STATELIFE INSURANCE CORPORATION OF PAKISTAN

Tender Document

VOLUME-I
CONDITIONS OF CONTRACT

FIRE ALARM AND FIRE SUPPRESSION SYSTEM FOR STATELIFE BUILDING NO.11, KARACHI

Tender No. FF-SLB#11/01-2026

Address: Chief Engineer State Life Insurance Corporation Of Pakistan, 5th Floor, Real Estate Division, State Life Building No. 9, Principal Office,
Dr. Ziauddin Ahmed Road, Karachi-75530, Pakistan.
Tel: 021-99204520.

SUMMARY OF CONTENTS

INVITATION FOR BIDS

NOTICE INVITING TENDER

Tender No. FF-SLB#11/01-2026

State Life Insurance Corporation of Pakistan, Chief Engineer State Life Insurance Corporation Of Pakistan invites E-Bids through E-Pak Acquisition and Disposal System (EPADS) from PEC Registered Constructors/ Contractors in the Category of C-4 and above, and with Active Taxpayers List of the FBR and SRB for the FIRE ALARM AND FIRE SUPPRESSION SYSTEM FOR STATELIFE BUILDING NO.11, KARACHI.

Name of Work	Tender Fee (Rs.)	Bid Security
FIRE ALARM AND FIRE SUPPRESSION SYSTEM FOR STATELIFE BUILDING NO.11, KARACHI.	Nil	PKR 1,800,000/-

1. The Eligibility Criteria in details is mentioned in the bidding documents, refer **clause IB.2** for meeting the requirements of this tender.

2. A complete set of bidding documents may be downloaded from date of publication up to 23-09-2026 **before 11:00 AM** from E-Pak Acquisition and Disposal System (EPADS).

3. The method of procurement would be ***Single Stage Two Envelope.***

4. Tender Manual bid shall not be received. Interested Bidders are required to register themselves on EPAD System at the link www.eprocure.gov.pk for submission of electronic-bids.

5. The bids would be rejected and considered non-responsive under following conditions;

(i) Conditional and telegraphic bids/tenders;

(ii) Bids not accompanied by bid security of required amount and Soft should be uploaded on EPADS while Hardcopy to be submitted in person.

(iii) Bids received / uploaded on EPADS after specified date and time.

6. Bid validity Period is (180) days

7. (i) **Submission:** The bids prepared in accordance with the instructions in the bidding documents, must be submitted on EPADS by **23-09-*2026 up to 11:00AM on EPADS.*** and the bid security of PKR 1,800,000/-must reach the following procurement agency before the deadline for submission of e-bids, which will be opened on the same day.

(ii) **Opening:** tenders will be opened on **23-09-*2026 @ 11:30AM*** at the below mentioned address in the presence of Procurement Committee and representative of bidders.

(iii) **Place** of issuance, inquiries and opening will be below mention postal Address.

(iv) In case of Govt, announces any Public Holiday or any unfavorable circumstances, the tender /bids will be opened on next working day through EPADS with same Venue and Time.

8. SLIC reserves the right to reject all or any bids subject to the relevant provisions of Public Procurement Regulatory Authority Rules, 2004.

Chief Engineer State Life Insurance Corporation Of Pakistan, Real Estate Division,
State Life Building No. 9, Principal Office,
Dr. Ziauddin Ahmed Road, Karachi-75530, Pakistan.
TEL: 021-99204520

INSTRUCTIONS TO BIDDERS & BIDDING DATA

Notes on the Instructions to Bidders

This section of the bidding documents should provide the information necessary for bidders to prepare responsive bids, in accordance with the requirements of the Procuring Agency. It should also give information on bid submission, opening and evaluation, and on the award of contract.

Matters governing the performance of the Contract or payments under the Contract, or matters affecting the risks, rights, and obligations of the parties under the Contract are not normally included in this Section, but rather in the appropriate sections of the *Conditions of Contract* and/or *Contract Data.*

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INSTRUCTIONS TO BIDDERS

INSTRUCTIONS TO BIDDERS

A. GENERAL

IB.1 Scope of Bid & Source of Funds

1.1 Scope of Bid

The Procuring Agency as defined in the Bidding Data (hereinafter called the State Life Insurance Corporation of Pakistan, Chief Engineer State Life Insurance Corporation of Pakistan wishes to receive Bids for the Works summarized in the Bidding Data (hereinafter referred to as the Works "FIRE ALARM AND FIRE SUPPRESSION SYSTEM FOR STATELIFE BUILDING NO.11, KARACHI." Bidders must quote for the complete scope of work. Any Bid covering partial scope of work will be rejected as non-responsive.

1.2 Source of Funds

The Employer has funds from own resources in Pakistani currency towards the cost of the project and it is intended that part of the proceeds of this it will be applied to eligible payments under the Contract for which these Bidding Documents are issued.

IB.2 Eligible Bidders

2.1 Bidding is open to all firms and persons meeting the following requirements:

1. Tender documents duly signed and stamped by signing authority.
2. Documents showing Registration of the Firm document under the Law as Sole Proprietor, Partnership or Pvt. Limited firm.
3. Copy of NTN certificate & FBR activated account certificate.
4. Copy of last year paid income tax return.
5. Copy of registration with SRB.
6. Bank certificate showing financial capability.
7. Copy of valid certificate of Pakistan Engineering Council is mandatory with minimum C-4 Category and having CE-10(ii), ME-02, and EE-11 PEC codes.
8. The Bidder must possess relevant experience for execution of such similar nature of projects in any Government, Semi-Government or private institutions of Pakistan in the last 3 years provide documentary evidence.
9. The Bidder must provide the documentary evidences of containing the information and data tendering to prove experience, expertise, source and import documents, required skills, human and financial resources and completion certificate of executing such assignments.
10. Submit Affidavit at Original Rs.100 Stamp paper that firm is not black listed in any Government, Semi-Government, Autonomous body & Private Institutions.

2.2 Evaluation Criteria

The further detailed criteria for each category as given under each head as follows:

2.2.1 Revised Scoring Criteria (100 Marks)

Category	Marks
Financial Soundness	25
Experience in Fire Alarm and Fire Suppression system	45
Personnel Capabilities	10
Equipment & Tools	10
Certifications	10

Minimum qualifying score: 60 marks.

2.2.2 Financial Soundness – 25 Marks

Credit Marks shall be awarded on the basis of the following criteria:

Description	Requirement	Marks
Audited Financial Statements	Audited Statement/ Bank Statements of Last 03 years, showing Annual Turnover of 50 million	15
Working Capital / Bank Credit Line	Working Capital/ showing current month Liquid Cash or Valid Bank Credit Line available, minus other commitments of & net value PKR 20 million	5
Income Tax Returns	Last 3 years	5

2.2.3 Experience in Fire Fighting & Renovation Works– 45 Marks

Credit Marks shall be awarded under this category using the following qualifications:

Description	Requirement	Marks
Fire Fighting Projects	Three (03) projects of similar nature, each having a value of PKR 50 million or above, successfully completed during the last five (05) years.	15
Projects Currently in Hand	Three (03) projects of similar nature, each having a value of PKR 25 million or above, currently in hand.	15
Related Experience of firm	1–10 years	10
Enlistment with Government organizations	Status of enlistment with Government Organizations and other credible agencies.	5

2.2.4 Personnel Capabilities – 10 Marks

Credit Marks shall be awarded under this category using the following criteria:

Position	Minimum Requirement	Marks
Project Manager	BE Mechanical, 10 years of relevant Experience.	5
Site Engineer	BE Mechanical, 5 years	2
MEP Engineer	Electrical/Mechanical, 3+ years	2
Quantity Surveyor	DAE Civil/Mechanical, 3+ years	1

2.2.5 Equipment Capabilities – 10 Marks

Credit Marks shall be granted based on the following criteria for various kinds of equipment relevant for the Project:

Equipment	Marks
Pipe threading machine	10
Digital Multimeter	
Pipe Cutting & Grooving Machine	
Hydrostatic Pressure Testing pump	
Fire Pump Testing Equipment (Flow meter, Pressure gauge)	
Fire Alarm testing Equipment	
Ladders, Mobile Scaffolding	
Core Cutter / Demolition Tools	
Welding & Fabrication Equipment	
Electrical Testing Instruments	
Pickup/Transport Vehicles	
Survey Equipment	

2.2.6 Certification – 10 Marks

Certification	Marks
NFPA 72 Certification/Training (Fire Alarm)	3
NFPA 13 Certification/Training (Sprinkler Systems)	3
ISO 9001	4

IB.3 Cost of Bidding

3.1 The bidder shall bear all costs associated with the preparation and submission of its bid and the Office of "State Life Insurance Corporation of Pakistan" will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process (PPR Rules 23(5)).

BIDDING DOCUMENTS

IB.4 Contents of Bidding Documents

4.1 In addition to Invitation for Bids, the Bidding Documents are those stated below, and should be read in conjunction with any Addendum issued in accordance with Sub-Clause IB.6.1.

1. Instructions to Bidders & Bidding Data
2. Form of Bid, Qualification Information & Schedules to Bid Schedules to Bid comprise the following:

   (i) Schedule A: Schedule of Prices/ Bill of Quantities (BOQ).
   (ii) Schedule B: Specific Works Data
   (iii) Schedule C: Works to be Performed by Subcontractors
   (iv) Schedule D: Proposed Programme of Works
   (v) Schedule E: Method of Performing Works
   (vi) Schedule F: Integrity Pact (works costing Rs 10 million and above)

3. Conditions of Contract & Contract Data

4. Standard Forms
   (i) Form of Bid Section
   (ii) Form of Performance Security;
   (iii) Form of Contract Agreement;
   (iv) Form of Bank Guarantee for Advance Payment. (Not Applicable)

5. Specification Drawings, if any

IB.5 Clarification of Bidding Documents

5.1 A prospective bidder requiring any clarification(s) in respect of the Bidding Documents may notify the "State Life Insurance Corporation of Pakistan, **Chief Engineer State Life Insurance Corporation of Pakistan**" on EPADS.

IB.6 Amendment of Bidding Documents (PPR Rules 23(3) & 23).

6.1 At any time prior to the deadline for submission of Bids, the Procuring Agency may, for any reason, whether at his own initiative or in response to a clarification requested by a interested bidder, modify the Bidding Documents by issuing addendum.

6.2 Any addendum thus issued shall be part of the Bidding Documents pursuant to Sub-Clause 6.1 hereof, and shall be communicated in writing to all purchasers of the Bidding Documents. Prospective bidders shall acknowledge receipt of each addendum in writing to the Procuring Agency.

6.3 To afford interested bidders reasonable time in which to take an addendum into account in preparing their Bids, the Procuring Agency may at its discretion extend the deadline for submission of Bids.

C. PREPARATION OF BIDS

IB.7 Language of Bid

7.1 All documents relating to the Bid shall be in the language specified in the Contract Data.

IB.8 Documents Comprising the Bid

8.1 The Bid submitted by the bidder shall comprise the following:

a) Offer /Covering Letter
b) Form of Bid duly filled, signed and, in accordance with IB.14.3.
c) Schedules (A to F) to Bid duly filled and initialled, in accordance with the instructions contained therein & in accordance with IB.14.3.
d) Bid Security furnished in accordance with IB.13.
e) Power of Attorney in accordance with IB 14.5.
f) Documentary evidence in accordance with IB.2(c) & IB.11
g) Documentary evidence in accordance with IB.12.

THE GAZETTE OF PAKISTAN, EXTRAORDINARY

[PART II] — MAY 14, 2022

S. R. O. 592(I)/2022.—In exercise of the powers conferred by Section 27 of the Public Procurement Regulatory Authority Ordinance, 2002 (No. XXII of 2002), the Public Procurement Regulatory Authority is pleased to make the following regulations, namely:—

1. Short title and commencement.—(1) These regulations may be called the Declaration of Beneficial Owners' Information of Public Procurement Contract Awarded Regulations, 2022.

(2) They shall come into force at once.

2. Definitions.—(1) In these Regulations, unless there is anything repugnant in the subject or context:—

(a) "Company" means a company formed and registered under the company law and includes but not limited to a private limited company, public limited company, firm, association of persons or sole proprietorship or any other form of business organization.

(b) "Beneficial Owner (BO)" means,—

(i) a natural person who ultimately owns or controls the bidder's company and/or the natural person on whose behalf a transaction is being conducted; or

(ii) a natural person who exercises ultimate effective control over a legal person or legal arrangement.

[The definition of "Beneficial Owner" is adopted from the Anti-Money Laundering Act, 2010.]

(c) "Public Procurement Contract (PPC)" means the contract awarded under the Public Procurement Regulatory Authority Ordinance, 2002, Public Procurement Rules, 2004 and the Regulations.

(2) The expressions used but not defined in these Regulations shall have the same meaning as are assigned to them in the Public Procurement Regulatory Authority Ordinance, 2002, Public Procurement Rules, 2004 and the Regulations.

3. Scope.—These Regulations shall extend to the whole of Pakistan and shall be applicable to all the procuring agencies within or outside Pakistan.

4. Declaration of Beneficial Ownership Information.—All procuring agencies while engaging in public procurement contracts worth Rs. 50 Million and above shall make a mandatory provision of beneficial ownership information of the company in the said contracts as per prescribed proforma (Annexure-I) in accordance with provisions of Forms-42, 43 and 44 of the Securities & Exchange Commission of Pakistan.

5. Enforcement Mechanism of Beneficial Ownership Information.—(1) Subject to regulation 4, the procuring agencies while engaging in public procurement contract awards shall publicise the beneficial ownership information of the company on PPRA's website.

(2) In case of failure to provide the required information of the beneficial ownership by the company or submission of false or partial information, the procuring agency shall:

i. Blacklist the said company in accordance with rule 19(1)(a) of the Public Procurement Rules, 2004.

ii. Reject the bid of the said company:

Provided that any object or class of objects procured in contravention of any provision of these regulations shall amount to mis-procurement.

(3) In case the procuring agency fails to obtain the required information as per prescribed proforma (Annexure-I) from a prospective bidder during the procurement process and the procuring agency enters into a contract with the said bidder, then the Managing Director (PPRA) may declare such procurement process as mis-procurement and blacklist the said bidder.

ANNEXURE-I

Declaration of Ultimate Beneficial Owners' Information for Public Procurement Contracts

1. Name
2. Father's Name / Spouse's Name
3. CNIC / NICOP / Passport No.
4. Nationality
5. Residential address
6. Email address
7. Date on which shareholding, control or interest was acquired in the business.
8. In case of indirect shareholding, control or interest being exercised through intermediary companies, entities or other legal persons or legal arrangements in the chain of ownership or control, the following additional particulars to be provided:

Legal form (company / Limited Liability Partnership / Association of Persons / Single Member Company / Partnership Firm / Trust / Any other individual, body corporate — to be specified)	Country	CNIC / NICOP / Registration No.	Percentage of shareholding, control or interest of BO in the legal person or legal arrangement	Percentage of shareholding, control or interest of BO in the Company	Identity of the natural person who ultimately owns or controls the legal person or legal arrangement

9. Information about the Board of Directors (details shall be provided regarding the number of shares in the capital of the company as set opposite respective names).

Name and surname (in Block Letters)	CNIC No. (in case of foreigner, Passport No.)	Father's / Husband's Name in full	Current Nationality	Any other Nationality	Residential address in full (or registered principal office address for subscribers other than a natural person)	No. of shares taken by cash (figures and words)

10. Any other information incidental or relevant to the Beneficial Owner(s).

_____

Name and signature

(Person authorized to issue notice on behalf of the company)

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IB.9 Sufficiency of Bid

9.1 Each bidder shall satisfy himself before Bidding as to the correctness and sufficiency of his Bid and prices quoted/entered in the Schedule of Prices, which rates and prices shall except in so far as it is otherwise expressly provided in the Contract, cover all his obligations under the Contract and all matters and things necessary for the proper completion of the works.

9.2 The bidder is advised to obtain for himself at his own cost and responsibility all information that may be necessary for preparing the bid and entering into a Contract for execution of the Works.

IB.10 Bid Prices, Currency of Bid and Payment

10.1 The bidder shall fill up the Schedule of Prices (Schedule A to Bid)/ Bill of Quantities indicating the Rates/unit rates and prices of the Works to be performed under the Contract. Prices in the Schedule of Prices/Bill of Quantities shall be quoted entirely in Pak Rupees keeping in view the instructions contained in the Preamble to Schedule of Prices.

10.2 Unless otherwise stipulated in the Conditions of Contract, prices quoted by the bidder shall remain fixed during the bidder ‘s performance of the Contract and not subject to variation on any account.

10.3 The unit rates and prices in the Schedule of Prices shall be quoted by the bidder in the currency as stipulated in Bidding Data.

10.4 Items for which no rate or price is entered by the Bidder will not be paid for by the Procuring Agency when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities.

IB.11 Documents Establishing Bidder’s Eligibility and Qualifications

11.1 Pursuant to Clause IB.8, the bidder shall furnish, as part of its bid, documents establishing the bidder‘s eligibility to bid and its qualifications to perform the Contract if its bid is accepted.

11.2 Bidder must possess and provide evidence of its capability and the experience as stipulated in Bidding Data and the Qualification Criteria mentioned in the Bidding Documents.

IB.12 Documents Establishing Works’ Conformity to Bidding Documents

12.1 The documentary evidence of the Works ‘conformity to the Bidding Documents may be in the form of literature, drawings and data and the bidder shall furnish documentation as set out in Bidding Data.

12.2 The bidder shall note that standards for workmanship, material and equipment, and references to brand names or catalogue numbers, if any, designated by the Procuring Agency in the Technical Provisions are intended to be descriptive only and not restrictive.

IB.13 Bid Security

13.1 Each bidder shall furnish, as part of his bid, at the option of the bidder, a Bid Security of fixed amount stipulated in Bidding Data in Pak. Rupees in the form of *Deposit at Call/ Payee’s Order/Demand Draft or a Bank Guarantee* issued by a Scheduled Bank in Pakistan in favour of the “State Life Insurance Corporation of Pakistan” valid for a period up to One Hundred Eighty (180) days beyond the bid submission date as per PPR Rule 25 the Bid Security shall PKR 1,800,000/-

13.2 Any bid not accompanied by an acceptable Bid Security shall be rejected by the **Committee** State Life Insurance Corporation of Pakistan as non-responsive. Soft copy of Bid Security shall be uploaded on EPADS while, Hardcopy should be submitted to the "Office of Chief Engineer State Life Insurance Corporation of Pakistan" before deadline.

13.3 The bid securities of unsuccessful bidders will be returned upon award of contract to the successful bidder or on the expiry of validity of Bid Security whichever is earlier.

13.4 The Bid Security of the successful bidder will be returned when the bidder has furnished the required Performance Security, and signed the Contract Agreement (PPR Rule 39).

13.5 The Bid Security may be forfeited:

a) if a bidder withdraws his bid during the period of bid validity; or
b) if a bidder does not accept the correction of his Bid Price, pursuant to Sub-Clause 16.4 (b) hereof; or
c) in the case of a successful bidder, if he fails within the specified time limit to:
   (i) furnish the required Performance Security or
   (ii) sign the Contract Agreement.

IB.14 Validity of Bids, Format, Signing and Submission of Bid

14.1 Bids shall remain valid for the period stipulated in the Bidding Data after the date of bid opening.

14.2 In exceptional circumstances, Procuring Agency may request the bidders to extend the period of validity for an additional period but not exceedingly more than 180 days. The request and the bidders' responses shall be made in writing or by cable. A Bidder may refuse the request without forfeiting the Bid Security. A Bidder agreeing to the request will not be required or permitted to otherwise modify the Bid, but will be required to extend the validity of Bid Security for the period of the extension, and in compliance with IB.13 in all respects (PPR Rule 26(4)).

14.3 All Schedules to Bid are to be properly completed and signed.

14.4 No alteration is to be made in the Form of Bid except in filling up the blanks as directed. If any alteration be made or if these instructions be not fully complied with, the bid may be rejected.

14.5 Each bidder shall prepare number of copies specified in the Bidding Data of the documents comprising the bid as described in IB.8 and clearly mark them **"COPY"** as appropriate.

14.6 The original and all scanned copies of the bid shall be typed or written in indelible ink and shall be signed by a person or persons duly authorized to sign. This shall be indicated by submitting a written Power of Attorney authorising the signatory of the bidder to act for and on behalf of the bidder. All pages of the bid shall be initialed and official seal be affixed by the person or persons signing the bid.

14.7 The Bid shall be uploaded on EPADS before the deadline mentioned in the bidding data sheet.

D. SUBMISSION OF BID

IB.15 Deadline for Submission, Modification & Withdrawal of Bids

15.1 Bids must be uploaded on EPADS as provided in Bidding Data not later than the time and date stipulated therein.

15.2 Bids should be Submitted Electronically through EPADS, Bids submitted through telegraph, telex, fax or e-mail shall not be considered and no physical bid will be considered as well.

15.3 Any bid received by the Procuring Agency after the deadline for submission prescribed in Bidding Data will not be considered.

15.4 Withdrawal of a bid during the interval between the deadline for submission of bids and the expiration of the period of bid validity specified in the Form of Bid may result in forfeiture of the Bid Security pursuant to IB.13.5 (a).

E. BID OPENING AND EVALUATION

IB.16 Bid Opening, Clarification and Evaluation (PPR Rules 28, 29, 30 & 31)

16.1 The Office of Chief Engineer State Life Insurance Corporation of Pakistan, "**Committee**" will open the bids, in the presence of bidder's representatives Electronically through EPADS System, at the time, date and in the place specified in the Bidding Data.

16.2 The bidder's name, Bid Prices, the presence or absence of Bid Security, and such other details as the Procuring Agency at its discretion may consider appropriate, will be announced by the Procuring Agency at the bid opening. The Procuring Agency will record the minutes of the bid opening. Representatives of the bidders who choose to attend shall sign the attendance sheet.

Any Bid Price or discount which is not read out and recorded at bid opening will not be taken into account in the evaluation of bid.

16.3 To assist in the examination, evaluation and comparison of Bids the Engineer/Procuring Agency may, at its discretion, ask the bidder for a clarification of its Bid. The request for clarification and the response shall be in writing and no change in the price or substance of the Bid shall be sought, offered or permitted (PPR Rule 31).

16.4 (a) Prior to the detailed evaluation, pursuant to IB.16.7 to 16.9, the Engineer/Procuring Agency will determine the substantial responsiveness of each bid to the Bidding Documents. For purpose of these instructions, a substantially responsive bid is one which conforms to all the terms and conditions of the Bidding Documents without material deviations. It will include determining the requirements listed in Bidding Data.

(b) Arithmetical errors will be rectified on the following basis:

If there is a discrepancy between the unit price and total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected. If there is a discrepancy between the words and figures the amount in words shall prevail. If there is a discrepancy between the Total Bid price entered in Form of Bid and the total shown in Schedule of Prices-Summary, the amount stated in the Form of Bid will be corrected by the Procuring Agency in accordance with the Corrected Schedule of Prices.

If the bidder does not accept the corrected amount of Bid, his Bid will be rejected and his Bid Security forfeited.

16.5 A Bid determined as substantially non-responsive will be rejected and will not subsequently be made responsive by the bidder by correction of the non-conformity.

16.6 Any minor informality or non-conformity or irregularity in a Bid which does not constitute a material deviation **(major deviation)** may be waived by "Office of Chief Engineer State Life Insurance Corporation of Pakistan,

Provided such waiver does not prejudice or affect the relative ranking of any other bidders.

(A). Major (material) Deviations include:

Bid has been not properly signed;

(i) is not accompanied by the bid security of required amount and manner;
(ii) stipulating price adjustment when fixed price bids were called for;
(iii) failing to respond to specifications;
(iv) failing to comply with Mile-stones/Critical dates provided in Bidding Documents;
(v) sub-contracting contrary to the Conditions of Contract specified in Bidding Documents;
(vi) refusing to bear important responsibilities and liabilities allocated in the Bidding Documents, such as performance guarantees and insurance coverage;
(vii) taking exception to critical provisions such as applicable law, taxes and duties and dispute resolution procedures;
(viii) a material deviation or reservation is one:

(a) which affect in any substantial way the scope, quality or performance of the works;
(b) adoption/rectification whereof would affect unfairly the competitive position of other bidders presenting substantially responsive bids.

(B) Minor Deviations

Bids that offer deviations acceptable to the Procuring Agency and which can be assigned a monetary value may be considered substantially responsive at least as to the issue of fairness. This value would however be added as an adjustment for evaluation purposes only during the detailed evaluation process.

16.7 The Office of Chief Engineer State Life Insurance Corporation of Pakistan "**Commitee**" will evaluate and compare only the bids previously determined to be substantially responsive pursuant to IB.16.4 to 16.6 as per requirements given hereunder. Bids will be evaluated for complete scope of works. The prices will be compared on the basis of the Evaluated Bid Price pursuant to IB.16.8 herein below.

Technical Evaluation: It will be examined in detail whether the works offered by the bidder complies with the Technical Provisions of the Bidding Documents. For this purpose, the bidder's data submitted with the bid in Schedule B to Bid will be compared with technical features/criteria of the works detailed in the Technical Provisions. Other technical information submitted with the bid regarding the Scope of Work will also be reviewed.

16.8 Evaluated Bid Price

In evaluating the bids, the Engineer/Procuring Agency will determine for each bid in addition to the Bid Price, the following factors (adjustments) in the manner and to the extent indicated below to determine the Evaluated Bid Price:

(i) Making any correction for arithmetic errors pursuant to IB.16.4 hereof.
(ii) Discount, if any, offered by the bidders as also read out and recorded at the time of

bid opening.

(iii) Excluding **provisional sums** and the provisions for **contingencies** in the Bill of Quantities **if any**, but including **Day work,** where priced competitively.

IB.17 Process to be Confidential

17.1 Subject to IB.16.3 heretofore, no bidder shall contact Engineer/Procuring Agency on any matter relating to its Bid from the time of the Bid opening to the time the bid evaluation result is announced by the Procuring Agency. The evaluation result shall be announced at least seven (15) days prior to award of Contract (PPR Rule 35). The announcement to all bidders will include table(s) comprising read out prices, discounted prices, price adjustments made, final evaluated prices and recommendations against all the bids evaluated.

17.2 Any effort by a bidder to influence "**Office of Chief Engineer State Life Insurance Corporation of Pakistan**" in the Bid evaluation, Bid comparison or Contract Award decisions may result in the rejection of his Bid. Whereas any bidder feeling aggrieved, may lodge a written complaint to Complaint Redressal Committee as per terms and conditions mentioned in PPR Rules 48. However, mere fact of lodging a complaint shall not warrant suspension of procurement process.

17.3 Bidders may be excluded if involved in **"Corrupt and Fraudulent Practices"** means either one or any combination of the practices given below PPR Rule2(f);

(i) —**Coercive Practice** means any impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence the actions of a party to achieve a wrongful gain or to cause a wrongful loss to another party;

(ii) —**Collusive Practice** means any arrangement between two or more parties to the procurement process or contract execution, designed to achieve with or without the knowledge of the procuring agency to establish prices at artificial, non-competitive levels for any wrongful gain;

(iii) —**Corrupt Practice** means the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence the acts of another party for wrongful gain;

(iv) —**Fraudulent Practice** means 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;

(v) —**Obstructive Practice** means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in a procurement process, or affect the execution of a contract or deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements before investigators in order to materially impede an investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; 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 acts intended to materially impede the exercise of inspection and audit rights provided for under the Rules.

F. AWARD OF CONTRACT

IB.18. Post Qualification

18.1 The Office of Chief Engineer State Life Insurance Corporation of Pakistan "Committee", at any stage of the bid evaluation, having credible reasons for or prima facie evidence of any defect in contractor's capacities, may require the contractors to provide information concerning their professional, technical, financial, legal or managerial competence whether already pre-qualified or not:
Provided, that such qualification shall only be laid down after recording reasons therefore in writing. They shall form part of the records of that bid evaluation report.

18.2 The determination will take into account the bidder's financial and technical capabilities. It will be based upon an examination of the documentary evidence of the bidders 'qualifications submitted under B.11, as well as such other information required in the Bidding Documents.

IB.19 Award Criteria

19.1 Subject to IB.19.2, the "**Office of Chief Engineer** State Life Insurance Corporation of Pakistan" will award the Contract to the bidder whose bid has been determined to be Most Advantageous Bid and substantially responsive to the Bidding Documents and who has offered the lowest evaluated Bid Price, provided that such bidder has been determined to be qualified to satisfactory perform the Contract in accordance with the provisions of the IB.18.

19.2 Notwithstanding IB.19.1, the Procuring Agency reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids, at any time prior to award of Contract, without thereby incurring any liability to the affected bidders or any obligation to inform the affected bidders of the grounds for the Procuring Agency's action except that the grounds for its rejection of all bids shall upon request be communicated, to any bidder who submitted a bid, without justification of the grounds. Notice of the rejection of all the bids shall be given promptly to all the bidders (PPR Rule 33).

IB.20 Notification of Award & Signing of Contract Agreement

20.1 Prior to expiration of the period of bid validity prescribed by the Procuring Agency, the Procuring Agency will notify the successful bidder in writing (—Letter of Acceptance) that his bid has been accepted (PPR Rule 44(a)).

20.2 Within seven (07) days from the date of furnishing of acceptable Performance Security under the Conditions of Contract, the Procuring Agency will send the successful bidder the Form of Contract Agreement provided in the Bidding Documents, incorporating all agreements between the parties.

20.3 The formal Agreement between the "Office of Chief Engineer State Life Insurance Corporation of Pakistan" and the successful bidder duly stamped at rate of 0.35% of bid price (updated from time to time) stated in Letter of Acceptance shall be executed within seven (07) days of the receipt of Form of Contract Agreement by the successful bidder from the Procuring Agency.

IB.21 Performance Security

21.1 The successful bidder shall furnish to the Procuring Agency a Performance Security in the form and the amount stipulated in the Conditions of Contract within a period of fourteen (14) days after the receipt of Letter of Acceptance (PPR Rule 39).

21.2 Failure of the successful bidder to comply with the requirements of Sub-Clauses IB.20.2 & 20.3 or 21.1 or Clause IB.22 shall constitute sufficient grounds for the annulment of the award and forfeiture of the Bid Security.

21.3 Publication of Award of Contract: within seven days of the award of contract, the procuring shall publish on the website of the authority and on its own website, if such a website exists, the results of the bidding process, identifying the bid through procurement identifying Number if any and the following information:

1) Evaluation Report;
2) Form of Contract and letter of Award;
3) Bill of Quantities or Schedule of Requirements. (PPR Rule 38)

IB.22 Integrity Pact The Bidder shall sign and stamp the Form of Integrity Pact provided at Schedule-F to Bid in the Bidding Document for all Federal Government procurement contracts exceeding Rupees ten (10) million. Failure to provide such Integrity Pact shall make the bid nonresponsive (PPR Rule 7).

BIDDING DATA

Instructions to Bidders Clause Reference

1.1 Name of Procuring Agency

Office of Chief Engineer State Life Insurance Corporation of Pakistan.

Brief Description of Works

5.1 (a) Procuring Agency's address:

Address (Postal):

Office of Chief Engineer State Life Insurance Corporation of Pakistan, 5th Floor,
Real Estate Division, State Life Building No. 9, Principal Office,
Dr. Ziauddin Ahmed Road, Karachi-75530, Pakistan.
Tel: 021-99204520.

10.3 Bid shall be quoted entirely in Pak. Rupees. The payment shall be made in Pak. Rupees.

11.2 The bidder has the financial, technical and constructional capability necessary to perform the Contract (*as per NIT)*

12.1 (a) A detailed description of the Works, essential technical and performance characteristics.

(b) Complete set of technical information, description data, literature and drawings as required in accordance with Schedule B to Bid, Specific Works Data. This will include but not be limited to a sufficient number of drawings, photographs, catalogues, illustrations and such other information as is necessary to illustrate clearly the significant characteristics such as general construction dimensions and other relevant information about the works to be performed.

13.1 **Amount of Bid Security**

PKR 1,800,000/-*of the bid amount in the shape of Payorder or Demand Draft in Favour of State Life Insurance Corporation of Pakistan.*

14.1 Period of Bid Validity

(180 Days)

14.4 Number of Copies of the Bid to be submitted:

One original Hard copy to be submitted in person and also same to be Uploaded on EPADS before Deadline.

14.6 (a) Address for the Purpose of Bid Submission

Address (Postal):

Address: Office of Chief Engineer State Life Insurance Corporation of Pakistan, 5th Floor, Real Estate Division, State Life Building No. 9, Principal Office, Dr. Ziauddin Ahmed Road, Karachi-75530, Pakistan.
Tel: 021-99204520.

15.1 Deadline for Submission of Bids

As notified in "Tender Notice"

16.1 Venue, Time, and Date of Bid Opening

As notified in "Tender Notice"

16.4 Responsiveness of Bids

(i) Bid is valid till required period,
(ii) *Bid prices are firm during currency of contract/Price adjustment;
(iii) Completion period offered is within specified limits,
(iv) Bidder is eligible to Bid and possesses the requisite experience, capability and qualification.
(v) Bid does not deviate from basic technical requirements and
(vi) Bids are generally in order, etc.

FORM OF BID AND SCHEDULES TO BID

(LETTER OF OFFER)

Bid Reference No. _____

(Name of Works)

To:

Gentlemen,

1. Having examined the Bidding Documents including Instructions to Bidders, Bidding Data, Conditions of Contract, Contract Data, Specifications, Drawings, if any, Schedule of Prices and Addenda Nos. _____ for the execution of the above-named works, we, the undersigned, being a company doing business under the name of and address _____ _____ and being duly incorporated under the laws of Pakistan hereby offer to execute and complete such works and remedy any defects therein in conformity with the said Documents including Addenda thereto for the Total Bid Price of Rs_____(Rupees_____) or such other sum as may be ascertained in accordance with the said Documents.

2. We understand that all the Schedules attached hereto form part of this Bid.

3. As security for due performance of the undertakings and obligations of this Bid, we submit herewith a Bid Security in the amount of _____ _____ drawn in your favour or made payable to you and valid for a period of Ninety (180) days beyond the period of validity of Bid.

4. We undertake, if our Bid is accepted, to commence the Works and to deliver and complete the Works comprised in the Contract within the time(s) stated in Contract Data.

