NO.-3:-FIRE PROTECTION SYSTEM	
	TOTAL COST FOR BILL NO.:1-3 TK =	

(In Word: Taka .....

.....only)

ASIAN UNIVERSITY FOR WOMEN

Schedule of Items & Bill of Quantities (BoQ)

Fire Detection & Protection System for Three Storied with a Semi-Basement Academic Building for Asian University for Women, Pahartoli, Chattogram.

A. : BILL NO.:1: GENERAL WORKS

Item No	Description	Quantity	Unit	Quoted rate in Tk. (Both in fig. & words)	Amount in Taka
1	**Erection and maintenance of site office and removal of the same after completion of work** in accordance with the conditions of contract. In addition to the office required for his own use, the contractor shall provide and maintain furnished field office for the use of the Engineer-in-charge and his staff. The field office is to have a concrete floor, adequate foundation, brick walls, false ceiling of hard board with seasoned Garjan wood frame and painted, and all windows are to be glazed and provided with steel grill. Outside and inside wall surface are to be painted on plaster acceptable to the Engineer-in-charge. The field office shall be maintained in a secure and watertight condition by the contractor until the completion of the contract and shall be provided with electricity, running water and sewerage. All doors shall be fitted with approved locks and windows shall be provided with screen/blinds. Before construction the contractor shall submit plans and drawings showing proposed details and location for the field office, including foundations, access roads, shades, layout of electrical and water supply and hard standings thereto for the approval of the Engineer-in-charge.				

Item No	Description	Quantity	Unit	Quoted rate in Tk. (Both in fig. & words)	Amount in Taka
	The Engineer-in-charge may require revision of the plans prior to giving approval for construction. The contractor shall also submit details proposed furniture, fittings and other items of equipment and plant to the Engineer-in-charge for approval. The office, complete with furnishings, fittings, access roads and hard standings shall be ready for occupation by the Engineer-in-charge **(This is a time related item; proportionate payment for this item shall be made distributing in each bill on the basis of percentage progress of the whole works under contract)**				
1.1	**Engineer's site office of minimum 10 sqm plinth area** with providing necessary facilities including office furniture, consumables, stationeries etc.	1.00	Job		
2	**Providing necessary facilitie**s in construction site for maintaining site safety including safety helmet, safety belt , apron, gumboot, goggles etc.	1.00	Set		
3	Supplying and providing of first aid box with necessary materials/medicine (hygienic gown, thermometer, adhesive dressings, antiseptic solutions, bandages, cotton balls or swaps, emergency blanket, gloves, hand sanitizer, ice pack, saline etc). All complete as per direction of Engineer-in -charge.	1.00	Each		

Item No	Description	Quantity	Unit	Quoted rate in Tk. (Both in fig. & words)	Amount in Taka
4	**Providing 3 sets as-built drawings subject to Engineer's approval** produced in AutoCAD software in 584.5 mm x 413.5 mm (A-2 size) standard drawing paper, and operating and maintenance manual of the equipment and plant incorporated in the works, if any, in original by the date stated in the particular conditions of contract (PCC). If the contractor does not supply the as-built drawings and operating & maintenance manuals by the date stated in the particular conditions of contract (PCC), or they do not receive the Engineer-in-charge's approval, the Engineer-in-charge shall withhold the amount stated in the PCC from the payments due to the contractor. The as-built drawings must show the permanent works as actually constructed and reflect the revision of drawings supplied to the contractor during the Contract as well as revisions of drawings supplied to the contractor during the contract. (One set of as-built drawings shall be considered for measurement and payment)	1.00	Per Tender		

Item No	Description	Quantity	Unit	Quoted rate in Tk. (Both in fig. & words)	Amount in Taka
5	**Mobilization and cleaning site** before commencing actual physical work and during contract period and demobilization after completion of the Works under contract accepted by Engineer-in-Charge/Consultant. This work shall also covers clayey cleaning and clearing, and in the ground to the project can be executed an extent that all the events of works of smoothly in a working environment with a particular attention on safety and security in all respects, agreed by the Engineer / Consultant, where payments are to be based on ground area determined by the Engineer-in-Charge/Consultant and be proportionate to the percentage progress of work under contract as a whole in all respects and approved by the Engineer-in-Charge / Consultant.	1.00	LS		
TOTAL COST BILL NO:1 TK.					

ASIAN UNIVERSITY FOR WOMEN

Schedule of Items & Bill of Quantities (BoQ)

B: BILL NO.:2:- FIRE DETECTION &COMMUNICATION SYSTEM

I) FIRE DETECTION SYSTEM

Sl. No.	Description of Items	Quantity	Unit	Quoted rate in Tk. (Both in fig. & words)	Amount in Taka.
1.00	**FIRE ALARM MASTER PANEL:** Fire Alarm Panel of addressable type capacity should be 700-1000 devices capable constructed with heavy gauged sheet steel painted with color as fire code approved. The control and indicating panel shall be wall-mounted modular type with front panel displays and controls. The panel shall be capable to handle complete network having addressable detection and alarm system. The panel shall have LED indicator for fire, fault indicator, power-supply unit, alarm silence, provision of microphone for speaker control, alarm control selection and by pass switch etc. complete. **The panel shall be complete with battery with trickle charger**. Battery shall be suitable to provide power for the total system for at least 1 hour after an interruption of 24 hours. Approvals: UL Listed, FM Approved. Brand: Simplex / Shield / Honeywell / Mircom/ Secutron /EST3 or Equivalent Country of Origin: USA / UK. Standard: UL LISTED	1	Set		
2.00	**REPEATER FIRE PANEL :** Supply and installation of romote LCD annaciator (repeater panel) complete with two line 40 character LCD display, LED status indicator, control switches and all other accessories.	1	Set.		

Sl. No.	Description of Items	Quantity	Unit	Quoted rate in Tk. (Both in fig. & words)	Amount in Taka.
3.00	**HEAT SENSOR DETECTOR:** Addressable type rate of raise heat Detector of two- wire system suitable to mount on ceiling/wall surface and shall be complete with detector base, visual indication, EOL resistor and all mountings. Construction shall be with self-extinguishing thermo- plastic rated at 105°C and shall be extremely strong. Wall mounted heat detectors shall be at a height of 7' from the floor level. The detector shall respond fire when rate of rise of temperature is above 8°C per minute. Product shall be UL listed. Power supply shall be 24V DC. Installation of Heat Detector on ceiling shall be at location shown in the drawing and shall be as per recommendation of the manufacturer.	40	Nos.		
4.00	**SMOKE DETECTOR:** Smoke Detector of two wire system suitable to mount Wall or Ceiling and shall be complete with detector base and all mountings. The unit shall be capable of rapid detection of visible and invisible smoke and shall have two chambers to eliminate false alarms and shall have latching LED. Power supply shall be 24V DC. Unit shall be complete with mounting base & EOL resistor and shall be suitable for 2-wire installation. Product shall be UL listed. Installation of Smoke Detector on ceiling shall be at location shown in the drawing and shall be as per recommendation of the manufacturer.	350	Nos.		
5.00	**MANUAL PULL STATION:** Addressable Type Surface mounted type Manual Pull Station shall be metal construction, easy to operate and shall be with monitor module as per specification. Brand: Simplex / Shield / Honeywell / Mircom/ Secutron /EST3 or Equivalent Country of Origin: USA / UK. Standard: UL LISTED	32	No		

Sl. No.	Description of Items	Quantity	Unit	Quoted rate in Tk. (Both in fig. & words)	Amount in Taka.
6.00	**ALARM BELL:** Surface mounted type alarm bell of 150mm dia shall be suitable to produce 90dB of sound at a distance of 1 meter. Bell shall be pressed steel gong with robust striker mechanism complete monitor module and all other accessories. Power supply shall be 24V DC. Installation of Alarm Bell shall be at location shown in the drawing and shall be as per recommendation of the manufacturer.	24	Nos.		
7.00	**MODULE:**				
7.1	**MONITOR MODULE (Input)** Addressable module shall be used to connect the detector with network and to detect the bells as addressable device. **UL, ULC Listed & FM approval** Brand: Simplex / Shield / Honeywell / Mircom/ Secutron or Equivalent Country of Origin: USA / UK. Standard: UL LISTED	26	Nos.		
7.2	**CONTROL MODULE (Output) WITH ADPTER :** Addressable module shall be used to connect the detector with network and to detect the bells as addressable device.	26	Nos.		
7.3	**ISOLATOR MODULE (If required)** Brand: Simplex / Shield / Honeywell / Mircom/ Secutron or Equivalent Country of Origin: USA / UK Standard: UL LISTED	5	Nos.		

8.00	**FIREMEN TELEPHONE OUTLET:** Single telephone zone circuit. The telephone **jack** shall be red baked enamel finish with a white silk- sereened telephone **handset** icon on them. Product shall be UL/FM/CSFM/VDS listed.	20	Nos.		

Sl. No.	Description of Items	Quantity	Unit	Quoted rate in Tk. (Both in fig. & words)	Amount in Taka.
9.00	**FIREMEN TELEPHONE SET :** Handheld type Firemen Telephone set shall be complete with portable box, suitable to jack with outlet, communicate upto central panle.	3	Set.		
10.00	**FIRE RATED TELEPHONE CABLE 6pair** Brand: Shield / Tianjie / Equivalent Origin: UK / CHINA / Equivalent Standard: LPCB / UL listed	2320	Rm		
11.00	**EXIT LIGHT:** Exit Light of 12 V complete with rechargeable battery and charger. Light shall be suitable for AC/DC. Power supply shall be 220V/ single phase power supply from Fire Panel. Installation of Exit Light shall be at location shown in the drawing and shall be as per recommendation of the manufacturer.	35	Nos.		

12.00	**FIRE RESISTANT CABLE: (TWO CORE)** Supply of 1.5rm Fire retardantmulti core PVC insulated, fire cable of copper conductor of required size as per drawing and direction. Cable work shall be good for power and communication for complete system. The work shall be complete with metal conduit, conduit bends, tees, junction box, pull box, cable ladder etc. complete as per direction and standard. Cutting of walls floor, roof etc. mending good the damage shall be as per direction. Termination and cable jointing shall be done as per standard practice. Cable work shall be done as per drawing and direction. The cable shall be able to with stand fire temperature 400ºC for at least two hours. Installation of Fire resistance Cable shall be at location shown in the drawing and shall be as per recommendation of the manufacturer. Approved type of metal conduit shall be used.	1	Lot		

Sl. No.	Description of Items	Quantity	Unit	Quoted rate in Tk. (Both in fig. & words)	Amount in Taka.
13.00	**POWER CABLE (TWO CORE)** 2.5 rm fire rated cable two core cable.Cable shall be complete with supply & return lope .Termination and cable jointing shall be done as per standard practice. Cable work shall be done as per drawing and direction. The Authority shall supply required power up to panel. The shall be able to with stand at 400ºC for at least two hours. Cable should be comply with as per specification. Brand: Shield / Tianjie / Equivalent Origin: UK / CHINA / Equivalent Standard: LPCB / UL listed	3,920	Rm		
14.00	**FIRE ACCESSORIES:**				
14.1	**Fire Protected Suit :** Fire protected suit shall be suitable to withstand 150°C temperature for two hours. Suit shall be suitable to cover total body of the fire fighter including shoe, hand globs, transparent eye cover etc.	10	Set.		
14.2	**Fire Protected Breathing Mask** Fire protected Breathing Mask shall be suitable to withstand 150°C temperature with breathing arrangement inside fire and smoke and of Standard size with all accessories complete in all respect.	10	Set		
14.3	**Fire Protected Blanket** Fire protected Blanket shall be suitable to withstand 150°C temperature for 30 minutes. Blanket shall be of standard size to cover hole body of the.	20	Set		
15.00	**MAINTENANCE TOOLS:**	1	Lot.		

Sl. No.	Description of Items	Quantity	Unit	Quoted rate in Tk. (Both in fig. & words)	Amount in Taka.
16.00	**SPARE PARTS ;** Spare parts for the fire detection system shall be suitable for 5 years trouble free operation of the system. Detail of spare parts including its name and unit rate shall be submitted.	1	Lot		
17.00	**TESTING COMMISSIONING :** Testing and commissioning of the total fire detection system shall be done as per NFPA standard. All test result shall have Owner's approval.	1	Job.		
			TOTAL COST FORFIRE DETECTION SYSTEM TAKA		

Schedule of Items & Bill of Quantities (BoQ)

B: BILL NO.-2:- FIRE DETECTION & COMMUNICATION SYSTEM

II) VOICE COMMUNICATION SYSTEM

Sl. No.	Description of Items	Quantity	Unit	Quoted rate in Tk. (Both in fig. & words)	Amount in Taka.
1	**OPERATOR CONSOLE:** Operator console suitable to announce fire commends to different location and shall be complete with selector switch, presated announcement etc. as per specification.	1	Set.		
2	**ZONE SELECTION SWITCH :** Zone selection switch shall be as per specification.	1	Set.		
3	**AMPLIFIER :** Supply, installation, testing and commissioning of heavy duty amplifier for 240W speakers.	2	Set.		
4	**CEILING SPEAKER:** Supply and Installation of ceiling mounted type speaker of capacity 6 watt operable on 100 volt line. The speaker shall be housed within insect proof metallic housing which is resistant to moisture.	150	No		
5	**HORN SPEAKER :** Horn speaker shall be wall mounted type suitable for loud voice announcement 20watt capacity.	20	No		

Sl. No.	Description of Items	Quantity	Unit	Quoted rate in Tk. (Both in fig. & words)	Amount in Taka.
6	**FIRE RESISTANT CABLE :** All cable for voice announcement system shall be fire resistant type as per specification. Cable work shall be complete with uPVC conduit, cable tray etc. complete.	1	Lot.		
7	**SPARE PARTS :** Spare parts for 5 years trouble free operation.	1	Lot.		
8	**TESTING AND COMMISSIONING :** After complete installation, testing, commissioning and balancing of the system shall be done as per recommendation of the Manufacturer and as per NFPA. Pipe system shall be tested at 250psig pressure. All the individual items shall be tested separately upto the satisfaction of the Owner.	1	job		
9	**DOCUMENTAION :** After complete installation, testing, commissioning and balancing compilation of the document such as as-built drawing, product catalogue, specification etc. shall be done and submitted to the Authority in triplicate. System layout as per building layout shall also be done.	1	Job.		
	TOTAL COST OF VOICE COMMUNICATION SYSTEM TAKA				

C. BILL NO.-3:- FIRE PROTECTION SYSTEM

Sl. No.	Description of Items	Quantity	Unit	Quoted rate in Tk. (Both in fig. & words)	Amount in Taka.
1	**FIRE PUMP:**				
	Supply & Installation of Pump for fire fighting system use shall be complete with mounting, coupled motor etc. complete. The pump shall be minimum 60% efficient. Impeller speed shall not be more than 2,900 rpm. Power supply shall be 400 V/3 phase 50 cycles AC supply with a terminal box suitable for the reception of power cable termination, common base plate, necessary foundation bolts and accessories, pressure gauges, test valve connections, Y Delta Starter, squirel cage for motor etc. all as per detailed specification. Rate quoted shall include necessary valves and butterfly Valves & non return valves as required on suction, delvery and testline common header side, etc complete.The NPSHr of the pump should not exceed 4 mtr. of WC @ 150% of rated flow. . The pump shall have a capacity to handle 1000 US GPM of water against a head of 80 meter of water. Pump shall be operated on pressure signal from pressure switch. Checking, carrying and Installation of fire pump shall be as per drawing and direction and recommendation of manufacturer. Foundation works shall be done by for other contractor as per direction. Suction and delivery connection to the pumps shall be with proper size of adapter. Water, electrical and control wiring shall be done as per recommendation and drawing. Pump assembly shall be properly aligned. Base shall be provided with drain.				