5. We agree to abide by this Bid for the period of _____ days from the date fixed for receiving the same and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

6. Unless and until a formal Agreement is prepared and executed, this Bid, together with your written acceptance thereof, shall constitute a binding contract between us.

7. We undertake, if our Bid is accepted, to execute the Performance Security referred to in Conditions of Contract for the due performance of the Contract.

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

9. We do hereby declare that the Bid is made without any collusion, comparison of figures or arrangement with any other person or persons making a bid for the Works.

Dated this _____day of _____, 20 Signature _____ in the

capacity of _____duly authorized to sign bid for and on behalf of

(Name of Bidder in Block Capitals) (Seal)

Address:
_____
_____
_____

Witness:

(Signature)_____

Name:_____
Address: _____

[SCHEDULES TO BID INCLUDE THE FOLLOWING:

□ Schedule A to Bid: Schedule of Prices □ Schedule B to Bid: Specific Works Data □ Schedule C to Bid: Works to be Performed by Subcontractors □ Schedule D to Bid: Proposed Program of Works □ Schedule E to Bid: Method of Performing Works □ Schedule F to Bid: Integrity Pact

SCHEDULE – A TO BID
SCHEDULE OF PRICES

Sr. No.

1 Preamble to Schedule of Prices……

2 Schedule of Prices……

*(a) Summary of Bid Prices

* (b) Detailed Schedule of Prices /Bill of Quantities (BOQ)

SCHEDULE -A TO BID

PREAMBLE TO SCHEDULE OF PRICES

1. General

1.1 The Schedule of Prices shall be read in conjunction with the Conditions of Contract, Contract Data together with the Specifications and Drawings, if any.

1.2 The Contract shall be for the whole of the works as described in these Bidding Documents. Bids must be for the complete scope of works.

2. Description

2.1 The general directions and descriptions of works and materials are not necessarily repeated nor summarized in the Schedule of Prices. References to the relevant sections of the Bidding Documents shall be made before entering prices against each item in the Schedule of Prices.

3. Units & Abbreviations

3.1 Units of measurement, symbols and abbreviations expressed in the Bidding Documents shall comply with the System International Units (SI Units).

4. Rates and Prices

4.1 Except as otherwise expressly provided under the Conditions of Contract, the rates and amounts entered in the Schedule of Prices shall be the rates at which the Contractor shall be paid and shall be the full inclusive value of the works set forth or implied in the Contract; except for the amounts reimbursable, if any to the Contractor under the Contract.

4.2 Unless otherwise stipulated in the Contract Data, the premium, rates and prices entered by the bidder shall not be subject to adjustment during the performance of the Contract.

4.3 All duties, taxes and other levies payable by the Contractor shall be included in the rates and prices.

4.4 The whole cost of complying with the provisions of the Contract shall be included in the items provided in the Schedule of Prices, and where

no items are provided; the cost shall be deemed to be distributed among the rates and prices entered for the related items of the Works and no separate payment will be made for those items.

The rates, prices and amounts shall be entered against each item in the Schedule of Prices. Any item against which no rate or price is entered by the bidder will not be paid for by the Procuring Agency when executed and shall be deemed covered by the rates and prices for other items in the Schedule of Prices.

4.5 (a) The bidder shall be deemed to have obtained all information as to and all requirements related thereto which may affect the bid price.

*(b) The Contractor shall be responsible to make complete arrangements for the transportation of the Plant to the Site.

1 The Contractor shall provide for all parts of the Works to be completed in every respect. Notwithstanding that any details, accessories, etc. required for the complete installation and satisfactory operation of the Works, are not specifically mentioned in the Specifications, such details shall be considered as included in the Contract Price.

2 **Bid Prices**

5.1 Break-up of Bid Prices The various elements of Bid Prices shall be quoted as detailed by the Procuring Agency in the format of Schedule of Prices. The bidder shall recognize such elements of the costs which he expects to incur the performance of the Works and shall include all such costs in the rates and amounts entered in the Schedule of Prices.

5.2 The total of bid prices in the Schedule of Prices shall be entered in the Summary of Bid Prices.

6. Provisional Sums and Day work

6.1 Provisional Sums included and so designated in the Schedule of Prices if any, shall be expended in whole or in part at the direction and discretion of the Engineer/Procuring Agency. The Contractor will only receive payment in respect of Provisional Sums, if he has been instructed by the Engineer/Procuring Agency to utilize such sums.

6.2 Day work rates in the contractor‘s bid are to be used for small additional amounts of work and only when the Engineer have given written instructions in advance for additional work to be paid for in that way.

SCHEDULE – C TO BID WORKS TO BE PERFORMED BY SUBCONTRACTORS*

The bidder will do the work with his own forces except the work listed below which he intends to sub-contract.

Items of Works to be Sub-Contracted	Name and address of Sub-Contractors	Statement of similar works previously executed. *(attach evidence)*

1. No change of Sub-Contractors shall be made by the bidder without prior approval of the Procuring Agency.

2. The truthfulness and accuracy of the statement as to the experience of Sub-Contractors is guaranteed by the bidder. The Procuring Agency‘s judgment shall be final as to the evaluation of the experience of Sub-Contractors submitted by the bidder.

3. Statement of similar works shall include description, location & value of works, year completed and name & address of the clients.

SCHEDULE – D TO BID

PROPOSED PROGRAMME OF WORKS

Bidder shall provide a programme in a bar-chart or Program Evaluation and Review Technique (PERT) or Critical Path Method (CPM) showing the sequence of work items by which he proposes to complete the works of the entire Contract. The programme should indicate the sequence of work items and the period of time during which he proposes to complete the works including the activities like designing, schedule of submittal of drawings, ordering and procurement of materials, manufacturing, delivering, construction of civil works, erection, testing and commissioning of works to be supplied under the Contract.

SCHEDULE – E TO BID

METHOD OF PERFORMING WORKS

The bidder is required to submit a narrative outlining the method of performing the Works. The narrative should indicate in detail and include but not be limited to:

- The sequence and methods in which he proposes to carry out the Works, including the number of shifts per day and hours per shift, he expects to work.

- A list of all major items of construction and plant erection, tools and vehicles proposed to be used in delivering/carrying out the works at site.

- The procedure for installation of equipment and transportation of equipment and materials to the site.

- Organization chart indicating head office & field office personnel involved in management, supervision and engineering of the Works to be done under the Contract.

SCHEDULE – F TO BID

(INTEGRITY PACT)

DECLARATION OF FEES, COMMISSION AND BROKERAGE ETC PAYABLE BY CONTRACTORS

(FOR CONTRACTS WORTH RS. 10.00 MILLION OR MORE)

Contract No._____ Dated _____ Contract Value: _____
Contract Title: _____

…… [name of Contractor] hereby declares that it has not obtained or induced the procurement of any contract, right, interest, privilege or other obligation or benefit from any administrative subdivision or agency thereof or any other entity owned or controlled through any corrupt business practice.

Without limiting the generality of the foregoing, [name of Contractor] represents and warrants that it has fully declared the brokerage, commission, fees etc. paid or payable to anyone and not given or agreed to give and shall not give or agree to give to anyone within or outside Pakistan either directly or indirectly through any natural or juridical person, including its affiliate, agent, associate, broker, consultant, director, promoter, shareholder

sponsor or subsidiary, any commission, gratification, bribe, finder‘s fee or kickback, whether described as consultation fee or otherwise, with the object of obtaining or inducing the procurement of a contract, right, interest, privilege or other obligation or benefit in whatsoever form from, from Procuring Agency (PA) except that which has been expressly declared pursuant hereto.

[name of Contractor] accepts full responsibility and strict liability that it has made and will make full disclosure of all agreements and arrangements with all persons in respect of or related to the transaction with PA and has not taken any action or will not take any action to circumvent the above declaration, representation or warranty.

[name of Contractor] accepts full responsibility and strict liability for making any false declaration, not making full disclosure, misrepresenting facts or taking any action likely to defeat the purpose of this declaration, representation and warranty. It agrees that any contract, right, interest, privilege or other obligation or benefit obtained or procured as aforesaid shall, without prejudice to any other rights and remedies available to PA under any law, contract or other instrument, be voidable at the option of PA.

Notwithstanding any rights and remedies exercised by PA in this regard, [_____] agrees to indemnify PA for any loss or damage incurred by it on account of its corrupt business practices and further pay compensation to PA in an amount equivalent to ten time the sum of any commission, gratification, bribe, finder‘s fee or kickback given by [name of Contractor] as aforesaid for the purpose of obtaining or inducing the procurement of any contract, right, interest, privilege or other obligation or benefit in whatsoever form from PA.

……
[Procuring Agency] [Contractor]

CONDITIONS OF CONTRACT

TABLE OF CONTENTS CONDITIONS OF CONTRACT

CONDITIONS OF CONTRACT

1. GENERAL PROVISIONS

1.1 Definitions

In the Contract as defined below, the words and expressions defined shall have the following meanings assigned to them, except where the context requires otherwise:

The Contract

1.1.1 "Contract" means the Contract Agreement and the other documents listed in the Contract Data.

1.1.2 "Specifications" means the document as listed in the Contract Data, including Procuring Agency's requirements in respect of design to be carried out by the Contractor (if any), and any Variation to such document.

1.1.3 "Drawings" means the Procuring Agency's drawings of the Works as listed in the Contract Data, and any Variation to such drawings.

Persons

1.1.4 "Procuring Agency" means the person named in the Contract Data and the legal successors in title to this person, but not (except with the consent of the Contractor) any assignee.

1.1.5 "Contractor" means the person named in the Contract Data and the legal successors in title to this person, but not (except with the consent of the Procuring Agency) any assignee.

1.1.6 "Party" means either the Procuring Agency or the Contractor.

Dates, Times and Periods

1.1.7 "Commencement Date" means the date fourteen (14) days after the date the Contract comes into effect or any other date named in the Contract Data.

1.1.8 "Day" means a calendar day

1.1.9 "Time for Completion" means the time for completing the Works as stated in the Contract Data (or as extended under Sub-Clause 7.3), calculated from the Commencement Date.

Money and Payments

1.1.10 "Cost" means all expenditure properly incurred (or to be incurred) by the Contractor, whether on or off the Site, including overheads and similar charges but does not include any allowance for profit.

Other Definitions

1.1.11 "Contractor's Equipment" means all machinery, apparatus and other things required for the execution of the Works but does not include Materials or Plant intended to form part of the Works.

1.1.12 "Country" means the Islamic Republic of Pakistan.

1.1.13 "Procuring Agency's Risks" means those matters listed in Sub-Clause 6.1.

1.1.14 "Force Majeure" means an event or circumstance which makes performance of a Party's obligations illegal or impracticable and which is beyond that Party's reasonable control.

1.1.15 "Materials" means things of all kinds (other than Plant) to be supplied and incorporated in the Works by the Contractor.

1.1.16 "Plant" means the machinery and apparatus intended to form or forming part of the Works.

1.1.17 "Site" means the places provided by the Procuring Agency where the Works are to be executed, and any other places specified in the Contract as forming part of the Site.

1.1.18 "Variation" means a change which is instructed by the Engineer/Procuring Agency under Sub-Clause 10.1.

1.1.19 "Works" means any or all the works whether Supply, Installation, Construction etc. and design (if any) to be performed by the Contractor including temporary works and any variation thereof.

1.1.20 "Engineer" means the person notified by the Procuring Agency to act as Engineer for the purpose of the Contract and named as such in Contract Data.

1.2 **Interpretation**

Words importing persons or parties shall include firms and organisations. Words importing singular or one gender shall include plural or the other gender where the context requires.

1.3 **Priority of Documents**

The documents forming the Contract are to be taken as mutually explanatory of one another. If an ambiguity or discrepancy is found in the documents, the priority of the documents shall be in accordance with the order as listed in the Contract Data.

1.4 **Law**

The Law of the contract is the relevant law of Islamic republic of Pakistan.

1.5 **Communications**

All Communications related to the Contract shall be in English language.

1.6 **Statutory Obligations**

The Contractor shall comply with the Laws of Islamic Republic of Pakistan and shall give all notices and pay all fees and other charges in respect of the Works.

2. THE PROCURING AGENCY

2.1 **Provision of Site**

The Procuring Agency shall provide the Site and right of access thereto at the times stated in the Contract Data. **Site Investigation Reports** are those that were included in the bidding documents and are factual and interpretative reports about the surface and subsurface conditions at the Site.

2.2 **Permits etc.**

The Procuring Agency shall, if requested by the Contractor, assist him in applying for permits, licences or approvals which are required for the Works.

2.3 **Engineer's/Procuring Agency's Instructions**

The Contractor shall comply with all instructions given by the Procuring Agency or the Engineer, if notified by the Procuring Agency, in respect of the Works including the suspension of all or part of the works.

2.4 **Approvals**

No approval or consent or absence of comment by the Engineer/Procuring Agency shall affect the Contractor‘s obligations.

3. ENGINEER'S/PROCURING AGENCY'S REPRESENTATIVES

3.1 **Authorized Person**

The Procuring Agency shall appoint a duly authorized person to act for him and on his behalf for the purposes of this Contract. Such authorized person shall be duly identified in the Contract Data or otherwise notified in writing to the Contractor as soon as he is so appointed. In either case the Procuring Agency shall notify the Contractor, in writing, the precise scope of the authority of such authorized person at the time of his appointment.

3.2 **Engineer's / Procuring Agency's Representative**

The name and address of Engineer's/Procuring Agency's Representative is given in Contract Data. However the Contractor shall be notified by the Engineer/Procuring Agency, the delegated duties and authority before the Commencement of works.

5. DESIGN BY CONTRACTOR

5.1 **Contractor's Design (not applicable)**

The Contractor shall carry out design to the extent specified, as referred to in the Contract Data. The Contractor shall promptly submit to the Engineer/Procuring Agency all designs prepared by him, within fourteen (14) days of receipt the Engineer/Procuring Agency shall notify any comments or, if the design submitted is not in accordance with the Contract, shall reject it stating the reasons. The contractors shall not construct any element of the works designed by him within fourteen (14) days after the design has been submitted to the Engineer/Procuring Agency or which has been rejected. Design that has been rejected shall be promptly amended and resubmitted. The Contractor shall resubmit all designs commented on taking these comments into account as necessary.

5.2 **Responsibility for Design**

The Contractor shall remain responsible for his bided design and the design under this Clause, both of which shall be fit for the intended purposes defined in the Contract and he shall also remain responsible for any infringement of any patent or copyright in respect of the same. The Engineer/Procuring Agency shall be responsible for the Specifications and Drawings.

6. PROCURING AGENCY'S RISKS

6.1 **The Procuring Agency's Risks**

The Procuring Agency's Risks are:

a) war, hostilities (whether war be declared or not), invasion, act of foreign enemies, within the Country**;**

b) rebellion, terrorism, revolution, insurrection, military or usurped power, or civil war, within the Country**;**

c) riot, commotion or disorder by persons other than the Contractor's personnel and other employees including the personnel and employees of Sub-Contractors, affecting the Site and/or the Works**;**

d) ionising radiations, or contamination by radio-activity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuel, radio-active toxic explosive, or other hazardous properties of any explosive nuclear assembly or nuclear component of such an assembly, except to the extent to which the Contractor/Sub-Contractors may be responsible for the use of any radio-active material**;**

e) Pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds**;**

f) use or occupation by the Procuring Agency of any part of the Works, except as may be specified in the Contract**;**

g) late handing over of sites, anomalies in drawings, late delivery of designs and drawings of any part of the Works by the Procuring Agency‘s personnel or by others for whom the Procuring Agency is responsible;

h) a suspension under Sub-Clause 2.3 unless it is attributable to the Contractor‘s failure; and

i) physical obstructions or physical conditions other than climatic conditions, encountered on the Site during the performance of the Works, for which the Contractor immediately notified to the Procuring Agency and accepted by the Procuring Agency.

7. TIME FOR COMPLETION

The time for the completion of project is stated to be of Twelve (12) months.

7.1 Execution of the Works

The Contractor shall commence the Works on the Commencement Date and shall proceed expeditiously and without delay and shall complete the Works, subject to Sub-Clause 7.3 below, within the Time for Completion.

7.2 Programme

Within the time stated in the Contract Data, the Contractor shall submit to the Engineer/Procuring Agency a programme for the Works in the form stated in the Contract Data.

7.3 Extension of Time

The Contractor shall, within such time as may be reasonable under the circumstances, notify the Procuring Agency/Engineer of any event(s) falling within the scope of Sub-Clause 6.1 or 10.3 of these Conditions of Contract and request the Procuring Agency/Engineer for a reasonable extension in the time for the completion of works. Subject to the aforesaid, the Procuring Agency/Engineer shall determine such reasonable extension in the time for the completion of works as may be justified in the light of the details/particulars supplied by the Contractor in connection with the such determination by the Procuring Agency/Engineer within such period as may be prescribed by the Procuring Agency/Engineer for the same; and the Procuring Agency may extend the time for completion as determined.

7.4 **Late Completion**

If the Contractor fails to complete the Works within the Time for Completion, the Contractor‘s only liability to the Procuring Agency for such failure shall be to pay the amount as **liquidity damages** stated in the Contract Data for each day for which he fails to complete the Works.

8. **TAKING-OVER**

8.1 **Completion**

The Contractor may notify the Engineer/Procuring Agency when he considers that the Works are complete.

8.2 Taking our Notice

Within fourteen (14) days of the receipt of the said notice of completion from the Contractor the Procuring Agency/Engineer shall either takeover the completed works and issue a Certificate of Completion to that effect or shall notify the Contractor his reasons for not taking-over the works. While issuing the Certificate of Completion as aforesaid, the Procuring Agency/Engineer may identify any outstanding items of work which the Contractor shall undertake during the Maintenances Period.

9. REMEDYING DEFECTS

9.1 **Remedying Defects**

The Contractor shall for a period stated in the Contract Data from the date of issue of the Certificate of Completion carry out, at no cost to the Procuring Agency, repair and rectification work which is necessitated by the earlier execution of poor quality of work or use of below specifications material in the execution of Works and which is so identified by the Procuring Agency/Engineer in writing within the said period. Upon expiry of the said period, and subject to the Contractor‘s faithfully performing his aforesaid obligations, the Procuring Agency/Engineer shall issue a Maintenance Certificate whereupon all obligations of the Contractor under this Contract shall come to an end.

Failure to remedy any such defects or complete outstanding work within a reasonable time shall entitle the Procuring Agency to carry out all necessary works at the Contractor‘s cost. However, the cost of remedying defects not attributable to the Contractor shall be valued as a Variation.

9.2 **Uncovering and Testing**

The Engineer/Procuring Agency may give instruction as to the uncovering and/or testing of any work. Unless as a result of an uncovering and/or testing it is established that the Contractor‘s design, materials, plant or workmanship are not in accordance with the Contract, the Contractor shall be paid for such uncovering and/or testing as a Variation in accordance with Sub-Clause 10.2.

10. VARIATIONS AND CLAIMS

10.1 Right to Vary

The Procuring Agency/Engineer may issue Variation Order(s) in writing. Where for any reason it has not been possible for the Procuring Agency/Engineer to issue such Variations Order(s), the Contractor may confirm any verbal orders given by the Procuring Agency/Engineer in writing and if the same are not refuted/denied by the Procuring Agency/Engineer within ten (10) days of the receipt of such confirmation the same shall be deemed to be a Variation Orders for the purposes of this Sub-Clause.

10.2 Valuation of Variations

Variations shall be valued as follows:

a) at a lump sum price agreed between the Parties, or

b) where appropriate, at rates in the Contract, or

c) in the absence of appropriate rates, the rates in the Contract shall be used as the basis for valuation, or failing which

d) at appropriate new rates, as may be agreed or which the Engineer/Procuring Agency considers appropriate, or

e) if the Engineer/Procuring Agency so instructs, at day work rates set out in the Contract Data for which the Contractor shall keep records of hours of labour and Contractor‘s Equipment, and of Materials, used.

10.3 Changes in the Quantities.

a) If the final quantity of the work done differs from the quantity in the Bill of Quantities for the particular item by more than 25 percent, provided the change exceeds 1 percent of the Initial Contract Price, the Procuring Agency/Engineer shall adjust the rate to allow for the change and will be valued as per sub clause 10.2.

b) The Engineer shall not adjust rates from changes in quantities if thereby the Initial Contract Price is exceeded by more than 15 percent, except with the prior approval of the Procuring Agency.

c) If requested by the Engineer, the contractor shall provide the Engineer with a detailed cost breakdown of any rate in the Bill of Quantities.

10.4 **Early Warning**

The Contractor shall notify the Engineer/Procuring Agency in writing as soon as he is aware of any circumstance which may delay or disrupt the Works, or which may give rise to a claim for additional payment.

To the extent of the Contractor‘s failure to notify, which results to the Engineer/Procuring Agency being unable to keep all relevant records or not taking steps to minimize any delay, disruption, or Cost, or the value of any Variation, the Contractor‘s entitlement to extension of the Time for Completion or additional payment shall be reduced/rejected.

10.5 **Valuation of Claims**

If the Contractor incurs Cost as a result of any of the Procuring Agency‘s Risks, the Contractor shall be entitled to the amount of such Cost. If as a result of any procuring Agency Risk,
It is necessary to change the works, this shall be dealt with as a Variation subject to Contractor‘s notification for intention of claim to the Engineer/Procuring Agency within fourteen (14) days of the occurrence of cause.

10.6 **Variation and Claim Procedure**

The Contractor shall submit to the Engineer/Procuring Agency an itemized detailed breakdown of the value of variations and claims within twenty eight (28) days of the instruction or of the event giving rise to the claim. The Engineer/Procuring Agency shall check and if possible agree the value. In the absence of agreement, the Procuring Agency shall determine the value.

11. CONTRACT PRICE AND PAYMENT

11.1 (a) **Terms of Payments**

The amount due to the Contractor under any Interim Payment Certificate issued by the Engineer pursuant to this Clause, or to any other terms of the Contract, shall , subject to Clause 11.3, be paid by the Procuring Agency to the Contractor within 30 days after such Interim Payment Certificate has been jointly verified by Procuring Agency and Contractor, or, in the case of the Final Certificate referred to in Sub Clause 11.5, within 60days after such Final Payment Certificate has been jointly verified by Procuring Agency and Contractor;

Provided that the Interim Payment shall be caused in thirty (30) days and Final Payment in 60 days in case of foreign funded project. In the event of the failure of the Procuring Agency to make payment within 18 days then Procuring Agency shall pay to the Contractor compensation at the 28 days rate of KIBOR+2% per annum in local currency and LIBOR+1% for foreign currency, upon all sums unpaid from the date by which the same should have been paid.

(b) **Valuation of the Works**
The Works shall be valued as provided for in the Contract Data, subject to Clause 10.

11.2 **Monthly Statements**

The Contractor shall be entitled to be paid at monthly intervals:

a) the value of the Works executed less to the cumulative amount paid previously; and
b) value of secured advance on the materials and valuation of variations (if any).

The Contractor shall submit each month to the Engineer/Procuring Agency a statement showing the amounts to which he considers himself entitled.

11.3 Interim Payments

Within a period not exceeding seven (07) days from the date of submission of a statement for interim payment by the Contractor, the Engineer shall verify the same and within a period not exceeding thirty (30/60) days from the said date of submission by the Contractor, the Procuring Agency shall pay to the Contractor the sum subject to adjustment for deduction of the advance payments and retention money.

11.4 **Retention**

Retention money shall be paid by the Procuring Agency to the Contractor within fourteen (14) days after either the expiry of the period stated in the Contract Data, or the remedying of notified defects, or the completion of outstanding work, all as referred to in Sub-Clause 9.1, whichever is the later.

11.5 **Final Payment**

Within twenty one (21) days from the date of issuance of the Maintenance Certificate the Contractor shall submit a final account to the Engineer to verify and the Engineer shall verify the same within fourteen (14) days from the date of submission and forward the same to the Procuring Agency together with any documentation reasonably required to enable the Procuring Agency to ascertain the final contract value.

Within sixty (60) days from the date of receipt of the verified final account from the Engineer, the Procuring Agency shall pay to the Contractor any amount due to the Contractor. While making such payment the Procuring Agency may, for reasons to be given to the Contractor in writing, withhold any part or parts of the verified amount.

11.6 **Currency**

Payment shall be in the currency stated in the Contract Data.

12. DEFAULT

12.1 **Defaults by Contractor**

If the Contractor abandons the Works, refuses or fails to comply with a valid instruction of the Engineer/Procuring Agency or fails to proceed expeditiously and without delay, or is, despite a written complaint, in breach of the Contract, the Procuring Agency may give notice referring to this Sub-Clause and stating the default. If the Contractor has not taken all practicable steps to remedy the default within fourteen (14) days after receipt of the Procuring Agency‘s notice, the Procuring Agency may by a second notice given within a further twenty one (21) days, terminate the Contract. The Contractor shall then demobilize from the Site leaving behind any Contractor‘s Equipment which the Procuring Agency instructs, in the second notice, to be used for the completion of the Works at the risk and cost of the Contractor.

12.2 **Defaults by Procuring Agency**

If the Procuring Agency fails to pay in accordance with the Contract, or is, despite a written complaint, in breach of the Contract, the Contractor may give notice referring to this Sub-Clause and stating the default. If the default is not remedied within fourteen (14) days after the Procuring Agency‘s receipt of this notice, the Contractor may suspend the execution of all or parts of the Works.

If the default is not remedied within twenty eight (28) days after the Procuring Agency‘s receipt of the Contractor‘s notice, the Contractor may by a second notice given within a further twenty one (21) days, terminate the Contract. The Contractor shall then demobilize from the Site.

12.3 **Insolvency**

If a Party is declared insolvent under any applicable law, the other Party may by notice terminate the Contract immediately. The Contractor shall then demobilize from the site leaving behind, in the case of the Contractor‘s insolvency, any Contractor‘s Equipment which the Procuring Agency instructs in the notice is to be used for the completion of the Works.

12.4 **Payment upon Termination**

a) any sums to which the Contractor is entitled under Sub-Clause 10.4,

b) any sums to which the Procuring Agency is entitled,

c) if the Procuring Agency has terminated under Sub-Clause 12.1 or 12.3, the Procuring Agency shall be entitled to a sum equivalent to twenty percent (20%) of the value of parts of the Works not executed at the date of the termination, and

d) if the Contractor has terminated under Sub-Clause 12.2 or 12.3, the Contractor shall be entitled to the cost of his demobilisation together with a sum equivalent to ten percent (10%) of the value of parts of the works not executed at the date of termination.

The net balance due shall be paid or repaid within twenty eight (28) days of the notice of termination.

13. RISKS AND RESPONSIBILITIES

13.1 **Contractor's Care of the Works**

After termination, the Contractor shall be entitled to payment of the unpaid balance of the value of the works executed and of the Materials and Plant reasonably delivered to the site, adjusted by the following: Subject to Sub-Clause 9.1, the Contractor shall take full responsibility for the care of the work from the commencement date until the date of the Procuring Agency 's / Engineer's insurance for certificate of compilation under Sub-Clause 8.2. Responsibility shall then pass to the Procuring Agency. If any loss or damage happens to the Works during the above period, the Contractor shall rectify such loss or damage so that the Works conform with the Contract. Unless the loss or damage happens as a result of any of the procuring Agency Risks, the Contractor shall indemnify the Procuring Agency, or his agents against all claims loss, damage and expense arising out of the Works

13.2 **Force Majeure**

If Force Majeure occurs, the Contractor shall notify the Engineer/Procuring Agency immediately. If necessary, the Contractor may suspend the execution of the Works and, to the extent agreed with the Procuring Agency demobilize the Contractor's Equipment.

If the event continues for a period of eighty-four (84) days, either Party may then give notice of termination which shall take effect twenty-eight (28) days after the giving of the notice.

After termination, the Contractor shall be entitled to payment of the unpaid balance of the value of the Works executed and of the Materials and Plant reasonably delivered to the Site, adjusted by the following:

a) any sums to which the Contractor is entitled under Sub-Clause 10.4,
b) the cost of his demobilization, and
c) less any sums to which the Procuring Agency is entitled.

The net balance due shall be paid or repaid within thirty five (35) days of the notice of termination.

14. INSURANCE

14.1 Arrangements

The Contractor shall, prior to commencing the Works, effect insurances of the types, in the amounts and naming as insured the persons stipulated in the Contract Data except for items (a) to (e) and (i) of the Procuring Agency‘s Risks under Sub-Clause 6.1. The policies shall be issued by insurers and in terms approved by the Procuring Agency. The Contractor shall provide the Engineer/Procuring Agency with evidence that any required policy is in force and that the premiums have been paid.

14.2 Default

If the Contractor fails to effect or keep in force any of the insurances referred to in the previous Sub-Clause, or fail Medical s to provide satisfactory evidence, policies or receipts, the Procuring Agency may, without prejudice to any other right or remedy effect insurance for the cover relevant to such as a default and pay the premiums due and recover the same plus a sum in percentage given in Contractor Data from any other amounts due to the Contractor..

15. RESOLUTION OF DISPUTES

15.1 Engineer’s Decision

If a dispute of any kind whatsoever arises between the Procuring Agency and the Contractor in connection with the works, the matter in dispute shall, in the first place, be referred in writing to the Engineer, with a copy to the other party. Such reference shall state that it is made pursuant to this Clause. No later than the twenty eight (28) days after the day on which he received such reference, the Engineer shall give notice of his decision to the Procuring Agency and the Contractor.

Unless the Contract has already been repudiated or terminated, the Contractor shall, in every case, continue to proceed with the work with all due diligence, and the Contractor and the Procuring Agency shall give effect forthwith to every such decision of the Engineer unless and until the same shall be revised, as hereinafter provided in an arbitral award.

15.2 Notice of Dissatisfaction

If a Party is dissatisfied with the decision of the Engineer of consultant or if no decision is given within the time set out in Sub-Clause 15.1 here above, the Party may give notice of dissatisfaction referring to this Sub-Clause within fourteen (14) days of receipt of the decision or the expiry of the time for the decision. If no notice of dissatisfaction is given within the specified time, the decision shall be final and binding on the Parties. If notice of dissatisfaction is given within the specified time, the decision shall be binding on the Parties who shall give effect to it without delay unless and until the decision of the Engineer is revised by an arbitrator.

If a contractor is dissatisfied with the decision of the Engineer of the department or decision is not given in time then he can approach Procuring Agency within 14 days, in case of dissatisfaction with decision of Procuring Agency or not decided within 28 days, then arbitration process would be adopted as per clause 15.3.

15.3 **Arbitration**

A dispute which has been the subject of a notice of dissatisfaction shall be finally settled as per provisions of Arbitration Act 1940 (Act No. X of 1940) and Rules made there under and any statutory modifications thereto. Any hearing shall be held at the place specified in the Contract Data and in the language referred to in Sub-Clause 1.5.

16 INTEGRITY PACT

16.1 If the Contractor or any of his Sub-Contractors, agents or servants is found to have violated or involved in violation of the Integrity Pact signed by the Contractor as Schedule-F to his Bid, then the Procuring Agency shall be entitled to:

(a) recover from the Contractor an amount equivalent to ten times the sum of any commission, gratification, bribe, finder‘s fee or kickback given by the Contractor or any of his Sub-Contractors, agents or servants;

(b) terminate the Contract;

(c) recover from the Contractor any loss or damage to the Procuring Agency as a result of such termination or of any other corrupt business practices of the Contractor or any of his Sub-Contractors, agents or servants.

On termination of the Contract under Sub-Para (b) of this Sub-Clause, the Contractor shall demobilize from the site leaving behind Contractor‘s Equipment which the Procuring Agency instructs, in the termination notice, to be used for the completion of the works at the risk and cost of the Contractor. Payment upon such termination shall be made under Sub-Clause 12.4, in accordance with Sub-Para (c) thereof, after having deducted the amounts due to the Procuring Agency under Sub-Para (a) and (c) of this Sub-Clause.

CONTRACT DATA

Sub-Clauses of Conditions of Contract

1.1.3 Office of the "State Life Insurance Corporation of Pakistan, Chief Engineer State Life Insurance Corporation of Pakistan" Drawings, if any

1.1.4 **The Procuring Agency** means

Office of Chief Engineer State Life Insurance Corporation Of Pakistan,
Real Estate Division, **State Life Building No. 9, Principal Office,**
Dr. Ziauddin Ahmed Road, Karachi-75530, Pakistan.
TEL: 021-99204520

1.1.5 The Contractor means who executes the work

1.1.7 **Commencement Date** means the date of issue of Engineer's Notice to Commence which shall be issued within Seven (07) days of the signing of the Contract Agreement.

1.1.9 **Time for Completion:** 12 months

1.1.20 **Engineer from "Office of Chief Engineer State Life Insurance Corporation of Pakistan"**, Nominated Representative,

1.3 **Documents forming the Contract listed in the order of priority:**

(a) The Contract Agreement
(b) Letter of Acceptance.
(c) The completed Form of Bid
(d) Contract Data
(e) Conditions of Contract
(f) The completed Schedules to Bid including Schedule of Prices
(g) The Drawings,
(h) The Specifications
(i) _____
(j) _____

2.1 **Provision of Site:**

3.1 **Authorized person:** Chief Engineer State Life Insurance Corporation of Pakistan.

3.2 Name and address

Office of Chief Engineer State Life Insurance Corporation Of Pakistan,
Real Estate Division, State Life Building No. 9, Principal Office,
Dr. Ziauddin Ahmed Road, Karachi-75530, Pakistan.
TEL: 021-99204520

4.4 Performance Security:

The Performance Security shall be equal to amount of **5% of the contract price** as stated in letter of Acceptance, such security in the form of Pay Order/ Bank Guarantee from a Schedule Bank of Pakistan acceptable to the procuring agency (**STATE LIFE INSURANCE CORPORATION OF PAKISTAN**), the performance security will be valid for a period upto the completion of project and after the date of issue of Defect Liability Certificate from the Client.

5.1 **Requirements for Contractor's design**

(Not applicable):

7.2 **Programme:**
Time for submission: Within Seven (07) days of the Commencement Date.

Form of programme: *(Bar Chart*)

7.4 **Amount payable due to failure to complete shall be 0.1% per day up to a maximum of (10%) of sum stated in the Letter of Acceptance/Award.**

7.5 **Early Completion**

(Not applicable)

9.1 **Period for remedying defects/ defect liability period (DLP)**
DLP period will be 12 months

_____

11.1 **Terms of Payments**

a) Mobilization Advance: 5% of the Contract Price

11.3 Percentage of retention: 5% of the amount of Interim Payment Certificate.

11.6 Currency of payment: Pak. Rupees

14.1 Insurances:
Type of cover
Third Party-injury to persons and damage to property

Rs.500,000 per occurrence with a number of occurrences unlimited.

Other cover*: Amount to be recovered Premium plus _____ percent (%)

1. **Arbitration**** Place of Arbitration: Karachi.

STANDARD FORMS

FORM OF BID SECURITY

(Bank Guarantee)

Guarantee No._____ Executed on _____ **(**Letter by the Guarantor to the Procuring Agency)

Name of Guarantor (Scheduled Bank in Pakistan) with address:_____ Name of Principal (Bidder) with address:_____

Sum of Security (express in words and figures):_____ _____

Bid Reference No._____Date of Bid _____

KNOW ALL MEN BY THESE PRESENTS, that in pursuance of the terms of the Bid and at the request of the said Principal, we the Guarantor above-named are held and firmly bound unto the _____, (hereinafter called The ―Procuring Agency‖) in the sum stated above, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has submitted the accompanying Bid numbered and dated as above for _____ (Particulars of Bid) to the said Procuring Agency; and

WHEREAS, the Procuring Agency has required as a condition for considering the said Bid that the Principal furnishes a Bid Security in the above said sum to the Procuring Agency, conditioned as under:

(1) that the Bid Security shall remain valid for a period of twenty eight (28) days beyond the period of validity of the bid;

(a) the Principal withdraws his Bid during the period of validity of Bid, or

(b) the Principal does not accept the correction of his Bid Price, pursuant to Sub-Clause 16.4 (b) of Instructions to Bidders, or

(c) failure of the successful bidder to

(i) furnish the required Performance Security, in accordance with Sub-Clause IB-21.1 of Instructions to Bidders, or

(ii) sign the proposed Contract Agreement, in accordance with Sub-Clauses IB-20.2 & 20.3 of Instructions to Bidders,

The entire some be paid immediately to the said Procuring Agency for delayed

completion and not as penalty for the successful bidder's failure to perform.

NOW THEREFORE, if the successful bidder shall, within the period specified therefore, on the prescribed form presented to him for signature enter into a formal Contract Agreement with the said Procuring Agency in accordance with his Bid as accepted and furnish within fourteen (14) days of receipt of Letter of Acceptance, a Performance Security with good and sufficient surety , as may be required, upon the form prescribed by the said Procuring Agency for the faithful performance and proper fulfilment of the said Contract or in the event of non-withdrawal of the said Bid within the time specified then this obligation shall be void and of no effect, but otherwise to remain in full force and effect.

PROVIDED THAT the Guarantor shall forthwith pay to the Procuring Agency the said sum stated above upon first written demand of the Procuring Agency without cavil or argument and without requiring the Procuring Agency to prove or to show grounds or reasons for such demand, notice of which shall be sent by the Procuring Agency by registered post duly addressed to the Guarantor at its address given above.

PROVIDED ALSO THAT the Procuring Agency shall be the sole and final judge for deciding whether the Principal has duly performed his obligations to sign the Contract Agreement and to furnish the requisite Performance Security within the time stated above, or has defaulted in fulfilling said requirements and the Guarantor shall pay without objection the sum stated above upon first written demand from the Procuring Agency forthwith and without any reference to the Principal or any other person.

IN WITNESS WHEREOF, the above bounded Guarantor has executed the instrument under its seal on the date indicated above, the name and seal of the Guarantor being hereto affixed and these presents duly signed by its undersigned representative pursuant to authority of its governing body.

_____

Guarantor

(Bank)

Witness: 1. Signature _____

1._____ 2. Name _____

_____ 3. Title _____

Corporate Secretary (Seal)

2. _____

_____

(Name, Title & Address) Corporate Guarantor (Seal)

FORM OF PERFORMANCE SECURITY

(Bank Guarantee)

Guarantee No._____

Executed on _____

Expiry Date _____

(Letter by the Guarantor to the Procuring Agency)

Name of Guarantor (Scheduled Bank in Pakistan) with address:_____ Name of Principal (Contractor) with

address:_____Penal Sum of Security (express in words and figures) _____

Letter of Acceptance No._____ Dated _____

KNOW ALL MEN BY THESE PRESENTS, that in pursuance of the terms of the Bidding Documents and above said Letter of Acceptance (hereinafter called the Documents) and at the request of the said Principal we, the Guarantor above named, are held and firmly bound unto the _____ (hereinafter called the Procuring Agency) in the penal sum of the amount stated above, for the payment of which sum well and truly to be made to the said Procuring Agency, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the principal has accepted the Procuring Agency's above said Letter of Acceptance for _____ _____ (Name of Contract) for the _____

_____ (Name of Project).

NOW THEREFORE, if the Principal (Contractor) shall well and truly perform and fulfill all the undertakings, covenants, terms and conditions of the said Documents during the original terms of the said Documents and any extensions thereof that may be granted by the Procuring Agency, with or without notice to the Guarantor, which notice is, hereby, waived and shall also well and truly perform and fulfill all the undertakings, covenants terms and conditions of the Contract and of any and all modifications of the said Documents that may hereafter be made, notice of which modifications to the Guarantor being hereby waived, then, this obligation to be void; otherwise to remain in full force and virtue till all requirements of Clause 9, Remedying Defects, of Conditions of Contract are fulfilled.

Our total liability under this Guarantee is limited to the sum stated above and it is a condition of any liability attaching to us under this Guarantee that the claim for payment in writing shall

be received by us within the validity period of this Guarantee, failing which we shall be discharged of our liability, if any, under this Guarantee.

We, _____ (the Guarantor), waiving all objections and defenses under the Contract, do hereby irrevocably and independently guarantee to pay to the Procuring Agency without delay upon the Procuring Agency's first written demand without cavil or arguments and without requiring the Procuring Agency to prove or to show grounds or reasons for such demand any sum or sums up to the amount stated above, against the Procuring Agency's written declaration that the Principal has refused or failed to perform the obligations under the Contract, for which payment will be effected by the Guarantor to Procuring Agency‘s designated Bank & Account Number.

PROVIDED ALSO THAT the Procuring Agency shall be the sole and final judge for deciding whether the principal (Contractor) has duly performed his obligations under the Contract or has defaulted in fulfilling said obligations and the Guarantor shall pay without objection any sum or sums up to the amount stated above upon first written demand from the Procuring Agency forthwith and without any reference to the principal or any other person.

IN WITNESS WHEREOF, the above bounded Guarantor has executed this Instrument under its seal on the date indicated above, the name and corporate seal of the Guarantor being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Guarantor (Bank) Witness:

_____

Guarantor

(Bank)

Witness: 1. Signature _____

1._____ 2. Name _____

_____ 3. Title _____

Corporate Secretary (Seal)

2. _____

_____ _____

(Name, Title & Address) Corporate Guarantor (Seal)

FORM OF CONTRACT AGREEMENT

THIS CONTRACT AGREEMENT (hereinafter called the —Agreement‖) made on the _____ day of _____ 202 _____ between _____(hereinafter called the "Procuring Agency") of the one part and _____ (hereinafter called the —Contractor‖) of the other part.

WHEREAS the Procuring Agency is desirous that certain Works, viz _____ should be executed by the Contractor and has accepted a Bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein.

NOW this Agreement witnesseth as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.

2. The following documents after incorporating addenda, if any except those parts relating to Instructions to Bidders, shall be deemed to form and be read and construed as part of this Agreement, viz:

(a) The Letter of Acceptance;

(b) The completed Form of Bid along with Schedules to Bid;

(c) Conditions of Contract & Contract Data;

(d) The priced Schedule of Prices/Bill of quantities (BOQ);

(e) The Specifications; and

(f) The Drawings

3. In consideration of the payments to be made by the Procuring Agency to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Procuring Agency to execute and complete the Works and remedy defects therein in conformity and in all respects within the provisions of the Contract.

4. The Procuring Agency hereby covenants to pay the Contractor, in consideration of the execution and completion of the Works as per provisions of the Contract, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS WHEREOF the parties hereto have caused this Contract Agreement to be executed on the day**,** month and year first before written in accordance with their respective laws.

Signature of the Contactor	Signed of the Procuring Agency
_____	_____
(Seal)	(Seal)

Signed, Sealed and Delivered in the presence of:

Witness:	Witness:
_____	_____
(Name, Title and Address)	(Name, Title and Address)

MOBILIZATION ADVANCE GUARANTEE

Guarantee No._____

Executed on_____

(Letter by the Guarantor to the Procuring Agency)

WHEREAS the _____ (hereinafter called the Procuring Agency) has entered into a Contract for

_____ (Particulars of Contract), with

_____ (hereinafter called the Contractor).

AND WHEREAS the Procuring Agency has agreed to advance to the Contractor, at the Contractor's request, an amount of Rs._____ Rupees _____) which amount shall be advanced to the Contractor as per provisions of the Contract.

AND WHEREAS the Procuring Agency has asked the Contractor to furnish Guarantee to secure the advance payment for the performance of his obligations under the said Contract.

AND WHEREAS _____ (Scheduled Bank) (hereinafter called the Guarantor) at the request of the Contractor and in consideration of the Procuring Agency agreeing to make the above advance to the Contractor, has agreed to furnish the said Guarantee.

NOW THEREFORE the Guarantor hereby guarantees that the Contractor shall use the advance for the purpose of above mentioned Contract and if he fails, and commits default in fulfillment of any of his obligations for which the advance payment is made, the Guarantor shall be liable to the Procuring Agency for payment not exceeding the aforementioned amount.

Notice in writing of any default, of which the Procuring Agency shall be the sole and final judge, as aforesaid, on the part of the Contractor, shall be given by the Procuring Agency to the Guarantor, and on such first written demand payment shall be made by the Guarantor of all sums then due under this Guarantee without any reference to the Contractor and without any objection.

This Guarantee shall come into force as soon as the advance payment has been credited to the account of the Contractor.

This Guarantee shall expire not later than _____

by which date we must have received any claims by registered letter, telegram, telex or telefax.

It is understood that you will return this Guarantee to us on expiry or after settlement of the total amount to be claimed hereunder.

Guarantor (Scheduled Bank)

_____

Guarantor (Scheduled Bank)

Witness: 1. Signature _____

1._____ 2. Name _____

_____ 3. Title _____

Corporate Secretary (Seal)

2. _____

_____ _____

(Name, Title & Address) Corporate Guarantor (Seal)

INDENTURE FOR SECURED ADVANCE

(For use in cases in which is contract is for finished work and the contractor has entered into an agreement for the execution of a certain specified quantity of work in a given time).

This INDENTURE made the .... day of ..... -----..... ----------.....-20-----"-BETWEEN (hereinafter called "the Contractor" which expression shall where the context so admits or implied be deemed to include his heirs, executors, administrators and assigns) of the one part and THE GOVERNOR OF SINDH (hereinafter called "the Government" of the other part).

WHEREAS by an agreement, dated (hereinafter called the said agreement, the contractor has agreed to perform the under-mentioned works (hereinafter referred to as the said work):

(Here enter (the description of the works).

AND WHEREAS the contractor has applied to the .... —..... -----for an advance to him of Rupees ----------. (Rs. .....) on the security of materials absolutely belonging to him and brought by him to the site of the said works the subject of the said agreement for use in the construction of such of the said works as he has undertaken to execute at rates fixed for the finished work (inclusive of the cost of materials and labour and other charge) AND WHEREAS the Government has agreed to advance to the Contractor the sum of Rupees, (Rs. .....) on the security of materials the quantities and other particulars of which are detailed in Part II of Running Account Bill (E). the said works signed by the contractor

Fin R.Form.l7.A on----------..... — and on such covenants and conditions as are hereinafter contained and the Government has reserved to itself the option of marking any further advance or advances on the security of other materials brought by the Contractor to the site of the said works.

NOW THIS INDENTURE WTTNESSETH that in pursuance of the said agreement and in consideration of the sum of Rupees..... ----------.....-.....— ..... (Rs. ------..... -----) on or before the execution of these presents paid to the Contractor by the Government (the receipt whereof the Contractor doth hereby acknowledge) and of such further advances (if any) as may be made to him as aforesaid (all of which advances are hereinafter collectively referred to as the said amount) the Contractor doth hereby assign unto the Government the said materials by way of security for the said amount

And doth hereby covenant and agree with the Government and declare ay follow :

(1) ThatthesaidsumofRupees.....-..... ----------..... ----------(RF. ----------) so advanced by the Government to the Contractor as aforesaid and all or any further sum or sums which may be advanced aforesaid shall be employed by the contractor in or towards expending the execution of the said works and for no other purpose whatsoever.

(2) That the materials detailed in the said Running Account Bill (B) which have been

Fin R Form No. 17-A

Offered to and accepted by (he Government as security for the said amount are absolutely by the Contractors own property free from encumbrances of any kind and the Contractor will not make any application for or receive a further advance on the security of materials which are not absolutely his own property and free from encumbrances of any kind and the contractor hereby agrees, at all times, to indemnify and save harmless the Government against all claims whatsoever to any materials in respect of which an advance has been made to him as aforesaid.

(3) That the said materials detailed in the said Running Account Bill (B) and all other

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Materials on the security of which any further advance or advances may hereafter be made as aforesaid (hereinafter called the said materials) shall be used by the Contractor solely in *the* execution of the said works in accordance with the directions of the Divisional Officer----------(hereinafter called the Divisional Officer) and in the terms of the said agreement.

(4) That the Contractor shall make at his own cost all necessary and adequate arrangement for the proper watch, safe custody and protection against all risks of the said material and that until used in construction as aforesaid the said materials shall remain at the site of the said works in the Contractor's custody and at his own risk and on his own responsibility and shall at all times be open to inspection by (he Divisional Officer or any officer authorized by him. In the event of the said materials of any part (hereof being stolen, destroyed or damaged or becoming deteriorated in a grater degree than is due to reasonable use and wear thereof Contractor will forthwith replace the same with other materials of like qualify or repair and make good the same as required by the Divisional Officer and the materials so brought to replace the said materials so repaired and made good shall also be considered as security for the said amount.

(5) 'Hurt the said materials shall not on any account be removed from the site of the said works except with the written permission of the Divisional Officer or an officer authorized by him in that behalf

(6) That the said amount shall be payable in full when or before the Contractor receives payment, from the Government of the price payable to him for the said works under the terms and provisions of the said agreement PROVIDED THAT if any intermediate payments are made to the contractor on account of work done then on the occasion of each such payment the Government will be at liberty to make a recovery from the Contractors Bill for such payment by deducting there from in the value of the said materials (hen actually used in the construction and in respect of which recovery has not been made previously the value for this purpose being determined in respect of each description of material at (he rates at which the amount of the advances made under these presents were calculated.

(7) That if the Contractor shall at any time make any default in the performance or observation in any respect of any of the terms and provisions of the said agreement or of these presents the total amount of the advance or advances that may still be owing to the Government shall immediately on the happening of such default be repayable by the Contractor to the Government together with interest thereon at twelve percent per annum from the date or respective dates of such advance or advances to the date or repayment and with all costs, charges, damages and expenses incurred by the Government in or for the recovery thereof or the enforcement of this security or otherwise by reason of (he default of the Contractor and any moneys so becoming due and payable shall constitute a debt due from the Contractor to the Government and the Contractor hereby covenants and agrees with the Government

to repay and the same respectively to it accordingly.

(8) That the Contractor hereby charges all the said materials with the repayment to the Government of the said sum of Rupees ..... -..... (Rs.....) and any further sum or sums which may be advanced as aforesaid and all costs charges damages and expenses payable under these present PROVIDED ALWAYS and it is hereby agreed and declared that not withstanding anything in the said agreement and without prejudice to the powers contained therein if and whether the covenant for payment and repayment hereinbefore contained shall become enforceable and the money owing shall not be paid to accordingly.

Once therewith the Government may at any time thereafter adopt all or any of following courses as it may deem best ;

(a) Seize and utilize the said materials or any part thereof in the completion of the said works on behalf of the Contractor in accordance with the provisions in that behalf contained in the said agreement debiting the Contractor with the actual cost of effecting such completion the amount due in respect of advances under these presents and crediting the Contractor with the value of work done as he had carried it out in accordance with the said agreement and at the rates thereby provided. If the balance is against the Contractor, he is to pay the same to the Government on demand.

(b) Remove and sell by public auction the seized materials or any part thereof and out of the moneys arising from the sale retain all the sums aforesaid repayable to the Government under these presents and pay over the surplus (if any) to the Contractor.

(c) Deduct all or any part of the moneys owing out of the security deposit or any sum due to the Contractor under the said agreement.

(9) That except as is expressly provided by the presents interest on the aid advance shall not be payable.

(10) That in the event of any conflict between the provisions of these presents and the said agreement the provisions of these presents shall prevail and in the event of any dispute or difference arising over the construction or effect of these presents the settlement of which has not been hereinbefore expressly provided for the same shall be referred to the Procuring Agency ..... Circle whose……. decision shall be final and the provisions of the Indian Arbitration Act for the time being in force so far as they are applicable shall apply to any such reference.

In witness where of the* _____on behalf of the Governor of Sindh and the said..... —..... -..... --have hereunto set their respective hands and seals the day and first above written.

Signed, sealed and delivered by* In the presence of

_____

Seal

1st witness 2nd witness

Signed, sealed and delivered by* In the presence of

Seal

1st Witness 2nd witness

SPECIFICATION

[Note for Preparing the Specifications]

A set of precise and clear specifications is a prerequisite for bidders to respond realistically and competitively to the requirements of the user without qualifying their Bids. The specifications must be drafted to permit the widest possible competition and, at the same time, present a clear statement of the required standards of workmanship, materials, performance of the works. Only if this is done objectives of economy, efficiency, and fairness in procurement will be realized and responsiveness of Bids can be ensured, and the subsequent task of bid evaluation can be facilitated. The specifications should require that materials to be incorporated in the works be new, unused, and of the most recent or current models, and incorporated all recent improvements in design and materials unless provided for otherwise in the contract.

Samples of specifications from similar to previous procurements are useful in this respect. The use of metric units is encouraged. Depending on the complexity of the works and the repetitiveness of the type of procurement, it may be advantageous to standardize the Technical Specifications that should cover all classes of workmanship, materials and equipment although not necessarily to be used in a particular procurement.

Care must be taken in drafting specifications to ensure that they are not restrictive. In the specification of standards for equipment, materials, and workmanship, recognized international standards should be used as much as possible. The specifications shall consider all conditions but not limited to seismic conditions, weather conditions and environmental impact. The specifications should state that equipment, materials, and workmanship that meet other authoritative standards, and which ensure at least a substantially equal quality than the standards mentioned, will also be acceptable. The following clause may be inserted in the Specifications.

Sample Clause: Equivalency of Standards and Codes

Wherever reference is made in the Specifications to specific standards and codes to be met by Works to be furnished and tested, the provisions of the latest current edition or revision of the relevant shall apply, unless otherwise expressly stated in the Contract. Other authoritative standards that ensure equivalence to the standards and codes specified will be acceptable.

STATELIFE INSURANCE CORPORATION OF PAKISTAN

Tender Document

VOLUME-III
TECHNICAL SPECIFICATIONS

FIRE ALARM AND FIRE SUPPRESSION SYSTEM FOR STATELIFE BUILDING NO.11, KARACHI

Tender No. FF-SLB#11/01-2026

Address: Chief Engineer State Life Insurance Corporation Of Pakistan, 5th Floor, Real Estate Division, State Life Building No. 9, Principal Office,
Dr. Ziauddin Ahmed Road, Karachi-75530, Pakistan.
Tel: 021-99204520.

SUMMARY OF CONTENTS

Contents

BASIC MECHANICAL REQUIREMENTS

PART-1: GENERAL

1. Related Documents:

A. Drawings and general provisions of Contract, including General and Special Conditions apply to this Section.

2. Instructions to Tenderers:

A. The Specifications & Drawings make reference to certain Standard Specifications and also to certain manufacturers and equipment model numbers. The object of these references is to ensure that the equipment and materials offered by the Tenderers and supplied by the Contractor are in accordance with the required standard of quality, workmanship and capacities, etc. The object is not to limit the selection of equipment to a particular manufacturer unless specifically mentioned in the tender documents that a particular equipment and/or material is to be supplied.

B. It is clarified that the equipment and the materials complying with various standards and of manufacturers other than mentioned in the tender documents shall be acceptable provided they meet the required capacities as specified and meet the intent of the specifications regarding quality and workmanship.

C. In case there is any deviation between any item or material offered by the Tenderer from the tender specifications and drawings, the Tenderer shall clearly draw attention to all such deviations and no such item or material shall be supplied by the Contractor without prior written approval of the Engineer/ Consultant.

D. These Specifications and accompanying Drawings are to be considered as supplementing each other and as such are intended to serve jointly as the basis upon which the Contractor shall establish a Contract Price, and upon which he shall base the performance of the required work.

E. It is the intent of these Specifications and Drawings to call for finished work, tested, complete, and ready for operation.

F. These Drawings and Specifications are presented to the Tenderer with the understanding that he is an expert and is competent in the preparation of Contact Bid Prices on the basis of information such as is contained in these documents, which do not include assurance as to their complete accuracy and validity, in all details, and which may depend, for proper execution, upon interpretation by the Engineer/ Consultant and other Authorities, during the course of construction.

G. For the above reasons, the Tenderer shall understand that his submission of an unqualified proposal commits him to perform all work expressed and implied in the Drawings and Specifications without additional compensation. He shall further understand that such submission commits him without extra compensation, and within the scope of the Contract, to the following:

1. To provide, if required by the Engineer/ Consultant, the items or arrangements of greater quantity, better quality, or higher cost in the event that a disagreement with regard to; such items occurs between the drawings and specifications, or within one.

2. To provide any small items of work not specifically called for, but required to complete the intended installations.

3. To co-ordinate his work or adjust the same so that conflicts in space do not occur with other trades involved at the project.

4. To co-ordinate his work or adjust the same to suit site or any other existing conditions.

H. Contractor to ensure a hard copy of all the relevant standards pertaining to the work on site are available on site at all times.

3. Design Life of Equipment:

A. The design life of all equipment and material shall be a minimum of 25 years. Bidder shall identify all equipment and material that has a lower design life and shall indicate the proposed design life in his bid, and this shall be subject to approval by the Consultant.

4. Standards to be kept on Site:

A. The Contractor shall maintain at his site office a hard-copy of all standards that are referenced in these specifications. The Contractor shall submit to the Consultant and obtain approval on a list of all standards that he is required to maintain in his site office. The cost of maintain these standards is assumed to be covered in the overall contract price.

5. Interpretation of the Drawings & Specifications:

A. Except where modified by a specific notation to the contrary, it shall be understood that the indication and/or description of any item, in the drawings or specifications or both, carries with it the instructions to furnish and install the item, regardless of whether or not this instruction is explicitly stated as part of the indication or description.

B. It shall be understood that the specifications and drawings are complimentary and are to be taken together for a complete interpretation of the work. Exceptions are that notes on the drawings, which refer to an individual element of work, take precedence over the specifications where they conflict with the same.

C. No exclusions from, or limitation, in the language used in the Drawings or Specifications shall be interpreted as meaning that the appurtenances or accessories necessary to complete any required system or item of equipment are omitted.

D. The necessary Drawings utilise symbols and schematic diagrams to indicate various items of work. Neither of these have any dimensional significance nor do they delineate every item required for the intended installations. The work shall be installed in accordance with the diagrammatic intent expressed on the mechanical drawings, and in conformity with the dimensions indicated on final Architectural and Structural working Drawings and on equipment shop drawings.

E. No interpretation shall be made from the limitations of symbols and diagrams that any elements necessary for complete work are excluded.

F. Certain details appear on the Drawings which are specific with regard to the dimensions and positioning of the work. These details are intended only for the purpose of establishing general feasibility. They do not obviate field co-ordination for the indicated work.

G. Information as to the general construction not evident in this specifications and drawings shall be derived from structural & architectural drawings and specifications.

6. Codes, Permits & Inspection:

A. All works shall meet or exceed the latest requirements of all authorities having jurisdiction over construction work at the project site.

B. All required permits and inspection certificates shall be obtained, paid for, and made available at the time of completion of the Works.

C. All work shall be carried out in accordance with the following codes:

1. Fire Suppression Works:

- NFPA
- FM Global (where applicable)

2. Electrical Works:

- IEE Wiring Regulation
- Pakistan Electricity Rules
- Electric Inspectors Regulation & Requirements
- NFPA Standards

7. Coordination of Contract Works

A. The Contractor shall coordinate the Works with those works of the Building Contractor and any other contractors and sub-contractors.

B. The Contractor shall note that the drawings supplied to him only indicate the approximate locations of the works. He shall make any modification reasonably required of his Program, work sequence and physical deployment of his works to suit the outcome of work coordination or as necessary and ensure that all cleaning, adjustment, test and control points are readily accessible.

C. The Contractor shall pay particular attention to the building works Program and shall plan, coordinate and Program his works to suit and adhere to the building works in accordance with the building Program.

D. Any significant problems encountered during the coordination work, which are beyond the Contractor's control, shall promptly be reported to the Engineer/ Consultant.

8. Drawings by the Contractor:

Shop Drawings

1. The Contract Drawings are schematic and are intended to enable the Contractor to prepare his estimate and submit a tender. The contract drawings are not intended to be used as shop drawings and will not be used for execution. Contractor shall prepare installation (Shop) drawings for execution of his works

2. If the Contractor requires any further instructions, details, contract drawings or information drawings to enable him to prepare his working drawing he will apply in writing to the Engineer/ Consultant /Consultant for such information well in advance of application of such information.

3. All shop drawings shall be prepared on computer using current version of AUTOCAD software.

4. Prior to commencement of works on site and at least 3 weeks in advance of the drawings being required for actual execution, the Contractor shall submit hard-copies of shop drawings in triplicate plus soft-copy on AUTOCAD CD (both PDF & DWG format) for approval of the Consultant/Engineer/ Consultant. The Consultant/Engineer/ Consultant shall review the drawings & (i) approve the

drawing or, (ii) disapprove the drawings with comments or, (iii) disapprove the drawings with comments for rectification/revision. In the event of (iii), the Contractor shall correct/revise the drawing & resubmit 3 hard-copies of the drawings plus soft-copy on AUTOCAD CD to the Consultant/Engineer/ Consultant for Approval. On a drawing being approved, the Contractor shall submit 6 hard-copies plus soft-copy on AUTOCAD CD for formal approval and distribution to relevant offices.

5. All drawings shall show plans and sections with sufficient details to clearly reflect the installation of the plant. All material specifications shall be provided on the drawings. All information required for preparing suitable foundation, for providing suitable access to the plant, for making openings in building structure, for co-ordination with electrical, plumbing, air-conditioning and other designs etc., shall be clearly provided.

6. The Contractor shall submit to the Consultant/Engineer/ Consultant 3 sets of hard-copy drawings plus soft-copy on AUTOCAD CD showing all major holes, cavities, embedded frames and other parts of the plant to be embedded in the floor, ceiling and walls, channels in the floors, cable trenches, cement pipes or other major conduits, which are needed for the successful and timely completion of the works. The Consultant/Engineer/ Consultant after ascertaining the accuracy of these drawings, shall return 1 (one) set of the drawings to the Contractor, within 14 days of the receipt of these drawings.

7. All shop drawings shall be fully dimensioned and suitably scaled showing construction, sizes, weights, arrangements, operating clearances and performance characteristics.

8. Shop drawings shall only be of standard sizes of A0, A1 size as per ISO 5457:1999, as approved by the Consultant.

9. Installation shall not be allowed to commence unless approved shop drawings are in possession of the Contractor, for which purpose shop drawings shall be submitted by the Contractor to the Consultant/Engineer/ Consultant sufficiently in advance of actual requirements to allow for ample time to the Consultant in checking and approval and no claim for extension of the Contract time will be considered by reason of the Contractor's failure to submit the drawings on time.

10. Each shop drawing submitted by the Contractor shall include a certificate by the Contractor that all related conditions on site relevant to the particular installation have been checked and that no conflict exists.

11. Any expenses resulting from an error mistake or omission in or delay in delivery of the drawings & information mentioned in sub-clause (b) of this clause shall be borne by the Contractor.

12. Drawings approved shall not be departed from except on the instructions of the Consultant/Engineer/ Consultant.

13. The approval by the Consultant for any submitted data, working drawings, performance curves, test certificates for any items, arrangements and/or layout shall not relieve the Contractor for any responsibility regarding the performance of the Contract. Such approval shall also not relieve the Contractor from responsibility of any error in the submitted data & workings, brought to light at any time subsequent to any approvals.

A. Civil Work Drawings

The Contractor shall submit to the Engineer/ Consultant in accordance with the approved "Submission Schedule", 6 copies of drawings showing details of all civil work to be done by this Contractor or other contractors as noted below:

1. Equipment foundation drawings, duly coordinated with the equipment certified dimensions, and indicating the weight and the load on each support of equipment.

2. Plant room drawings, clearly indicating the details and positions of all openings, trenches, ducts and cutting required and construction details needed to complete the Works.

3. Elevations of all masonry and concrete and other walls, clearly indicting the dimensions and locations of all openings required and the type and design of the sleeves to be installed.

B. Manufacturer's Shop Drawings

1. The drawings shall show detailed construction, principal dimensions, weights and clearances for maintenance, etc. Immediately after placing of any order or at any event within 4 weeks unless otherwise approved in writing by the Engineer/ Consultant, the Contractor shall forward to the Engineer/ Consultant for comment, 4 copies of manufacturer's shop drawings indicating detailed construction, principal dimensions and weights, clearances for withdrawals and/or cleaning, etc. No work shall proceed on or off Site unless drawings requiring approval are so approved in writing by the Engineer/ Consultant.

C. Record Drawings

1. The Contractor shall maintain an accurate record of changes as work progresses on a set of Record Drawings, which shall be maintained at Site, and the following procedure shall be adopted:

a. Make records in a neat and legibly printed manner with a non-smudging medium.

b. Identify each Record Drawing as the "Project Record Copy", maintain Drawings in good condition, do not use them for construction purposes, and make them readily available to the Engineer/ Consultant.

c. Maintain project Record Drawings in a state current to the project. Failure to comply with this requirement may prejudice Progress Payments. The Engineer/ Consultant's visual inspection shall constitute proof that Record Drawings are current.

d. If the Contractor fails to produce either the marked-up drawings during the execution of the works or the record drawings, etc. for the Engineer/ Consultant/ Consultant approval, within one month after sectional or practical completion, the Engineer/ Consultant/ Consultant will have the right to have these drawings produced by others. The cost of obtaining the necessary information and preparing such drawings etc. will be deducted from the outstanding payments owing to the Contractor.

D. As–Built Drawings

1. The Contractor shall submit 3 sets of the first draft prints of As-Built drawings within 28 days of the issuance of the Certification of Completion to the Engineer/ Consultant/ Consultant for checking. The Engineer/ Consultant/ Consultant after checking the above draft prints shall return one set of the marked up copies of these As-Built drawings to the Contractor within 42 days from the date of submission of the Contractor's draft prints with comments. The Contractor shall within a further 28 days from the date of receiving the Engineer/ Consultant/ Consultant's comments on the draft As-Built drawings re-submit to the Engineer/ Consultant/ Consultant for his approval another 3 sets of the second draft prints of As-Built drawings with the Engineer/ Consultant/ Consultant's comments incorporated. This process of submission and approval shall continue until the final approval of the Engineer/ Consultant/ Consultant on these As-Built drawing is obtained.

2. The Contractor shall ensure all As-Built drawings are accurate representation of the complete Works, before submitting them to the Engineer/ Consultant/ Consultant.

3. As-built drawings shall only be of standard sizes of A0, A1 size as stipulated in ISO 5457:1999, as approved by the Consultant.

4. The final approved As-Built drawings shall be in 6 sets of hard copy and 3 sets of electronic copies. These shall be submitted within 21 days from the date of final approval. Each electronic copy shall be in the form of CD-ROM (both in PDF & DWG formats), labeled, with cross reference to a printed list of files explaining the contents and purpose of each file and supplied in sturdy plastic containers.

9. Responsibility for Accuracy of Information:

A. The Contractor shall be fully responsible for accuracy of all information necessary for successful and timely completion of the works.

B. The Contractor shall be responsible to make all measurements and set out all the necessary dimensions for their correctness.

C. The Contractor shall be fully responsible for ascertaining the accuracy of the dimensions and other information given in the tender documents before carrying out the work. The Contractor shall provide the complementary dimensions and communicate the same to the Engineer/ Consultant/Consultant.

D. The Contractor shall consult the drawings and documents which have been prepared for the Civil and other contracts by other Engineer/ Consultants, which can effect his work and which are either kept on site or are available with the other Engineer/ Consultants.

E. It shall be the responsibility of the Contractor to acquire all necessary information and ascertain its accuracy for co-ordination of the works with the works of other Contractors.

10. Storage Arrangements:

A. The Contractor shall make adequate arrangements for the storage of the materials arranged by him or supplied by the Employer. No payment shall be made to the Contractor for storage arrangements whatsoever. However adequate space for stores shall be provided on site to the Contractor.

B. The location of the store area shall be within the Site premises and/or selected with the consultation and approval of the Engineer/ Consultant.

11. Standards & Typical Design:

A. The specification either cites or implies M Global, IEEE, IEC, ASME, ASHRAE, or BS Standards where the context so refers. Other comparable United States, or European standards and typical designs are equally acceptable providing that they in no way detract from the quality, safety, operability or durability of the equipment and material furnished. However, when other standards or typical designs than those cited or implied are offered by a tenderer, he shall set forth in his proposal the alternate standards and/or designs he proposes so that a direct comparison can be made by the Engineer/ Consultant before the issue of a Letter of Award. Each specific difference from the specifications shall be clearly spelled out by the tenderer. If no alternates are set forth by the Tenderer in his proposal, it will be assumed that the equipment and material will be in accordance with the standards and typical designs as cited or implied in the Specifications.

12. Abbreviations for Standards:

A. The standards, codes of practice and recommendations of the following societies or institutions have either been used in the specifications and are cited here as a general level of quality for the equipment, materials and workmanship.