Sl. No.	Description of Items	Quantity	Unit	Quoted rate in Tk. (Both in fig. & words)	Amount in Taka.
1.01.	**Electrical Driven:** Electrical driven fire pump shall be complete with motor, starter, base plate, coupling, all other accessories etc. as per specification and drawing.	1	Set		
1.02	**Engine Driven Pump :** Engine driven fire pump shall be complete with direct coupled diesel engine, pump, all controls and accessories, diesel tank etc. as per specification and drawing.	1	Set		
1.03	**Jockey Pump:** Jockey pump shall vertical type complete with pump, pump motor, pressure switches all other standard accessories as per specification. The pump shall have a capacity of 20GPM against a head of 80m wg.	1	Set		

2.00	**VALVE ACCESSORIES:** Pipe accessories such as gate valves, globe valves, check valves, strainer, expansion joint etc. Pipe accessories shall be suitable to with stand a pressure of 250 psig. Valves of 100mm dia and above shall be of iron body, flanged end type complete with companion flanges, gaskets, nuts bolts etc. and valves less than 80mm dia shall be bronze body threaded end type. Installations of pipe accessories such as gate valves, globe valves, check valves, strainer, expansion joint etc. shall be as per drawing and direction. Proper size of flanges with gasket nut-bolt shall be used. Valve installation shall be leak proof type. Each pipe accessories shall be provided with support, bracket or hanger so that there is no load on pipe work. Handle of the valves shall be positioned in such a way that operation shall be easy. If required Valve pit for service valve for under ground pipe installation shall be done as per direction. Valve pit shall be provided with cover and drainage system.				

Sl. No.	Description of Items	Quantity	Unit	Quoted rate in Tk. (Both in fig. & words)	Amount in Taka.
	Testing & Commissioning of Pipe accessories such as gate valves, globe valves, check valves, strainer, expansion joint etc. shall be as per drawing and direction.				
2.1	**O.S & Y Gate Valve** : O.S & Y Gate valve shall be anti corrosive cast iron body flanged end type complete with companion flanges, nut-bolt gasket etc.				
a)	150mm dia	4	No		
b)	100mm dia	3	No		
2.02	**Gate Valve:** Gate valve constructed with bronze shall be wage type threaded end.				
a)	100mm dia, butter fly type.	1	No		
b)	80mm dia, butter fly type.	3	No		
c)	65mm dia, butter fly type.	20	No		
d)	40mm dia, Ball Valve.	2	No		

Sl. No.	Description of Items	Quantity	Unit	Quoted rate in Tk. (Both in fig. & words)	Amount in Taka.
e)	25mm dia, Ball Valve.	12	No		
2.03	**Globe Valves**: Globe valve 50 mm dia and smaller shall be bronze body, screwed bonnet, rising stem, swivel disc and valve 65 mm dia and larger shall be iron body, bolted bonnet, outside screw and yoke, rising stem, bevelled wedge disc and flanged end type complete with companion flanges with nut-bolt, gasket etc.				
a)	150mm dia	4	No		
b)	40mm dia	2	No		
2.04	**Non Return Valves:** Non-Return valves shall be re-grind able seat, screwed cap, lift type disc, integral seal and flanges end type.				
a)	150mm dia	2	No		
b)	40mm dia	2	No		

Sl. No.	Description of Items	Quantity	Unit	Quoted rate in Tk. (Both in fig. & words)	Amount in Taka.
2.05	**Flexible Joint:** Flexible joint shall be suitable to absorb shock and system hammering and to reduce vibration transmission. Flexible joint shall be ss construction, flanged end type.				
a)	150mm dia	4	No		
b)	40mm dia	2	No		
2.06	**Expansion Valve:** Expansion valve shall be stainless steel construction, flanged end type and of 150mm dia.	2	No		
2.07	**Y-Strainer :** Strainer shall be Y type with SS screen, flanged end type, cast iron body.				
a)	150mm dia	2	No		
b)	50mm dia	2	No		
2.08	**Pressure Relief Valve:** Pressure relief valve shall be electric operated solenoid type with motor, linkage, pressure sensor in discharge pipe, all mountings etc. as per specification. Dia of the valves shall be 100mm.	1	Set.		

Sl. No.	Description of Items	Quantity	Unit	Quoted rate in Tk. (Both in fig. & words)	Amount in Taka.
2.09	**Alarm Valve:** Alarm Valve shall be suitable to provide audible sound on flow throgh the valve and give a signal to central panel. The valve shall be complete with all standard accessories. **Dia of the valve shall be 150mm.**	1	Set.		
2.10	**Sight Glass:** Site glass shall be installed on pressure release by pass line to see water flow. Dia of the sight glass shall be 100mm.	1	Set.		
2.11	**Vent Valve:** Automatic vent valve shall be free floating type having test cock, 20mm threaded outlets to accept drain line and threaded inlet connection. Vent valve shall be 20mm size.	12	No		
2.12	**Pressure reducing Valve:** Pressure reducing valve shall be bronze body, flanged end type suitable to adjust water pressure to have delivery pressure at 50 psi. Inlet pressure may be 200 psi to 60 psi.				
a)	65mm dia	6	No		
b)	25mm dia	12	No		

Sl. No.	Description of Items	Quantity	Unit	Quoted rate in Tk. (Both in fig. & words)	Amount in Taka.
2.13	**Flow Switch :** Leaf type flow switch shall be of following dia suitable to send signal on flow of water.				
a)	100mm dia, butter fly type.	1	No		
b)	80mm dia, butter fly type.	3	No		
c)	65mm dia, butter fly type.	20	No		
3.00	**METERING DEVICES :**				
3.01	**Pressure Gauge:** Pressure gauge shall be of dial type of 100mm dia suitable to read 0 to 10 Kg pressure. Pressure gauge shall be completed with petcock, pressure snowbar, nipple etc.	10	No		
3.02	**Flow Measuring Devices :** Flow metering devices shall be suitable to direct installation on pipe to measure flow of water through pipe in GPM. It shall be flanged end type.				
a)	150mm dia pipe.	2	No		
b)	100mm dia pipe	1	No		

Sl. No.	Description of Items	Quantity	Unit	Quoted rate in Tk. (Both in fig. & words)	Amount in Taka.
4.00	**FIRE HYDRANT:** Supply, installation, testing and commissioning of Fire hydrant point shall be comprising of 65mm dia angle valve and 25mm dia hose reel set within single fire hydrant cabinet as per specification. 30meter 38mm dia hose reel shall be connected with riser system within box. Fire hydrant shall be complete with 65mm firemen hydrant, 25mm hose reel, nozzle, swing type reel wheel, one ABC type fire extinguisher etc. complete as per drawing.				
4.01	Fire Hydrant on Ground floor shall be with axe and other accessories as per drawing.	3	Set.		
4.02.	Fire hydrant on other floor with normal accessories as per drawing and specification.	9	Set		
4.03	Free standing roof or out door installation type fire hydrant as per drawing.	18	Set.		
5.00	**FIRE BRIGADE CONNECTION :** Fire Brigade Connection of 150mm dia with four connections of 65mm dia each and shall be completed with non-return valve, valve cap, chain, purging valve etc. Installation, Testing & Commissioning of Fire Brigade Connection shall be completed with non-return valve, valve cap, chain, purging valve etc.	2	Set.		

Sl. No.	Description of Items	Quantity	Unit	Quoted rate in Tk. (Both in fig. & words)	Amount in Taka.
6.00	**SPRINKLER SYSTEM:**				
6.01.	**Sprinkler Head:** Supply and installation of sprinkler head shall be exposed And Concealed type, 12.7mm dia having fusing temperature of 65°F as per specification and drawing. Sprinkler head shall be complete with spare sprinkler head with box as per specification.				
a)	Pendent type sprinkler head with spare	780	No		
b)	Side wall type sprinkler head with spare	50	No		
7.00	**FIRE DOOR AND ASSEMBLY** Fire door having a minimum rating of 2 hour shall be of self-closing type and complete with smoke seal. Door shall be equivalent to UL/FM listed. Door shall only open in the direction of exit. Door shall have push bar for opening and complete with visual sign indicating the door opening mechanism. Fire dood shall have device to send dingnal to central fire panel about their position. If should prodive a sound/signal to central panle when the door is open position. Door shall be complete with fire rated clear glass viewer of size 300x 600mm, door stopper, auto clouser, option to open from outside with special service man key etc. All gasket, sealent and other accessories shall be fire rated.				

Sl. No.	Description of Items	Quantity	Unit	Quoted rate in Tk. (Both in fig. & words)	Amount in Taka.
	Dimension of door given are tentative. The contractor has to measure at site correctly and after confirmation he has to go for fabrication or ordering.				
8.00	**Floor Door (Push bar)** Door shall be of single leaf each 1000mm clear width, 2100 mm clear height.	12	No		
9.00	**Floor Door (Non Push bar)** Door shall be of single leaf each 1000mm clear width, 2100 mm clear height.	4	No		
10.00	**Sub-Station Room** Fire-Rated steel doors play a vital role in keeping people safe and minimizing property damage during a fire. Labeled fire doors control the spread of fire and smoke for up to 3 hours. Door shall be of double leaf each 1800mm clear width, 2550 mm clear height.	1	No		
11.00	**PORTABLE EXTINGUISHER:** Supply and Fixing of Portable Fire Extinguisher of following type shall be as per drawing and direction. Extinguisher shall be enclosed within a steel box made with 18 BWG galvanized sheet steel painted with red colour front panel shall be with glass. Box may be local and shall be suitable to fix within wall punch.				
a)	Portable Fire extinguisher of capacity 4.5 Kg of dry powder (DCO) type suitable for ABC &E fire.	60	Set		

b)	Portable Fire Extinguisher of capacity 5kg of CO2 foam.	60	Set		

Sl. No.	Description of Items	Quantity	Unit	Quoted rate in Tk. (Both in fig. & words)	Amount in Taka.
12.00	**PIPE WORK: SCHEDULE(40)** Supply and Installation of black steel pipe of schedule 40(S) suitable to withstand a test pressure 15 kg of water complete with bends, tees, elbows, reducers, socket, union etc. as per drawing and direction. Cutting of pipe welding, threading and sealing the thread with proper type of sealing compound shall be done leak proof. Pipe work along with fittings shall be suitable to withstand a test pressure of 15 Kg/cm². Required flanges shall be provided in main pipe as per directionAll Pipe including M/S. materials including outside of Black steel pipe work shall be provided with two coats of cold galvanisation after proper cleaning. All underground pipes shall be protected with black tape wrapping. Earth cutting, filling with sand cc pipe support at an interval of 3 meter shall be done for out door underground pipe work. All pipe work shall be completed with support, bracket etc. complete as per drawing and direction.				
12.01	200mm dia	15	Rm		
12.02	150mm dia	750	Rm		
12.03	100mm dia	50	Rm		
12.04	80mm dia	125	Rm		

Sl. No.	Description of Items	Quantity	Unit	Quoted rate in Tk. (Both in fig. & words)	Amount in Taka.
12.05	63mm dia	100	Rm		
12.06	50mm dia	250	Rm		
12.07	40mm dia	200	Rm		
12.08	32mm dia	360	Rm.		
12.09	25mm dia	320	Rm.		
13.00	**PUMP PANEL:** Supply and Installation of Combined Pump panel constructed with 16 BWG sheet steel painted with two coats of epoxy paint over a coat of prime. The panel shall be double-hinged door type only knob of the main MCCB shall be extended beyond front skin. The panel shall house MCCB/MCB for all pumps, bus- bar, insulator, ammeter for all equipment, main volt meter, indicating light, earthing block pressure controller & switch, auto starting arrangement on receiving signal of low pressure in pipe line, status indication, MCCB etc. complete as per drawing and direction. The panel shall be installed at location shown in the drawing.	1	Set		

Sl. No.	Description of Items	Quantity	Unit	Quoted rate in Tk. (Both in fig. & words)	Amount in Taka.
14.00	**ELECTRICAL CABLE WORK:** Supply and Installation of single/multi core Fire rated PVC insulated, PVC sheathed electrical cable of copper conductor of following size as per drawing & direction. The work shall be complete with water grade PVC conduit, required ECC, conduit bends, tees, junction box, pull box etc. complete as per direction and standard. Cutting of walls floor, roof etc. mending good the damage shall be as per direction. The Authority shall supply required power up to pump house. Cable shall be Eastern/Paradise/ Poly Cable.				
14.1	a) 3CX120+70 sqmm (NYY)with ECC (BYA)with through PVC pipe	30	Rm		
14.2	b) 1C-4x4sqmm (NYY)with 4sqmm (BYA)ECC with through PVC pipe	20	Rm		
15	**TESTING, COMMISSIONING AND BALANCING:** After proper installation the system shall be tested, commissioned and balanced as per direction and recommendation. Pipe work shall be tested at a test pressure of 15 kg/cm^2 for 24 hours without any leak. After proper testing, commissioning and balancing the system shall run for seven days upto the satisfaction of the Owner.	1	Job		