1. Abbreviations for International institutions are given below:

- International Electro technical Commission .. IEC

2. Abbreviations for some European societies and standards institutions are as follows:

- Association Francaise de Normalisation ...AFN
- American Society of Heating Refrigerating and

  Air-conditioning Engineers ... ASHRAE
- British Standard Institution... BSI
- Chartered Institution of Building Services ... CIBS
- Dentsches Institute fur Normung ...DIN
- Institution of Electrical Engineer/ Consultants, London ... IEE

3. Abbreviations for Pakistani Societies and Standard Institutions:

- Pakistan Standards Institution ... PSI

4. Abbreviations for various United States Societies and Standard Institutions:

- American Standards Association ... ASA
- American Society of Heating, Refrigerating and

  Air-conditioning Engineers ... ASHRAE
- American Society of Mechanical Engineer ... ASME
- National Electrical Manufacturers Association ... NEMA
- American Society for Testing and Material ... ASTM
- Instrument Society of America ... ISA
- National Bureau of Standards ... NBS
- National Fire Protection Association... NFPA

B. Where differences or contradictions appear between any of the laws, standards, codes, specified herein, the decision of the Consultant shall be final and binding on the Contractor and the Contractor shall not claim any additional charges for carrying out the same.

13. Delivery of Equipment / Material on Site:

A. No plant or Contractor's Equipment shall be shipped or delivered to the Site until intimation in writing has been applied for and obtained by the Contractor from the Engineer/ Consultant that the

plant may be delivered. The Contractor shall be responsible for the reception on Site of all plant and Contractor's Equipment delivered for the purpose of the Contract.

B. All materials delivered to Site shall be accurately listed and recorded in the site record books maintained on site by the Contractor and shared with Employer's Project Manager.

C. Materials and equipment delivered to Site and paid for in interim payment shall be the Employer's property. Such materials and equipment shall not be removed from Site without the approval of the Engineer/ Consultant in writing and appropriate deduction shall be made in the next interim payment in accordance with the Contract.

14. Unloading & Storage at Site:

A. The Contractor shall unload all owner supplied or otherwise equipment & material at the site from delivery vehicles as the case may be. Items for permanent installation shall be properly stored in areas designated by the Engineer/ Consultant and shall be protected as required to prevent damage or deterioration of any type. Storage methods shall be such as to cause minimum inconvenience to others and shall be arranged to facilitate inspection.

B. All equipment and material storage shall be subject to the approval of the Engineer/ Consultant.

1. Items stored shall be blocked up at least six (6) inches off the ground.

2. The ends of all nozzles, pipes, tubes and conduits while in storage at the site shall be covered with a tube cap to save against entrance of rain water, blowing dirt, and other foreign matter. Tubing shall be shipped and stored in neat bundles.

3. Miscellaneous steel, plate work, pipes, etc. shall be protected by a prime coat of paint and kept painted throughout the storage and erection period to inhibit rusting unless such items are galvanised or have other corrosion proof finish.

C. All packing boxes, shipping containers, planking, covering, etc., shall become the property of the Employer as soon as the equipment and material which is contained therein arrives at the site. The Employer, on application from the Contractor, may permit the Contractor to use some of the boxes, containers, etc., without charge for equipment and material storage purposes.

15. Equipment Lifting:

A. The contractor shall be solely responsible for safe lifting of the equipments from place of storage to location of final installation and finally on the foundations.

B. Prior to lifting the equipments the following procedure shall be adopted:

1. Submit comprehensive insurance policy for the full value of the equipment to the Engineer/ Consultant/Employer from approved insurance company.

2. Submit complete information of specialist firm of lifters/riggers to the Engineer/ Consultant & obtain approval.

3. Submit complete procedure & equipment to be used for lifting the equipment in place. Identify on plans location of tripods, hoist, etc. that will transfer weight to the equipment, to the structure & obtain approval.

4. All the above to be completed with one month before the date of lifting of equipment.

16. Qualification of Equipment & Material Manufacturer:

A. All minor equipment and all materials shall be manufactured by companies which have had at least five years previous experience in the design and manufacture of equipment and or material of comparable type, capacity and operating conditions.

B. Where the requirements of this clause make any material non-obtainable the Employer and/or Engineer/ Consultant reserves the right to waive any portion or portions of it as required to obtain the intent of the Specifications.

C. When manufacturer's product is specified by name or equivalent, it shall be the sole judgement of the Engineer/ Consultant/Consultant to determine the acceptability of any product which is offered as an equal to that specified.

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

E. If the Contractor in his tender proposal has offered more than one source of equipment or material the selection of the source shall be at the judgement of the Consultant/Engineer/Consultant.

17. Guarantees/Warrantees for Equipment/Plant:

A. The period of guarantee/warrantee on the equipment/plant shall be the period stated in Conditions of Contract.

B. The Contractor's guarantee does not cover the normal wear & tear.

C. Manufacturer's equipment warranties if they exceed the Maintenance Period as defined in these Documents shall be transferred to the Employer at the end of the Maintenance Period.

D. The Contractor shall guarantee that the material & workmanship incorporated into the plant/equipment are new and the best of their respective kinds for the service intended and that all items will be free from inherent defect in design, workmanship & materials, and that all equipment in its several parts will operate successfully at all capacities up to and including the maximum specified load without undue noise, heating, straining of parts, wear and vibration and that an ample factor of safety is included in every design.

E. Guarantee/Warrantee, shall be furnished by the Contractor upon forms approved by the Consultant/Engineer/Consultant and shall be signed by both the Contractor and the Sub-Contractors whose work is involved.

F. If the equipment/plant manufacturer's standard guarantee/warrantee is applicable, the guarantee/warrantee form and conditions must be submitted along with the equipment/plant 'technical submittals'.

G. The Contractor's liability shall be limited to the replacement of defective parts that may develop in the equipment or material of his own work or manufacture or his Sub-Contractors under proper use and arising solely from faulty design, material, or workmanship provided always that such defective parts are not repairable at the Site, and are not essential in the meantime for commercial use of the equipment, are promptly returned to the Contractor's or Sub-Contractor's factory unless otherwise arranged. The equipment so replaced or repaired shall be in conformity with the specifications.

H. For indigenous equipment, all replacements shall be made free of cost at the Site by the Contractor.

I. For imported equipment, all replacement shall be made free of cost ex-Karachi port, and the Employer shall arrange to have then cleared, pay all duties and hand-over the replaced parts to the Contractor.

J. The return of defective parts to the Contractor's or Sub-Contractor's factory shall be the Contractor's responsibility and shall be made at his expense. The Employer will, however, render such assistance as necessary to expedite the same. In the case of defective parts not repairable at the site but essential in the meantime for the commercial use of the equipment, the Contractor shall, whenever possible, replace free of cost at the site the said defective parts before the defective parts are removed from the site.

K. If it becomes necessary for the Contractor to replace or renew any defective portions of the Plant under this clause, the provisions of this clause will apply to the portions of the plant so replaced or renewed until the expiration of six months from the date of such replacement or until the end of the guarantee period, whichever shall be later. If any defects are not remedied within a reasonable time, the Employer, after due notice to the Contractor, may proceed with the work at the Contractor's risk and expense without prejudice to any other rights which the Employer may have against the Contractor in respect to such defects.

L. If the replacements or renewals are of such a character as may effect the efficiency of the plant, the Engineer/ Consultant/Consultant shall have the right to give to the Contractor within one month of such replacement or renewal, notice in writing that performance tests be made, in which case tests shall be carried out as provided in these Documents. Should such tests show that the guarantees of the Contract are sustained; the cost of the tests shall be borne by the Employer. Should the guarantees not be sustained, the cost of the test shall be borne by the Contractor.

M. If during the guarantee period the services of the Contractor's personnel are required for the rectification or replacement of any defective part or work due to defective material, design or workmanship, such services shall be made by the Contractor without charge to the Employer.

PART-2: EXECUTION

2.1 Execution of Works:

A. Program of Works

1. The Contractor shall submit to the Engineer/ Consultant a detailed Program of Works within 2 weeks from the acceptance of his tender showing the intended method, stages and order of work execution in coordination with the building construction Program, together with the duration he estimated for each and every stage of the Works. The Program shall include at least the following:

a. Dates for submission of shop drawings and technical submittals;

b. Dates for the placement of orders for equipment and materials;

c. Expected completion dates for builder's works, i.e. when work site needs to be ready;

d. Delivery dates of equipment and materials to Site;

e. Dates of commencement and completion of every stage of the Works in line with the building construction Program, i.e. each floor level and/or zone area;

f. Dates of documents/drawings submissions to relevant Government departments to obtain the necessary approvals;

g. Dates of requirement of temporary facilities necessary for testing & commissioning, e.g. electricity supply, water and town gas;

h. Dates of completion, testing and commissioning; and

i. Short term Programs showing the detailed work schedules of coming weeks and months shall also be provided to the Engineer/ Consultant. Programs shall be regularly updated to reflect the actual progress and to meet the Contractor's obligations under the Contract.

2. In addition, detailed submission schedules for installation drawings, equipment and testing and commissioning shall be submitted to the Engineer/ Consultant for approval. The formats and information to be included in the schedules shall be as required by the Engineer/ Consultant.

B. Builder's Work

1. The builder's work in connection with mechanical equipment rooms construction will be carried out as part of the building works by the Building Contractor at the expense of the Employer. The Contractor shall submit full details of such requirements with all details for openings required to be kept for movement of equipment, and for electrical and mechanical services, within a reasonable time to the Engineer/ Consultant/ Consultant for approval, so that due consideration may be given before the Building Contractor commences the building works in accordance with the building Program in the areas concerned. The Contractor is required to mark out at the relevant locations of the Site the exact positions and sizes of all such works and to provide detailed information of such works to the Building Contractor to facilitate him to carry out the builder's work as the works proceed.

2. The Contractor is also required to set all sleeves in masonry and concrete works, of the correct size and at the correct location, before the works are carried.

3. All 'cutting-away' and 'making-good' shall be carried out by the Contractor or charged to the Contractor.

4. All expenses properly incurred and losses suffered by the Employer as a result of the Contractor's failure to comply with the above requirements are recoverable by the Employer from the Contractor's bills.

C. Cooperation with other Contractors

1. The Contractor shall cooperate at all times with the Building Contractor and all other contractors and sub-contractors in order to achieve efficient workflow on Site.

2. Any significant problems beyond the Contractor's control shall promptly be reported to the Engineer/ Consultant.

D. Site Supervision

A. The Contractor shall keep on the Site a Site Engineer/ Consultant along with a team of competent and technically qualified site supervisors to control, supervise and manage all the Works on Site. The Site Engineer/ Consultant shall be vested with suitable powers to receive instructions from the Engineer/ Consultant/ Consultant.

B. The team shall be of adequate strength and all personnel deployed on site by the Contractor shall be technically competent and have adequate site experience for the Works. The Contractor shall submit

the CV of all such personnel and obtain approval from the Engineer/ Consultant/ Consultant prior to their deployment on site. The Contractor shall immediately replace any site supervisor whose experience, skill or competency is, in the opinion of the Engineer/ Consultant/ Consultant, found to be inadequate for the particular work.

C. All such approvals provided by the Engineer/ Consultant/ Consultant shall not relieve the Contractor from any and all obligations of the Contract. The Contractor shall also refer to the Conditions of Contract for other specific requirements, if any, on site supervision.

2.2 Verification of Actual Dimensions on Site:

A. The Contractor shall be solely responsible for verification of actual site dimensions and building layout. Building layouts shown on Consultant's drawings shall not be considered to be final with regard to dimensions and layout but shall be subject to actual verification by the Contractor. All working drawings prepared by the Contractor shall incorporate actual measurements taken on site. The Contractor shall ensure that all equipment can be conveniently fitted into the space allocated for this purpose.

B. If any space allocated for certain equipment or combination of equipments is insufficient or deficient in terms of clearances required for maintenance etc., the Contractor shall forthwith inform the Consultant/Engineer/ Consultant of the discrepancy. He shall provide all reasonable assistance to the Consultant/Engineer/ Consultant for verification of the same and for taking remedial measures. It is understood that all tenderers during tendering shall have checked that the equipment proposed to be supplied by them fits conveniently into the space allocated for this purpose. In case any such space is insufficient, the tenderer shall so indicate the deficiency in his tender documents and specify the space requirements. Failure on the part of the tenderer to point out any discrepancies existing in this regard shall make him liable, if his tender has been accepted, to bear the full consequences developing out of any equipment not fitting into the space allocated for the purpose.

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

2.3 Approval for Material & Equipment:

A. General: All equipment and material to be used in the Works shall be subject to approval obtained prior to delivery of the same on site. It is to be specifically noted that any approval given by the Engineer/ Consultant/Consultant/ Engineer/ Consultant shall not relieve this Contractor of his obligations under this Contract.

B. Approval of Imported Equipment: For approval of all equipment, the Contractor shall be required to submit, within two weeks of the signing of the Contract, detailed submittals stating the equipment proposed to be supplied and providing supporting literature/brochures etc., to enable the "CONSULTANT" to check conformance to the specifications. Performance curves and charts shall be submitted with the operating points clearly marked. The selection procedure for Chillers, AHU's FCU's, etc., shall be submitted in detail on type-written sheets. All equipment submittals shall be accompanied with a certificate stating that the equipment proposed to be supplied fits into the

space allocated for it with sufficient clearance around it to allow for installation of related ducting, piping, etc., and provides for maintenance clearances as required by the manufacturer of the equipment, and that all special requirements of the equipment have been accounted for. Any additional information, test reports etc., required by the "Consultant" shall be furnished by the Contractor. All work related to the equipment shall only be commenced after receipt of written approval from the "Consultant".

C. Approval of Locally Manufactured Equipment: The procedure of approval of locally manufactured equipment shall be the same as stipulated above for imported equipment. Additionally all locally manufactured equipment shall be inspected at the manufacturer's premises by the Consultant/Engineer/ Consultant, and approval given prior to delivery on site.

D. Approval of Imported Material: All imported material to be used in the works shall be submitted to the Consultant/Engineer/ Consultant and approval obtained. Manufacturer's literature/brochure etc. that provide complete information on the material specifications, to enable the Consultant/ Engineer/ Consultant to check conformance to specification, shall be submitted. Any additional information, test reports etc., required by the Consultant/ Engineer/ Consultant shall be supplied by the Contractor.

E. Approval of Locally Procured Material: All locally procured material shall be submitted to the Consultant/Engineer/ Consultant for approval, and approval obtained prior to delivery of the same on site. The procedure for obtaining approval shall generally be the same as given above for imported material, except that where manufacturer's literature is not available, a sample of the material shall be submitted along with type written notes indicating relevant source data and specs on the material. Any other samples, information, test reports etc., required by the Consultant/Engineer/ Consultant's shall be submitted.

2.4 Cutting & Patching:

A. Cutting will be done under Specifications of other trades. Perform cutting, fitting and patching of mechanical equipment and materials required to:

1. Set openings and sleeves for ducts & pipes accurately before the structural concrete are poured or set boxes on the forms so as to leave openings in the structure in which the required sleeves can be subsequently located in which case Contractor shall fill in the concrete voids around the sleeves.

2. Uncover work to provide for installation of ill-timed work.

3. Remove and replace defective work.

4. Remove and replace work not conforming to requirements of the Contract Documents.

5. Remove samples of installed work as specified for testing.

6. Install equipment and materials in existing structures.

7. Upon written instructions from the Consultant uncover and restore work to provide for observation of concealed work.

B. All patching will be done under Specifications of other trades. Should the Contractor neglect to perform his preliminary work and should cuttings be required in order to install the piping or equipment, then the expense of the cutting and restoring of surface to their original condition shall be borne by the Contractor.

C. Cut, remove and legally dispose of selected mechanical equipment, components and materials as directed by the Consultant, including but not limited to removal of mechanical piping, heating units and trim and other mechanical items made obsolete by new work.

D. Protect structure, furnishings, finishes and adjacent materials not indicated or scheduled to be removed.

E. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

F. Patch and refinished existing finished surfaces and building components using new materials matching existing materials and experienced installers.

2.5 Measuring Instruments:

A. The Contractor shall acquire and maintain on site various required measuring instruments in perfect working condition to enable the representative of the Employer Consultant/Engineer/ Consultant to check the quality and standard of all material and performance of equipments.

2.6 Operating & Maintenance Instructions:

A. Framed Instructions: Approved piping, wiring and control diagrams showing the complete layout of the entire system, including equipment, piping, valves and control sequence, framed under glass or in approved laminated plastic, shall be posted; where directed. In addition, condensed operating instructions, explaining preventive maintenance procedures, methods of checking the system for normal safe operation, and procedures of safely starting and stopping the system shall be prepared in typed form, framed as specified above and posted beside the diagrams. Proposed diagrams, instructions and other sheets shall be submitted for approval prior to the posting. The framed instructions shall be posted before acceptance testing of the system.

B. Field Instructions: During the two months of the operation and maintenance period upon completion of the work the services of one or more project engineers shall be provided by the Contractor to instruct the representative of the Employer in the operation and maintenance of the Works. The field instructions shall cover all the items contained in the bound instructions.

2.7 Operation & Maintenance (O&M) Manual & User Manual:

A. General

A. The Contractor shall provide two types of manuals to the Engineer/ Consultant with all changes made to the installation during the course of the Contract suitably incorporated.

B. The “O&M Manual” is for use by the maintenance contractor of the completed installation. It shall contain detailed technical information covering both operation and maintenance aspects of the installation.

C. The “User Manual” seeks to give users of the completed installation an overview of the essential information of the installation. The contents of the manual should be concise and succinct for ease of comprehension by people with a non-technical background.

2.8 Presentation:

A. All manuals shall be written in English, unless otherwise specified. The text of descriptive parts shall be kept concise while at the same time ensure completeness. Diagrammatic materials shall also be supported by comprehensive descriptions.

B. The manuals shall comprise A4 size loose-leaf, where necessary, A3 size folded loose-leaf. The loose-leaves shall be of good quality paper that is sufficiently opaque to avoid "show-through". Unless otherwise specified in the Contract, the manuals shall be bound in durable loose-leaf four ring binders with hard covers.

C. The manuals shall have labels or lettering on the front cover and spine. The Engineer/ Consultant's approval shall be obtained on this at the draft manual stage. The electronic copy of manuals including the technical literatures shall be in PDF format.

2.9 Checking and Approval:

A. The Contractor shall submit 3 sets of the first draft of O&M Manuals together with a list of recommended spare parts for one year's operation and a list of special tools both complete with prices to the Engineer/ Consultant for comment within 28 days of the issuance of the Completion Certificate.

B. The Contractor shall submit 2 sets of the first draft of the User Manual to the Engineer/ Consultant for comment at least 56 calendar days before the date of completion. The Engineer/ Consultant will check the drafts and return them to the Contractor within 42 days from the date of submission with comments necessary for a final and approved set of document. The Contractor shall then make all necessary amendments to the documents and resubmit them to the Engineer/ Consultant within 21 days from the date of receipt of comments.

C. The Contractor shall submit 3 sets of hard copies (one of which shall be the original) and one set of electronic copy of the final approved O&M Manuals in CD-ROM within 21 days from the date of approval by the Engineer/ Consultant. The Contractor shall submit 6 sets of hard copies and 3 electronic copy of the final approved User Manuals in CD-ROM within 21 days from the date of approval by the Engineer/ Consultant.

2.10 Structure and Content of O&M Manual:

A. The detailed requirements, structure and contents of the O&M Manual shall include the following information under separate sections where appropriate:

1. Project Information

a. This shall include: Project title, site address, contract no., contract title, contractor/sub-contractor name, address, contact persons and their telephone/fax nos., contract commencement date, substantial completion date and end date of operation & maintenance period.

2. System Description

a. Type(s) of system(s) and equipment installed;

b. Design criteria, design data and parameters;

c. Locations of the system and major equipment, and what they serve;

d. Description of operation and functions of the system and equipment;

e. General operating conditions, expected performance and energy and resources consumption where applicable.

3. List of Installed Equipment

a. Schedule of all items of equipment and plant stating the location, name, model no., manufacturer's serial or reference no., manufacturer's design duties and data.

4. Spare Parts and Special Tools Lists

a. List of Spare Parts supplied by the Contractors: Item descriptions, supplied quantities, model nos. manufacturer's serial or reference nos. and storage locations.

b. Recommended Spare Parts List and Special Tools List: Manufacturers'/suppliers' recommendations for spare parts and special tools with item description, unit rate, recommended stock quantities as well as the agents for the spare parts and special tools.

5. Manufacturers' Certificates/Guarantees

a. Manufacturers' certificates such as factory test certificates, laboratory test reports and guarantees and any others where required for the equipment and plants, etc.

b. Originals of Statutory Inspection Certificate for various installations, including:

[Note: Testing records & commissioning data (other than the types prescribed above), which are required under the Contract are checked and endorsed separately by the Engineer/ Consultant and do not form part of the O&M manuals.

6. Safety Precautions for Operation and Maintenance

State, where applicable, hazard warnings and safety precautions of which the operation and maintenance staff need to be aware:

a. mandatory requirements relating to safety;

b. known hazards against which protection measures shall be taken; and

c. known features or operational characteristics of the installed equipment or systems which may cause hazard and the related safety precautions.

7. Operation Instructions

Instructions for the safe and efficient operation, under both normal and emergency conditions, of the installed system which shall comprise:

a. an outline of the operating mode;

b. control logic and data (sequence, effect, limits of capability, modes and set points);

c. procedures and sequences for start-up and shut-down;

d. interlocks between equipment/system;

e. calling on of stand-by equipment;

f. precautions necessary to overcome known hazards;

g. means by which any potentially hazardous equipment can be made safe;

h. estimation of energy consumption and energy costs;

i. forms for recording plant running hours, energy consumption and energy costs; and

j. operating data such as running current, operating pressure, operating flow rates, etc.

8. Maintenance

(i) Maintenance instructions

Manufacturers' and the Contractor's recommendations and instructions for the maintenance of the installed equipment. Clear distinction should be made between planned tasks (preventive maintenance) and fault-repair tasks (corrective maintenance). Instructions shall be given on each of the following, as appropriate:

(a) nature of deterioration, and the defects to be looked for;

(b) isolation and return to service of plant and equipment;

(c) dismantling and reassembly;

(d) replacement of components and assemblies;

(e) dealing with hazards which may arise during maintenance;

(f) adjustments, calibration and testing; and

(g) special tools, test equipment and ancillary services.

(ii) Maintenance schedules

Proposed maintenance schedules for all the preventive maintenance tasks identified above. The schedules shall be based on both manufacturers' recommendations and other authoritative sources (e.g. statutory or mandatory requirements) and should include:

(a) routine servicing;

(b) inspections;

(c) tests and examinations;

(d) adjustments;

(e) calibration; and

(f) overhaul.

The frequency of each task may be expressed as specific time intervals, running hours or number of completed operations as appropriate. Collectively, the schedules will form a complete maintenance cycle, repeated throughout the whole working life of the installation.

(a) Drawing Lists

(b) A complete list of as-built drawings identified with drawing number/reference;

(c) A complete list of manufacturers' shop drawings with drawing number/reference, where applicable; and

(d) A brief description of CD-ROM for these drawings.

(e) Technical Literatures

A complete set of manufacturers' literatures for all the plant and equipment installed in the system. The contents of these literatures shall cover the following areas where applicable:

(a) description of equipment with model numbers highlighted;

(b) performance -behavioral characteristics of the equipment;

(c) applications -suitability for use;

(d) factory/laboratory test reports, detailed drawings, circuit diagrams;

(e) methods of operation and control;

(f) operation instructions;

(g) cleaning and maintenance requirements;

(h) plants, materials and space required for maintenance;

(i) protective measures and safety precautions for operation and maintenance; and part lists.

(j) Contact addresses and telephone numbers of suppliers of major equipment

2.11 Structure and Content of User Manual:

A. The detailed requirements, structure and contents of the User Manual shall include, where applicable, the following information:

1. Project Information

This shall include: Project title, site address, contract no., contract title, contract commencement date, substantial completion date and end date of Maintenance Period.

2. System Description

(i) Type(s) of system(s) and equipment installed, and their purposes;

(ii) Locations of major plant spaces and riser ducts;

(iii)Brief description of the operation and functions of the systems and equipment; and

(iv)Listing of set points which can be adjusted by the user to suit their operation needs.

3. Schedule of Major Plant Spaces and Installed Equipment

(i) Schedule of major plant spaces and riser ducts including their locations; and

(ii) Schedule of major equipment and plants including their locations and serving areas.

4. Safety Precautions for Operation

Any safety precautions and warnings signals that the users shall be aware of in the daily operation of the various systems and equipment in the installation including:

(i) mandatory requirements relating to safety;

(ii) features or operational characteristics of the installed systems or equipment which may cause hazard and the related safety precautions;

(iii) protective measures and safety precautions for operation; and

(iv) list of warning signals and the related meanings that the user shall be aware of and the actions to be taken.

5. Operation Instructions

Instructions for the safe and efficient operation, under both normal and emergency conditions, of the installed system which shall comprise:

(i) an outline of the operating mode;

(ii) step by step operation instructions for systems and equipment that are to be operated by the user, including at least procedures for start-up and shut-down;

(iii) means by which any potentially hazardous situation can be made safe;

(iv) cleaning and basic maintenance procedures.

6. List of Statutory Periodic Inspections and Tests

A schedule of periodic inspections and tests that Employer and/or user of the installation have to arrange to achieve compliance with the requirements stipulated in the relevant Laws (if any). The frequency of such inspections and tests shall be expressed in specific time intervals.

7. Drawings

A set of selected as-built drawings which shall be able to illustrate to the user the general layout of the completed installation.

8. Photographs

A set of photographs with suitable captions to illustrate to the user the appearance and locations of devices which require their setting and operation.

2.12 Mechanical Installations:

A. Sequence, coordinate, and integrate the various elements of mechanical systems, materials and equipment. Comply with the following requirements:

1. Coordinate mechanical systems, equipment and materials installation with other building components

2. Verify all dimensions by field measurements.

3. Arrange for chases, slots and openings in other building components during progress of construction, to allow for mechanical installations.

4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.

5. Sequence, coordinate and integrate installations of mechanical, materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing the building.

6. Where mounting heights are not detailed or dimensioned, install systems, materials and equipment to provide the maximum headroom possible.

7. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Provide required connection for each service.

8. Install systems, materials and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Consultant/Engineer/Consultant.

9. Install systems, materials and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.

10. Install mechanical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.

11. Install access panel or doors where units are concealed behind finished surfaces.

12. Install systems, materials and equipment giving right of-way priority to systems required to be installed at a specified slope.

13. Provide fire stopping materials in all annular spaces surrounding piping, conduits, ducts, etc. that penetrate fire-resistive construction.

2.13 Safety Program

A. The Contractor shall strictly follow at his own cost the Safety Program outlined below and such additional measures as the Engineer/ Consultant or Engineer/ Consultant's Representative may determine to be reasonably necessary.

1. Prior to commencement of work the successful Contractor shall submit safety Program for discussion with the Employer and the Engineer/ Consultant.

2. The Contractor shall prepare a plan of the Works' Site to assure that storage areas for materials and equipment are located on the project/work site for maximum efficiency. This plan will be subject to the approval of the Engineer/ Consultant.

3. Activities between different operations and different crafts will be co-ordinated.

4. The Contractor shall layout and provide an efficient access system with information and directional signs posted as necessary.

5. All employees will be instructed on safe work method.

6. The Contractor shall advise all his supervisory staff of their responsibility for the prevention of injury to persons or damage to property or equipment in their respective areas of supervision.

7. Safety will be included in all job planning. This will include providing safe construction equipment and vehicles, protective equipment necessary for protection of workmen, and establishing methods for safe operation.

8. Good housekeeping will be maintained at all times.

9. Scaffolds, ladders, ramp", runways etc. will be constructed properly and maintained in safe conditions.

10. Ample fire protection will be provided and fire hazards guarded, by the Contractor.

11. Adequate lighting, ventilation etc. will be provided as necessary, by the Contractor.

12. Equipment will be properly and regularly inspected and maintained by the Contractor to the satisfaction of the Engineer/ Consultant.

13. The Contractor will assign to his employees only such duties as are within their physical and mental capabilities.

14. The Contractor will hold monthly meetings with his supervisory staff and the man incharge at the lower level will hold safety meetings of 10 to 15 minutes with his crew each week.

15. First Aid facilities will be provided at job sites, the services of doctors and hospitals made available, and all supervisors instructed in handling of injured employees.

16. Adequate toilet facilities will be provided, maintained in a hygienic condition and their use enforced by the Contractor.

B. Accident reports will be furnished to the Engineer/ Consultant for onward transmission to the Employer within 2 days of the reported accident.

C. Copies of the safety Program will be supplied by the Contractor to the Engineer/ Consultant and will be promptly posted in all offices in use of projects/works under this Contract.

D. At all construction sites the following instructions shall be followed:

1. availability of safety (hard) hats, which should be worn by anyone visiting or working within the designated work area

2. controlled entry to the designated work area

3. proper distribution of temporary electric power (use of RCDs/ELCBs, switch gear, cabling, socket outlets)

4. proper guarding of shafts, stairs and floor edges up, to a height of 42".

5. proper access stairs and ladders with handrails

6. properly demarcated passageways, which are kept clear of materials, equipment, and rubbish

7. daily cleaning of debris and rubbish from the site

8. adequate temporary lighting

9. proper housekeeping to reduce slipping and tripping hazards.

10. proper protection to pedestrians and adjoining buildings

11. contractor's all-risk Insurance policy to be inplace.

E. To ensure safety of all people on the Site during the construction process, including Contractors' personnel and Employer's representatives, the following procedures shall be adopted by all Contractors for the use of temporary electricity supply.

1. Work shall generally be carried out in accordance with 16th Edition of UK IEE Wiring Regulations, BS CP 1017 "Distribution of Electricity on Building Sites", and the Pakistan "Electricity Rules, 1937" all legal formalities of the Electric Inspector's office shall be complied with.

2. Construction of cables used shall be as follows:

a) to fixed distribution boards and fixed equipment, pvc/pvc/swa/pvc, to BS 6346.

b) to moveable plant, flexible armoured cables, to BS 6116.

c) to welding electrode-holders, flexible cables to BS 638.

d) to portable tools and hand-lamps, flexible cords to BS 6500

3. Installation of cables shall be as follows:

a) outdoors, directly buried at least 500mm below grade, with tile covers and cable markers (at minimum 10 meter intervals and at bends), and in RCC pipe at road/traffic crossings.

b) indoors, clipped to the surface at least 3000mm above floor/ground level.

c) strain relief shall be provided at termination of all cables at equipment, plugs, etc.

4. Double earthing, with stranded copper conductors, shall be used to establish a TNS system. No separate earthing electrodes are required at each location.

5. A main distribution board, to BS 4363, of totally enclosed sheet-steel construction (IP 54) shall be provided, with 30mA trip residual current device(s) for the earth-leakage protection of circuits. Short-circuit and overload protection shall be provided by circuit-breakers of the appropriate rupturing capacity.

6. Plugs, sockets, and accessories of a robust, unbreakable construction, to BS 4343, shall be used for all equipment. Portable tools, to BS 2769, shall preferably be of double-insulated construction and be operated at 110V.

7. A layout drawing of the proposed temporary installation with schematics, cable sizes and routes, earth conductors, and protection details shall be had approved from the Employer. After installation, test results (insulation resistance, earth-loop impedance, etc.) shall be submitted; re-testing shall be done every three months.

2.14 Tests on Completion:

A. The Contractor shall give to the Engineer/ Consultant/Consultant/Engineer/ Consultant in writing 15 days notice of the date after which he will be ready to make the "Tests on Completion". Unless otherwise agreed the tests shall take place within 10 days after the said date on such day or days as the Consultant/Engineer/ Consultant shall in writing notify the Contractor.

B. If the Consultant/Engineer/ Consultant fails to appoint a time after having been asked to do or to attend at any time or place duly appointed for making the said tests, the Contractor shall be entitled to proceed in his absence and the said tests shall be deemed to have been made in the presence of the Consultant/Engineer/ Consultant.

C. If in the opinion of the Consultant/Engineer/ Consultant the tests are being unduly delayed he may, by notice in writing, call upon the Contractor to make such tests within 10 days from the receipt of the said notice, and the Contractor shall make the said tests on such day within the said 10 days as the Contractor may fix and of which he shall give notice to the Consultant/Engineer/ Consultant. If the Contractor fails to make such tests within the time aforesaid, the Consultant/Engineer/ Consultant may himself proceed to make the tests. All tests so made by the Consultant/Engineer/ Consultant shall be at the risk and expense of the Contractor.

D. The Employer, except where otherwise specified, shall provide free of charge subject to the provisions of Sub-clause (e) of this clause; electricity, fuel and water, as may be reasonably demanded to carry out such tests efficiently.

E. If any portion of the works fail to pass the tests, tests of the said portion shall, if required by the Consultant/Engineer/ Consultant or by the Contractor, be repeated within a reasonable time upon the same terms and conditions, as aforesaid, save that all expenses to which the Employer may be put by the repetition of the tests shall be deducted from the Contract Price.

2.15 Inspection of Completed Works:

A. The Contractor is required to give the Employer/Engineer/ Consultant/Consultant due notification when he expects the work to be completed, a report in triplicate of the measurements carried out with regard to pressure testing of pipes and leak testing of duct work and other specified tests shall be attached to this application. The final inspection should then be carried out, without unnecessary delay, and if possible within four weeks.

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

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

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

E. Inspections are to be carried out by the Consultant/Engineer/ Consultant or any other suitable and competent person appointed by the Employer.

F. The costs of Advance Inspection, Final Inspection & Guarantee Inspection are to be met by the Employer, where the inspection has been carried out by a person appointed by him.

G. The costs of supplementary inspections and re-inspections are to be borne by the Contractor.

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

I. The inspector's decision as to what faults or omissions may have occurred is binding on both sides.

J. The Contractor is required to carry out, without delay, any improvements, alterations or additions which may be considered necessary as the result of an inspection report.

K. When the final inspection has taken place, the work is to be handed over to the Employer in so far has been found to be in the state required by the Contract, and can suitably be put into use for this purpose for which it was intended.

L. The Employer has the right to put into use any Section of the work contracted for and not approved at the time of inspection, provided this can be done without jeopardising the progress of the work, and he may use it without special compensation even before the faults or omissions have been made good.

M. Where special dates are specified under the Contract for the completion of different Sections of the work, the provisions of this Clause are to apply to each part separately.

N. The inspection report required under this Clause is to be delivered in writing, and signed by the inspector, giving the date on which it is to be made available for the parties' inspection. The report should cover the following points:

1. State whether the work has been approved or not.

2. State the reasons for failing to approve it, if it has not been approved.

3. State faults or omissions for which the Contractor is to be held responsible, together with the time within which they are to be made good.

4. Include notes on matters which do-not require immediate action, but ought to be finally settled in connection with the guarantee inspection.

5. The sum to which the Employer is entitled.

6. Date on which the insurance taken out by the Contractor lapses.

7. If the work has been approved at the final inspection, the date from which the guarantee/maintenance period is to run and the day after which it expires.

8. Distribution of costs connected with the inspection.

2.16 Acceptance & Interim Operation

A. After the performance tests, if the equipment supplied by the Contractor is found to meet the guarantee and any other specified requirement, and if all other work called for hereunder has been completed, the Employer's acceptance will be forth-coming and final payment will become due as provided for under the terms of payment. This acceptance shall, however, not relieve the Contractor of his responsibility for the first inspection.

B. Should the equipment furnished by the Contractor fail to operate as required, or in case of failure to meet any of its guarantees, the Employer shall have the right to operate the equipment, using the Contractor's supervisory operating personnel, until such defects have been remedied and guarantees met with. In the event that defects necessitate the rejection of the equipment or any part thereof, the Employer shall have the right to operate the equipment until such time as new equipment is provided to replace the rejected equipment. Such operation shall not be deemed as an acceptance of any equipment.

2.17 Inspection & Testing During Manufacture

A. The Consultant/Engineer/ Consultant shall be entitled at all responsible times during manufacture to inspect, examine and test on the Contractor's premises the materials and workmanship of all plant to be supplied under the Contract, and if part of the said plant is being manufactured on another premises the Contractor shall obtain the Consultant/Engineer/ Consultant's permission to inspect, examine & test as if the said plant were being manufactured on the Contractor's premises. Such

inspections, examination or testing if made shall not release the Contractor from any obligation under the Contract.

B. The Contractor shall give to the Consultant/Engineer/ Consultant reasonable notice in writing of the date and place at which the plant will be ready for testing as provided in the Contract, and unless the Engineer/ Consultant shall attend at the place so named within ten days of the date which the Contractor has stated in his notice, the Contractor may proceed with the test and also get the inspection and test carried out by an international testing agency of repute in the country of manufacture of the plant and thereafter forward to the Engineer/ Consultant duly certified copies of the test report carried out by him and the international inspecting agency, who on basis thereof give his opinion/decision. Provided that the Engineer/ Consultant shall give the Contractor twenty four hours notice in writing of his intention to attend the test.

C. Where the Contract provides for tests on the premises of any Sub-Contractor, the Contractor shall provide such assistance, labour, materials, electricity, fuel, stores, apparatus and instruments as may be requisite and as may be reasonably demanded to carry out such tests efficiently.

D. As and when any Plant shall have passed the tests referred to in this Clause the Consultant/Engineer/ Consultant shall furnish to the Contractor a certificate in writing to that effect.

END OF SECTION 20 05 01

EQUIPMENT INSTALLATION

PART-1: GENERAL

1.1 Section Scope:

A. The Contractor shall install equipment as & where shown on the drawings and guidelines defined in this section.

1.2 Reference Specifications:

A. The following specifications shall be construed to be part of this Section.

1. 21 05 23-Valves for Fire Protection Service
2. 21 12 16-Hose Reel and Hose racks
3. 22 12 20-Fire Hydrants and Stand Pipes
4. 21 12 24-Fire Brigade Connections
5. 21 13 13-Wet Pipe Fire Sprinkler System
6. 21 31 16-Electric & Diesel Engine Drive- Centrifugal Fire Pump

PART-2: EXECUTION

2.1 Equipment Foundation Bases:

A. Unless otherwise indicated on drawings, equipment shall generally be installed on a 100mm to 150mm high concrete base.

B. Base shall be constructed of 1:2:4 (210 kg/cm^2, 28 day compressive strength) approved concrete with nominal reinforcement.

C. Base shall be finished with 5mm cement plaster, or approved tiles as shown on drawings. Edges shall be provided with 25 x 25 x 3mm galvanized angle iron frame work. Base dimension shall not be less than 100mm larger in both directions than supported equipment.

D. Manufacturer's supported recommendation shall be followed, using anchor bolts at tie-in locations. Drawings shall be submitted to the Consultant for approval.

2.2 Installation Contractor's Responsibilities (Foundation):

A. The contractor shall be solely responsible for safe lifting of the equipments from place of storage on site to location of final installation and finally on the foundations.

B. Prior to lifting the equipments the following procedure shall be adopted:

1. Submit comprehensive insurance policy for the full value of the equipment to the Engineer/Employer from approved insurance company.
2. Submit complete information of specialist firm of lifters/riggers to the Engineer & obtain approval.
3. Submit complete procedure & equipment to be used for lifting the equipment in place. Identify on plans location of tripods, hoist, etc. that will transfer weight to the equipment, to the structure & obtain approval.
4. All the above to be completed with one month before the date of lifting of equipment.

2.3 Installation Contractor's Responsibilities (Equipment):

A. The Contractor shall ensure that the equipment is installed totally in accordance with the manufacturer's instructions (equipment installation manual must be obtained & read), and as directed by the Consultant. Correct allignment & levelling must be ensured.

B. Field assemble equipment (if required) in accordance with instructions in the manufacturer's installation bulletin.

C. Install the equipment on the foundation. Neoprene isolation pads or spring vibration isolators as specified for the equipment shall be placed under the equipment.

D. Insure that structure, piping or other equipment adjacent to this equipment do not restrict operation & maintenance requirements of the equipment.

E. Install all piping, cable, and other connections with all fittings, to the equipment. All material and labor required for a complete installation shall be supplied by the Contractor.

F. Connect equipment control panel to all operating external safety and auxiliary control devices.

G. Provide and install gauge cocks for pressure readings at the inlet and outlet of all fluid flows.

H. Install any control components provided by the manufacturer for installation external to the machine.

END OF SECTION 21 05 10

PIPE WELDING

PART-1: GENERAL

1.1 Section Scope:

A. This section describes the overall welding and related procedure that's needs to be adopted for joining/cutting of various pipe joints.

1.2 Reference Standards:

A. ASME Section IX

1.3 Reference Specifications:

A. The following specifications shall be construed to be part of this Section.

1. 21 20 10-Buried Fire Protection Piping
2. 21 20 20-Above Ground Fire Suppression Piping & Specialities

1.4 Quality Assurance:

A. Standard & Regulatory Requirements

1. Welder Qualification

a. Welding shall be carried out by qualified welders. Welder qualification shall be carried out in accordance with ASME Section IX Welding & Brazing Qualifications.

b. The Contractor shall provide all material, consumables and labour needed for welder qualification tests. The Contractor shall also arrange and pay for all the test required at a testing facility acceptable to the Owner.

PART-2: EXECUTION

2.1 Fabrication Requirements:

A. End Preparation

1. Butt welding ends shall be bevelled. Bevelling shall be done by grinding or machining and the finished bevel shall be free of nicks or grooves. Prior to welding, the bevelled surface and the adjacent surface within 6mm of the weld joint shall be cleaned of all foreign material, rust loose mill scale etc., before being placed in alignment for welding.

B. Weld Joint Alignment

1. The parts to be welded shall be aligned by suitable means such as external clamps, yokes etc. Yokes, if used, shall be tack welded using electrodes compatible with the parent metal. After joint fit-up yokes shall be ground flush.
2. Tack welding shall be done by qualified welders only and shall conform to the quality of root weld.

C. Nozzles and Piping

1. Pipes below Ø 25mm shall be cut by pipe cutter only: flame cutting is not allowed. Larger sizes may be flame cut provided edges are prepared by grinding or machining, after cutting.
2. Bolt holes shall straddle the axis of pipe for all flanged connections.

3. The center line of branch connections shall intersect the centre line of the header.

2.2 Welding:

A. Production Welding Requirements

1. All production welding including repair welding shall be carried out according to qualified welding procedures and by qualified welders only. The Owner reserves the right, at any time, to make changes in the welding procedure to ensure production of acceptable welds.

2. Scale and slag shall be removed from each weld bead and groove before depositing the next weld bead. Cleaning shall be done by power grinders and wire brushes.

3. Fillet welding shall be done for reinforcing pads, sockets welding fittings and slip-on flanges. Fillet welds shall be continuous, unless otherwise specified in the drawings. Size of fillet welds shall be as indicated on the drawings. Where no size is given, it shall be equal to the thickness of the thinner of the two parts being welded.

4. Arc burns shall be removed by grinding. Grinding shall have a smooth contour. After grinding, the remaining wall thickness in the area shall not be less than 90% of the nominal wall thickness.

2.3 Inspection and Testing:

A. Hydrostatic Testing: The piping shall be tested with water and all welds carefully inspected for leaks. The pressure shall be raised slowly and steadily until test pressure is reached. The pressure shall be maintained while a thorough examination is made to ensure that all welding are sound and show no leaks or undue distortion.

B. Repairs & Welds: Defective welds found during pressure test shall be cut out for a distance of not less than 25mm on either side of the defect and shall be rewelded.

C. Repeat Pressure Test: Following the execution of any repairs found to be necessary, the piping shall again be tested in accordance with the above specs.

D. Record: Contractor shall keep a record of all tests performed and shall record the date of test, test conditions and results. These reports shall be signed by the Owner's representative and Contractor's representatives.

1. Contractor shall provide all material and labour required for testing.

END OF SECTION 21 05 11

PRESSURE Gauges

PART-1: GENERAL

1.1 Scope:

A. The work in this section includes the installation of Pressure Gauges at locations indicated on the drawings.

1.2 Scale Ranges:

A. Pressure gauges shall be of scale range 0-200 psig or 0-300 psig, as required, for service condition, graduated in both Psi and Kg/cm². On open circuit pump suction line and wherever necessary install compound gauges.

1.3 Submittals:

A. Tendering Stage Submittal

1. The tenderer shall indicate the Meters and Gauges he intends to use and shall provide their source.

B. Construction Stage Submittal

1. The contractor shall provide complete details of all Meters and Gauges to be used, and shall obtain Consultants approval.

C. Quality Assurance

1. During installation & during operation checking shall be carried out to ensure that all meters and gauges are performing as desired.

D. Standards

1. UL 393- Indicating Pressure Gauges for Fire-Protection Service

E. Warranty

1. Manufacturer shall guarantee the equipment and components against defects in materials and/or workmanship for a period of one year from date of initial operation or 18 months from date of shipment, whichever occurs first, unless otherwise stated elsewhere in this document.

PART-2: PRODUCTS

2.1 Pressure Gauges:

A. Case: shall be of cast aluminium, black finished. Ring shall be close type, chrome plated. Window shall be clear acrylic. Dial shall be white with jet black embossed figures and graduations. Pointer shall be micrometer type, black finished and red tipped. Movement shall be stainless steel, rotary type. Bourdon tube shall be phosphor bronze. Socket shall be forged brass. Accuracy shall be 1% of the scale range. Connection shall be 6mm NPT. Dial size shall be Ø 4.5 inches.

PART-3: EXECUTION

3.1 Installation:

A. Pressure gauges shall be installed where shown on drawings. These shall be installed with ball valves to serve as gauge cocks. Gauges shall be screwed in so that no leakage exists, and shall be installed in a neat and workmanlike manner and the dials aligned for convenient reading.

END OF SECTION 21 05 19

FIRE STOP SYSTEM FOR PENETRATIONS THROUGH FIRE BARRIER WALLS & FLOORS

PART-1: GENERAL

1.5 Section Scope:

A. This Section specifies the fire stopping at penetrations of fire barriers.

B. It is the intent of these specifications that all penetrations or openings between two fire compartments and / or between a fire compartment and a non-fire compartment shall be sealed in a manner specified below.

1.6 Technical Submittals:

A. Submit detailed literature on all fire stopping materials and products.

B. Submit samples when so directed by the Consultant

1.7 Reference Specifications:

A. 21 05 01 - Basic Mechanical Requirement

B. 21 05 02 - Basic Mechanical Materials and Methods

1.8 Quality Assurance:

A. Products shall be sourced from manufacturers engaged in the manufacturing of these products for at least 5 years.

1.9 Delivery, Storage, and Handling:

A. Products shall be stored and handled in accordance with the manufacturer’s recommendations.

1.10 Warranty:

A. Manufacturer shall guarantee the product against defects in materials and/or workmanship for a period as stated in Section-300, Conditions of Particular Application.

PART-2: PRODUCTS

2.1 Fire Damper:

A. Shall be provided where shown on drawings & shall be similar to model FK as manufactured by TROX. Fire doors and fire dampers shall be automatic operating type approved for the protection of openings in one, two and four hour fire-rated walls and partitions and shall be installed in accordance with the Consultant's directives. Suitable hand hole openings with tightly fitted access covers or doors shall be provided in the fire dampers to make all fire doors and fire dampers accessible for inspection and maintenance. Unless otherwise shown, the installation details given in SMACNA Fire Damper Guide for fire dampers shall be followed except minimum thickness of metal for all sleeves provided for the fire dampers shall be not lighter than 14 gauge (1.90mm). All necessary items associated with the fire doors and fire dampers such as retaining angles, sleeves, breakaway connections and access doors shall be provided. The fire dampers shall have a mechanism to show the open-closed status of the fire dampers by means of an indicating lever visible below the false ceiling.

Materials shall be as follows:

Casing steel, minimum 12 gages

Blade Steel, minimum 12 gages

Fusible Link to operate at 72°C

Bushes Stainless Steel

2.2 Fire Stopping Materials:

A. All fire stopping materials shall comply with BS-476.

2.3 Fire Prevention Sealant:

A. For sealing of narrow gaps e.g. joints between sheet metal, construction joints, joints between steel and concrete components, etc. neutral elastic silicon based sealant equivalent to Hilti CP 601S elastic fire stop sealant shall be used. Non flammable mineral wool of minimum 100-kg/m^3 density as backfilling material shall be used.

2.4 Fire Prevention Mortars for Sealing Cable Penetration:

A. For sealing of medium sized to very large openings and penetrations, with provision for installing pipes or cables at a later date, fire resistant cement mortar equivalent to Hilti CP 636 fire prevention mortar shall be used.

2.5 Sealing of Inflammable Pipes:

A. Sealing of Inflammable Pipes of Outer Diameter Less Then 50mm

For sealing of inflammable pipes less than 50mm outer diameter, water based intumescent acrylic based sealant equivalent to Hilti CP 611A shall be used. If the pipe passes through metallic/plastic sleeve, the gap between the sleeve and fire penetration wall/floor shall be filled with fire prevention sealant as specified have in above. Non-flammable mineral wool of minimum 100-kg/m^3 density shall be used as backfilling material.

B. Sealing of Inflammable Pipes of Outer Diameter 50mm and Larger

For sealing of inflammable pipes outer diameter 50mm and larger, fire prevention jacket consisting of zinc-plated sheet steel housing with intumescent insert and appropriate number of fastening hooks shall be installed. Jacket shall be similar in construction to Hilti CP 642 fire prevention jacket. If inflammable pipe passes through a wall, a pair of fire prevention jackets shall be installed, one on each fire zone. If inflammable pipe passes through a ceiling, only one fire prevention jacket shall be installed.

PART-3: EXECUTION

3.1 Fire Stopping Requirements:

A. Every opening in a fire barrier shall be protected to limit the spread of fire and restrict the movement of smoke from one side of the fire barrier to the other. The fire protection rating for opening protectives shall be as follows:

1. 2-hour fire barrier: 1 ½ -hour fire protection rating.

2. 1-hour fire barrier: 1-hour fire protection rating where used for vertical openings or exit enclosures, or ¾ -hour fire protection rating where used for other than vertical openings or exit enclosures.

B. Pipes, conduits bus, ducts, cables, wires, air ducts, pneumatic tubes and ducts, and similar building service equipment that pass through fire barriers shall be protected as follows:

1. The space between the penetrating item and the fire barrier shall:

a) be filled with a material capable of maintaining the fire resistance of the fire barrier, or

b) be protected by an approved device designed for the specific purpose.

2. Where the penetrating item uses a sleeve to penetrate the fire barrier, the sleeve shall be solidly set in the fire barrier, and the space between the item and the sleeve shall:

a) be filled with a material capable of maintaining the fire resistance of the fire barrier, or

b) be protected by an approved device designed for the specific purpose.

3. Insulation and coverings for pipes and ducts shall not pass through the fire barrier unless:

a) the material is capable of maintaining the fire resistance of the fire barrier, or

b) the material is protected by an approved device designed for the specific purpose.

4. Where designs take transmission of vibration into consideration, any vibration isolation shall:

a) be made on either side of the fire barrier, or

b) be made by an approved device designed for the specific purpose.

END OF SECTION 21 05 21

VALVES & STRAINERS

Butterfly Valves:

Butterfly valves shall be used applications requiring 50mm or larger diameter valves, and shall have a rating suitable for the service intended, but a minimum of 10 bars.

Butterfly valves shall be wafer type with modular cast iron body, suitable for mounting between ANSI 150 lb flanges. Two flanges plus required nuts and bolts shall be provided with the valves.

The centre disc shall be of stainless steel, with extended shaft for accommodating insulation depth.

The liner shall be replaceable, of Nitrile or EPDM rubber. Each valve shall be provided with one replaceable liner as spare.

Actuator shall be worm gear type of aluminium or cast iron, weather proof to IP65, complete with hand wheel, position indicator, and with adjustable stops at both fully open and fully closed positions. The actuator shall be self-locking, lubricated for life and free of maintenance.

Gate Valves:

a) Ø 50mm (2 inch) & Smaller

125 psi (860 kPa) SWP, 250°F (120°C), threaded ends, bronze body, union bonnet, non-rising stem, wedge disc. Hand wheel nut, packing nut, gland, stuffing box, bonnet, bonnet ring, disc and body shall be of bronze. Hand wheel shall be of malleable iron. Packing shall be suitable for specified usage but shall not use asbestos. Stem shall be manganese bronze.

b) Ø 65mm (2 1/2 inch) & Larger

125 psi (860 kPa) SWP, 250°F (120°C), cast iron body bronze mounted with flanged ends. These shall be of solid wedge disc type, with outside screw and yoke (rising stem). Body and bonnet shall be of cast iron. Wedge shall be of cast iron with bronze disc. Seat rings shall be bronze. Packing shall be suitable for specified usage but shall not use asbestos. Packing gland shall be cast iron. Yoke shall be of cast iron and yoke nuts shall be of bronze. Hand wheel shall be of cast iron.

Globe Valves:

a) Ø 50mm (2 inch) & Smaller

125 psi (860 kPa) SWP, 250°F (120°C), bronze, threaded ends. Body, bonnet, disc holder, stem lock nut, packing nut and disc lock nut shall be of bronze. Hand wheel shall be of malleable iron with stem of manganese bronze. Renewable composition disc shall be provided suitable for water & steam. Packing shall be suitable for specified usage, but shall not use asbestos.

b) Ø 65mm (2 1/2 inch) & Larger

125 psi (860 kPa) SWP, 250°F (120°C), cast iron body, bronze mounted with bronze faced disc and yoke bonnet, and shall be flanged. Hand wheel, gland, bonnet and body shall be of cast iron. Stem shall be of manganese bronze. Packing shall be suitable for specified usage but shall not use asbestos. Stem lock nut, disc and seat ring shall be of bronze. Disc shall be renewable composition type.

Ball Valves:

a) Ø 50mm (2 inch) & Smaller

125 (860 kPa) SWP, Screwed; two-piece cast bronze body, chrome plated brass ball, teflon ball and flange seals, rods silicon brass stem, teflon and Viton "O" ring stem seals, zinc plated carbon steel handle with vinyl grip and brass handle nut.

Swing Check Valves:

a) Ø 50mm (2 inch) & Smaller

125 psi (860 kPa) SWP; 250°F (120°C), threaded ends. Cap, hinge pin, body, hinge, disc nut and disc shall be of bronze.

b) Ø 65mm (2 1/2 inch) & Larger

125 psi (860 kPa) SWP; 250°F (120°C), cast iron body, including valve cap and disc. Hinge pin, seat ring and disc ring shall be of bronze. Ends shall be flanged.

Guided Check Valves:

a) Ø 80mm (3 inch) & Smaller

125 (860 kPa) SWP, Screwed, (pump discharge): bronze or cast steel wafer body, bronze or stainless steel trim, centre guided, silent type.

b) Ø 100mm (4 inch) & Larger

125 (860 kPa) SWP, Flanged, (pump discharge): bronze or cast steel globe body, bronze or stainless steel trim, centre guided, silent type, flanged.

Y-Strainers:

a) Ø 50mm (2 inch) & Smaller

125 psi (860 kPa) SWP; 250°F (120°C), "Y" type, with bronze body and threaded ends. Screen shall be of 20 mesh monel.

b) Ø 65mm (2 1/2 inch) & Larger

125 psi (860 kPa) SWP; 250°F (120°C), cast iron body with flanged ends. Screen cover shall be provided with blow off taping. Screen shall be of perforated stainless steel, (33 holes per sq.cm.), with 1.1mm diameter and 0.41mm thickness.

Bucket Strainers:

Shall be fabricated from Ø 300mm, Black Steel, Schedule 40 pipe. Flanges shall conform to ANSI B16.5. After fabrication the entire assembly shall be hot dipped galvanised. Bolts shall be galvanised. The strainer shall consist of a brass perforated screen bucket. Perforation shall be as approved.

Pressure Reducing Valves (PRV):

Pressure Reducing Valves (PRV's) shall be pilot operated.

PRV's shall be suitable for the service specified & shall be able to maintain downstream pressure at all flow rates & shall be sized for the maximum flow & pressure specified or required on the basis of manufacturers published data.

PRV's upto Ø 40mm shall be of bronze with screwed ends, while higher size PRV's shall be of cast-iron body with flanged ends. Nominal working pressure shall be 16 barg. PRV shall be able to sustain working temperature upto 70°C (158°F). Pilot shall be adjustable for 1.4 barg to 12 barg.

Float Valve:

Shall be best quality heavy duty type provided with Ø 150mm copper ball and heavy duty bronze float arm. Valve shall provide tight shut off at full closed position.

Foot Valve for Pump Suction Line:

Shall be installed where required or indicated on the drawing. Foot valve shall be of brass, and shall be provided with integral strainer. Foot valve shall be provided with a spring loaded vertical check disc with gasket for tight shut-off.

Gaskets:

General: non-asbestos, compressed gasket material with high-strength aramid fibres bonded with high grade nitrite NBR synthetic rubber, suitable for 750°F (400°C) and 1450 psi (10000 kPa).

Thread Lubricant:

General: non-hardening, non-poisonous as approved.

Dielectric Couplings:

General: provide sweat-to-screw dielectric couplings at junction of copper pipe to steel pipe and insulation bushings for flanged connections to steel or cast iron valves and fittings.

Quality Assurance:

All fire protection valves & accessories to be supplied preferably by one manufacturer and shall be UL Listed and FM Global Approved.

Installation of Valves and Strainers:

All gate valves, globe valves, check valves, control valves, butterfly valves, drain cocks, etc. necessary for satisfactory operation of the system shall be provided whether indicated or not. All valves having steam over 2m height shall be provided with galvanised chain operators. Valves in horizontal lines shall be installed with stem horizontal or above. Isolation gate valves shall be installed on each side of each piece of equipment as pumps, coils and other similar items; at the midpoint of all looped mains; and at any other points indicated or as required for draining, isolation or sectionalising purposes. Each valve shall be identified with not less than 35mm round or square black over white laminated plastic tags secured to valve with a suitable brass chain. Tags shall be engraved to identify valve by number and valve function. Strainers shall be installed wherever necessary to protect equipment and control valve, where proper functioning would be affected by dirt on the seat or scoring of the seat. Strainers shall be arranged not to clog piping and allow easy disconnection for change. All strainers 50mm and above shall be provided with Ø 20mm ball valves for blow-off. Strainers shall allow removal of accumulated dirt and screen replacement without disconnecting main piping.

END OF SECTION 21 05 23

SUPPORTS & ANCHORS

PART-1: GENERAL

1.4 Scope:

A. The work in this section includes the supply & installation of supports & anchors.

1.5 Submittals:

A. Tendering Stage Submittal

1. The tenderer shall indicate the supplier/manufacturer of the support & anchor he intends to use and shall provide their source.

B. Construction Stage Submittal

1. The contractor shall provide complete details of all the support & anchor, and shall obtain Consultants approval.

1.6 Quality Assurance:

A. During installation & during operation checking shall be carried out to ensure that all support & anchors are installed as per the good engineering practices & manufacturer recommendations.

1.7 Warranty:

A. Manufacturer shall guarantee the equipment and components against defects in materials and/or workmanship for a period of one year from date of initial operation or 18 months from date of shipment, whichever occurs first, unless otherwise stated elsewhere in this document.

1.8 Payments:

A. Unless otherwise indicated in the BOQ, no separate payment shall be made for supports, hangers, sleeves, etc. and cost for these shall be part of the price quoted for the supported piping, equipment, etc. Payment shall however be made for ‘Doyma Sleeves’ and ‘Pipe Bridges’ as indicated in the BOQ.

PART-2: PRODUCTS

2.1 Description:

A. All pipe supports shall be approved supports manufactured by specialist pipe supports manufacturers, such as Hilti, Sikla, Fisher, or other manufacturers indicated in the List of Approved Manufacturer's.

B. Pipe hangers, brackets, saddles, inserts, clamps and pipe rolls including rods, bolts, turn buckles, bases and protection shields shall conform to standard recommended engineering practice and shall be all sourced from approved manufacturers of support system. Design generally accepted as exemplifying good engineering practice, using stock or production parts shall be utilised wherever possible.

C. All pipe supports shall be UL Listed & FM approved.

D. Chain, wire, strap or other make shift devices will not be permitted as hangers or supports.

E. Pipe hangers shall be capable of supporting the pipe in all conditions of operations. Hangers shall be supported with beam-clamps, concrete inserts, Phillips concrete fasteners, or rawl-bolts. Concrete inserts when used shall be installed in the exact location prior to the pouring of the concrete.

PART-3: EXECUTION

3.1 Suspended Piping Supports:

A. Piping shall be supported by adjustable hangers or supports, which shall provide a means of vertical adjustment after erection. Unless otherwise indicated on drawings maximum spacing between pipe supports for straight runs of steel pipe shall be in accordance with recommended spacing shown in the table given below OR as per the manufacturer recommendation (Contractor to provide details, calculation & analysis of support system):

	Nominal Pipe Size, Ø mm											
	13	20	25	40	50	65	75	100	125	150	200	250
Maximum Span, m	1.5	1.8	2.1	2.7	3	3.3	3.6	4.2	4.8	5.1	5.2	6.7
Rod Size, Ø mm	10	10	10	10	10	13	13	16	16	19	22	22

3.2 Pipe Sleeves:

A. Pipes passing through concrete or masonry walls or concrete floors or roofs shall be provided with pipe sleeves fitted into place at the time of construction or afterwards if necessary. Each sleeve shall extend through its respective wall, floor or roof and shall be cut flush with each surface. Sleeves shall be of such size as to provide a minimum of 6mm all around clearance between bare pipe and sleeve or between jacket over insulation and sleeve. Sleeves shall be of steel pipe or cast iron pipe.

B. Sleeves in exterior below ground, walls, pits and tanks shall be similar to 'Doyma' sleeves consisting of a galvanised steel sleeve to be embedded in concrete, with the pipe passing through synthetic rubber rings that are compressed using galvanised steel pressure plates on both sides of the rubber ring as shown on drawings.

3.3 Other Supports:

A. Equipment and any other component requiring supporting and anchoring shall be provided with properly engineered supports and anchors, as shown on the drawings, or as per manufacturer's recommendation or as directed by the Consultant/Engineer. In all cases drawings & submittals for supports & anchor system shall be submitted to the consultant and approval obtained.

3.4 External pipe Bridges & Supports:

A. Where shown on the drawings, External Pipe Bridges shall be fabricated & constructed as per the approved shop drawings. Contractor shall ensure that all necessary measurements have been obtained from the site and are correct.

3.5 Installation:

A. Pipe hangers and supports shall be spaced not over 1.5m apart at heavy fittings and valves. A hanger shall be installed at not over 300mm from each change in direction of piping.

B. Vertical Piping shall be guided or supported in the centre of each riser but not over 4.5m on centres and shall be supported at the base of the riser on a base elbow or tee with a pipe stand only where required.

C. Installation of the External Pipe Bridges & Supports shall include all civil works, such as excavation, disposal of surplus earth, concrete re-enforced foundations, and all steel fabricated bridges & support shown on the drawings. After construction of the foundation, the excavated areas shall be finished as it was before the excavation.

END OF SECTION 21 05 29

PAINTING AND COATING

General:

A. Painting shall include furnishing labour, materials, equipment, ladders, scaffolding, protective covers, other items required to prepare and finish surfaces of work specified herein or in any of the other sections. Paint colour scheme shall be specified at the time of painting or earlier and shall be based on American Standard "Scheme for Identifications of Piping System" ASA A-13.1 of 1975 & shown on detail drawing which form part of these specifications.

Surface Preparation:

A. Surface to be painted shall be dry and free from burrs, weld spatter, flux, dirt, dust, rust, loose mill scale, grease, oil and other foreign matter before any paint is applied.

B. All rust and loose mill scale etc. shall be removed by thoroughly chipping, scraping and wire brushing. Oil, grease, dust etc. shall be removed by washing down with a suitable solvent, as recommended by the paint manufacturer, and wiping with clean rags.

C. The minimum acceptable standard for surface preparation shall be SSPC-SP2, 'Hard Tool Cleaning'.

D. All tools shall be used in such a manner so as not to leave rough or sharp surfaces. No cuts shall be made on steel surfaces.

E. Before applying the finish coat the primed surface shall be scuffed lightly with sand paper recommended by the paint manufacturer.

Application:

A. All material shall be applied in strict accordance with the paint manufacturer's directions unless otherwise specified.

B. Paint shall be applied by brush, spray or any other paint manufacturer's approved method in such a manner that a uniform thickness (as per manufacturer's recommendation) is maintained in each coat and no defects are produced in the previous coats.

C. Each coat shall preferably be of a different colour so as to produce a contrast assuring complete covering by the next coat. Sufficient time shall be allowed between coats to permit drying. A minimum of 24 hours between applications on any one surface shall be allowed unless otherwise specified by the manufacturer.

D. No painting work shall be done on exterior surfaces during rainy, damp, foggy or dusty weather and no painting material shall be applied if the temperature is above 122°F (50°C) or below 41°F (5°C). Painting work shall be avoided in cases where the surface is damp or when there is dirt and dust deposition due to blowing winds. The Owner's representative shall determine whether the conditions are suitable for painting or not.

E. The primer coat of paint shall be applied as soon as possible after the surface preparation but, in any case, on the same day.

F. Before application of painting material, the Owner's/Engineer's representative shall inspect and approve the quality of surface preparation and the preparation of painting material.

Paint System:

A. Materials & Equipment: All materials & equipment factory fabricated, imported or otherwise shall be provided with a fresh coat of paint of same colour as the original factory paint, if in the opinion of

the Consultant the same has deteriorated to an extent to require fresh painting. Paint shall be applied as per the accepted norms and as directed by the Consultant. The items covered under this head shall include fire pumps and other equipment that are a part of this contract.

B. Un-insulated Surfaces: including piping, valves, and fittings, tanks, etc., shall be painted with two coats of primer followed by two coats of enamel paint.

C. Hangers & supports for ducting and piping shall be galvanised, and need not be painted.

Paint:

A. Primer for Iron Surfaces shall be Dulux Synthetic Red Primer as manufactured by ICI. This shall be Lead free.

B. Primer for Galvanised Surfaces shall be ETCH PRIMER AND "ZINC CHROMATE YELLOW PRIMER" as manufactured by ICI.

C. Finishing Paint shall be generally enamel paint, unless the application requires special paint, in which case suitable special paint shall be used.

D. All paint supplied from factory shall be ready for application. The application of thinners or any other material shall be subject to approval by the Consultant. In any case all instructions of the paints manufacturer shall be strictly followed.

Galvanising:

A. Galvanising shall comply with BS 729. The term 'galvanised' shall apply to hot dip or electrolytic galvanising, zinc spraying or cadmium plating. All surfaces shall be degreased, washed with mineral turpentine and given a coat of latex based primer prior to the application of final coats.

B. After fabrication, pickle or abrasive blast clean all steelworks to be hot dipped galvanised

Powder Coating:

A. All surfaces to be powder coated shall be cleaned as for galvanising. Powder shall be applied by using an electrostatic gun in a clean atmosphere to ensure that no dust particles or other impurities blemish the final product.

B. Coated components shall be baked in special ovens at controlled and accurately predetermined temperatures, and powder applied to a thickness of 0.0125mm on wearing surfaces and 0.01mm on non-wearing surfaces, unless otherwise specified.

END OF SECTION 21 05 50

MECHANICAL IDENTIFICATION

General:

A. The Contractor shall install mechanical identification tags, shield, plates, etc., where specified below, shown on drawings, or directed by the Consultants. All components of the identification system shall be submitted to the Consultants for approval & approval obtained prior to installation.

Manufacturer's Equipment Name Plates:

A. All equipment shall be provided by manufacturer installed metal nameplate with operational data engraved or stamped; permanently fastened to equipment at an accessible & visible location. Nameplate shall have name of manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances and similar essential data.

B. Manufacturer's standard pre-printed, permanent adhesive, color-coded, pressure-sensitive vinyl pipe markers, conforming to ASME A13.1 shall also be accepted.

Equipment Data Plates:

A. Contractor shall install Equipment Data Plates on all equipment; Equipment Data Plates shall be permanently fastened at a suitable accessible and visible location of the equipment. Data plates shall be of minimum 3mm thick laminated plastic of suitable size (min. 150mm x 100mm) fastened securely to the equipment. The plates shall generally display the following data:

1. Consultant's equipment identification symbol/number.
2. Fluid flow rates.
3. Pressure, pressure drops.
4. Motor data.
5. Any other matter required by the Consultants.