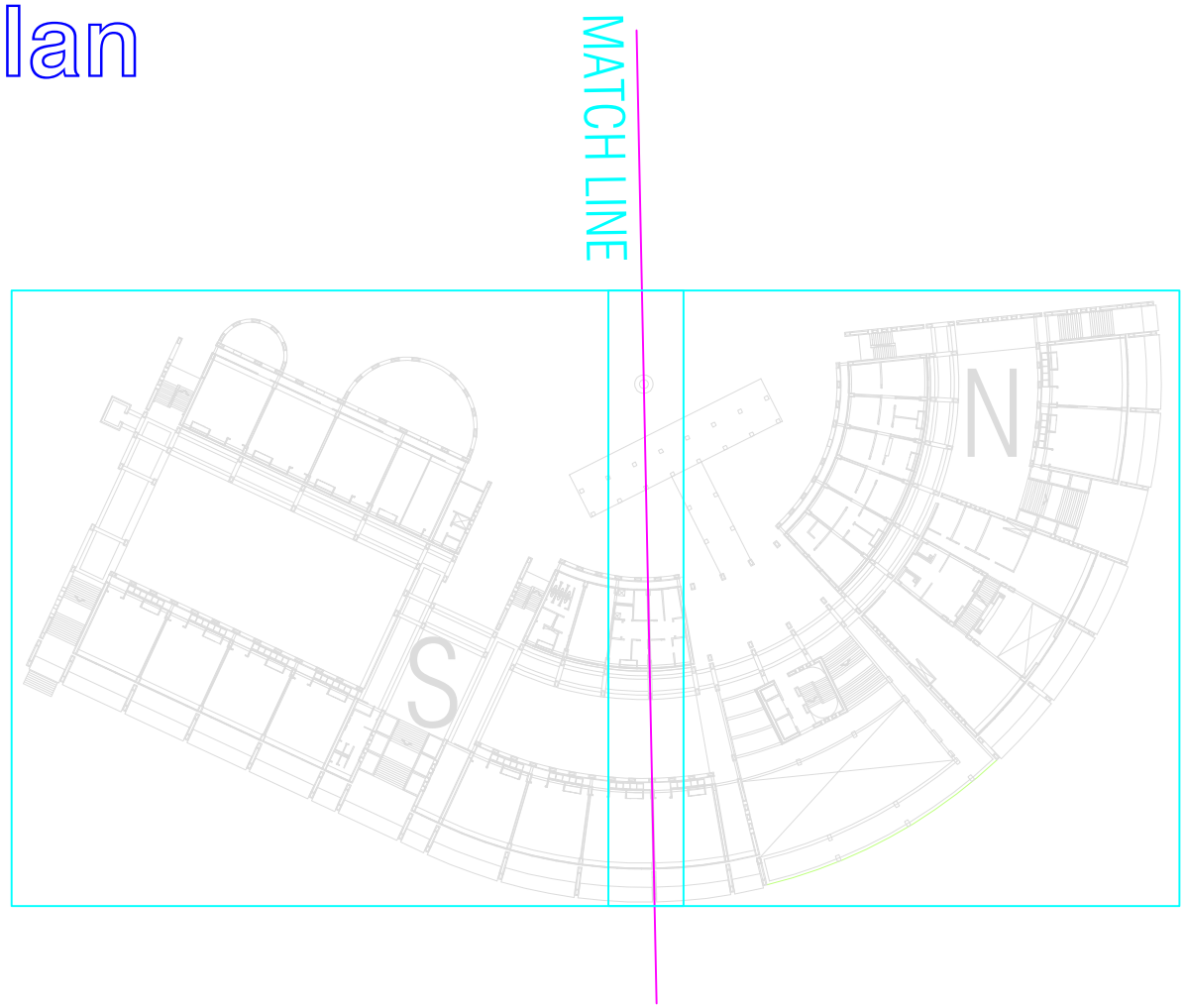
Sl. No.	Description of Items	Quantity	Unit	Quoted rate in Tk. (Both in fig. & words)	Amount in Taka.
16	**TRAINING & FIRE DRILL:** After complete installation, testing commissioning and balancing the system the contractor shall have to provide training programme to the representatives of the Client. Fire drill shall be performed before handing over the system to the Owner. Fire Drill shall be performed at least once in a month for 12 months defect liability period.	1	Job		
	TOTAL COST OF FIRE FIGHTING SYSTEM IN TAKA				

Annexure I – Drawings / Layouts

LIST OF DRAWINGS :

COVER SHEET	SS-00.0.0	SAFETY & SECURITY SYSTEM COVER SHEET
LEVEL -0 FLOOR PLAN Scale :- 1: 100	SS-40	
	SS-40.0.1	LEVEL -0 (S) FIRE DETECTION & PROTECTION LAYOUT REFLECTED CEILING PLAN
	SS-40.0.2	LEVEL -0 (S) FIRE DETECTION & PROTECTION LAYOUT REFLECTED CEILING PLAN
	SS-40.0.3	LEVEL -0 (S) FIRE DETECTION & PROTECTION LAYOUT REFLECTED CEILING PLAN
LEVEL -1 FLOOR PLAN Scale :- 1: 100	SS-40.1.1	LEVEL -1 (S) FIRE DETECTION & PROTECTION LAYOUT REFLECTED CEILING PLAN
	SS-40.1.2	LEVEL -1 (S) FIRE DETECTION & PROTECTION LAYOUT REFLECTED CEILING PLAN
LEVEL -2 FLOOR PLAN Scale :- 1: 100	SS-40.2.1	LEVEL -2 (S) FIRE DETECTION & PROTECTION LAYOUT REFLECTED CEILING PLAN
	SS-40.2.2	LEVEL -2 (S) FIRE DETECTION & PROTECTION LAYOUT REFLECTED CEILING PLAN
LEVEL -3 FLOOR PLAN Scale :- 1: 100	SS-40.3.1	LEVEL -2 (S) FIRE DETECTION & PROTECTION LAYOUT REFLECTED CEILING PLAN
	SS-40.3.2	LEVEL -2 (S) FIRE DETECTION & PROTECTION LAYOUT REFLECTED CEILING PLAN
SAFETY & SECURITY DETAIL Scale :- AS EHOWN	SS-AD-01	DETAIL SCHEMATIC DIAGRAM FIRE ALARM, COMMUNICATION AND EVACUATION SYSTEM
	SS-AD-02	DETAIL SCHEMATIC DIAGRAM OF FIRE PUMP
	SS-AD-03	FIRE PROTECTION FABRICATION DETAIL-1
	SS-AD-04	FIRE PROTECTION FABRICATION DETAIL-2

Key Plan



FIRE LEGEND :

- PROTECTION SYSTEM
- PORTABLE EXTINGUISHER,5kgx1no.(450mm)
- PORTABLE EXTINGUISHER,5kgx3no.(450mm)
- FIRE EXTINGUISHER (DCP)
- FIRE EXTINGUSHER (CO2)
- 65/40 MM DIA FIRE HYDRENT (450mm)
- 150 MM SIMES CONNECTION
- SPRINKLER, PANDENT
- SPRINKLER, PANDENT-FLUSH
- SPRINKLER, WALL
- WATER PIPE
- OS&Y GATE VALVE
- GLOBE VALEV
- BUTTERFLY VALVE
- STRAINER
- NON RETURN VALVE
- FLOW SWITCH
- WATER MOTOR
- FIRE PUMP
- FIRE ALARM CONTROL PANEL
- PUMP CONTROL PANEL
- DETECTION SYSTEM

- DETECTOR-H-HIRATE
- DETECTOR-H
- DETECTOR-P
- DETECTOR-S
- SMOKE DETECTOR WITH SOUNDER
- DETECTION WIRING WITHIN EMT CONDUIT
- ALARM SYSTEM
- PULL STATION, (900mm)
- ALARM BELL.(2500mm)
- FIRE TELEPHONE
- SPEAKER WALL (2500mm)
- SPEAKER CEILING
- STROBELIGHT
- EVACUATION LIGHT
- EMERGENCY EXIT SIGN
- LOCATION MAP
- ESCAPE SIGN
- EMERGENCY EXIT LIGHT (2500mm)
- EMERGENCY FLOOD LIGHT (2500mm)
- 2Hr FIRE RETADE DOOR
- CC-CLOSED CIRCUIT CAMERA

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Chittagong, Bangladesh
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Associate Architects
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ISSUE - A

Phase One, Building 1a
Construction Document Phase.
(SAFETY & SECURITY DRAWINGS)

CD 100%	09/30/2010	FOR REVIEW
CD 50%	08/22/2010	FOR REVIEW

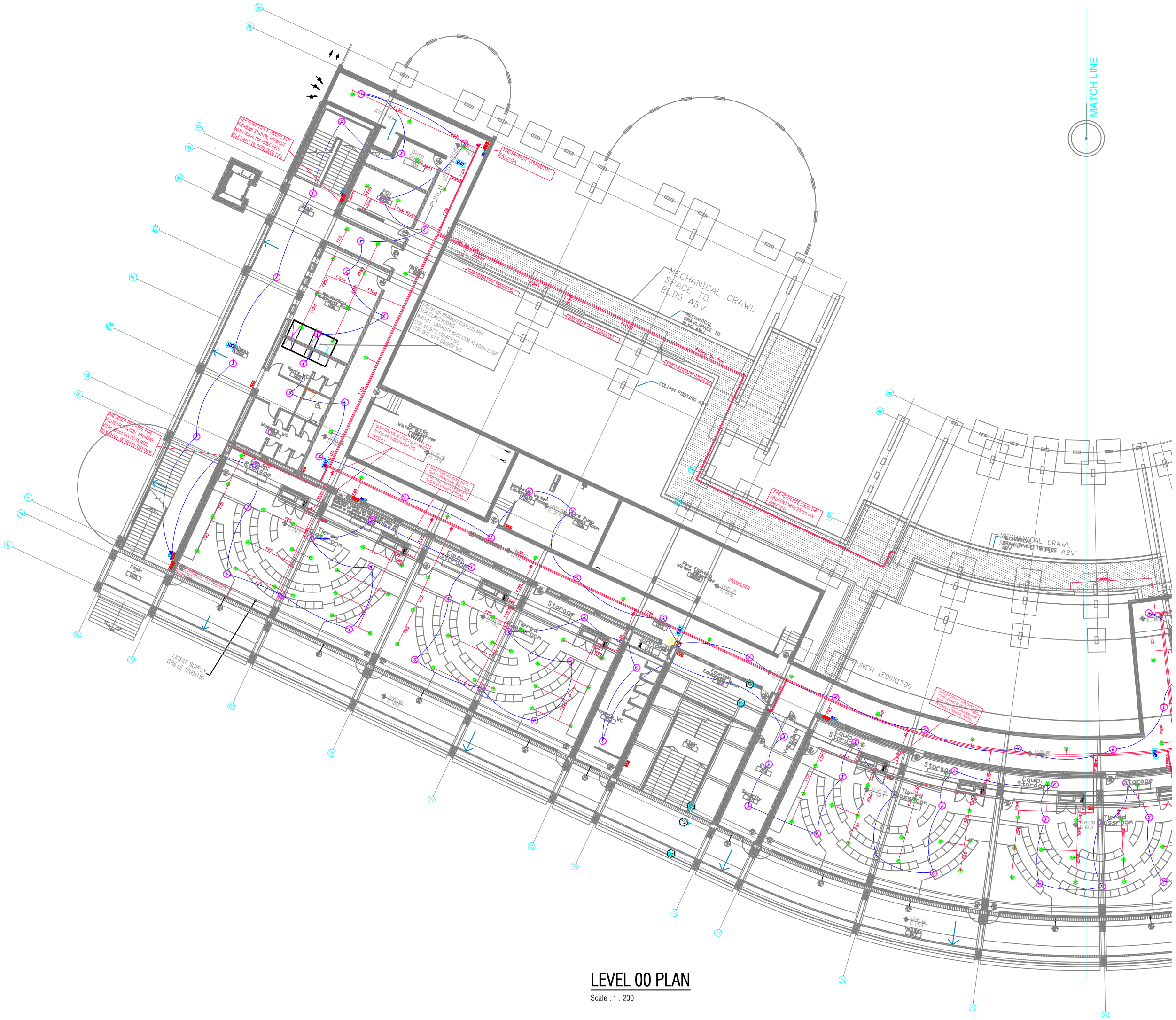
Seal Of Approval :

Drawn By : SM
Checked By : KM
Scale : 1:100

Drawing Title :

COVER SHEET

A-00.0.0



LEVEL 00 PLAN

Scale : 1 : 200

Asian University For Women

Chittagong, Bangladesh
www.asian-universityforwomen

Phase One, Building 1a

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Phone : 8610116-7.

Key Plan

ISSUE - A

Phase One, Building 1a
Construction Document Phase.
(SAFETY & SECURITY DRAWINGS)

CD 100%	09/30/2010	FOR REVIEW
CD 50%	08/22/2010	FOR REVIEW

Seal Of Approval :

Drawn By : SM
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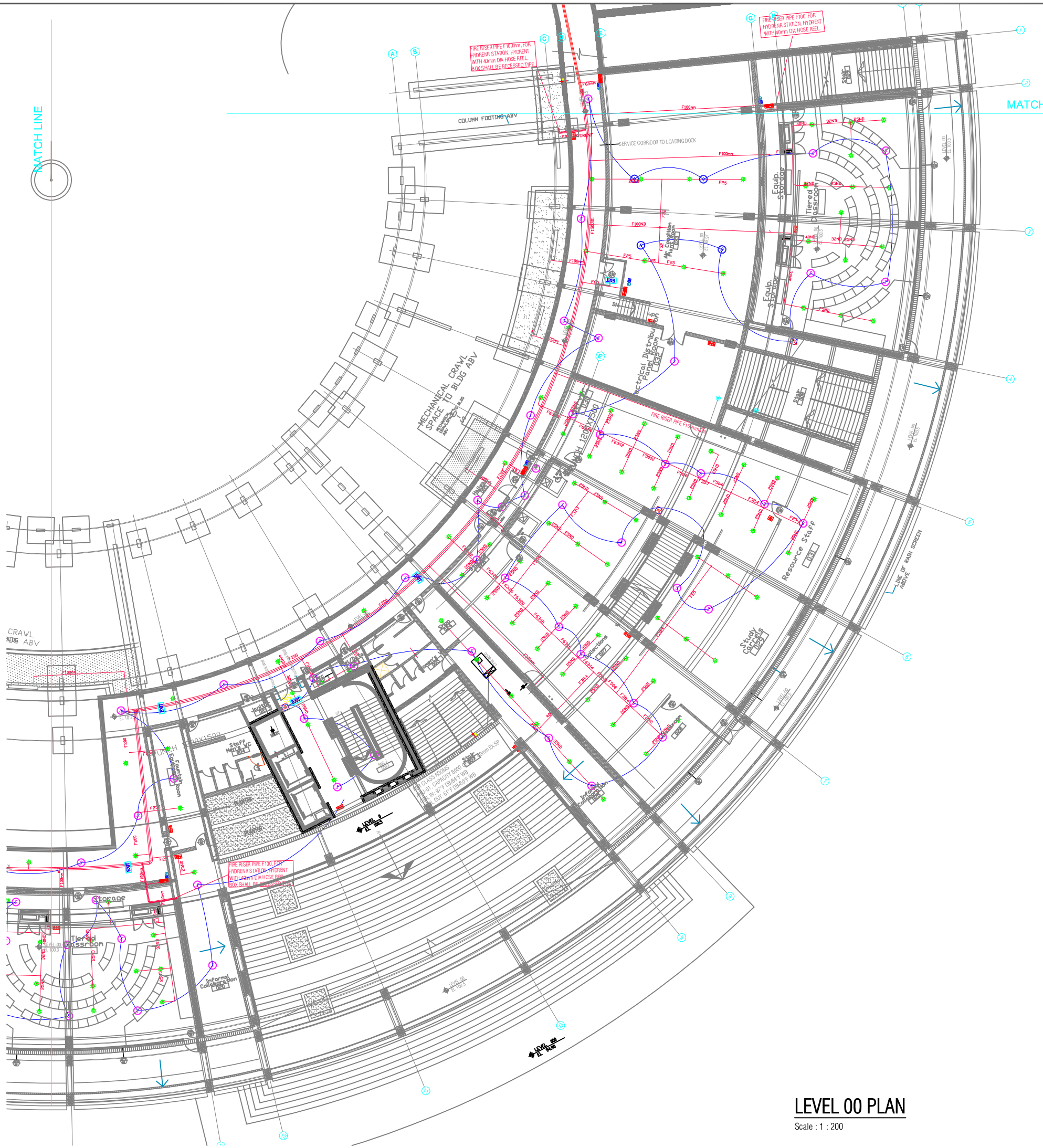
Drawing Title :