B. Size of Name Plate: Name plates shall be 200mm x 150mm or as approved by the Consultant.

C. Lettering Size: Main identification letters shall be 20mm high, with smaller size for subsequent text, as approved by the Consultant.

D. Text of Signs: Provide text as approved by the Consultant. Text shall inform operator of operational requirements, indicate safety and emergency precautions and warn of hazards and improper operations, in addition to name of identified unit.

Labelling & Identifying Piping:

A. The Contractor shall attach a stencil near each valve on the pipe, indicating the name of the fluid. Also an arrow should be painted next to the legend indicating the direction of flow in pipe. The legend shall be placed in a location so that it can be easily read from the floor. The legend shall conform in size of letters and colour to ASA A-13.1 of 1975, "Scheme for the Identification of Piping System", but shall not be less than 32mm letters for duct work, and not less than 19mm letters for access door sign & similar operational instructions.

B. Install pipe markers as follows on each system, wherever piping is exposed in finished spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums) and exterior non-concealed locations. Include arrows showing normal direction of flow:

1. Near each valve and control device.
2. Near each branch, excluding short take-offs for fixtures and terminal units. Mark each pipe at branch, where flow pattern is not obvious.
3. Near locations where pipes pass through walls, floors, ceilings or enter non-accessible enclosures.
4. At access doors, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at a maximum of 15 meters intervals along each run. Reduce intervals to 8 meters in congested areas of piping and equipment.
7. On piping above removable acoustical ceilings, except omit intermediately spaced markers.

Labelling & Identifying Valves:

A. Identification Tags shall be installed on all valves, controls and other parts of the system where necessary. Tags shall be either of engraved laminated plastic as approved by Consultant, 3mm thick (black in front and white behind) 1.6 inches (40mm) round or square with letters or numbers 0.5 inches (12mm) high and fastened securely with brass “S” hooks or chains.

B. The Contractor shall further provide charts, diagrams, of size and type as approved designating numbers, service or function and location of each tagged item.

END OF SECTION 21 05 53

FIRE PROTECTION SYSTEM Piping & specialities

Piping Material:

a) Seamless Black Steel Piping: Seamless black-steel piping, Schedule 40 conforming to ASTM A53.

b) Black Steel Pipe: Electrode Resistance Welded, conforming to BS 1387 (medium series).

c) Galvanised Iron Pipe: G.I. Pipe shall conform to BS 1387 of 1957 (Medium Series), welded type. Fittings shall be of galvanised malleable iron. Fittings upto 100mm shall be screwed.

d) uPVC Pipe: uPVC pipe shall be only used for underground applications. Pipes shall conform to ASTM D1785 or BS 3505 of 1968 and shall have Class'D' wall thickness. Fittings shall be injection moulded of high density & shall be imported.

Application:

a) Fire Protection shall be of material as specified under piping schedule in EQUIPMENT DATA SHEETS.

Fittings & Flanges:

a) Fittings shall be forged, compatible to the pipe. Welded fittings shall be butt-welding type. Galvanised piping shall be provided with galvanised fittings with threads. All fittings shall be rated for minimum 10 bars SWP.

b) Flanges shall be slip-on type & shall conform to ANSI B16.5. Galvanised piping shall be provided with galvanised threaded flanges. All flanges shall be rated for minimum 10 bars SWP.

c) All joints shall be welded, except the sprinkler fitting.

Valves & Strainers:

Refer Section 21 05 23, Valves & Strainers.

Automatic Air Vents:

Automatic air vents shall be suitable for liquid systems. Body and cover shall be of malleable iron. Float & Valve seat shall be of stainless steel. Valve head shall be of Vitone (Synthetic Rubber). Connections shall be 13mm or 20mm as specified, screwed BSP. Vents shall be suitable for service up to 125 SWP (8.5bars) & 250°F (120°C) service.

Vents shall be similar to model AE 550 manufactured by SPIRAX-SARCO.

Air vents shall be provided at high points, on all water coils, and where shown on the drawings to ensure adequate venting of the piping system. A ball valve shall be provided to isolate the vent. The vent outlet shall be piped to a nearby convenient drain using suitable diameter flexible transparent PVC tubing.

Expansion Joints:

a) Where indicated on the drawings, expansion joints shall be provided. Expansion joints shall also be provided in all lines subject to temperature changes where indicated or required to relieve strain developed in lines due to temperature increase or decrease.

Pipe alignment guides shall be installed as recommended by the joint manufacturer but in any case not more than 1.5m on each side of expansion joint, except in lines 100mm or smaller they may not be over 600mm on each side of joint.

b) Anchors shall be provided wherever necessary or indicated to localise expansion or to prevent undue strain on piping. Anchors shall consist of heavy steel collars with lugs and bolts for clamping and attaching anchor braces, unless otherwise indicated. Anchor braces shall be installed in the most effective manner to secure the desired results, using turnbuckles wherever required. Anchors, supports or stays shall be attached in places where such supports will not injure the construction during installation or damage the structure by the weight or expansion of the pipeline. Detailed drawings of pipe anchors shall be submitted for approval before installation.

Flexible Connectors:

Flexible connectors shall be constructed of rubber, tetrafluoroethylene resin, or corrosion resisting steel, bronze, monel or galvanised steel. The material used and the configuration shall be suitable for pressure, vacuum, temperature and circulation medium. The flexible sections may have threaded, welding, soldering, flanged or socket ends and shall be suitable for service intended. The flexible section may be reinforced with metal retaining rings, with built in reinforcement and restriction bolts or with wire braid cover suitable for the service intended. Flanged assemblies shall be equipped with limit bolts to restrict maximum travel within limits standard with the manufacturer. Unless otherwise shown on the drawings, the length of the flexible connector shall be as recommended by the manufacturer for the service intended. Internal sleeves or liners shall be provided when recommended by the manufacturer suitable for the circulating medium. Covers to protect the bellows will be provided where necessary or directed. Flexible connectors shall be designed for 125Psi (8.5 bars) service, and 250°F (120°C).

Flexible pipe connectors shall be installed on piping connected to equipment where indicated on the drawings. Installation shall be in accordance with manufacturer's recommendations.

Installation:

a) General: All piping shall be installed in accordance with NFPA standards:

NFPA 13 Standard for the installation of Sprinkler system.

NFPA 14 Standard for the installation of Standard-pipe and hose systems.

NFPA 20 Standard for the installation of Centrifugal Fire Pumps.

NFPA 24 Standard for the installation of Private Fire Service Mains & their appurtenances.

Pipes shall be cut accurately to measurements established at the job site and worked into place without springing or forcing, properly clearing all windows, doors and other openings. Excessive cutting or other weakening of the building structure to facilitate piping installation will not be permitted without written approval. Layout drawings required under the title of “Approval of Material & Equipment” shall show locations of all supports, the load imposed on each fastening or anchor, typical details for special anchorage, for suspended piping, valves, tank, pumps, converters, and other mechanical equipment. Where supports are required between structural framing members, suitable intermediate metal framing shall be provided and detailed. Pipe shall have burrs removed by reaming and shall be installed to permit free expansion and contraction without damage to joints and hangers. Changes in direction shall be made with fittings, except that bending of pipe 100mm and smaller will be permitted provided a pipe bender is used and wide-sweep bends are formed. The centre line radius of bends shall not be less than 6 diameters of the pipe. Bent pipe showing kinks, wrinkles, flattening or other malformations will not be accepted.

All piping shall be installed with sufficient pitch to ensure adequate drainage and venting. Piping connections to equipment shall be provided with unions or flanges. Open ends of pipelines or

equipment shall be properly capped or plugged during installation to keep dirt and other foreign matters out of the system.

b) Screwed joints shall be made with tapered threads properly cut. Joints shall be made tight with a stiff mixture of lethargy and glycerine, or polytetrafluoroethylene (PTFE) tape, or approved thread joint compound applied to the male thread only. Not more than three threads shall show after the joint is made up. For steam piping do not use PTFE tape.

c) Welded joints shall be fusion welded by metal arc welding method unless otherwise required. Changes in direction of piping shall be made with welding fittings only. Mitering or notching pipe to form elbows & tees or other similar construction will not be permitted. Branch connections shall be made with welding tees or forged welding tees or forged welding outlets.

Field and shop bevels shall be in accordance with the recognised standards and shall be done mechanically by means of flame cutting. Where bevelling is done by flame cutting, surfaces shall be clean of scale and oxidation prior to welding.

Before welding, the component parts to be welded shall be aligned so that no strain is placed on the weld when finally positioned. Height shall be so aligned that no part of the pipe wall is offset by more than 20% of the wall thickness. Flanges and branches shall be set true. This alignment shall be preserved during the welding operation.

Removing and replacing defective welds shall be at no additional cost to the Owner. Repairing of defective welds by adding new material over the defects or by peeling will not be permitted. Electrodes shall be stored in a dry heated area and shall be kept free of moisture or dampness during fabrication operations. Electrodes that have lost part of their coating shall be discarded.

d) Flanges and Unions shall be faced true. Flanges shall be provided with 1.6mm gasket of material suitable for specified usage, but shall not use asbestos, and made square and tight. Except where copper tubing is used, union or flange joints shall be provided in each line immediately preceding the connection to each piece of equipment such as coils, pumps, control valves & other similar items.

e) Solvent Welded Joints for uPVC Pipes: uPVC pipes shall be welded using solvent welding. Solvent used shall be specifically recommended by the pipe manufacturer. No alternative shall be acceptable. Prior to solvent welding the pipe and fitting shall be thoroughly cleaned, and then the solvent shall be applied. The joint shall be kept firm for the specified period as recommended by the manufacturer.

Pipe Supports:

All supports and anchors shall be installed in accordance with NFPA Standard.

Refer Section 21 05 29, Supports & Anchors for detailed specs.

Pressure Testing:

Fire Protection piping shall be hydrostatically tested at a pressure equal to 150% of the maximum operating pressure, but not less than 200psi (13.6 bars), for a period of time sufficient to inspect every joint in the system but in no case less than two hours. No loss of pressure will be allowed.

Leaks found during tests shall be repaired by re-welding or replacing pipe or fittings. Caulking of joints will not be permitted. Concealed piping shall be tested in place before concealing. Tests shall be conducted in the presence of the Consultant or the Consultant's representative who shall be given 10 days notice before any test is to be conducted. All material, equipment or instruments required for tests shall be provided by the Contractor.

END OF SECTION 21 10 10

BURIED FIRE SUPRESSION PIPING- HDPE

PART-1: GENERAL

1.11 Section Scope:

A. The work under this section of the specifications consists of providing all material and labour for proper installation of fire water pipes and pipe fittings below ground, including excavation & backfilling, jointing, laying, testing and commissioning, as shown on the drawings, as specified herein, and as directed by the Consultant.

B. Furnish, install, and test HDPE pipe as indicated and specified in this section, and as referred to in related sections, and the drawings.

C. The primary installation method is burial. The means and methods, including the testing for acceptance shall conform to all applicable standards as noted herein with the intention of providing a leak-free system to the owner.

1.12 Submittals:

A. Tenderer shall submit the following documentation:

1. Product data indicating options and specialties.

2. Statement of conformance to specifications and deviation from specifications.

1.13 Reference Standards:

A. To the extent referenced in this specification section, the standards and documents listed below are included, and made a part of this specification.

B. In the event of a conflict, the requirements of this specification section will prevail.

C. Unless otherwise specified, references to documents shall mean the latest published edition of the referenced document in effect at the bid date of the project.

ANSI/AWWA

A. ANSI/AWWA C906-07 Polyethylene (PE) Pressure Pipe and Fittings, 4 In. (100 mm) Through 63 In. (1,600 mm), for Water Distribution and Transmission

B. AWWA M55 Manual of Water Supply Practices, PE Pipe–Design and Installation

ASTM

A. ASTM F 714 Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter

B. ASTM F905 Standard Practice for Qualification of Polyethylene Saddle-Fused Joints

C. ASTM F 1055 Standard Specification for Electro fusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing

D. ASTM F 2164 Standard Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping Systems Using Hydrostatic Pressure

E. ASTM F2206 Standard Specification for Fabricated Fittings of Butt-Fused Polyethylene (PE) Plastic Pipe, Fittings, Sheet Stock, Plate Stock, or Block Stock

F. ASTM F 2620 Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings

G. ASTM D 2683 Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing

H. ASTM D 2774 Standard Practice for Underground Installation of Thermoplastic Pressure Piping

I. ASTM D 3261 Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing

J. ASTM D 3350-08 Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

1.14 Reference Specifications:

A. The following specifications shall be construed to be part of this Section.

1. 21 05 01 - Basic Mechanical Requirement
2. 21 05 02 - Basic Mechanical Materials and Methods
3. 21 05 90 - Excavation & Backfilling
4. 21 12 30- Valves for Fire Suppression Piping

1.15 Delivery, Storage, and Handling;

A. Protect internals from entry of foreign material by temporary caps on flanged openings.

B. Handle the pipe in accordance with the PPI Handbook of Polyethylene Pipe (2nd Edition), Chapter 2 using approved strapping and equipment rated for the loads encountered. Do not use chains, wire rope, forklifts or other methods or equipment that may gouge or damage the pipe or endanger persons or property. Field storage is to be in compliance with AWWA Manual of Practice M55 Chapter 7.

C. If any gouges, scrapes, or other damage to the pipe results in loss of 10% of the pipe wall thickness, cut out that section or do not use.

1.16 Warranty:

A. Manufacturer shall guarantee the piping and fittings against defects in materials and/or workmanship for a period as stated in Section-300, Conditions of Particular Application.

PART-2: PRODUCTS

General:

A. The contractor shall furnish and install HDPE piping, fittings and all accessories and appurtenances necessary to use the piping as buried fire main serving the fire suppression system.

System Design Parameters:

A. The polyethylene system working pressure rating accommodates the normal operating pressure and the repetitive surges. The pressure rating applies at 80^{o} F or less.

B. Per AWWA 901 and C906, the repetitive surge pressure allowance is one half the pressure class of the pipe, and the occasional surge over pressure allowance is equal to the pressure class of the pipe. Allowable Total Pressure during Recurring Surge conditions equals 1.5 times the pipe's pressure

class. Allowable Total Pressure during Occasional Surge conditions equals 2.0 times the pipe's pressure class.

1. Table 1 gives the Pressure Class per AWWA C901, Pressure Rating and Allowable Total Pressure during Recurring and Occasional Surge for PE4710 pipe at 80ºF or less. For PE 3608, refer to Table 2.

2. Table 1 Pressure Class per AWWA C901 for PE 4710 at 80 °F or less

Pipe Dimension Ratio (DR)	Pressure Class	Pressure Rating	Allowable Total Pressure During Recurring Surge	Allowable Total Pressure During Occasional Surge
DR 9	250 psi	250 psi	375 psi	500 psi
DR 11	200 psi	200 psi	300 psi	400 psi
DR 14.3	150 psi	150 psi	225 psi	300 psi
DR 17	125 psi	125 psi	185 psi	250 psi
DR 21	100 psi	100 psi	150 psi	200 psi

3. Table 2 gives the Pressure Class per AWWA C901 and C906, Pressure Rating and Allowable Total Pressure during Recurring and Occasional Surge for PE3608 pipe at 80 °F or less.

4. Table 2 Pressure Class per AWWA C901 and C906 for PE 3608 at 80 °F or less

Pipe Dimension Ratio (DR)	Pressure Class	Pressure Rating	Allowable Total Pressure During Recurring Surge	Allowable Total Pressure During Occasional Surge
DR 9	200 psi	200 psi	300 psi	400 psi
DR 11	160 psi	160 psi	240 psi	320 psi
DR 14.3	120 psi	120 psi	180 psi	240 psi
DR 17	100 psi	100 psi	150 psi	200 psi
DR 21	80 psi	80 psi	120 psi	160 psi

Pipe:

A. Polyethylene pipe shall be made from HDPE material having a material designation code of PE3608 or higher. The material shall meet the requirements of ASTM D 3350 and shall have a minimum cell classification of PE345464C. In addition, the material shall be listed as meeting NSF-61.

B. The pipe and fittings shall meet the requirements of AWWA C906.

C. HDPE pipe shall be rated for use at a pressure class as specified in EQUIPMENT DATA SHEET.

Fittings:

A. Butt Fusion Fittings - Fittings shall be made of HDPE material with a minimum material designation code of PE3608 and with a minimum Cell Classification as noted in 2B.01A. Butt Fusion Fittings shall

meet the requirements of ASTM D3261. Molded and fabricated fittings shall have a pressure rating equal to the pipe unless otherwise specified on the plans. All fittings shall meet the requirements of AWWA C906.

Markings for moulded fittings shall comply with the requirements of ASTM D 3261. Fabricated fittings shall be marked in accordance with ASTM F 2206. Socket fittings shall meet ASTM D 2683.

B. Electro fusion Fittings - Fittings shall be made of HDPE material with a minimum material designation code of PE 3608 and with a minimum Cell Classification as noted in 2B.01A. Electro fusion Fittings shall have a manufacturing standard of ASTM F1055. Fittings shall have a pressure rating equal to the pipe unless otherwise specified on the plans. All electro fusion fittings shall be suitable for use as pressure conduits, and have nominal burst values of four times the Working Pressure Rating (WPR) of the fitting. Markings shall be according to ASTM F 1055.

C. Flanges and Mechanical Joint Adapters (MJ Adapters) – Flanges and Mechanical Joint Adapters shall have a material designation code of PE3608 or higher and a minimum Cell Classification as noted in 2B.01A. Flanged and Mechanical Joint Adapters can be made to ASTM D 3261 or if machined, must meet the requirements of ASTM F 2206. Flanges and MJ Adapters shall have a pressure rating equal to the pipe unless otherwise specified on the plans. Markings for moulded or machined flange adapters or MJ Adapters shall be per ASTM D 3261. Fabricated (including machined) flange adapters shall be per ASTM F 2206.

Van-Stone style, metallic (including stainless steel), convoluted or flat-plate, back-up rings and bolt materials shall follow the guidelines of Plastic Pipe Institute Technical Note # 38, and shall have the bolt-holes and bolt-circles conforming to one of these standards: ASME B-16.5 Class 150, ASME B-16.47 Series A Class 150, ASME B-16.1 Class 125, or AWWA C207 Class 150 Series B, D, or E. The back-up ring shall provide a long-term pressure rating equal to or greater than the pressure-class of the pipe with which the flange adapter assembly will be used, and such pressure rating shall be marked on the back-up ring. The back-up ring, bolts, and nuts shall be protected from corrosion by a system such as paint, coal-tar epoxy, galvanization, polyether or polyester fusion bonded epoxy coatings, anodes, or cathodic protection, as specified by the project engineer.

D. Service connections shall be electro fusion saddles with a brass or stainless steel threaded outlet, electro fusion saddles, sidewall fusion branch saddles, tapping tees, or mechanical saddles.

For electro fusion saddles with threaded outlet the size of the outlet shall be one inch IPS unless a larger size is shown on the plans. Electro fusion saddles shall be made from materials required in part B. Electro fusion Fittings. For sidewall fusion saddles the size of the saddle shall be as indicated on the plans. The saddle can be made in accordance to ASTM D 3261 or ASTM F 2206. After installation, approximately ¼" of the PE pipe shall be visible beyond the saddle to confirm that proper surface preparation occurred. Saddle faces that do not provided ¼ inch of area beyond the saddle are not acceptable. Tapping tees shall be made to ASTM D3261 or D2683. Mechanical strap-on saddles can only be used where there use on PE pipe is approved by the mechanical saddle manufacturer. The body of the saddle shall be stainless steel, epoxy coated cast iron or brass. The gasket material and design must be acceptable for PE pipe. The outlet shall be threaded for one inch IPS unless a larger size is shown on the plans. Mechanical strap-on saddles will be installed per the manufacturer's instructions.

PART-3: EXECUTION

3.1 Excavation and Backfilling

A. Refer specifications given under Section 21 05 90.

B. Buried Utility Warning and Identification Tape: Provide detectable aluminium foil plastic backed tape or detectable magnetic plastic tape manufactured specifically for warning and identification of buried piping. Tape shall be detectable by an electronic detection instrument.

3.2 Laying of Piping:

A. Laying of pipes shall be done with extreme care. Laying operation shall be carried out as specified in British Standard in CP 2010: Part 2.

B. The pipes shall be laid in place, true to location, alignment, and grade as approved by the Engineer. The pipes shall be laid on a bed of well compacted graded material as specified in Section 21 05 90. Backfilling shall be carried out in the specified sequence. Great care shall be taken to avoid abrasion of the pipe. Pipes that have the grades or joints disturbed or dislocated after laying shall be removed and re-laid to the satisfaction of the Engineer. All pipelines and accessories shall be lowered into the trench with great care and by methods approved by the Engineer.

C. All construction debris shall be removed from the inside of the pipe before a joint is made. When the laying is not in progress the open end of the pipeline shall be fitted with a temporary end closure, as approved by the Engineer.

3.3 Installation:

A. Buried HDPE pipe and fittings shall be installed in accordance with ASTM D2321 or ASTM D2774 for pressure systems and AWWA Manual of Practice M55 Chapter 7.

B. Pipe embedment - Embedment material should be Class I, Class II, or Class III, materials as defined by ASTM D-2321 Section 6. The use of Class IV and Class V materials is not recommended, however it may be used only with the approval of the engineer and appropriate compaction.

C. Bedding: Pipe bedding shall be in conformance with ASTM D2321 Section 8. Compaction rates should be as specified in ASTM D2321. Deviations shall be approved by the engineer.

D. Haunching and backfill shall be as specified in ASTM D 2321 Section 9 with Class I, II, or III materials. Compaction shall be in excess of 85% Proctor.

3.4 Joining Methods

A. Butt Fusion: The pipe shall be joined by the butt fusion procedure outlined in ASTM F 2620 or PPI TR-33. All fusion joints shall be made in compliance with the pipe or fitting manufacturer's recommendations. Fusion joints shall be made by qualified fusion technicians per PPI TN-42.

B. Saddle fusion: Saddle fusion shall be done in accordance with ASTM F 2620 or TR-41 or the fitting manufacturer's recommendations and PPI TR-41. Saddle fusion joints shall be made by qualified fusion technicians. Qualification of the fusion technician shall be demonstrated by evidence of fusion training within the past year on the equipment to be utilized on this project. [Saddle fusion is used to fuse branch saddles, tapping tees, and other HDPE constructs onto the wall of the main pipe] (ASTM F905).

C. Socket Fusion: Molded socket fusion fittings are only to be used for joining of HDPE pipe from 1/2 inch to 2" in size. Socket fusion shall be done in accordance with ASTM F 2620 or the fitting manufacturer's recommendations. Socket fusion is the process of fusing pipe to pipe, or pipe to fitting by the use of a male and female end that are heated simultaneously, and pressed together so the outside wall of the male end is fused to the inside wall of the female end. Qualification of the fusion technician shall be demonstrated by evidence of socket fusion training within the past year on the equipment to be utilized on this project.

D. Electro fusion: Electro fusion joining shall be done in accordance with the manufacturers recommended procedure. Other sources of electro fusion joining information are ASTM F 1290 and PPI TN 34. The process of electro fusion requires an electric source , a transformer, commonly called an electro fusion box that has wire leads, a method to read electronically (by laser)or otherwise input the barcode of the fitting, and a fitting that is compatible with the type of electro fusion box used. The electro fusion box must be capable of reading and storing the input parameters and the fusion results for later download to a record file. Qualification of the fusion technician shall be demonstrated by evidence of electro fusion training within the past year on the equipment to be utilized for this project.

E. Mechanical:

1. Mechanical connection of HDPE to auxiliary equipment such as valves, pumps, and fittings shall use mechanical joint adapters and other devices in conformance with the PPI Handbook of Polyethylene Pipe, Chapter 9 and AWWA Manual of Practice M55, Chapter 6.

2. Mechanical connections on small pipe under 3" are available to connect HDPE pipe to other HDPE pipe, or a fittings, or to a transition to another material. The use of stab-fit style couplings is allowed, along with the use of metallic couplings of brass and other materials. All mechanical and compression fittings shall be recommended by the manufacturer for potable water use. When a compression type or mechanical type of coupling is used, the use of a rigid tubular insert stiffener inside the end of the pipe is recommended.

3. Mechanical couplings that wrap around the pipe and act as saddles are made by several manufacturers specifically for HDPE pipe. All such saddles, tapping saddles, couplings, clamps etc. shall be recommended by the manufacturer as being designed for use with HDPE pipe at the pressure class listed in this section.

4. Unless specified by the fitting manufacturer, a restraint harness or concrete anchor is recommended with mechanical couplings to prevent pullout.

5. Mechanical coupling shall be made by qualified technicians. Qualification of the field technician shall be demonstrated by evidence of mechanical coupling training within the past year. This training shall be on the equipment and pipe components to be utilized for this project.

F. Joint Recording - The critical parameters of each fusion joint, as required by the manufacturer and these specifications, shall be recorded either manually or by an electronic data logging device. All fusion joint data shall be included in the Fusion Technician's joint report.

3.5 Thrust Blocks:

A. Plugs, caps, tees, bends and fire hydrants shall be provided with concrete thrust blocks. Backing shall be placed between solid ground and the hydrant or fitting to be anchored. The area of bearing shall be as shown on the drawings. The backing shall be so placed that fittings & joints shall be accessible for repair. The concrete shall be 1:2:4 plain cement concrete.

3.6 Cleaning:

A. Cleaning shall be carried out in accordance with AWWA C651 and AWWA Manual of Practice M55 Chapter 10, and PPI Handbook of Polyethylene Pipe Chapter 2 (2nd Edition), or as specified in British Standard CP 2010: Part 2.

3.7 Hydrostatic Pressure Test:

A. Hydrostatic leakage testing shall comply with ASTM F 2164, ASTM F 1412, AWWA Manual of Practice M55 Chapter 9, and PPI Handbook of Polyethylene Pipe Chapter 2 (2ndEdition). If the test section fails this test, the Contractor shall repair or replace all defective materials and/or workmanship at no additional cost to the Owner.

B. Pneumatic (compressed air) leakage testing of HDPE pressure piping is prohibited for safety reasons.

C. The completed pipeline or each completed section as convenient to the contractor or as necessary in Engineer's opinion due to difference in elevation shall be subjected to hydrostatic pressure test of 1.5 times the operating pressure but not less than 200 psig. All fittings, specials, valves, etc., shall also be subjected to hydrostatic testing, while installed in the pipeline. The test reach in no case shall exceed 500 metre.

D. Before testing, the pipeline shall be cleaned as specified above.

E. Before starting of the test, the whole of the pipeline shall be inspected.

F. Sufficient material shall be backfilled over the centre of each pipe to prevent movement under the test pressure. Each section shall be properly sealed off preferably with special stop ends secured by adequate anchors. All permanent anchors shall be in position and shall have developed adequate strength before testing begins. The section under test shall be filled with water, taking care that all air is displaced either through vent, at high points or by using a swab.

G. After filling, the pipeline shall be left under lower pressure for a period in order to achieve conditions as stable as possible for testing. More water shall be pumped in until the test pressure is reached and then the section shall be completely closed off.

H. The test pressure shall be applied and maintained for at least 4 hours.

I. If the pressure measurements are not made at the lowest points of the section, an allowance shall be made for the static head between the lowest point and the point of measurement to ensure that the specified works test pressure is not exceeded at the lowest point. If a drop in pressure occurs, the quantity of water added in order to re-establish the test pressure shall be carefully measured.

J. If any abnormal movement, distortion, squirm or leakage is detected, the test pressure shall be discontinued immediately and cause of such abnormal behaviours shall be investigated and rectified in consultation with the approval of the Engineer.

K. The test will be considered as satisfactory, if the quantity of water required to be added to maintain test pressure does not exceed 100 litres per metre of diameter per kilometre of pipeline per day for each 30 metre head of test pressure.

3.8 Measurement and Payment:

A. General: Except otherwise specified herein or elsewhere in the Contract Documents, no separate measurement and payment will be made for the under mentioned works related to the relevant BOQ items but shall not be limited to the following. The cost thereof shall be deemed to have been included in the quoted unit rate of the respective items of the Bill of Quantities.

1. Excavation & backfilling.

2. Pipe fittings, cutting, jointing, flanges, gaskets, welding etc.

3. Thrust blocks.

4. Applying protective painting/coating/wrapping.
5. Cutting and breaking concrete and then making it good.
6. Cleaning and testing.

B. Measurement: Measurement for acceptably supplied quantity of buried pipes and pipe fittings for fire suppression system will be made in running metre/foot and shall be for the full work specified herein.

C. Payment: Payment will be made for acceptably installed quantity at the unit rate of bid per running metre/foot length of pipes and pipe fittings specified for fire suppression system. The item rate for the piping given in the Contract BOQ shall be full payment for completion of the work in all respects as specified in this section.

END OF SECTION 21 11 00

WET PIPE FIRE SPRINKLER SYSTEM

PART 1 - GENERAL

1.1 Section Scope:

A. This Section includes the installation of a new automatic sprinkler and standpipe system as described herein and indicated on the contract drawings.

B. The system installation shall include all piping, valves, sprinklers, fittings, hangers, alarm devices, backflow preventers, inspector's test connections, fire department connections, hose connections, and all accessories and miscellaneous items required for a complete operating system even if the item is not specifically described herein.

C. Project design drawings and specifications reflect the intent and scope of the project and general pipe routing. The Contractor shall provide a fire sprinkler and standpipe system that meets all of the requirements stated herein.

D. The system shall be installed in accordance with the drawings, specifications and referenced publications. Any conflicts between these documents shall be brought to the attention of the Consultant prior to submitting a bid. No contract adjustments will be made for failure to address conflicts between drawings and specifications prior to bid.

E. Work shall not be considered complete until accepted by the Consultant.

F. Repair Service/Replacement Parts: Repair services and replacement parts for the system shall be furnished under this contract and be available for a period of 15 years after the date of final acceptance by the Consultant.

G. In any case where this specification conflicts with any other section, this specification shall supersede all other sections in regard to automatic sprinkler and standpipe systems.

1.2 Related Sections:

A. Drawings and general provisions of the Contract, including General and Special Conditions, apply to this Section.

B. All work shall be installed in accordance with contract drawings, specifications, and applicable codes.

1.3 Related Sections:

A. Section- 21 05 01: Basic Mechanical Requirements

B. Section- 21 05 02: Basic Mechanical Materials & Methods

C. Section-21 05 11: Pipe Welding

D. Section-21 05 19: Pressure Gages

E. Section-21 05 29: Supports and Anchors

F. Section 21 05 21- Fire Stop Systems for Penetration through Fire Barrier Walls and Floors.

1.4 Reference Standards:

A. Provide an automatic sprinkler system conforming to the requirements of the listed editions of the following publications including all amendments to these publications:

1. NFPA 13 – Standard for the Installation of Sprinkler Systems,
2. NFPA 14 – Standard for the Installation of Standpipe and Hose Systems,
3. NFPA 24 – Standard for the Installation of Private Fire Service Mains,
4. NFPA 25 – Standard for the Inspection, Testing, and Maintenance of Water Based Fire Protection Systems.
5. ASCE/ SEI 7- American Society of Civil Engineers/ Minimum design load of building structures
6. NFPA 70- National Electric Code
7. UL 2443- Flexible Sprinkler Hose with Fittings for Fire Protection Service
8. UL 193
9. UL 405
10. NFPA 291

1.5 Abbreviations:

A. AHJ: Authority Having Jurisdiction.

B. FM: FM Global

C. NFPA: National Fire Protection Association

D. UL: Underwriters Laboratories

1.6 Definitions:

A. High-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure higher than standard 175 psig, but not higher than 300 psig.

B. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175 psig maximum.

C. Automatic Wet-Type, Class I Standpipe System: Includes NPS 2-1/2 inch (65mm) hose connections. Has open water-supply valve with pressure maintained and is capable of supplying water demand.

1.7 System Descriptions:

A. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to water supply through alarm valve. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device.

B. Dry-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing compressed air. Opening of sprinklers releases compressed air and permits water pressure to open dry-pipe valve. Water then flows into piping and discharges from sprinklers that are open.

C. Combination Sprinkler/Standpipe System: A system that supplies both standpipe hose connections and automatic sprinklers.

1.8 Performance Requirements:

A. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.

B. High-Pressure Piping System Component: Listed for 250-psig minimum.

1. Margin of Safety for Available Water Flow and Pressure: 15 percent or 10 psi, whichever is less, including losses through water-service piping, valves, and backflow preventers.

2. Sprinkler Occupancy Hazard Classifications: As shown on drawings and as defined by NFPA.

3. Maximum Protection Area per Sprinkler: Per UL listing and NFPA 13.

C. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7.

1.9 Submittals:

A. General Submittal Requirements: Refer to specifications for submittal process.

B. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

1.10 Quality Assurance:

A. All components of the sprinkler and stand-pipe system shall be of current design and shall be in regular and recurrent production. All equipment supplied shall be first quality and the manufacturer's best type and latest model capable of complying with all requirements of this specification and shall have been in continuous production for at least five years. Obsolete equipment shall not be used.

B. Provide materials, equipment, and devices that have been tested by an internationally recognized testing laboratory and listed or approved for fire protection service when so required by NFPA 13 or this specification.

C. Equipment located outside the building envelope shall be listed for outdoor use.

D. Sprinkler system installation shall be supervised by a system technician who is certified or has a minimum experience of 5 years in automatic sprinkler systems installation, as certified by the Consultant.

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 2 - PRODUCTS

2.1 Buried Fire Suppression Piping:

A. Refer Section 21 20 10 Buried Fire Suppression Piping.

2.2 Above Ground Fire Suppression Piping:

A. Refer Section 21 20 20 Above Ground Fire Suppression Piping.

2.3 Flexible Pipe Loop for Building Expansion Joint:

A. Manufacturer: Anvil Star (USA) or approved equivalent

B. Application: The seismic wire/ cable assemblies (Anvil-Star Tri-Flex Loop) shall be used to accommodate seismic displacement/building drift of riser fire protection piping between floors of the building, sprinkler pipes that either pass through or bridge building seismic joints, and building

expansion joints. They are to be used to be used on horizontal fire protection piping that crosses building seismic and expansion joints to accommodate building drift of each building.