LEVEL -0 (S) FIRE DETECTION & PROTECTION LAYOUT REFLECTED CEILING PLAN

SS-40.00.1



LEVEL 00 PLAN

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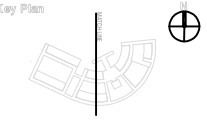

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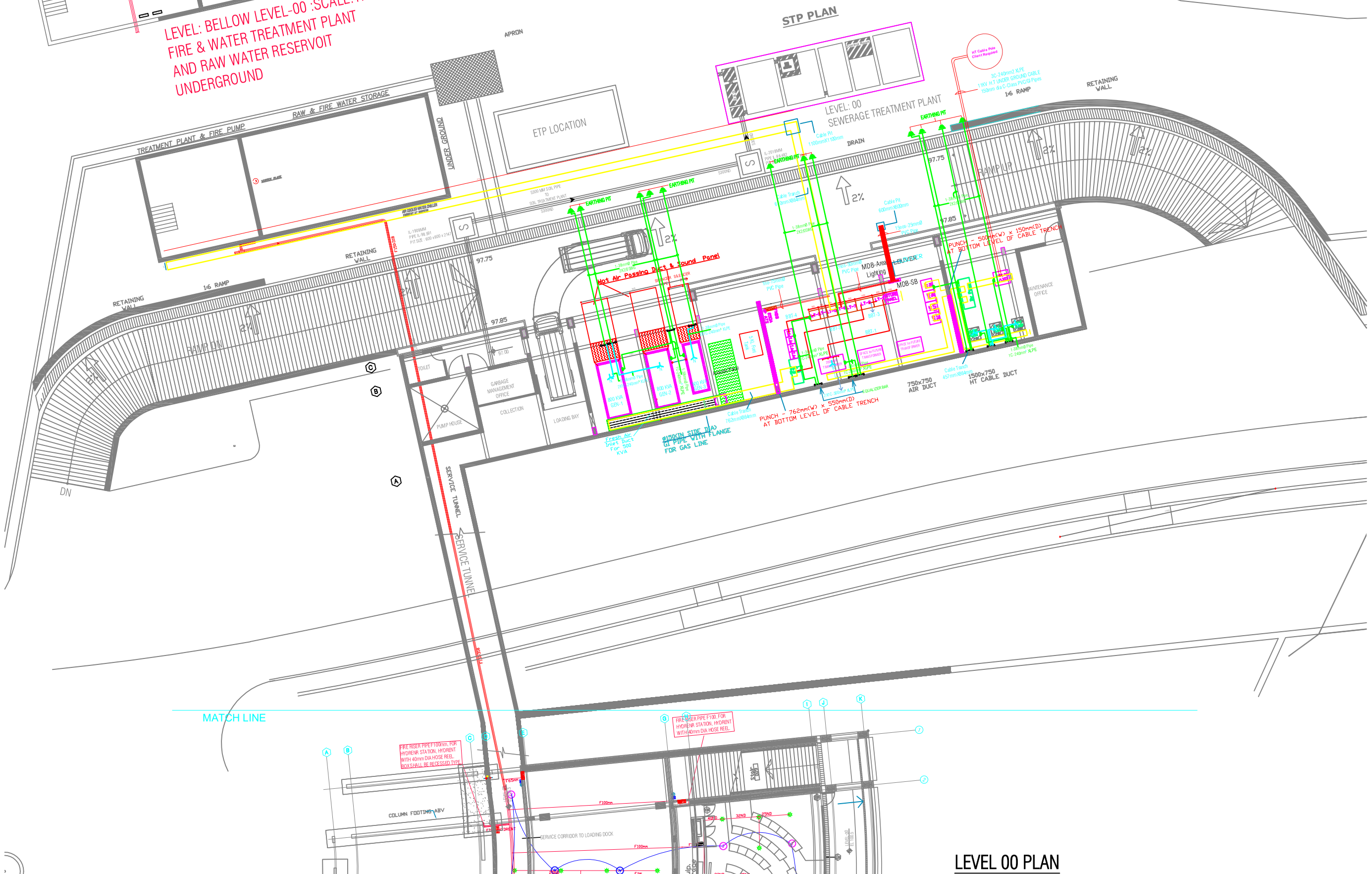

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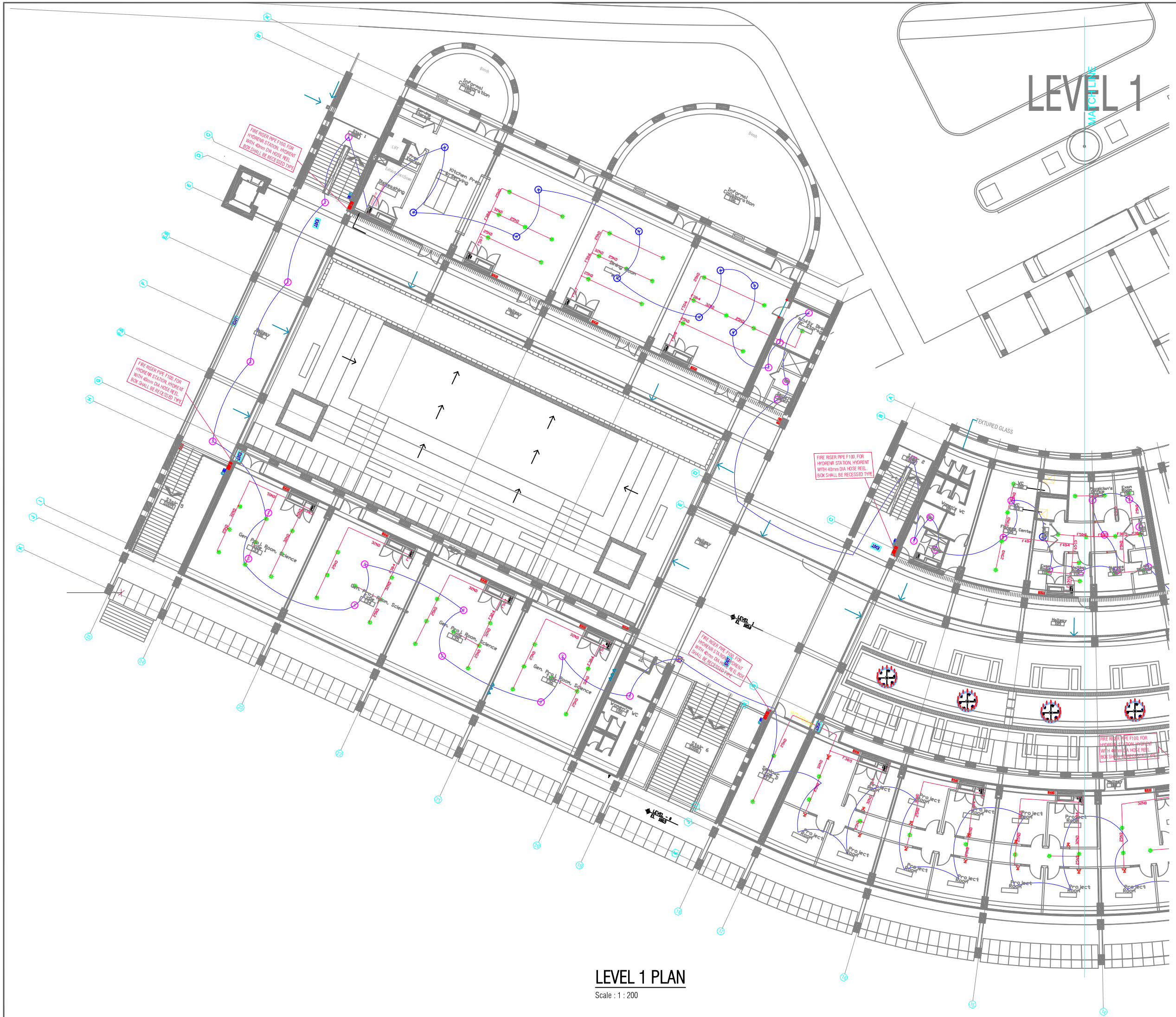

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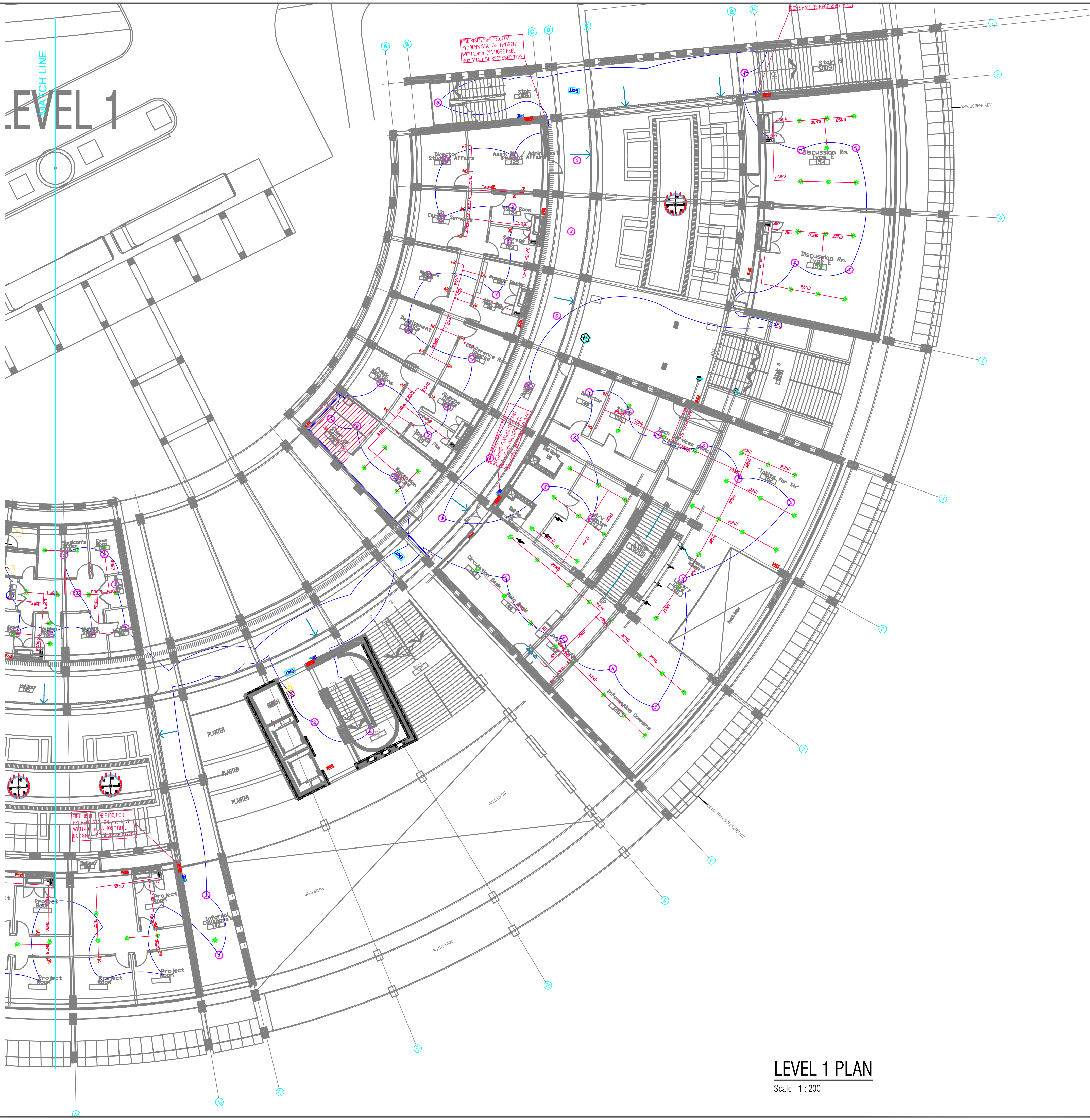

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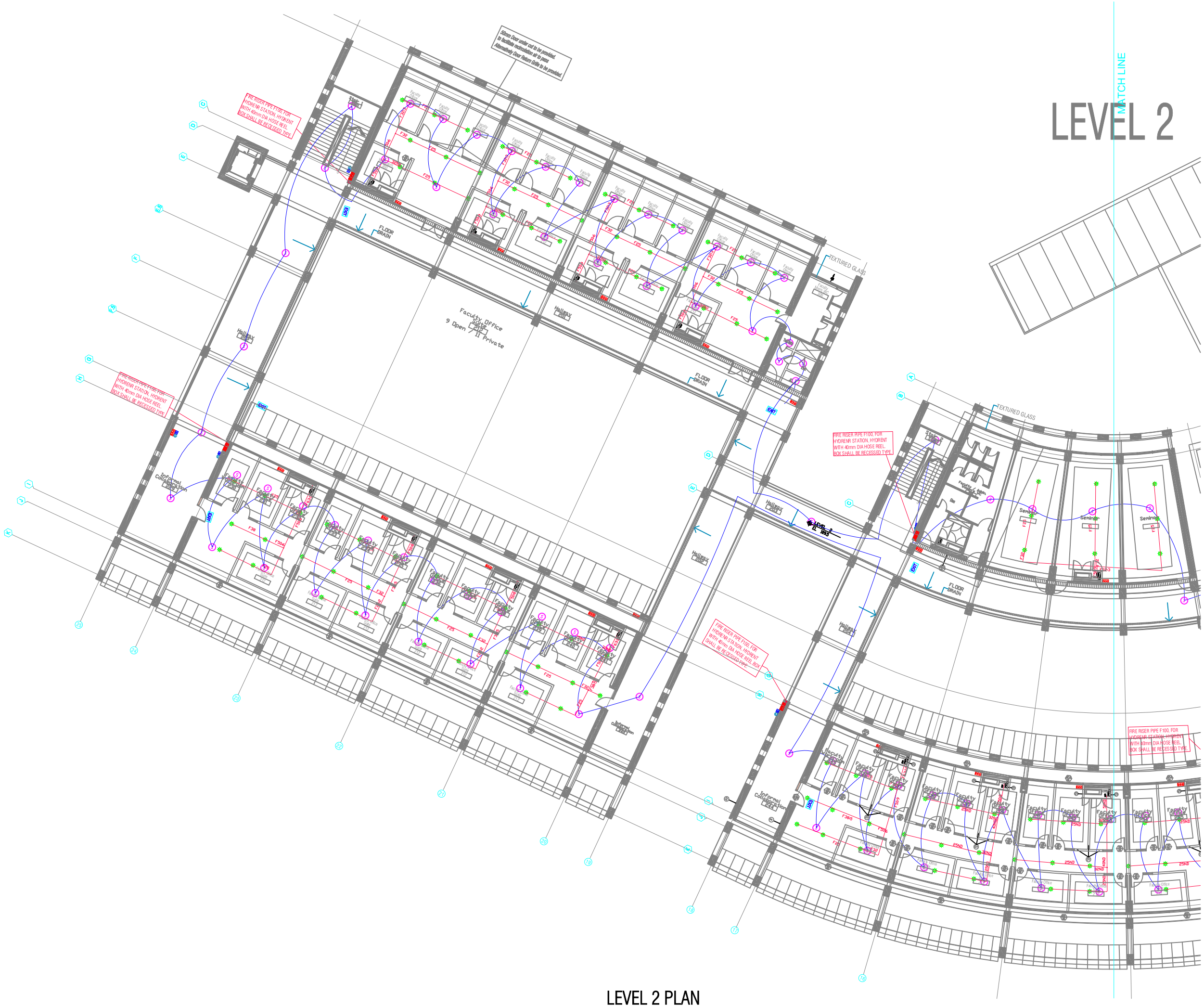

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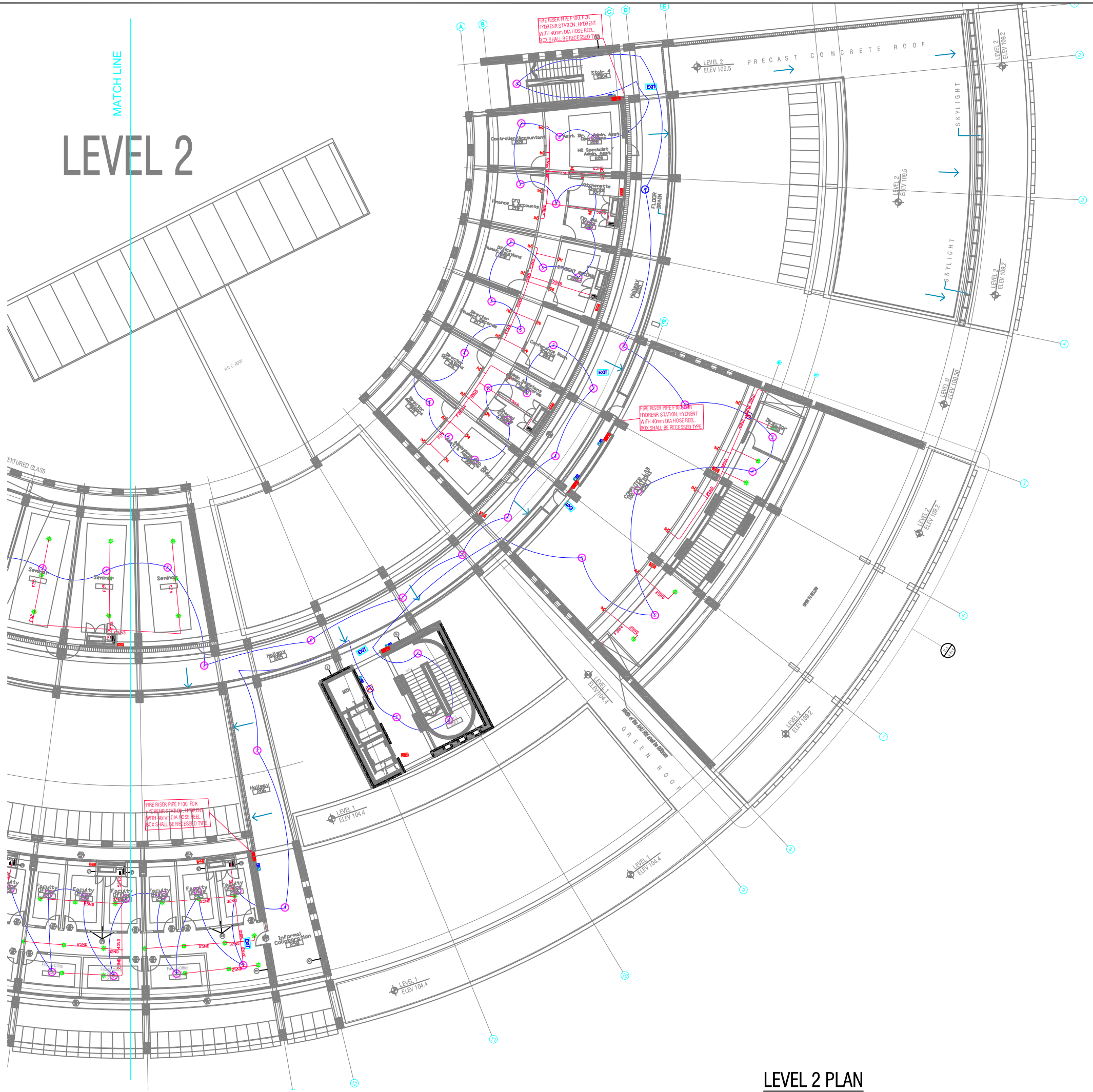

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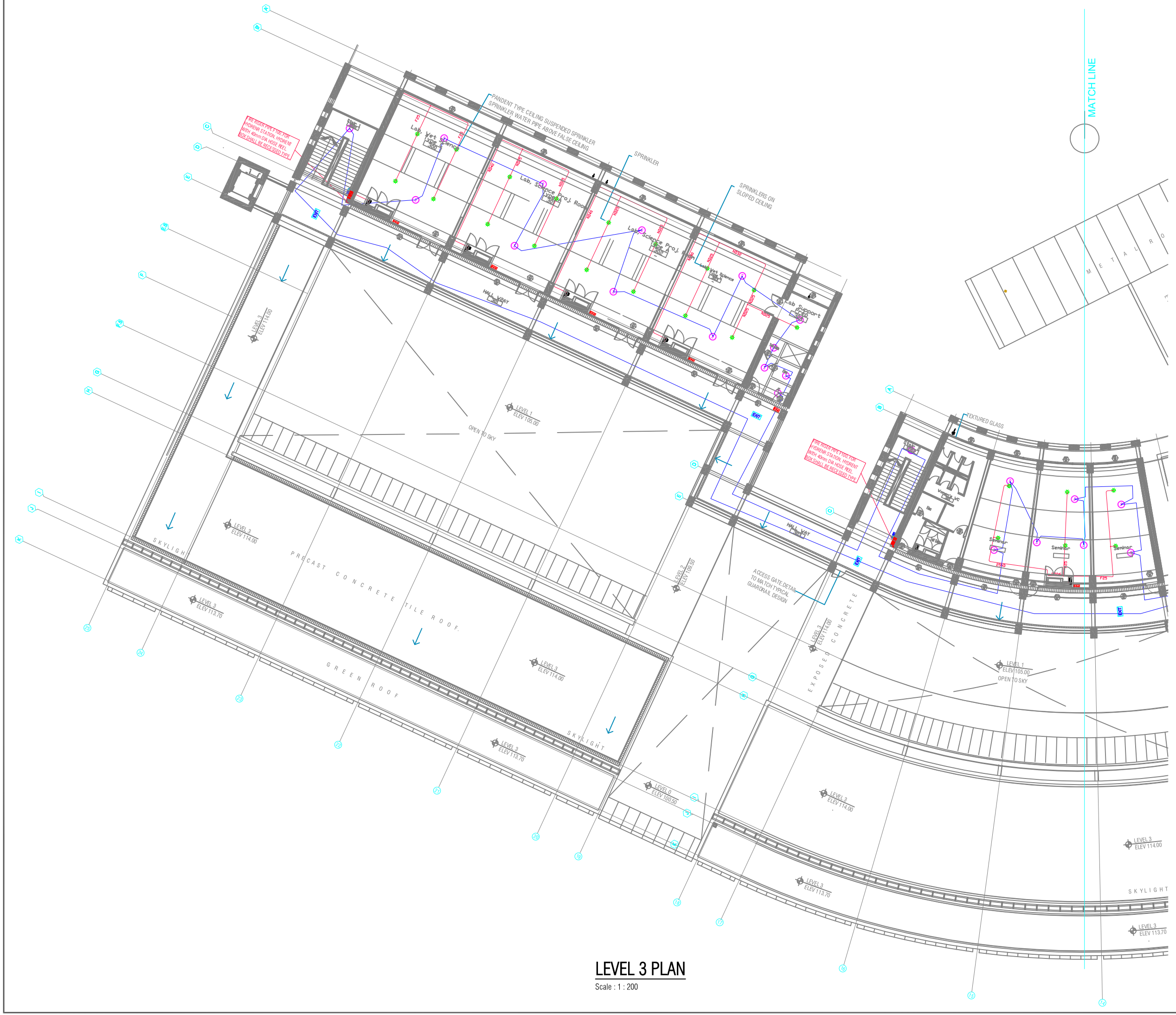
SS-40.02.2



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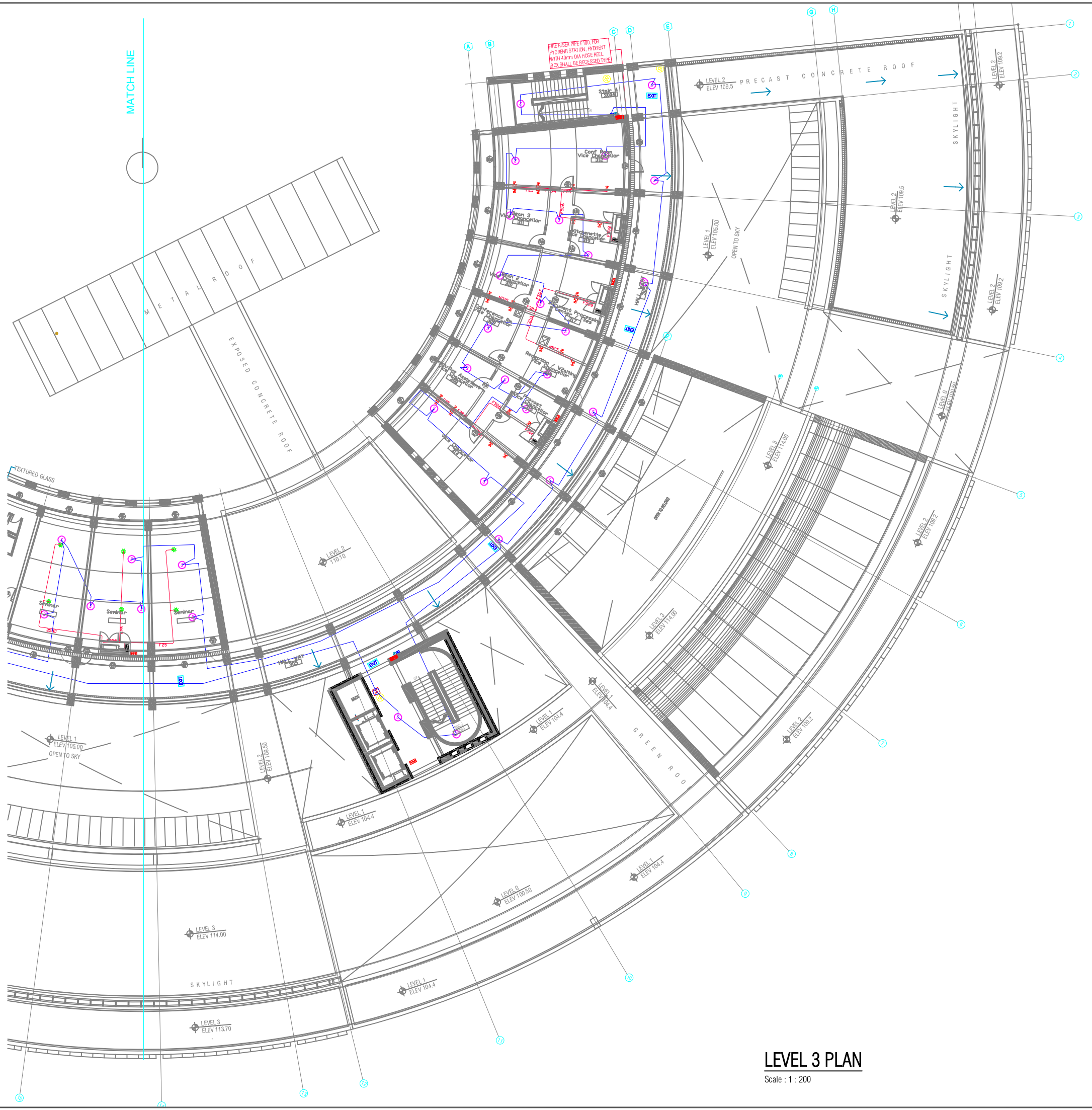