C. Construction to be three equal-length sections of annular, corrugated, stainless steel, close-pitch hose, with stainless steel over braid that will absorb or compensate for pipe movements in all six degrees of freedom (three coordinate axes, plus rotation about those axes) simultaneously.

D. Expansion Loop must be designed & tested for a one-time pressure testing at 1.5 times their maximum rated working pressure and have a minimum 4:1 (burst to working) safety factor.

E. Hanger assembly kit provided by Expansion Loop manufacturer must shall be used to support and hang the Expansion Loop. The Expansion Loop seismic wire/ cable hanging arrangement shall be FM Approved and UL Listed and conform to the requirements of the ASCE guidelines for structural applications of wire rope, in that the cable is pre-stretched and the permanent end fittings maintain the break strength of the cable with a safety factor of two.

F. Sizes 1-3 inch (25-80mm) shall be FM Approved for 300 psig working pressure at ambient temperature, and sizes 4-12 inch (100-300mm) are to be FM Approved for 175 psi working pressure.

2.4 Flexible Sprinkler Hose:

A. Manufacturer: Flexhead Industries or approved equivalent.

B. Standard: UL 2443.

C. Application: Flexible sprinkler hose shall be used to connect sprinklers to rigid piping in ceiling concealed applications and where shown on the drawing.

D. Flexible Hose Assemblies and End Fittings:

1. 100% Type 304 Stainless Steel or approved equivalent.

2. Rated Pressure: 175 psi minimum or higher as per service.

3. Fully welded non-mechanical fittings, fully braided, leak-tested with minimum 1 inch (25mm) true-bore internal corrugated hose diameter.

E. Ceiling Bracket

1. Type G90 Galvanized.

2. Type: Direct attachment type, having integrated snap-on clip ends positively attached to the ceiling using tamper-resistant screws.

2.5 Valves for Fire Suppression Service:

A. Refer Section 21 13 13 -Valves for Fire Suppression Service.

2.6 Trim and Drain Valves

A. Trim and drain valves are typically used as part of specialty control valve trim and drain piping, and are NPS 2inch (50mm) and smaller. Most of these valves are ball type, but there are also a few angle, butterfly, gate, and globe types listed. No UL standard exists for these valves.

B. Standard: "Approval Guide," published by FM Global, listing.

C. Pressure Rating: 175 psig minimum.

2.7 Alarm Check Valve:

A. The Alarm Check Valve shall be UL Listed & FM Approved, and shall conform to the data given on the EQUIPMENT DATA Sheet.

B. Manufacturers: Refer List of Approved Manufacturer's.

C. Standard: UL 193

D. Design: Alarm valve shall be similar to Model J, as manufactured by the Viking Corporation, or approved equivalent, suitable for horizontal or vertical installation.

E. Body Material: Ductile iron with brass trim.

F. Pressure rating: 250 psig.

G. Size: as indicated on drawings.

H. End Connections: Flanged or grooved.

I. The alarm check valve assembly shall consist of the following:

1. Alarm Check Valve, with trimmings for variable pressure, open drain, vertical installation.
2. Ø 2 inches main drain valve.
3. System pressure gage.
4. Supply pressure gage.
5. Bypass check valve.
6. Alarm control valve.
7. Retarding chamber.
8. Water motor alarm gong.
9. Pressure switch.
10. All other appurtenances, piping, etc required for a completely functional assembly.

J. The alarm check valve set shall be designed for use in wet pipe fire protection system and shall be capable of automatically actuating hydraulically and / or electrically operated alarms, when there is a steady flow of water into the system which is equal to the discharge rate of one or more sprinklers.

K. The alarm check valve shall be listed for installation in the vertical or horizontal position and equipped with a removable cover assembly.

L. The alarm valve shall be equipped with gauge connections on the system side and supply side of the valve clapper and shall be equipped with an external bypass to eliminate false water flow alarms.

M. The alarm valve trim piping shall be galvanized.

N. Retard Chamber: Ported alarm connections on sprinkler riser valve to be piped to a retard chamber to absorb variable pressure surges. Circuit closer to be installed on retard chamber with proper venting capabilities to eliminate vapour or hydraulic lock against circuit closure. The Retard Chamber to be similar to Model C-1 as manufactured by the Viking Corporation, or approved equivalent.

O. Water Motor Alarm: Water flow shall activate a hydraulic powered water motor alarm by way of integral valve alarm line trim piping. The water motor gong shall be connected to a water pressure retarding chamber to limit the propensity of unnecessary alarms. The water motor alarm shall be equipped with a rear closure plate to limit the access of foreign materials and accumulation of debris. The water motor alarm shall be UL listed and Factory Mutual approved for the application in which it is used.

2.8 Automatic (Ball Drip) Drain Valves:

A. Manufacturers: Refer List of Approved Manufacturers

B. Standard: UL 1726.

C. Pressure Rating: 175 psig minimum.

D. Type: Automatic draining, ball check.

E. Size: NPS 3/4 inch (20mm).

F. End Connections: Threaded.

2.9 Calibrated Orifice Plates:

A. Where shown on drawings Calibrated Orifice Plates shall be supplied & installed to meet the design intent.

B. The Orifice Plate shall be manufactured from 6mm thick stainless steel (SS-304).

2.10 Automatic Fire Sprinklers:

A. Manufacturers: Refer List of Approved Manufacturers

B. General Requirements:

1. Standard: "Approval Guide," published by FM Global, listing.

2. Pressure Rating for Automatic Sprinklers: 175 psig minimum.

3. Pressure Rating for High-Pressure Automatic Sprinklers: 250 psig minimum

C. Supply & install where shown on the drawings, automatic sprinklers, glass bulb or fusible link type with orifice diameter as specified, either upright or pendant type as specified in the FIRE SPRINKLER DATA SHEETS.

D. Standard: Automatic Sprinklers with Heat-Responsive Element, Non-residential applications: UL 199.

E. Sprinkler Finishes: Chrome plated; bronze; or painted as specified in SPRINKLER DATA SHEETS.

F. Special Coatings: Wax; lead; corrosion-resistant paint-provide where required by NFPA 13 or as indicated in SPRINKLER DATA SHEETS.

G. Sprinkler Escutcheons: Materials, types, and finishes for the sprinkler mounting escutcheons for concealed, flush, and recessed-type sprinklers shall be as specified in SPRINKLER DATA SHEETS. Recessed, sprinklers shall be supplied with retainer and trim-ring.

H. Sprinkler Guards: Provide where indicated in SPRINKLER DATA SHEETS or drawings, in accordance with NFPA 13. Sprinkler guards shall be installed on sprinklers that are subject to mechanical damage

or those installed less than 2m above the finished floor, except in IT rooms where they shall be provided for sprinklers within 4m above the finished floor. Standard: UL 199. Type: Wire cage with fastening device for attaching to sprinkler.

I. Sprinkler shall be supplied with a set of matching wrenches (1 No per 100 sprinklers or less). Special wrenches for recessed sprinklers shall be supplied.

2.11 Open Sprinklers:

A. Supply & install where shown on the drawings, open sprinklers, with orifice diameter as specified, either upright or pendant type as specified in the FIRE SPRINKLER DATA SHEETS.

2.12 Reserve Sprinklers Cabinet:

A. Supply & install Reserve Sprinkler Cabinets, with sprinklers and wrench for each type of sprinkler used on Project.

B. Sprinkler Cabinets shall be finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of 12 spare sprinklers plus sprinkler wrench.

C. The cabinet shall be painted bright red enamel paint inside & out and a label indicating that the cabinet is for reserve sprinklers shall be bonded to the cover.

D. The cabinets shall be rigidly attached to walls at locations indicated by the Consultant.

2.13 Pressure-Reducing Valve (PRV) Stations:

A. Manufacturer: Refer List of Approved Manufacturers.

B. Pressure Rating: Appropriate for system pressure but not less than 250 psig.

C. Standard: UL 1468- Direct Acting Pressure Reducing & Pressure Restricting Valves

D. Adjustable range: 20 psig to 175 psig.

E. PRV's shall be suitable for the service specified & shall be able to maintain & restrict downstream pressure at all flow rates.

F. PRV's shall be sized for the maximum flow & pressure specified or required as scheduled, and selected on the basis of manufacturers published data.

G. PRV's upto Ø 40mm shall be of bronze with screwed ends, while PRV's Ø 50mm & above shall be of cast-iron body with flanged/ grooved ends, as required.

2.14 Fire-Department Connections

A. Manufacturer: Refer List of Approved Manufacturers.

B. Standard: UL 405.

C. Design: Exposed Type- projecting for wall mounting; or Flush type for wall mounting, as indicated on drawings or DATA SHEET.

D. Pressure Rating: 175 psig minimum.

E. Body Material: Corrosion-resistant metal.

F. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.

G. Number of Inlets: Two X 65mm dia.

H. Caps: Brass, lugged type, with gasket and chain.

I. Escutcheon Plate: Round for projecting type and rectangular for flush mounting type; brass, wall type.

J. Escutcheon Plate: Marking: Similar to "AUTO SPKR & STANDPIPE". Finish: Polished chrome plated

K. Outlet: Back, with pipe threads; 100mm

2.15 Reduced-Pressure-Principle Backflow Preventers:

A. Manufacturer: Refer List of Approved Manufacturers. FM approved

B. Standard: ASSE 1013 or AWWA C511.

C. Operation: Continuous-pressure applications.

D. Pressure Loss: 12 psig maximum, through middle one-third of flow range.

E. Size: As indicated on drawings.

F. Design Flow Rate: As indicated on drawings.

G. Body Material: Cast iron with interior lining complying with AWWA C550

H. End Connections: Flanged.

I. Configuration: As shown on drawings. Include a permanently installed test assembly for full forward flow testing.

J. Accessories:

1. OS&Y gate type with flanged ends on inlet and outlet.

2. Air-Gap Fitting: ASME A112.1.2, matching backflow preventer connection.

2.16 Double-Check, Backflow-Prevention Assemblies:

A. Manufacturer: Refer List of Approved Manufacturers.

B. Standard: ASSE 1015 or AWWA C510.

C. Operation: Continuous-pressure applications unless otherwise indicated.

D. Pressure Loss: 5 psig maximum, through middle one-third of flow range.

E. Size: As indicated on drawings

F. Design Flow Rate: As indicated on drawings

G. Body Material: Cast iron with interior lining complying with AWWA C550

H. End Connections: Flanged.

I. Configuration: Designed for horizontal, straight through.

J. Accessories: OS&Y gate valves with flanged ends on inlet and outlet.

2.17 Zone Check Flow Switch Tester:

A. Manufacturer: Refer List of Approved Manufacturers.

B. Operation: Closed system with pump that re-circulates water around the flow switch at a pressure equal to one sprinkler head discharging water. As water operates the flow-switch paddle, an electronic signal is sent back to the key switch to indicate that the flow switch has operated correctly.

C. Size: Same as connected piping

D. Standard: "Approval Guide," published by FM Global, UL listed.

E. Pressure Rating: 175 psig minimum.

2.18 Adjustable Drop Nipples:

A. Manufacturer: Refer List of Approved Manufacturers.

B. Standard: UL 1474.

C. Pressure Rating: 250 psig minimum.

D. Body Material: Steel pipe with EPDM-rubber O-ring seals.

E. Size: Same as connected piping.

F. Length: Adjustable.

G. Inlet and Outlet: Threaded.

2.19 Water-Flow Indicators (Flow Switch):

A. The wet type fire sprinkler systems shall be equipped with the means to provide an alarm when a water flow condition exists. This shall be accomplished through the provision of a vane or paddle type water flow switch, deflection of which activates an adjustable electrical switch.

B. Manufacturer: Refer List of Approved Manufacturers.

C. Standard: UL 346.

D. Water-Flow Detector: Electrically supervised.

E. Components: Two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 230-V AC and 0.25 A, 24-V DC; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.

F. Type: Paddle operated; similar Viking Model VSR-F or VSR-D or approved equivalent.

G. Pressure Rating: 250 psig.

H. Design Installation: Horizontal or vertical.

2.20 Pressure Switches:

A. Manufacturer: Refer List of Approved Manufacturers.

B. Standard: UL 346.

C. Type: Electrically supervised pressure switch with retard feature.

D. Components: Single-pole, double-throw switch with normally closed contacts.

E. Design Operation: Rising pressure signals water flow.

2.21 Valve Supervisory Switches:

A. Provide and install Supervisory Switch designed to monitor the open condition of an OS&Y gate valve. This shall be similar to Model OSYS-U Supervisory Switch as manufactured by Polter Electric Signal Co., USA or approved equivalent.

B. Standard: UL 346.

C. Type: Electrically supervised, with 2 sets of single pole double throw contacts rated at 15Amp at 230V AC

D. Components: Single-pole, double-throw switch with normally closed contacts.

E. Design: Signals that controlled valve is in other than fully open position.

F. Housing: cast aluminum with all parts plated to resist corrosion, with all accessories necessary for field mounting.

2.22 Pressure Gages:

A. Refer Section 21 05 19.

PART 3 - EXECUTION

3.1 Wet-System Piping Installation:

A. Installation, workmanship, fabrication, assembly, erection, examination, inspection, and testing shall be in accordance with NFPA 13 and NFPA 25.

B. Install sprinkler piping straight and true, to bear evenly on hangers and supports. Sprinkler piping shall be hung from structural elements capable of bearing the full designed load and in full compliance with referenced codes. No other load shall be suspended from sprinkler piping or sprinkler piping hangers/supports.

C. Keep piping systems clean during installation by means of plugs or other approved methods. When work is not in progress, securely close open ends of piping to prevent entry of water and foreign material. Inspect piping before placing into position.

D. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.

E. Deviations from approved working plans for piping require written approval from Consultant.

F. Install seismic restraints on piping. Comply with requirements for seismic-restraint device materials and installation in NFPA 13.

G. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

H. Install unions adjacent to each valve in pipes NPS 2 inch (50mm) and smaller.

I. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 inch (65mm) and larger end connections.

J. Install Zone check flow switch testers in sprinkler system piping, in location approved by the Consultant.

K. Install sprinkler piping with drains for complete system drainage. All drains shall terminate at a location acceptable to Consultant. Drains that terminate to the exterior of the building shall have a 45 degree downturn no higher than 12 inches (300mm) from the ground with a splash-block.

L. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.

M. Install automatic (ball drip) drain valve at each check valve for fire-department connection, to drain piping between fire-department connection and check valve. Install drain piping to and spill over floor drain or to outside building.

N. Install alarm devices in piping systems.

O. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13.

P. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 inch (6mm) and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.

Q. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 210521- Fire Stop Systems for Penetration through Fire Barrier Walls and Floors.

3.2 Joint Construction:

A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.

B. Install unions adjacent to each valve in pipes 2 inch (50mm) and smaller.

C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2inch (65mm) and larger end connections.

D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.

G. Threaded Joints: The use of threaded joints is restricted to wet pipe systems. Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

H. Twist-Locked Joints: Insert plain end of steel pipe into plain-end-pipe fitting. Rotate retainer lugs one-quarter turn or tighten retainer pin.

I. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.

3.3 Valve And Specialties Installation:

A. Install valves as shown on the drawings and as recommended by the manufacturer. Lubricate valves and exercise them after installation and prior to testing to assure proper operation, travel, and ease of use.

B. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.

C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.

3.4 Sprinkler Installation:

A. Install sprinklers in suspended ceilings in center of acoustical ceiling panels.

B. Where flexible sprinkler hose is used, install sprinklers into flexible sprinkler hose fittings and install hose into bracket on ceiling grid.

3.5 Fire-Department Connection Installation:

A. Install fire-department connection(s) as indicated on the drawings.

B. Install automatic (ball drip) drain valve at each check valve for fire-department connection.

3.6 Hose-Connection Installation:

A. Install hose connections adjacent to standpipes. Hose connection shall be installed as shown on drawings at intermediate floor landings.

B. Install free standing hose connections for access and minimum passage restriction.

C. Install NPS 2-1/2 inch (65mm) hose connections with quick-disconnect coupling.

D. Install wall-mounted-type hose connections in cabinets. Include pipe escutcheons, with finish matching valves, inside cabinet where water-supply piping penetrates cabinet. Install valves at angle required for connection of fire hose. Comply with requirements for cabinets in Section 211216: Hose Reel & Hose Rack.

3.7 Identification:

A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13 and Section 210553-Mechanical Identification.

B. All concealed valves shall be marked.

C. Standpipes shall be painted red.

D. Identify system components, wiring, cabling, and terminals.

3.8 Field Quality Control:

A. Perform tests and inspections as noted below.

1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.

2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.

4. Energize circuits to electrical equipment and devices.

5. Coordinate with fire-alarm tests. Operate as required.

6. Coordinate with fire-pump tests. Operate as required.

7. Verify that equipment hose threads are same as local fire-department equipment.

B. Sprinkler piping system will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

D. Submit as-built drawings and testing certificates after the acceptance testing in accordance with specifications.

3.9 Cleaning:

A. Clean dirt and debris from sprinklers.

B. Remove and replace sprinklers with paint other than factory finish.

3.10 Demonstration:

A. Engage a factory-authorized service representative to train Client's maintenance personnel to adjust, operate, and maintain specialty valves.

3.11 Piping Schedule:

A. Typically, provide black steel, Schedule 10 pipe (or other listed schedule), roll-grooved for pipe 2-1/2” and larger. Provide black steel, Schedule 40 pipe, cut- or roll-grooved or threaded fittings for diameter 2” inches and smaller. Areas requiring nonferrous pipe shall be copper Type L with wrought copper solder joints. Galvanized Steel piping, where required, shall be Schedule 40 for all sizes.

3.12 Sprinkler Schedule:

A. Use sprinkler types in sub-paragraphs below for the following applications unless otherwise noted on drawings:

1. Rooms without Ceilings: Upright sprinklers.
2. Rooms with Suspended Ceilings: Concealed sprinklers
3. Wall Mounting: Sidewall sprinklers.
4. Spaces Subject to Freezing: dry sprinklers as indicated on drawings.
5. Behavioral Health and Holding Areas: Institution-style sprinklers.
6. Food Preparation Areas: Solder-type sprinklers.

B. Provide sprinkler types in subparagraphs below with finishes indicated.

1. Concealed Sprinklers: Rough brass, with [chrome] [factory painted white] [or custom factory painted where indicated] flat cover plate.
2. Flush Sprinklers: Bright chrome, with painted white escutcheon.
3. Recessed Sprinklers: Bright chrome, with bright chrome escutcheon.
4. [Upright] [Pendent] [and] [Sidewall] Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

END OF SECTION 21 13 13

FIRE SPRINKLER SYSTEM ACCEPTANCE

1. General:

The fire sprinkler system acceptance & testing shall be carried out as per NFPA requirements.

2. Approval of Sprinkler Systems:

The installing contractor shall:

a) Notify the consultant, authority having jurisdiction and owner's representative of the time and date testing will be performed.

b) Perform all required acceptance tests.

c) Complete and sign the appropriate Contractor's Material and Test Certificate(s) for above ground & underground piping (See NFPA Standards).

3. Acceptance Requirements:

3.1 Flushing of Piping: Underground mains and lead-in connections to system risers shall be completely flushed before connection is made to sprinkler piping. The flushing operation shall be continued for a sufficient time to ensure thorough cleaning. The minimum rate of flow shall be not less than:

a) The hydraulically calculated water demand rate of the system including any hose requirements, or

b) That flow necessary to provide a velocity of 10ft per sec (3 m/s).

3.2 Hydrostatic Tests: All interior piping and attached appurtenances subjected to system working pressure shall be hydrostatically tested at 200 pi (13.8 bars) and shall maintain that pressure without loss for 2 hours. Loss shall be determined by a drop in gauge pressure or visual leakage.

3.3 Additives: Additives, corrosive chemicals such as sodium silicate or derivatives of sodium silicate, brine, or other chemicals shall not be used while hydrostatically testing.

3.4 Piping between the exterior fire department connection and the check valve in the fire department inlet pipe shall be hydrostatically tested in the same manner as the balance of the system.

3.5 When deluge systems are being hydrostatically tested, plugs shall be installed in fittings and replaced with open sprinklers after the test is completed, or the operating elements of automatic sprinklers shall be removed after the test is completed.

3.6 All underground piping shall be hydrostatically tested in accordance with NFPA 24, Standard for the installation of Private Fire Service Mains and Their Appurtenances. The allowable leakage shall be within the limits prescribed by NFPA 24 and shall be recorded on the test certificate.

3.7 Provision shall be made for the proper disposal of water used for flushing or testing.

3.8 Test blanks shall have painted lugs protruding in such a way as to clearly indicate their presence. The test blanks shall be numbered, and the installing contractor shall have record-keeping method ensuring their removal after work is completed.

3.9 Valves isolating the section to be tested may not be "drop-tight". When such leakage is suspected, test blanks of the type required should be used in a manner that includes the valve in the section being tested.

3.10 Dry and iobe nter0ocked System(s) Ak Test: In addition to the standard hydrostatic test, an air pressure leakage test at 40 psi (2.8 bars) shall be conducted for 24 hr. Any leakage that results in a loss of pressure in excess of 1 1/2 psi (o.1 bar) for the 24 hr. shall be corrected.

3.11 Where systems are installed in spaces that are capable of being operated at temperatures below 32°F (0°C), air pressure leakage tests required shall be conducted at the lowest nominal temperature of the space.

4. System Operational Tests:

4.1 Water flow detecting devices including the associated alarm circuits shall be flow tested through the inspector's test connection and shall result in an audible alarm on the premises within 5 min after such flow begins and until such flow stops.

4.2 A working test of the dry pipe valve alone, and with a quick-opening device, if installed, shall be made by opening the inspector's test connection. The test shall measure the time to trip the valve and the time for water to be discharged from the inspector's test connection. All times shall be measured from the time the inspector's test connection is completely opened. The results shall be recorded using the Contractor's Material and Test Certificate for above ground piping.

4.3 The automatic operation of a deluge or preaction valve shall be tested in accordance with the manufacturer's instructions. The manual and remote control operation, where present, shall also be tested.

4.4 The main drain valve shall be opened and remain open until the system pressure stabilizes. The static and residual pressure shall be recorded on the contractor's test certificate.

4.5 Each pressure-reducing valve shall be tested upon completion of installation to ensure proper operation under flow and no-flow conditions. Testing shall verify that the device properly regulates outlet pressure at both maximum and normal inlet pressure conditions. The results of the flow test of each pressure-reducing valve shall be recorded on the contractor's test certificate. The results shall include the static and residual inlet pressures, static and residual outlet pressures, and the flow rate.

4.6 The backflow prevention assembly shall be forward flow tested to ensure proper operation. The minimum flow rate shall be the system demand, including hose stream demand where applicable.

4.7 Operating tests shall be made of exposure protection systems upon completion of the installation, where such tests do not risk water damage to the building on which they are installed or to adjacent buildings.

5. Instructions:

The installing contractor shall provide the owner with:

a) All literature and instructions provided by the manufacturer describing proper operation and maintenance of any equipment and devices installed.

b) Publication titled NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.

6. Hydraulic Design Name-Plate:

The installing contractor shall identify a hydraulically designed sprinkler system with a permanently marked stainless steel 24 gauge metal plate of minimum size 5 inch x 7 inch secured with corrosion-resistant wire, chain, or other approved means. Data shall be permanently marked or stamped in characters at-least 1 / 4 inch high. Such signs shall be placed at the alarm valve dry pipe valve, preaction valve, or deluge valve supplying the corresponding hydraulically designed area. The sign shall include the following information:

a) Location of the design area or areas.

b) Discharge densities over the design area or areas.

c) Required flow and residual pressure demand at the base of riser.

d) Occupancy classification or commodity classification and maximum permitted storage height and configuration.

e) Hose stream demand included in addition to the sprinkler demand.

END OF SECTION 21 13 17

HOSE REEL & HOSE RACK

PART-1: GENERAL

1.3 Section Scope:

A. The contractor shall supply hose reel and racks of the required specs as given in the EQUIPMENT DATA SHEET.

1.4 Submittals:

A. Tendering Stage Submittal

1. The tenderer shall indicate the equipment he intends to use and shall provide their source.

B. Construction Stage Submittal

1. The contractor shall provide complete details of all equipment to be used, and shall obtain Consultants approval.

1.5 Quality Assurance:

A. Factory Test:

1. Each equipment shall undergo a series of standard factory tests to ensure that the unit is leak tight, and that every aspect of unit fabrication meets stringent quality standards in accordance with good practice and the manufacturer's quality assurance requirements.

1.6 Delivery, Storage, and Handling:

A. Hoses and Racks shall be stored and handled in accordance with the manufacturer's recommendations.

B. Equipment shall be shipped with nameplates indicating name of manufacturer, model size, serial number, and all other data.

1.7 Warranty:

A. Manufacturer shall guarantee the equipment and components against defects in materials and/or workmanship for a period of one year from date of initial operation or 18 months from date of shipment, whichever occurs first, unless otherwise stated elsewhere in this document.

PART-2: PRODUCTS

2.1 Fire Hose Reel:

A. The Contractor shall supply and install recessed, swinging arm type, Fire Hose Reels, where indicated on the drawing. The Hose Reels shall conform to BS 5274:1985 and shall consist of:

1. Hose Reel Lock Shield Valve: manufactured from materials resistant to de-zincification, 25mm, threaded.

2. Side Disks: 18SWG, galvanised steel sheets, powder coated, post office red color.

3. Hose: Red rubber smooth, covered to BS3169 Type 1, Class B; 25mm and 30.5m long.

4. Control Nozzle: Nylon lever operated jet/spray

2.2 Fire Hose Reel Cabinet:

A. Provide and install Fire Hose Reel Cabinet constructed from 16swg galvanised sheet steel, powder coated to BS18 B25. Cabinet shall be minimum of size 850mm x 850mm and shall be minimum 350mm deep.

1. Water Entry: Top, bottom, back or side, 50 dia knockouts to suit pipework requirements.

2. Architrave: 20swg stainless steel, brushed satin finish.

3. Door: 15mm MDF finished in pre-catalysed lacquer both sides and edges in BS06 C33.

4. Concealed Hinges: Concealed hinges, left or right as required.

5. Name Panel/Finger Pull: Recessed stainless steel, brushed satin finish. Caption "FIRE HOSE REEL" in red 45mm high. Universal logo showing fire hose reel shall also be provided.

6. Instruction on reverse of panel: “In case of fire pull hose from reel and water will turn on automatically”.

2.3 Fire Hose Reel Cabinet Door:

A. Where steel cabinet is not felt necessary, only the Door will be installed over a recesses in the masonry construction for the hose reel, and / or extinguishers, as shown in the detail drawings.

B. Separate doors, one on top of another shall be provided & installed. The top door shall be for the hose reel, while the bottom door shall be to house fire extinguishers, as shown in the detail drawings.

C. Doors shall conform to specifications given at Clause 2.2 above for Hose Reel Cabinet.

2.4 Fire Hose Rack:

A. The Contractor shall supply and install fire-hose rack with hose of diameter 40mm with instantaneous coupling terminated with light alloy jet / spray nozzle.

B. Hose shall attaché to Ø 65mm fire hydrant valve (angle valve). Length of hose shall be 30 meter. Hose shall comply with British Standards BS-3169.

C. Fire hose shall be rubber lined with nylon hose.

D. Hose shall be as approved by the Consultant.

2.5 Hose Rack Cabinet:

A. Provide and install fire hose rack cabinet constructed from 16SWG galvanised steel sheet, powder coated to fire red colour according to BS 18 B 25. Cabinet shall have a minimum size of 600mm wide x 800mm high x 150mm deep, and shall have a full glass door.

2.6 Orifice Plates:

A. Where the dynamic pressure at the inlet to Fire Hose Reel exceeds 2.75 bars (40 psi) an orifice plate shall be installed prior to the inlet of Fire Hose Reel.

B. The orifice plate shall be fabricated of 6mm thick stainless steel (SS 304) and installed between steel flanges. Size of the bore shall be determined by the contractor.

C. Shop drawing shall be submitted to the Consultant for approval prior to the fabrication.

PART-3: EXECUTION

A. The equipment shall be installed where shown on drawings & shall be installed as per the manufacturer recommendations.

END OF SECTION 21 12 16

FIRE HYDRANT & STAND PIPES

PART-1: GENERAL

1.1 Scope of Work:

A. The work under this section of the specifications consists of providing all material and labour for proper installation of fire hydrants and stand pipes.

1.2 Submittals:

C. Tendering Stage Submittal

1. The tenderer shall indicate the fire hydrants and stand pipes he intends to use and shall provide their source.

D. Construction Stage Submittal

1. The contractor shall provide complete details of fire hydrants and stand pipes to be used, and shall obtain Consultants approval.

1.3 Warranty:

A. Manufacturer shall guarantee the equipment and components against defects in materials and/or workmanship for a period of one year from date of initial operation or 18 months from date of shipment, whichever occurs first, unless otherwise stated elsewhere in this document.

PART-2: PRODUCTS

2.1 Dry Barrel –Pillar Hydrant – Double Headed:

A. Fire Stand Pipes shall be of Pillar Hydrant type, of size dia 150mm, tested to 250 psi. The pillar Hydrant shall be constructed of steel, and shall consist of four sections, i.e. Dry Port, Upper Barrel, Lower Barrel, and Inlet Connection. The Dry Port shall be O'Ring sealed. The Upper Barrel shall be bolted on top to the Dry Port and at the Bottom to the Lower Barrel. The Upper Barrel shall house the outlet consisting of two nos. Ø 65mm hydrant valves with instantaneous couplings. The Lower Barrel shall carry the main hydrant valve, which shall be constructed of cast-iron and shall have a conical shaped synthetic rubber moulded disc which shall seat on to a precision machined bronze seat. The main hydrant valve shall be compression type opening against the pressure and closing with it, and shall be actuated by a cast bronze nut which shall rotate the steel hydrant rod.

2.2 Double Delivery Standpipe:

A. Shall be manufactured using Ø 6inch Schedule 40, Black steel pipe, fully welded, conforming to dimensions given in detail drawing, approximately 36 inch high, and with the top end capped. The barrel will be provided at the top with two dia 2½ " hydrant valves, placed 180 apart, and each outlet shall be provided with an instantaneous coupling. The bottom of the standpipe shall be flanged.

PART-3: EXECUTION

3.1 Installation:

A. Dry Barrel –Pillar Hydrant – Double Headed

1. Hydrant valve shall be provided with flanged inlet and tee-base. All nuts and bolts shall be zinc passivated and plated. Hydrant barrel shall be painted inside and out with a primer, and finish

painted on sections below ground level with black bituminous paint, while exposed surfaces shall have red high glass enamel.

B. Double Delivery Standpipe

1. When installing the standpipe, the piping leading to the standpipe shall be provided with concrete foundation/thrust block as shown in detail drawing.

END OF SECTION 22 12 20

VALVES FOR FIRE SUPRESSION SERVICE

PART-1: GENERAL

1.17 Section Scope:

A. The Contractor shall supply and install all valves used at various locations throughout the fire suppression system piping.

1.18 General Requirements

A. Valves shall be UL listed or FM approved.

B. Minimum Pressure Rating for Standard-Pressure Piping: 175 psig.

C. Minimum Pressure Rating for High-Pressure Piping: 300 psig.

1.19 Reference Standards

A. UL 1091-Butterfly Valves for Fire-Protection Service

B. UL 312- Check Valves for Fire Protection Service

C. UL 262- Gate Valves for Fire-Protection Service

D. UL 789- Indicator Post for Fire-Protection Service

1.20 Submittals:

A. Tendering Stage Submittal

1. Indicate the sourcing & manufacturer of the various valves.

B. Construction Stage Submittal

1. Provide schedule of valves

2. Provide complete details of all valves to be used, and obtain Consultants approval.

1.21 Quality Assurance:

A. All fire protection valves & accessories to be supplied preferably by one manufacturer.

B. Manufacturer shall be a company specializing in manufacture of valves with a minimum of five (5) years of experience.

1.22 Delivery, Storage, and Handling:

C. Valves shall be stored and handled in accordance with the manufacturer's recommendations.

D. Protect internals from entry of foreign material by temporary caps on all openings.

E. Equipment shall be shipped with nameplates indicating name of manufacturer, model size, serial number, and all other pertinent machine data.

PART-2: PRODUCTS

Butterfly Valves:

A. Standard: UL 1091- Butterfly Valves for Fire-Protection Service

B. Butterfly valves shall be used for applications requiring 50mm or larger diameter valves, and shall have a rating suitable for the service intended.

C. Butterfly valves shall be wafer type with modular cast iron body, suitable for mounting between ANSI flanges of the required pressure rating. Two flanges plus required nuts and bolts shall be provided with the valves.

D. The centre disc shall be of stainless steel.

E. The liner shall be replaceable, of Nitrile or EPDM rubber. Each valve shall be provided with one replaceable liner as spare.

F. Actuator shall be worm gear type of aluminium or cast iron, weather proof to IP65, complete with hand wheel, position indicator, and with adjustable stops at both fully open and fully closed positions. The actuator shall be self-locking, lubricated for life and free of maintenance.

G. All valves shall be indicating type.

Gate Valves:

A. Ø 50mm (2 inch) & Smaller

1. Standard: UL 262- Gate Valves for Fire-Protection Service

2. Bronze body, union bonnet, non-rising stem, wedge disc. Hand wheel nut, packing nut, gland, stuffing box, bonnet, bonnet ring, disc and body shall be of bronze.

3. Hand wheel shall be of malleable iron.

4. Packing shall be suitable for specified usage but shall not use asbestos. Stem shall be manganese bronze.

5. End Connections shall be threaded.

B. Ø 65mm (2 1/2 inch) & Larger

1. Standard: UL 262- Gate Valves for Fire-Protection Service

2. Cast/ ductile iron body bronze mounted with flanged ends. These shall be of solid wedge disc type, with outside screw and yoke (rising stem).