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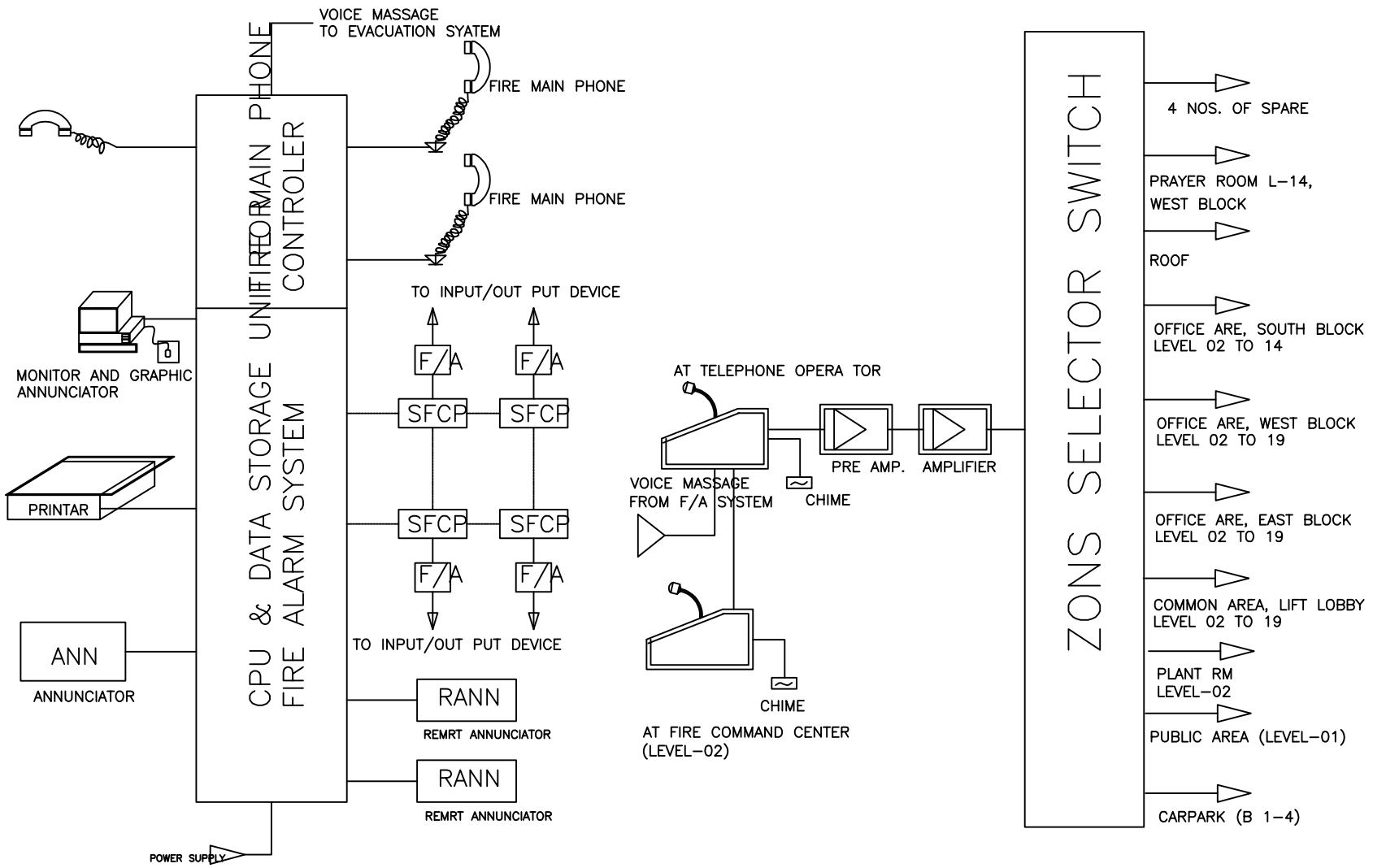
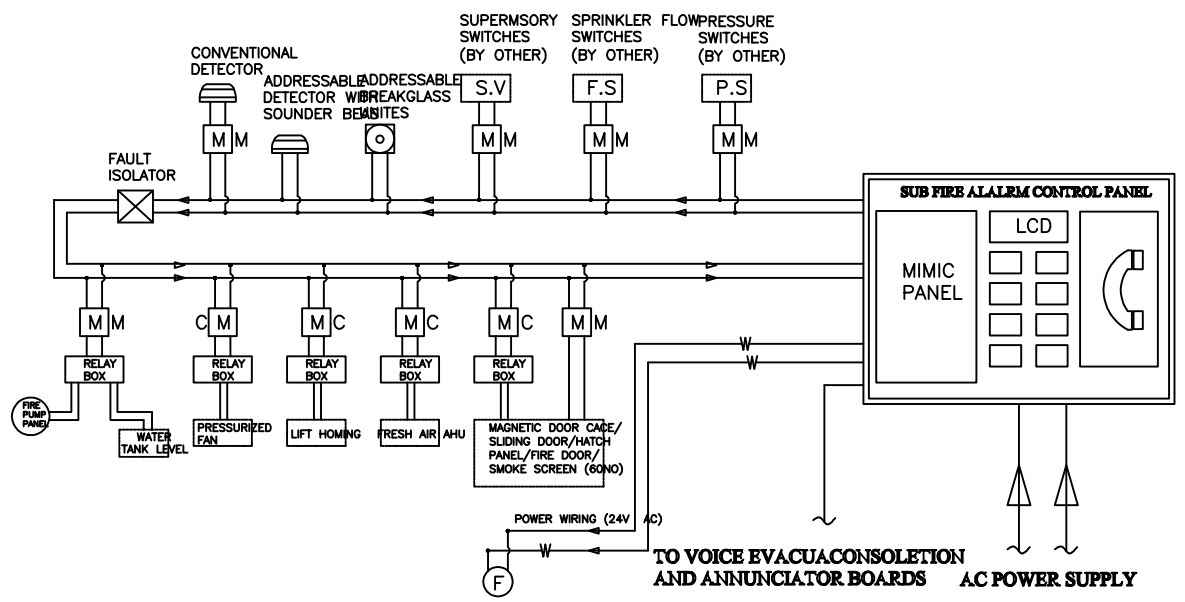


FIRE ALARM SYSTEM SCHMATIC DAIGRAM

EVACUTION SCHEMATIC DIAGRAM



TYPICAL INSTALLATION OF SUB FIRE ALALRM CONTROL PANEL

COMMUNICATION AND FIRE ALARM SYSTEM SCHEMATIC DIAGRAM

DETAIL SCHEMATIC DIAGRAM
Scale : NTS

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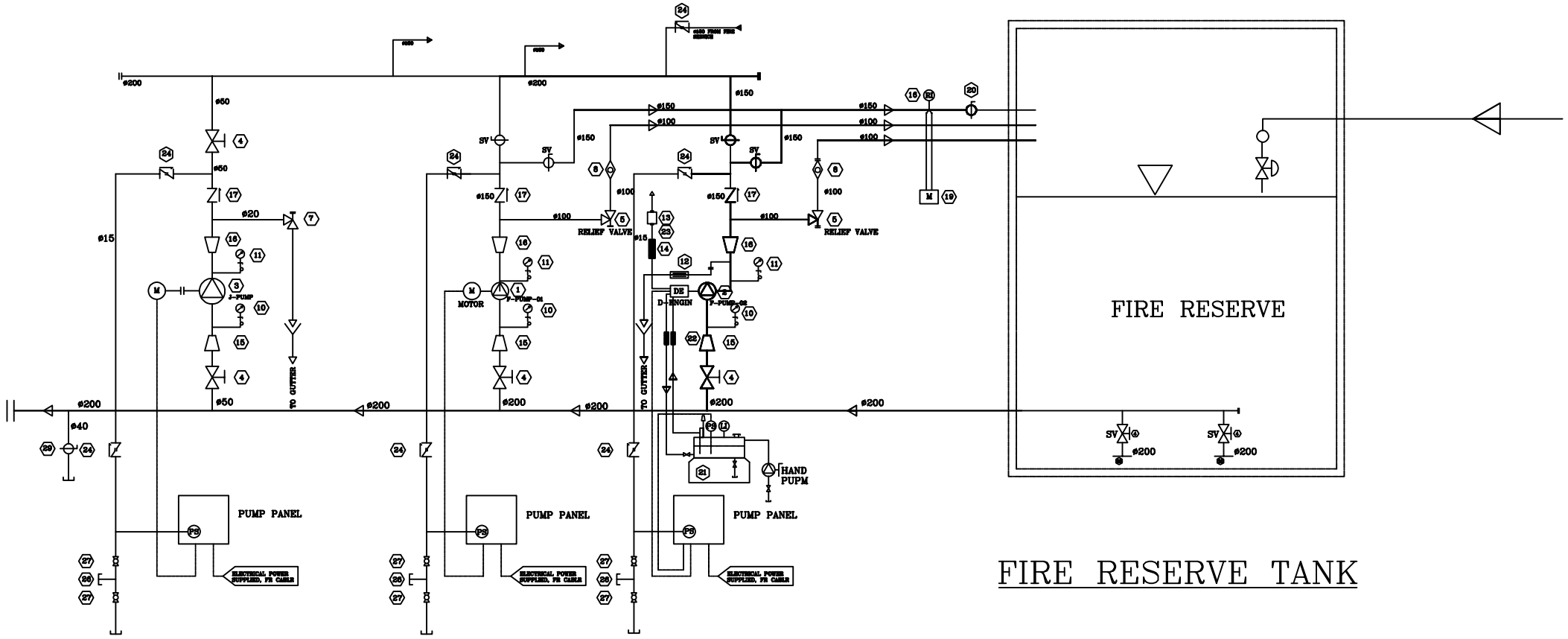
DETAIL SCHEMATIC DIAGRAM FIRE ALARM,COMMUNICATION AND EVACUATION SYSTEM

SS-AD-01



FIRE RESERVE TANK

FIRE PUMP SCHEMATIC DIAGRAM

ITEM NO.	DESCRIPTION	ITEM NO.	DESCRIPTION
1	DIESEL ENGINE DRIVE FIRE PUMP	16	CONCENTRIC DISCHARGE INCREASER
2	DIESEL ENGINE DRIVEN FIRE PUMP	17	CHECK VALVE
3	JOCKEY PUMPS (JP–01)	18	FLOW INDICATED SENSOR (50–200% OF 1000GPM.), 175PSI
4	OS & Y GATE VALVE WITH SUPERVISORY SWITCH	19	FLOW METER (50–100% OF 1000GPM)
5	ø100 MAIN RELIEF VALVE FOR FIRE PUMP	20	ø200 BUTTERFLY VALVE
7	ø20 CASING RELIEF VALVE FOR JOCKEY PUMP	21	FUEL STORAGE TANK WITH SPILL, LEAK CONTAINMENT AND ACCESSORIES
8	ø100XØ150 CLOSE WASTE CONE	22	FUEL STAINLESS STEEL FLEXIBLE CONNECTOR
9	AUTOMATIC AIR RELEASE VALVE WITH SEPERATED VALVE	23	ENGINE EXHAUST PIPE 80mm. CALCIUM SILICATE INSULATOR WITH 0.6mm. ALUMINIUM JACKET
10	SUCTION PRESSURE GAUGE (DIAL RANGE–15 TO 50 PSI)	24	ø50 CHECK VALVE
11	DISCHARGE PRESSURE GAUGE (DIAL RANGE–0 TO 500 PSI)	26	ø15 TEE WITH CAP
12	WATER–COOLED HEAT EXCHANGER	27	ø15 GLOBE VALVE WITH CAP
13	ENGINE EXHAUST SILENCER	27	ø15 GLOBE VALVE WITH CAP
14	EXHAUST STAINLESS STEEL FLEXIBLE CONNECTOR 25.4mm. THICK PREFORMED MINERAL WOOL INSULATOR WITH 40mm. THICK MIN.WOOL AND 0.6mm. THICK STAINLESS STEEL JACKET	28	AUTOMATIC AIR VENT WITH SEPERATED VALVE
15	ECCENTRIC SUCTION REDUCER	29	ø40 DRAIN BALL VALVE WITH CAP
		30	1.20m.x1.20m. ANTI–VORTEX PLATE

NOTE:

1. ALL FIRE PUMP FITTINGS ITEM 5 TO 16 SHALL BE FURNISHED WITH FIRE PUMP MANUFACTURER
2. THE INSTALLATION OF CENTRIFUGAL FIRE PUMPS SYSTEM SHALL BE FEBRICATED, INSTALLED, TESTED AND PLACED INTO AUTOMATIC SERVICE IN ACCORDANCE WITH NFPA 20 & THE SPECIFICATION.
3. THE PRESSURE SENSING PIPE AND FITTING SHALL BE MADE OF STAINLESS STEEL PIPE SCHEDULE 80 A312 GR.TP304. SEAMLESS
4. FUEL PIPE AND FITTINGS SHALL BE MADE OF COPPER TUBE

DETAIL FLOW DIAGRAM
Scale : NTS

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Key Plan

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT CONTRACTS,SPECIFICATIONS,REPORTS AND DRAWINGS. COPYRIGHT IS VESTED TO CONSULTANTS. DO NOT SCALE DRAWING. USE FIGURED DIMENSIONS ONLY. THIS DRAWING IS AN UNCONTROLLED COPY UNLESS STAMPED OTHERWISE. VERIFY ALL DIMENSIONS ON THE SITE.

ISSUE - A

Phase One, Building 1a
Construction Document Phase.
(SAFETY & SECURITY DRAWINGS)

CD 100%	09/02/2010	FOR REVIEW
CD 50%	08/27/2010	FOR REVIEW

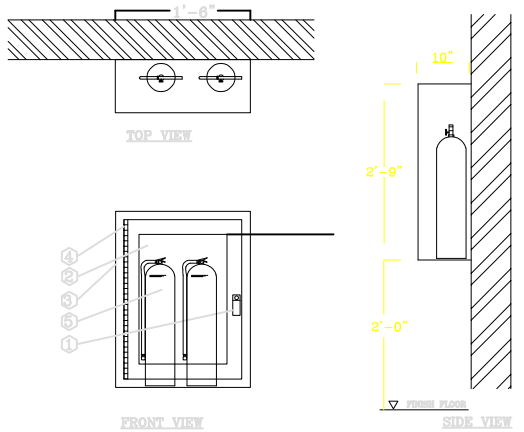
Seal Of Approval :

Drawn By : SM
Checked By : KM
Scale : 1:100

Drawing Title :

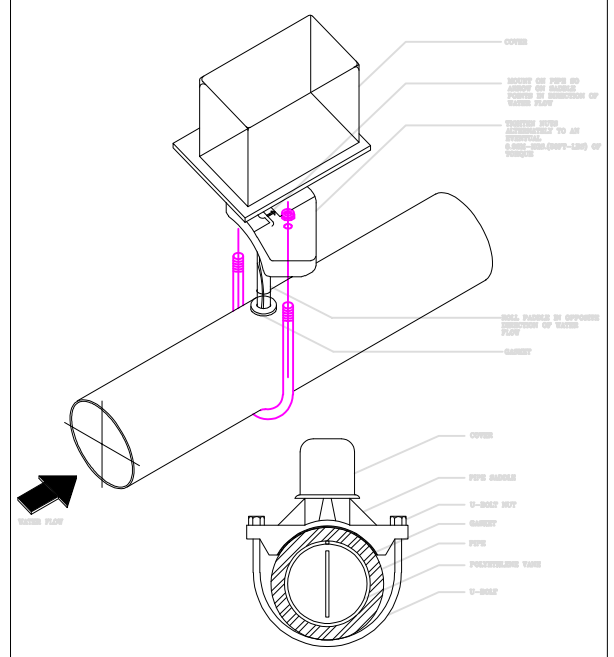
DETAIL SCHEMATIC DIAGRAM OF FIRE PUMP

SS-AD-02

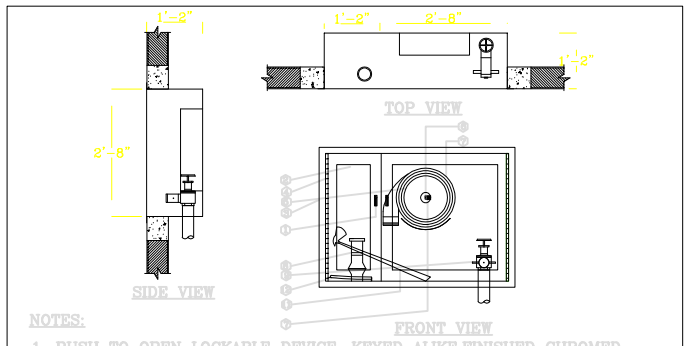


1. PUSH TO OPEN LOCKABLE DEVICE, KEYED ALIKE, FINISHED CHROMED.
2. SAFETY GLASS 5mm. THICK DOOR PANEL
3. SURFACE TYPE CABINET MADE OF 1.6mm. (16 GAUGE) STEEL WITH STEEL TRIM & DOOR FRAME, DOOR TO BE FURNISHED WITH CONTINUOUS STEEL HINGE (BRASS PIN), WITH PUSH TO OPEN LOCKABLE DEVICE, KEYED ALIKE, CABINET SHALL BE CLEANED & COATED WITH PHOSPHATE SOLUTION PRIOR TO BEING FINISHED WITH BACKED ON RED PAINTING (OSHA RED)
4. CONTIUOUS STEEL HINGE WITH BRASS PIN
5. ABC DRY CHEMICAL (AMMONIUM PHOSPHATE BASE) FIRE EXTINGUISHER, 4.5 kg.(10 LB), UL/FM LISTED, OR AS APPROVED TO TIS 332-2531

FIRE EXTINGUISHER CABINET
(SURFACE TYPE)



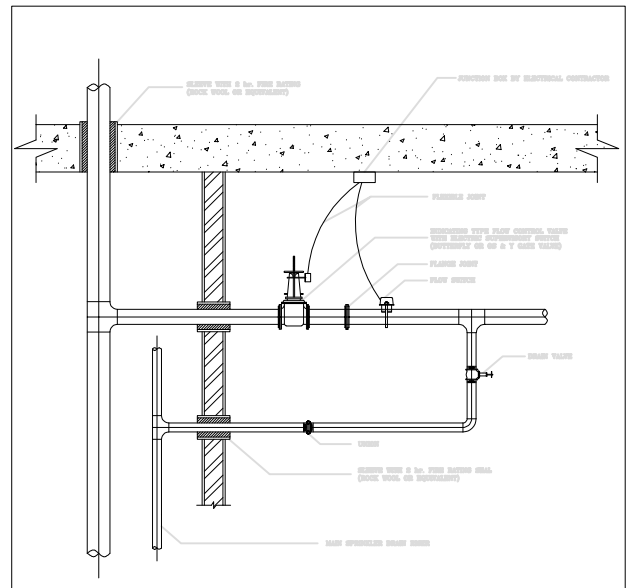
FLOW SWITCH INSTALLATION



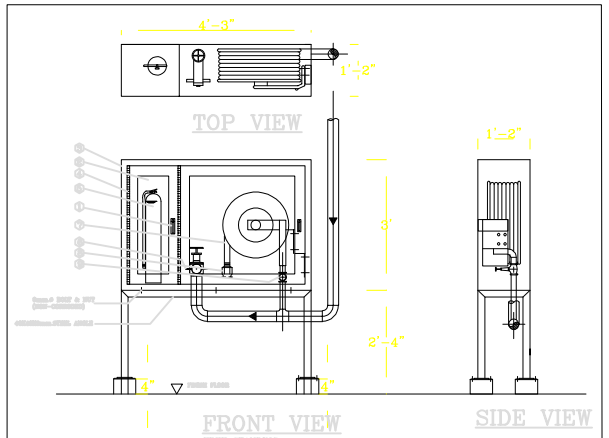
NOTES:

1. PUSH TO OPEN LOCKABLE DEVICE, KEYED ALIKE,FINISHED CHROMED
2. SAFETY GLASS 5mm. THICK DOOR PANEL
3. SURFACE TYPE CABINET MADE OF 1.6mm. (16 GAUGE) STEEL WITH STEEL TRIM & DOOR FRAME, DOOR TO BE FURNISHED WITH CONTINUOUS STEEL HINGE (BRASS PIN), WITH PUSH TO OPEN LOCKABLE DEVICE, KEYED ALIKE, CABINET SHALL BE CLEANED & COATED WITH PHOSPHATE SOLUTION PRIOR TO BEING FINISHED WITH BACKED ON RED PAINTING (OSHA RED)
4. CONTIUOUS STEEL HINGE WITH BRASS PIN
5. ALL SYNTHETIC SINGLE JACKET LINED 35 kg./cm. (500LB) FIRE HOSE 65mm.ø X 30m. (2½"ø X 100), UL/FM LISTED, WORKING PRESSURE 17.5 kg./cm. (250 PSI) TEST PRESSURE 35 kg./cm. (500 PSI) BURST PRESSURE 52 kg./cm. (750 PSI)
6. 65mm.ø(2½"ø) CAST BRASS INSTANTENEOUS COUPLING, MALE & FEMALE, TO BS 336.
7. STAINLESS STEEL WIRING.
8. CAST BRASS ADJUSTABLE STRAIGHT STEAM/FOG NOZZLE FOR 65mm.ø(2½"ø) HOSE WITH MALE INSTANTENEOUS.
9. 65mm.ø(2½"ø) CAST BRASS UL/FM. 21kg./CM2 (300LB) ANGLE HOSE VALVE WITH 65mm.ø(2½"ø) CAST BRASS INSTANTANEOUS COUPLING ADAPTOR WITH CAP & CHAIN.
10. STEEL HOSE BASE PLATE.
11. STEEL FIRE AXE LONG HANDLE.
12. HEAT RESISTANT HAND GLOVES.

FIRE HOSE CABINET 3
(L-01, AT FIREMAN)



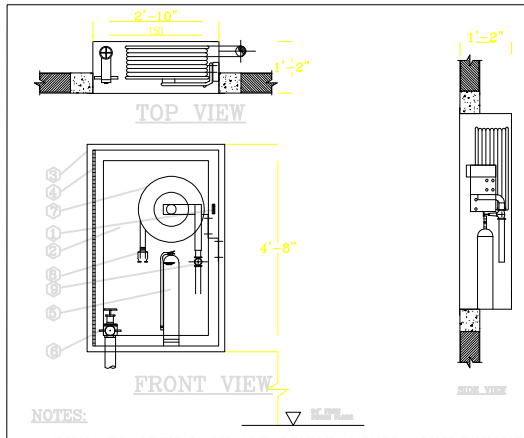
ELEVATION AT RISER
FEED MAIN AND CROSS MAIN



NOTES:

1. PUSH TO OPEN LOCKABLE DEVICE, KEYED ALIKE, FINISHED CHROMED
2. SAFETY GLASS 5mm. THICK DOOR PANEL
3. SURFACE TYPE CABINET MADE OF 1.6mm.(16 GAUGE) STEEL WITH STEEL TRIM & DOOR FRAME, DOOR TO BE FURNISHED WITH CONTINUOUS STEEL HINGE (BRASS PIN), WITH PUSH TO OPEN LOCKABLE DEVICE, KEYED ALIKE, CABINET SHALL BE CLEANED & COATED WITH PHOSPHATE SOLUTION PRIOR TO BEING FINISHED WITH BACKED ON RED PAINTING (OSHA RED)
4. CONTIUOUS STEEL HINGE WITH BRASS PIN
5. ABC DRY CHEMICAL (AMMONIUM PHOSPHATE BASE) FIRE EXTINGUISHER, 4.5 kg.(10 LB), UL/FM LISTED, OR AS APPROVED TO TIS 332-2531
6. 65mm.ø (2½"ø) CAST BRASS UL/FM. 21kg./cm.2 (300LB) ANGLE HOSE VALVE WITH 65mm.ø (2½"ø) CAST BRASS INSTANTANEOUS COUPLING ADAPTOR WITH CAP & CHAIN.
7. AUTOMATIC RECESSED HOSEREEL COMPLETE SET TO BS 5274-1985 WITH 25mm.ø X 30m. (1"ø X 100') RED RUBBER HOSE, THERMOPLASTIC POLYMER COVERED TO BS 3169-1986 CLASS B TYPE 1. AUTOMATIC VALVE MECHANISM SHALL BE NON CORRODED METAL (STAINLESS STEEL)
8. PLASTIC NOZZLE 25mm.ø (1"ø) INLET WITH 10mm. ORIFICE OR AS APPROVED.
9. 25mm.ø (1"ø) BRASS GATE VALVE OR BALL VALVE AS APPROVED.

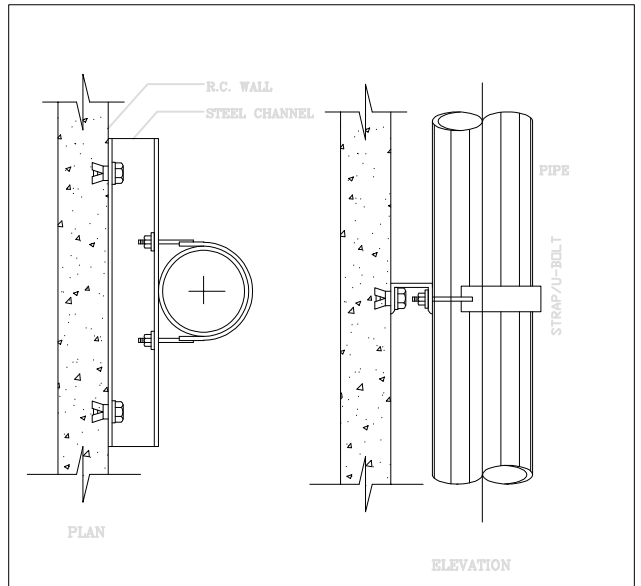
FIRE HOSE CABINET
ROOF MOUNTED



NOTES:

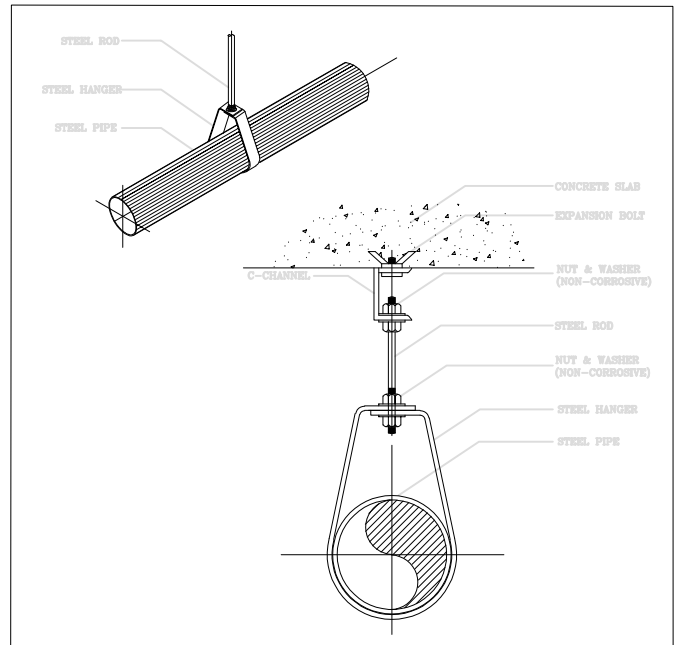
1. PUSH TO OPEN LOCKABLE DEVICE, KEYED ALIKE,FINISHED CHROMED
2. SAFETY GLASS 5mm. THICK DOOR PANEL
3. SURFACE TYPE CABINET MADE OF 1.6mm.(16 GAUGE) STEEL WITH STEEL TRIM & DOOR FRAME, DOOR TO BE FURNISHED WITH CONTINUOUS STEEL HINGE (BRASS PIN), WITH PUSH TO OPEN LOCKABLE DEVICE, KEYED ALIKE, CABINET SHALL BE CLEANED & COATED WITH PHOSPHATE SOLUTION PRIOR TO BEING FINISHED WITH BACKED ON RED PAINTING (OSHA RED)
4. CONTIUOUS STEEL HINGE WITH BRASS PIN
5. ABC DRY CHEMICAL (AMMONIUM PHOSPHATE BASE) FIRE EXTINGUISHER 4.5 kg.(10 LB), UL/FM LISTED, OR AS APPROVED TO TIS 332-2531
6. 65mm.ø (2½"ø) CAST BRASS UL/FM. 21kg./cm.2 (300LB) ANGLE HOSE VALVE WITH 65mm.ø (2½"ø) CAST BRASS INSTANTANEOUS COUPLING ADAPTOR WITH CAP & CHAIN.
7. AUTOMATIC RECESSED HOSEREEL COMPLETE SET TO BS 5274-1985 WITH 25mm.ø X 30m. (1"ø X 100') RED RUBBER HOSE, THERMOPLASTIC POLYMER COVERED TO BS 3169-1986 CLASS B TYPE 1. AUTOMATIC VALVE MECHANISM SHALL BE NON CORRODED METAL (STAINLESS STEEL)
8. PLASTIC NOZZLE 25mm.ø (1"ø) INLET WITH 10mm. ORIFICE OR AS APPROVED.
9. 25mm.ø (1"ø) BRASS GATE VALVE OR BALL VALVE AS APPROVED.

FIRE HOSE CABINET
WALL CONCEALED TYPE



NOTE: 1. ALL STEL PARTS SHALL BE PAINTED WITH 2 COATS OF ANTI-RUST PAINTAND 1 COAT OF FINISHED PAINT OR AS SPECIFIED.
2. A DIRT LEG AND BLOW-OFF VALVE SHALL BE PROVIDED ON EVERY RISERS.

PIPE RISER



NOTE: ALL STEEL PARTS SHALL BE PAINTED WITH 2 COATS OF ANTI-RUST PAINT AND 1 COAT OF FINISHED PAINT OR AS SPECIFIED.

PIPE HANGER FOR SIZE UP TO 50mm. (2"ø)

Asian University For Women
Chittagong, Bangladesh
www.asian-university.org
Phase One, Building 1a

Client
Asian University For Women Foundation
100 Massachusetts Ave.
Suite 300
Cambridge,MA 02138, USA

Architect
Moshe Safdie and Associates
100 Properzi Way
Somerville MA 02143, USA

Associate Architects
VITTI-SHS Consortium
2, Shangshad Avenue, 3rd Level,
Munipuripara, Dhaka 1215, Bangladesh

ASSOCIATE CONSULTANTS:

STRUCTURAL & CIVIL :
DESIGN PLANING AND MANAGEMENT CONSULTANT LTD. (DPM)
House no:4/1(2nd floor). Road no-4
Dhanmondi,Dhaka-1205, Bangladesh
Phone : 8610116-7.

BRTC
Bangladesh University of Engineering & Technology , BUET.Polashi, Dhaka-1000, Bangladesh
Phone : 8614640 , 9665650.PABX.

MECHANICAL AND PLUMBING :

AVE ENGINEERS & CONSULTANT LTD.
House no:5/3(1st floor). Block-A
Lalmatia,Dhaka-1205, Bangladesh
Phone : 8610116-7.

ELECTRICAL:
TECHNO CONSULTANTS
House no:86(1st floor),Road no-9/A Dhanmondi, Dhaka-1209, Bangladesh
Phone : 8610116-7.

Key Plan

ISSUE - A

Phase One, Building 1a
Construction Document Phase.
(SAFETY & SECURITY DRAWINGS)

CD 100%	09/30/2010	FOR REVIEW
CD 50%	08/22/2010	FOR REVIEW

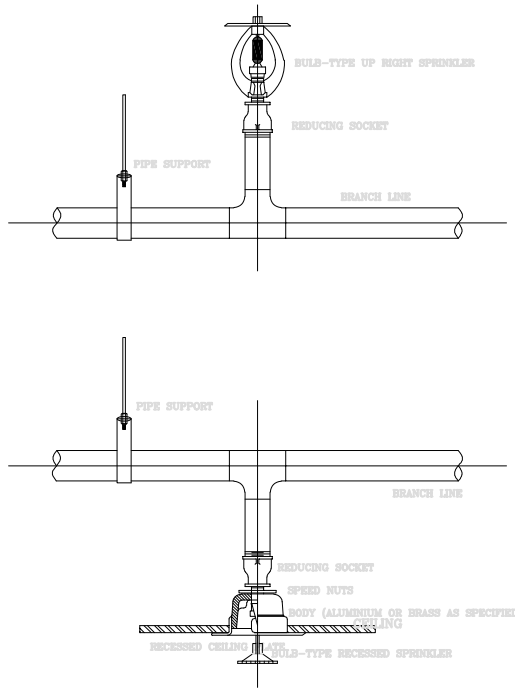
Seal Of Approval :

Drawn By : SM
Checked By : KM
Scale : 1:100

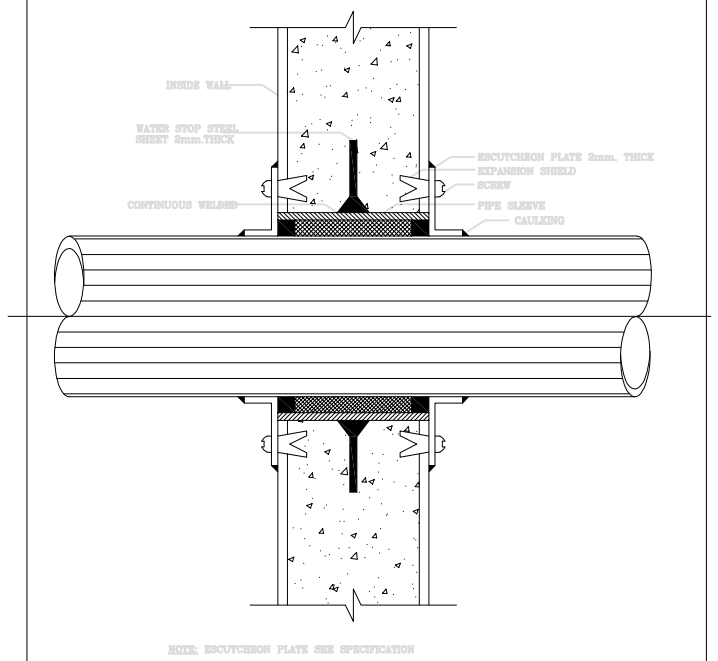
Drawing Title :

FIRE PROTECTION FABRICATION DETAIL-1

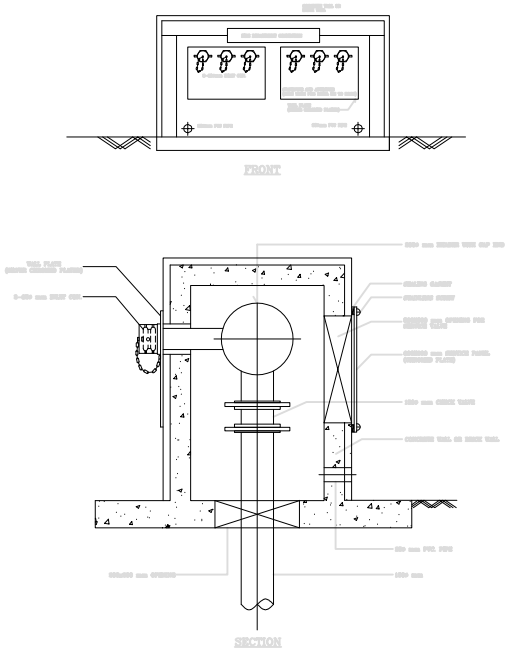
SS-AD-03



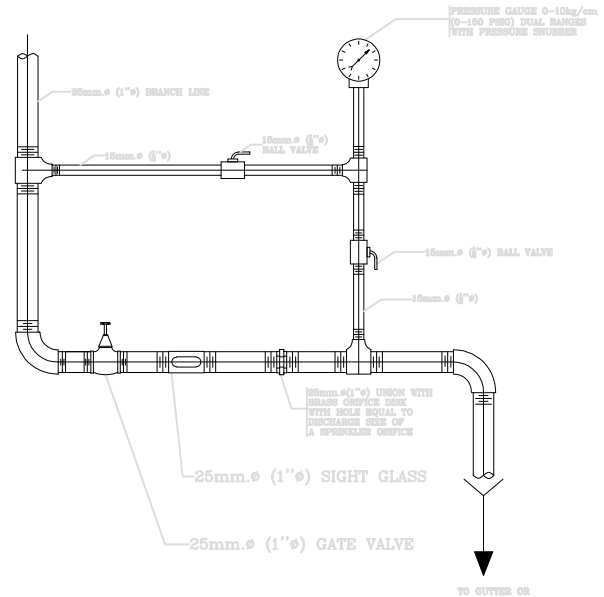
SPRINKLER HEAD INSTALATION



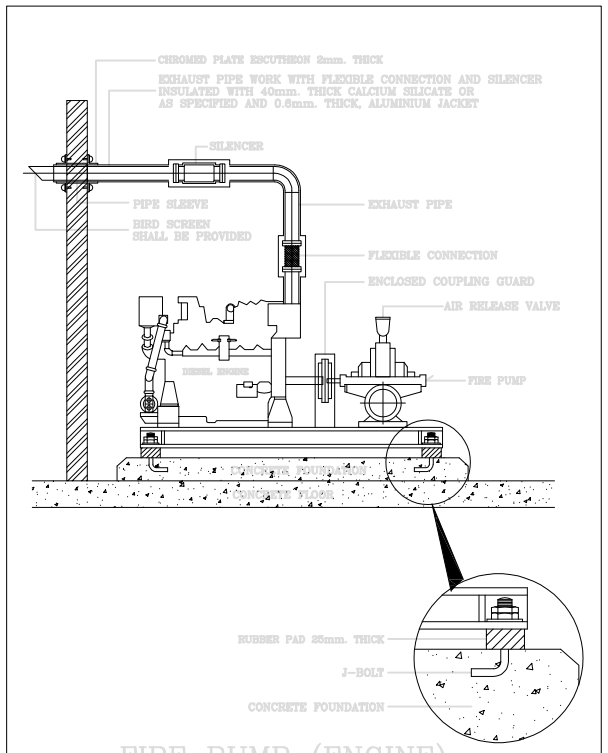
PIPE SLEEVE THROUGH OUTSIDE WALL



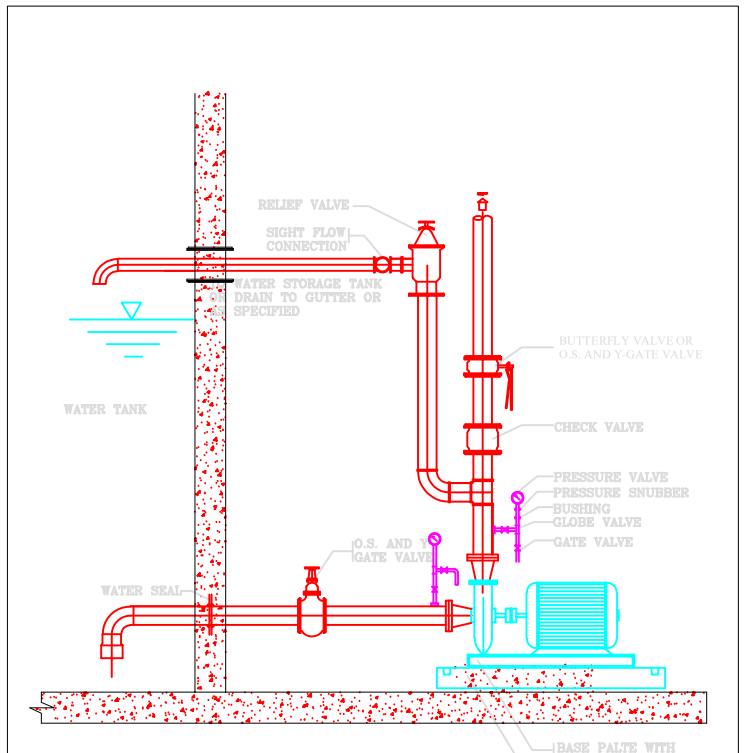
FIRE DEPARTMENT CONNECTION



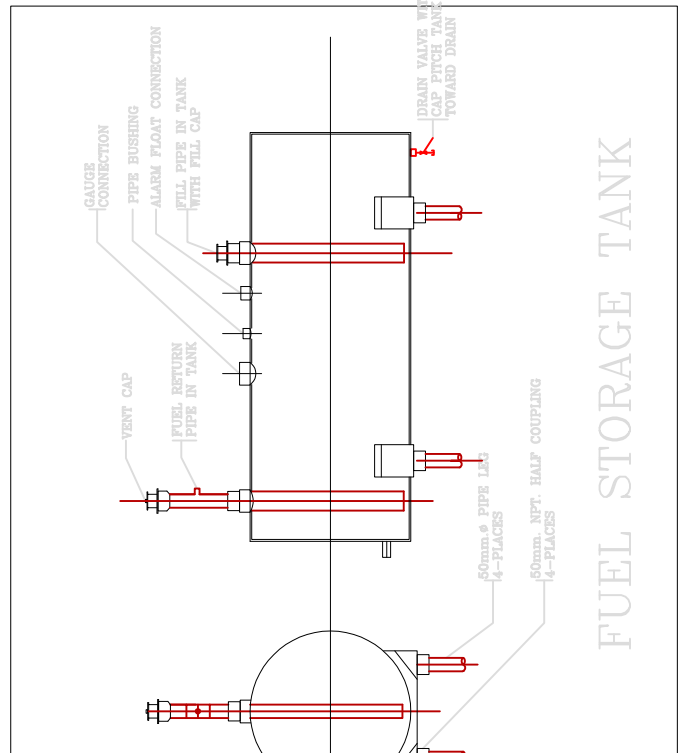
TEST STATION

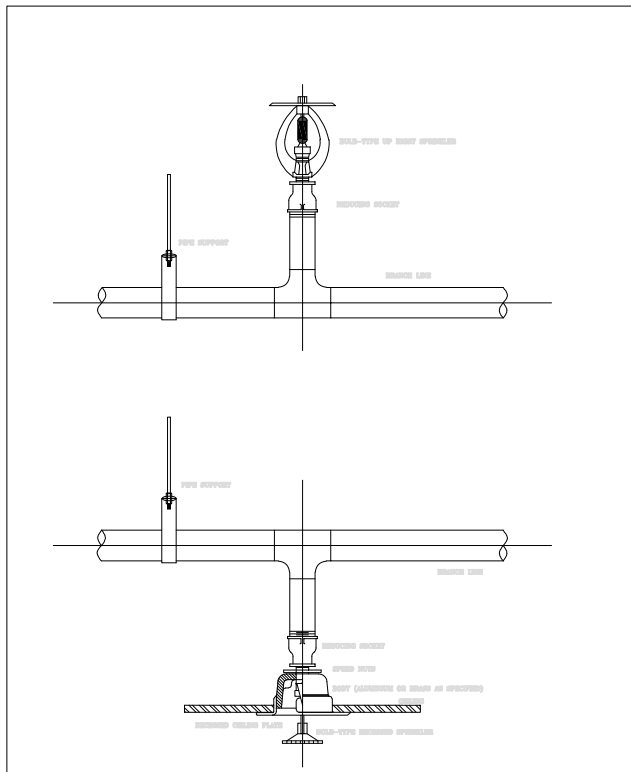


FIRE PUMP (ENGINE)



FIRE PUMP





SPRINKLER HEAD INSTALATION

Asian University For Women
Chittagong, Bangladesh
www.asian-university.org
Phase One, Building 1a

Client
Asian University For Women Support Foundation
100 Massachusetts Ave.
Suite 300
Cambridge,MA 02138, USA

Architect
Moshe Safdie and Associates
100 Properzi Way
Somerville MA 02143, USA

Associate Architects
VITTI-SHS Consortium
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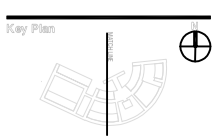

ISSUE - A

Phase One, Building 1a
Construction Document Phase.
(SAFETY & SECURITY DRAWINGS)

CD 100%	09/30/2010	FOR REVIEW
CD 50%	08/27/2010	FOR REVIEW

Seal Of Approval :

Drawn By : SM
Checked By : KM
Scale : 1:100

Drawing Title :

FIRE PROTECTION FABRICATION DETAIL-2

SS-AD-04