3. Body and bonnet shall be of cast iron. Wedge shall be of cast iron with bronze disc. Seat rings shall be bronze.

4. Packing shall be suitable for specified usage but shall not use asbestos. Packing gland shall be cast iron.

5. Yoke shall be of cast iron and yoke nuts shall be of bronze. Hand wheel shall be of cast iron.

6. End Connections: Flanged or grooved.

Ball Valves:

A. Ø 50mm (2 inch) & Smaller

1. Standard: UL 1091 except with ball instead of disc.
2. Two-piece cast bronze body, chrome plated brass ball, teflon ball and flange seals, rods silicon brass stem, teflon and Viton “O” ring stem seals, zinc plated carbon steel handle with vinyl grip and brass handle nut.
3. Valves NPS 1-1/2 inch and smaller: Bronze body with threaded ends.
4. Valves NPS 2 inch: Bronze body with threaded ends or ductile-iron body with grooved ends.

Swing Check Valves:

A. Ø 50mm (2 inch) & Smaller

1. Standard: UL 312- Check Valves for Fire Protection Service
2. Threaded ends.
3. Cap, hinge pin, body, hinge, disc nut and disc shall be of bronze.

B. Ø 65mm (2 1/2 inch) & Larger

1. Standard: UL 312- Check Valves for Fire Protection Service.
2. Cast/ ductile iron body, including valve cap and disc. Hinge pin, seat ring and disc ring shall be of bronze.
3. Ends shall be flanged or grooved as required.

Guided Check Valves:

A. Ø 80mm (3 inch) & Smaller

1. Standard: UL 312- Check Valves for Fire Protection Service.
2. Bronze or cast steel body, bronze or stainless steel trim, centre guided, silent type.
3. Valves NPS 1-1/2 inch and smaller: bronze body with threaded ends.
4. Valves NPS 2 inch & larger: cast/ ductile iron body with flanged or grooved ends as required.

B. Ø 100mm (4 inch) & Larger

1. Standard: UL 312- Check Valves for Fire Protection Service.
2. Cast/ ductile iron body, bronze or stainless steel trim, centre guided, silent type.
3. Ends shall be flanged or grooved, as required.

Hydrant Valves

A. Ø 65mm (2.5 inch)

1. Manufacturer: Refer List of Approved Manufacturers.
2. Standard: BS 5041 ; UL 668
3. Body: Copper Alloy to BS 1400

4. Pressure rating: 250 psig
5. Connections: threaded or flanges as required.
6. Configuration: Straight, right angled, oblique or bib nose as required, indicated on drawings or directed by Consultant.

Hydrant Valves with Pressure Regulating Valve

A. Ø 65mm (2.5 inch)

1. Manufacturer: Refer List of Approved Manufacturers.
2. Standard: BS 5041 ; UL 668
3. Body: Copper Alloy to BS 1400 and provided with a PRV to control outlet static pressure from 5 to 8 bars with inlet pressure up to 300 psig.
4. Pressure rating: 300 psig
5. Connections: threaded or flanges as required.
6. Configuration: Straight, right angled, oblique or bib nose as required, indicated on drawings or directed by Consultant.

Fire-Department Connections

H. Manufacturer: Refer List of Approved Manufacturers.

I. Standard: UL 405.

J. Design: Exposed Type- projecting for wall mounting; or Flush type for wall mounting, as indicated on drawings or DATA SHEET.

K. Pressure Rating: 175 psig minimum.

L. Body Material: Corrosion-resistant metal.

M. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.

N. Number of Inlets: Two X 65mm dia.

O. Caps: Brass, lugged type, with gasket and chain.

P. Escutcheon Plate: Round for projecting type and rectangular for flush mounting type; brass, wall type.

Q. Escutcheon Plate: Marking: Similar to "AUTO SPKR & STANDPIPE" . Finish: Polished chrome plated

R. Outlet: Back, with pipe threads; 100mm

Indicator Posts:

A. Standard: UL 789- Indicator Post for Fire Protection Service.

B. Type: Horizontal for wall mounting.

C. Body Material: Cast iron with extension rod and locking device.

D. Operation: Hand wheel.

Trim And Drain Valves:

A. Trim and drain valves are typically used as part of specialty control valve trim and drain piping, and are NPS 2 (DN 50) and smaller. Most of these valves are ball type, but there are also a few angle, butterfly, gate, and globe types listed. No UL standard exists for these valves.

B. Standard: "Approval Guide," published by FM Global listing.

C. Pressure Rating: 175 psig minimum.

Gaskets:

A. Non-asbestos, compressed gasket material with high-strength aramid fibres bonded with high grade nitrite NBR synthetic rubber, suitable for 750°F (400°C) and 1450 psi (10000 kPa).

Thread Lubricant:

A. General: non-hardening, non-poisonous as approved.

PART-3: EXECUTION

3.1 Installation Contractor's Responsibilities:

B. All gate valves, check valves, control valves, butterfly valves, drain cocks, etc. necessary for satisfactory operation of the system shall be provided whether indicated or not.

C. All valves whose stem are installed at a height of over 2m from floor level shall be provided with galvanised chain operators. Valves in horizontal lines shall be installed with stem horizontal or vertical above.

D. Each valve shall be identified with not less than 35mm round or square black over white laminated plastic tags secured to valve with a suitable brass chain.

E. Tags shall be engraved to identify valve by number and valve function.

END OF SECTION 21 12 30

ABOVE GROUND FIRE SUPRESSION PIping & specialities

PART-1: GENERAL

1.23 Section Scope:

B. This Section covers the scope of supply and installation of all above ground piping to conduct fire water for fire suppression system.

C. The Contractor shall supply and install all fire water piping as shown on the drawings and in accordance with these specifications.

1.24 General Requirements

D. Minimum Pressure Rating for Standard-Pressure Piping: 175 psig.

E. Minimum Pressure Rating for High-Pressure Piping: 300 psig.

1.25 Reference Standards

A. NFPA 13 Standard for the installation of Sprinkler system.

B. NFPA 14 Standard for the installation of Standard-pipe and hose systems.

C. NFPA 20 Standard for the installation of Centrifugal Fire Pumps.

D. NFPA 24 Standard for the installation of Private Fire Service Mains & their

1.26 Submittals:

C. Tendering Stage Submittal

2. Indicate the pipe sourcing and manufacturer.

D. Construction Stage Submittal

3. Provide all technical details of piping and fittings

4. Submit samples of pipes and fittings.

1.27 Quality Assurance:

C. All piping and fittings shall be supplied preferably by one manufacturer.

D. Manufacturer shall be a company specializing in manufacture of piping and fittings, with a minimum of five (5) years of experience.

1.28 Delivery, Storage, and Handling:

F. Pipes shall be stored and handled in accordance with the manufacturer's recommendations.

G. Protect internals from entry of foreign material by temporary caps on openings.

PART-2: PRODUCTS

2.1 Piping Material:

e) Seamless Black Steel Piping: Seamless black-steel piping, Schedule 40 conforming to ASTM A53.

f) Black Steel Pipe: Electrode Resistance Welded, conforming to BS 1387 (medium series).

g) Schedule 40, Black-Steel Pipe: ASTM A 53/A 53M. Pipe ends may be factory or field formed to match joining method.

h) Schedule 10, Black-Steel Pipe: ASTM A 135 or ASTM A 795/A 795M, Schedule 10 in NPS 5 inch (125mm) and smaller; and NFPA 13-specified wall thickness in NPS 6 inch (150mm) to NPS 10 inch (250mm), plain end.

i) Steel Pipe Nipples: ASTM A 733 made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.

j) Steel Couplings: ASTM A 865, threaded.

k) Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.

l) Malleable- or Ductile-Iron Unions: UL 860.

m) Cast-Iron Flanges: ASME 16.1, Class 125.

n) Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.

o) Grooved-Joint, Steel-Pipe Appurtenances:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:

a. Anvil International, Inc.

b. Tyco Fire & Building Products LP.

c. Victaulic Company.

2. Pressure Rating: [175 psig] [250 psig] [300 psig] minimum.

3. Grooved-End Fittings for Steel Piping:

   ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting; with dimensions matching steel pipe.

4. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213, rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

p) Steel Pressure-Seal Fittings: UL 213, FM-approved, 175-psig pressure rating with steel housing, rubber O-rings, and pipe stop; for use with fitting manufacturers' pressure-seal tools.

2.2 Application:

b) Fire Protection shall be of material as specified under piping schedule in EQUIPMENT DATA SHEETS.

2.3 Fittings & Flanges:

A. Fittings shall be forged, compatible to the pipe. Welded fittings shall be butt-welding type. Galvanised piping shall be provided with galvanised fittings with threads. All fittings shall be rated for minimum 10 bars SWP.

B. Flanges shall be slip-on type & shall conform to ANSI B16.5. Galvanised piping shall be provided with galvanised threaded flanges. All flanges shall be rated for minimum 10 bars SWP.

C. All joints shall be welded, except the sprinkler fitting.

2.4 Valves & Strainers:

Refer Section 21 05 23, Valves & Strainers.

2.5 Automatic Air Vents:

A. Automatic air vents shall be suitable for liquid systems. Body and cover shall be of malleable iron. Float & Valve seat shall be of stainless steel. Valve head shall be of Vitone (Synthetic Rubber). Connections shall be 13mm or 20mm as specified, screwed BSP. Vents shall be suitable for service up to 125 SWP (8.5bars) & 250°F (120°C) service.

B. Vents shall be similar to model AE 550 manufactured by SPIRAX-SARCO.

C. Air vents shall be provided at high points, on all water coils, and where shown on the drawings to ensure adequate venting of the piping system. A ball valve shall be provided to isolate the vent. The vent outlet shall be piped to a nearby convenient drain using suitable diameter flexible transparent PVC tubing.

2.6 Expansion Joints:

A. Where indicated on the drawings, expansion joints shall be provided. Expansion joints shall also be provided in all lines subject to temperature changes where indicated or required to relieve strain developed in lines due to temperature increase or decrease.

B. Pipe alignments guides shall be installed as recommended by the joint manufacturer but in any case not more than 1.5m on each side of expansion joint, except in lines 100mm or smaller they may not be over 600mm on each side of joint.

C. Anchors shall be provided wherever necessary or indicated to localise expansion or to prevent undue strain on piping. Anchors shall consist of heavy steel collars with lugs and bolts for clamping and attaching anchor braces, unless otherwise indicated. Anchor braces shall be installed in the most effective manner to secure the desired results, using turnbuckles wherever required. Anchors, supports or stays shall be attached in places where such supports will not injure the construction during installation or damage the structure by the weight or expansion of the pipeline. Detailed drawings of pipe anchors shall be submitted for approval before installation.

2.7 Flexible Connectors:

A. Flexible connectors shall be constructed of rubber, tetrafluoroethylene resin, or corrosion resisting steel, bronze, monel or galvanised steel. The material used and the configuration shall be suitable for pressure, vacuum, temperature and circulation medium. The flexible sections may have threaded, welding, soldering, flanged or socket ends and shall be suitable for service intended. The flexible section may be reinforced with metal retaining rings, with built in reinforcement and restriction bolts or with wire braid cover suitable for the service intended. Flanged assemblies shall be equipped with limit bolts to restrict maximum travel within limits standard with the manufacturer. Unless otherwise shown on the drawings, the length of the flexible connector shall be as recommended by the manufacturer for the service intended. Internal sleeves or liners shall be provided when recommended by the manufacturer suitable for the circulating medium. Covers to protect the bellows will be provided where necessary or directed. Flexible connectors shall be designed for 125Psi (8.5 bars) service, and 250°F (120°C).

B. Flexible pipe connectors shall be installed on piping connected to equipment where indicated on the drawings. Installation shall be in accordance with manufacturer's recommendations.

PART-3: EXECUTION

Installation Contractor's Responsibilities:

F. All gate valves, check valves, control valves, butterfly valves, drain cocks, etc. necessary for satisfactory operation of the system shall be provided whether indicated or not.

G. All valves whose stem are installed at a height of over 2m from floor level shall be provided with galvanised chain operators. Valves in horizontal lines shall be installed with stem horizontal or vertical above.

H. Each valve shall be identified with not less than 35mm round or square black over white laminated plastic tags secured to valve with a suitable brass chain.

I. Tags shall be engraved to identify valve by number and valve function.

Installation:

f) General: All piping shall be installed in accordance with NFPA standards:

NFPA 13 Standard for the installation of Sprinkler system.

NFPA 14 Standard for the installation of Standard-pipe and hose systems.

NFPA 20 Standard for the installation of Centrifugal Fire Pumps.

NFPA 24 Standard for the installation of Private Fire Service Mains & their appurtenances.

Pipes shall be cut accurately to measurements established at the job site and worked into place without springing or forcing, properly clearing all windows, doors and other openings. Excessive cutting or other weakening of the building structure to facilitate piping installation will not be permitted without written approval. Layout drawings required under the title of "Approval of Material & Equipment" shall show locations of all supports, the load imposed on each fastening or anchor, typical details for special anchorage, for suspended piping, valves, tank, pumps, converters, and other mechanical equipment. Where supports are required between structural framing members, suitable intermediate metal framing shall be provided and detailed. Pipe shall have burrs removed by reaming and shall be installed to permit free expansion and contraction without damage to joints and hangers. Changes in direction shall be made with fittings, except that bending of pipe 100mm and smaller will be permitted provided a pipe bender is used and wide-sweep bends are formed. The centre line radius of bends shall not be less than 6 diameters of the pipe. Bent pipe showing kinks, wrinkles, flattening or other malformations will not be accepted. All piping shall be installed with sufficient pitch to ensure adequate drainage and venting. Piping connections to equipment shall be provided with unions or flanges. Open ends of pipelines or equipment shall be properly capped or plugged during installation to keep dirt and other foreign matters out of the system.

g) Screwed joints shall be made with tapered threads properly cut. Joints shall be made tight with a stiff mixture of lethargy and glycerine, or polytetrafluoroethylene (PTFE) tape, or approved thread joint compound applied to the male thread only. Not more than three threads shall show after the joint is made up. For steam piping do not use PTFE tape.

h) Welded joints shall be fusion welded by metal arc welding method unless otherwise required. Changes in direction of piping shall be made with welding fittings only. Metering or notching pipe to form elbows & tees or other similar construction will not be permitted. Branch connections shall be made with welding tees or forged welding tees or forged welding outlets.

Field and shop bevels shall be in accordance with the recognised standards and shall be done mechanically by means of flame cutting. Where bevelling is done by flame cutting, surfaces shall be clean of scale and oxidation prior to welding.

Before welding, the component parts to be welded shall be aligned so that no strain is placed on the weld when finally positioned. Height shall be so aligned that no part of the pipe wall is offset by more than 20% of the wall thickness. Flanges and branches shall be set true. This alignment shall be preserved during the welding operation.

Removing and replacing defective welds shall be at no additional cost to the Owner. Repairing of defective welds by adding new material over the defects or by peeling will not be permitted. Electrodes shall be stored in a dry heated area and shall be kept free of moisture or dampness during fabrication operations. Electrodes that have lost part of their coating shall be discarded.

i) Flanges and Unions shall be faced true. Flanges shall be provided with 1.6mm gasket of material suitable for specified usage, but shall not use asbestos, and made square and tight. Except where copper tubing is used, union or flange joints shall be provided in each line immediately preceding the connection to each piece of equipment such as coils, pumps, control valves & other similar items.

j) Solvent Welded Joints for uPVC Pipes: uPVC pipes shall be welded using solvent welding. Solvent used shall be specifically recommended by the pipe manufacturer. No alternative shall be acceptable. Prior to solvent welding the pipe and fitting shall be thoroughly cleaned, and then the solvent shall be applied. The joint shall be kept firm for the specified period as recommended by the manufacturer.

Pipe Supports:

A. All supports and anchors shall be installed in accordance with NFPA Standard.

B. Refer Section 21 05 29, Supports & Anchors for detailed specs.

Pressure Testing:

A. Fire Protection piping shall be hydrostatically tested at a pressure equal to 150% of the maximum operating pressure, but not less than 200psi (13.6 bars), for a period of time sufficient to inspect every joint in the system but in no case less than two hours. No loss of pressure will be allowed. Leaks found during tests shall be repaired by re-welding or replacing pipe or fittings. Caulking of joints will not be permitted. Concealed piping shall be tested in place before concealing. Tests shall be conducted in the presence of the Consultant or the Consultant's representative who shall be given 10 days notice before any test is to be conducted. All material, equipment or instruments required for tests shall be provided by the Contractor.

END OF SECTION 21 20 20

PORTABLE FIRE EXTINGUISHING EQUIPMENT

PART-1: GENERAL

1.8 Section Scope:

A. The contractor shall supply Portable Fire Extinguishers of the required capacity and performance as given in the attached EQUIPMENT DATA SHEET.

1.9 Submittals:

E. Tendering Stage Submittal

1. The tenderer shall indicate the equipment he intends to use and shall provide their source.

F. Construction Stage Submittal

1. The contractor shall provide complete details of all equipment to be used, and shall obtain Consultants approval.

1.10 Reference Standards:

A. NFPA 10: Standard for Portable Fire Extinguishers.

1.11 Quality Assurance:

A. Factory Test:

1. Each extinguisher shall undergo a series of standard factory tests to ensure that the unit is leak tight, and that every aspect of unit fabrication meets stringent quality standards in accordance with good practice and the manufacturer's quality assurance requirements.

2. All extinguishers shall be of suitable construction tested to at least 20 bars pressure.

1.12 Delivery, Storage, and Handling;

H. Unit shall be stored and handled in accordance with the manufacturer's recommendations.

I. Equipment shall be shipped with nameplates indicating name of manufacturer, and all other data.

PART-2: PRODUCTS

2.1 Portable Fire Extinguishers:

A. General

1. Specific type Portable Fire Extinguishers shall be installed at locations shown on the drawings.

2. Each shall have suitable anti-corrosive protection and shall have powder coated red finish with non-damaging instruction label.

3. Extinguishers shall be installed on purpose made hooks at a suitable height as approved by the Engineer.

4. The extinguishers shall be provided complete with initial charge. In each case provide refill kits where available, suitable for one recharging. The extinguishers shall be of the following types:

2.2 Dry Chemical Powder Fire Extinguishers:

A. Extinguisher shall conform to BS 3465 and shall contain Dry Chemical Powder in main body and carbon dioxide gas in external steel bottle, powder content as indicated in the BOQ.

2.3 Chemical Foam Fire Extinguishers:

A. Conforming to BS 740 (Part 1), having a capacity as indicated in the BOQ.

2.4 Carbon Dioxide Fire Extinguisher:

A. Complete with hose and horn, of capacity as indicated in the BOQ.

2.5 Trolley Chemical Foam Extinguisher:

A. Provide steel tubular frame trolley with 2 rubber tyres of 16 inch diameter, mounted with Chemical Foam extinguisher having a capacity of 150 litres (34 gallons).

B. Extinguisher main body shall be of 10 SWG M.S sheet, electrically welded and tested to 20 bars, and internally and externally powder coated.

C. Cap and other parts shall be of gun-metal. Provide a minimum length of 20ft (6.0m) long high pressure hose, with open and shut-off control cock and discharge nozzle.

2.6 Trolley Mounted Dry Chemical Powder:

A. Similar to Clause 'e' above, except Dry Chemical Powder Extinguishers having a capacity of 50kg.

2.7 Cabinet for Fire Extinguishers:

A. Where indicated on drawings, provide portable fire extinguishers in concrete recess, provided with red powder coated aluminium frame with hinged 5mm steel door.

B. Size of the cabinet shall be adequate for size & quantity of fire extinguishers to be placed. Cabinet shall be minimum 400mm deep.

C. Cabinet door shall be painted with the following caption "PORTABLE FIRE EXTINGUISHER, OPEN IN CASE OF FIRE". Universal logo showing portable fire extinguisher shall also be provided.

2.8 Fire Buckets:

A. Where shown on drawings provide Fire Bucket set each consisting of 8 Nos. provide 2 IGAL Galvanised Iron bucket, hung on ø 40mm G.I. pipe stand. The stand and buckets shall be painted with two coats of primer and two finish coat of red paint, and on each bucket the word "FIRE" shall be painted.

2.9 Fire Blanket:

A. Blanket shall be of size 900mm x 900mm minimum and shall be made of texturized woven glass Fibre. Blanket shall be provided in storage container of non-corrosive, rigid, self-extinguishing white PVC.

2.10 Fire Fighting Accessories:

A. The Contractor shall supply the following fire fighting accessories and shall store them at a suitable location indicated by the Employer.

1. 2 Nos. Crow bar.

2. 2 Nos. Fire Beater.
3. 2 Nos. Fire Hook.
4. 2 Nos. Fire man's axe with rubberised handle.
5. 3 Nos. Gas Masks, haled face, Model 'TRILLIX-II' 'AVER' brand West Germany with gas filter and 2 spare filter elements for each mask.
6. 3 Pairs gloves, asbestos, heat resistant, size 400mm.
7. 3 Pairs gloves, rubber suitable for 11000 volts.
8. 3 Pairs Boot Cover, asbestos with rubber boots.
9. 3 Nos. Steel Helmets.
10. 4 Nos. - 30m long, Ø 65mm imported fire hose, rubber lined with nylon top, fitted with couplings.
11. 4 Nos. - Ø 65mm London gun metal nozzle with hand controlled branch pipe for jet/spray.
12. Glass fronted steel cabinet to house above accessories.

END OF SECTION 21 21 10

FIRE PUMP SET, ELECTRIC & diesel engine
(HYDRANT/sprinkler APPLICATION)

PART-1: GENERAL

1.29 System Description

The water based Fire Suppression System is served by a Fire Pump sets consisting of a Diesel Engine driven Fire Pump, an Electric Motor operated at Fire Pump and a Jockey Pump with individual Controllers. The Fire Pumps are located in the Central Fire Pump Room at Ground Floor Level, and are provided with flooded suction. The EQUIPMENT DATA SHEET for the Fire Pumps is attached to this document.

1.30 Submittals

A. Tendering Stage Submittals

1. Tenderer shall submit the following documentation:

a) Equipment catalogue having specifications, selection data; equipment dimensions, etc.

b) Factory certified selection documentation.

c) Equipment Quality Assessment Form supplied by the Consultants, dully filled.

d) Statement of deviation from specifications.

B. Technical Approval Stage Submittals

1. Contractor shall submit the following documentation and obtain Consultants approval prior to ordering the equipment:

a) equipment catalogue;

b) Factory certified selection documentation.

c) Pump curves indicating NFPA 20 requirements.

d) controller diagram and information

e) crating information

f) shipment information;

g) Statement of conformance to specifications and deviation from specifications.

C. Construction Stage Submittals

1. Contractor shall submit the following documentation at appropriate times:

a) Certified dimensional drawings of the equipment.

b) Equipment Installation, Operation & Maintenance Manual.

c) Field Wiring Diagram.

d) Factory Performance Test Protocol & Report

e) Certificate of Origin

D. Close-Out Submittals

1. Contractor shall submit the following documentation at the closeout of the project:

a) Commissioning Reports, as per manufacturer's standard, duly signed by the commissioning engineer.

b) Commissioning Reports of the Consultant, duly signed by the commissioning engineer.

c) 5-Sets of operation & maintenance manual.

d) 5 sets of spare parts manual.

1.31 Quality Assurance

A. Standard & Regulatory Requirements.

1. Fire Pump Set shall be designed and constructed to operate satisfactorily in a typical fire protection application. Pump, motor, engine & controller shall be the products of manufacturers regularly engaged in their production and marketing. Fire pump set shall conform to the requirements of the latest edition of NFPA-20 (Standard for the installation of Centrifugal Fire Pumps).

2. The fire pump, driver, controller and all accessories shall all be furnished by the pump manufacturer. All components of Fire Pump set shall be listed by Underwriters' Laboratories, Inc. (UL) and approved by Factory Mutual Research Corp. (FM).

3. Each pump shall be furnished with a certified performance curve indicating pressure, capacity & horsepower requirements.

B. Testing at Manufacturers Works

1. The Fire Pumps & Controllers shall be subjected to testing at the manufacturer's works, to determine conformance to NFPA 20 requirements and FM approval standards. All test reports shall be supplied by the Manufacturer to the Employer.

C. Testing at Site

1. The Supplier shall carry out complete testing of the fire pump sets after the completion of installation and in accordance with manufacturer's recommendations and shall record the commissioning and testing of the fire pumps in the Testing and Commissioning Forms attached as annexure to these specifications.

2. As part of the testing Supplier shall plot the pump performance on the manufactures' certified pump test curves showing head capacity and brake horsepower of the pump, and shall prove conformance of operation to rated data.

3. The testing shall be done by activating the individual fire pumps in the same operating sequence that will be actually implemented.

1.32 Delivery, Storage, and Handling

A. Unit shall be stored and handled in accordance with the manufacturer's recommendations.

1.33 Warranty

A. Manufacturer shall guarantee all components of the fire pumps against defects in materials and/or workmanship for a period of 18 months from date of initial operation or 24 months from data of shipment, whichever occurs first, unless otherwise stated elsewhere in this document.

B. Manufacturer/ Supplier shall conform to the stipulations of Warranty & Guarantee as per relevant clauses given in the Conditions of Contract.

PART-2: PRODUCTS

Scope:

A. The Contractor shall supply Fire Pump Sets of the capacity indicated in EQUIPMENT DATA SHEETS, and as per these specifications. The fire pump, driver, controller and all accessories shall be furnished by the pump manufacturer.

B. Each of the above pump sets shall be factory installed on a suitable steel skid and tested in accordance with NFPA 20 standards, and an FM approval certificate obtained.

C. All steel surfaces shall be sand blasted and painted with two coats of primer and finish paint of fire red colour to BS 4800/04D45.

D. The fire pump unit, consisting of a pump, driver and controller shall perform in compliance with the NFPA 20 as an entire unit when installed or when components have been replaced.

Operating Conditions:

A. The pump(s) shall be of the type and size to provide a flow rate and total head as indicated in EQUIPMENT DATA SHEETS.

B. As per NFPA 20 – A.6.2 (2013), the fire pump shall deliver not less than 150% of the rated capacity at a pressure of not less than 65% of the rated head and the shut off head shall not exceed 140% of the rated head.

Horizontal Split Case Centrifugal Pumps for Fire Service:

A. Casing: shall be horizontally split, with centreline discharge, foot-supported and made of cast iron. Casings shall be provided with tapped and plugged holes for priming vent and drain.

B. Impeller: shall be the single section enclosed type of bronze. Impeller shall be statically and hydraulically balanced. Drilled holes shall be provided through the impeller hub to balance axial thrust loads and keep positive pressure on the stuffing box. Impeller shall be keyed & locked to the shaft with a hexagonal head impeller nut, and shall be easily removable without the use of special tools.

C. Shaft: Pump shaft shall be high strength stainless steel sized to provide a minimum amount of deflection.

D. Seal: Pumps shall be provided with pack gland seal.

E. Bearing Frame: shall be rigid, one-piece cast iron construction. Frame shall be provided with catch basin reservoir with tapped drain hole to collect and pipe away drip.

F. Bearings: shall be ball type on both ends of the frame. Both bearings shall be locked in place and be sized to provide 100,000 hours life under thrust loads encountered. Both the bearings shall be enclosed by replaceable box.

G. Bearing Lubrication: Ball bearings shall be grease lubricated with provisions for the addition and relief of grease.

H. Baseplate: shall be fabricated steel centre drain or cast iron drip lip sufficiently rigid to support the pump and the driving motor with tap hole to pipe away leakage and condensation.

I. Coupling: shall be spacer flexible type.

J. Coupling-Guard: shall be all metal and fastened to the base plate.

Jockey Pump:

A. Selection Data: The jockey pump shall be suitable for providing a flow rate and total head as indicated in EQUIPMENT DATA SHEETS.

B. Type: Pump shall be vertical multi-stage type with direct mounted motor, similar to Grundfos Model CP or approved equivalent.

C. Casing: Suction and delivery chambers shall be of cast iron, with diffusers of stainless steel.

1. Impellers :Stainless steel

2. Shaft : Stainless steel

3. Shaft-seal Mechanical

4. Bearings :Stainless steel

Diesel Engine & Accessories

A. The diesel engine shall be of the four stroke, compression ignition, mechanical injection type turbo-charged, water-cooled, capable of operating continuously on full load at site elevation for a period of six hours, and shall be sized to ensure non-overloading operation of the engine at any point of the pump operation curve.

B. Engines shall be provided with a governor capable of regulating engine speed within a range of 10% between shutoff and maximum load condition of the pump.The governor shall be field adjustable and set and secured to maintain rated pump speed at maximum pump load.

C. The engine shall accelerate to rated output speed within 20 seconds.

D. The engine shall be equipped with the following methods of starting:

1. Automatic by means of a pressure sensor through a battery powered electric starter motor.

2. Manually activated electric starter motor.

3. Manually cranked starting.

E. Each starting arrangement shall have its own separate relay system and set of batteries but the same starter motor shall be used for automatic or manual starting. The engine will continue to run until shut-off manually. The stop control shall be so arranged so that the engine shutdown mechanism returns automatically to the starting position after use.

F. The pump-engine connecting universal coupling shall be so designed that either the pump or engine can be removed without disturbing the other. All rotating parts shall be guarded.

G. Engine shall be complete with:

1. 24 volt electric starting equipment comprising:

a. starter motor

b. two sets of lead-acid batteries mounted on the base plate, each adequate for 12 cycles of cranking a cold engine at 4 C.

c. battery leads and connectors.

d. hydrometer, to enable the state of charge of the batteries to be determined.

e. two manual emergency start switches

f. alternator 24V

2. A fuel system comprising:

a) fuel tank of sufficient capacity to allow the engine to run on full load for 6 hours. This shall be fitted with sludge and sediment trap, special fuel level gauge and an inspection and cleaning hole. Fuel feed pipe valve with facility for locking in the 'open' position and interconnecting flexible fuel supply pipe shall be provided.

b) fuel pump with mechanical governor & over-speed switch

c) fuel solenoid actuator energised to stop

d) fuel and lubricating oil filters

3. An exhaust system comprising:

a) flanged exhaust silencer (residential duty)

b) flanged flexible exhaust connector (stainless steel)

c) mild steel exhaust pipe as required for appropriate exhaust outlet

d) protected exhaust manifold (insulated)

4. An engine cooling system comprising of the following:

a) cooling system with mounted heat exchanger & circulating pump

b) expansion tank

c) thermostat & piping

d) engine jacket heater 400V, 1kW with thermostat (if required)

5. Instrumentation:

a) instrument panel containing oil pressure gauge, water temperature gauge, tachometer, hour-meter and ammeter

b) all necessary switches for cooling water temperature high, lubricating oil pressure low, etc.

c) magnetic pick up for tacho drive

6. Miscellaneous

a) air-cleaner (duty as required)

b) SAE flywheel and housing

c) engine wiring to a terminal box

d) red paint finish to BS 4800/04D45

e) tool kit

f) spare parts list

7. Spares

Spares shall be supplied as per the recommendations of the manufacturer for three years of normal operation.

8. 5Copies of "Operation and Maintenance" manual shall be supplied with the fire pump set.

Electric Motor-Drive:

A. Motor shall be constant speed, 3 phase, squirrel-cage induction, totally enclosed fan cooled type, IP-55 with class F insulation with a maximum temperature rise of 80°C in an ambient temperature of 40°C and shall be specifically listed for fire pump service.

B. The motors shall operate on 400V, 3-phase, 50 Hertz AC system and shall be suitable for voltage variation of $\pm$10%.

C. Motor shall comply with rules of electrical machines as stated in VDE 0530/59, BS 2613, BS 4999 Part 141, Part 105 and EN 60034 Parts 5, 6 & 7 and NFPA-20.

D. Motor horsepower & locked rotor current shall be as per Table 9.5.1.1 of NFPA 20 (2013).

E. Motor shall be sized to ensure non-overloading operation of the motor at any point of the pump operation curve and be rated at least at 125% of rated shaft power, and be able to provide required output under site conditions, i.e. maximum ambient temperature of 120°F. (50°C) and altitude 1700 feet (518 meters).

Fire Pump Controllers

A. General for Controllers

1. Approvals

a) The Fire Pump Controller shall meet the requirements of the latest edition of NFPA 20 as well as meeting CE mark requirements. It shall be listed by Underwriters Laboratories (UL) and approved by Factory Mutual Research (FM) for fire pump service.

b) All internal components shall be front mounted and wired for ease of inspection and maintenance. All relays shall be of the plug-in type, complete with visual indication to show that the relays are

energized. The Controller shall include an LCD display to indicate voltage and amperes as well as system pressure, in PSI or Bars.

B. Diesel Engine Operated Fire Pump Controller:

1. Approvals

a) The controller shall be (12 volt/ 24 volt) negative ground, for use with Diesel Engine supplied by the Manufacturer.

2. Construction

a) All internal components shall be front mounted and wired for ease of inspection and maintenance. All relays shall be of the plug-in type, complete with visual indication to show that the relays are energized. The Controller shall include an LCD display to indicate battery voltage and amperes as well as system pressure, in PSI or Bars.

b) The Controller shall have twin battery chargers meeting NFPA 20 requirements. The battery chargers shall have reverse polarity protection/ indication and be capable of recharging a completely discharged battery within 24 hours. The chargers shall auto detect the input voltage of either 120V or 230VAC and shall be able to be programmed for either 12VDC or 24VDC output.

c) The controller shall come standard with a breaker disconnects on the AC line and for both battery connections.

3. Pressure Sensor

a) A solid-state 4-20mA pressure sensor shall be provided. The pressure Start and Stop points shall be adjustable in increments of one (1) PSI. A low pressure pre-alarm indicated with a flashing green LED shall denote a potential pump starting condition and will remain lit once the pump has started to indicate the starting cause.

4. Output Relays

a) Two (2) sets of alarm contacts (Form-C) rated at 8A, 230VAC/32VDC shall be provided for remote indication of:

i. Engine Run (10A)

ii. Low Fuel

iii. Auto Mode

iv. Common Alarm

b) Two (2) 'FUTURE' relays, each containing two sets of alarm contacts (Form-C) shall be provided. Relays can be factory set to indicate a specific alarm and shall be field programmable adjustable to meet future site requirements.

c) The Common Alarm relay shall be energized under normal conditions.

5. Enclosure

a) The Controller shall be housed in a NEMA Type 12 (IEC IP52) dust-tight powder baked finish, free-standing enclosure.

6. Microprocessor Controller

a) The following parameters shall be programmable and included as standard:

i. Start And Stop Psi Points

ii. High And Low Pressure Alarm Set Points

iii. Stop Mode: Manual Or Auto

iv. Run Period Timer: 0-60 Min

v. Ac Power Failure: Enable Or Disable

vi. Sequential Start Timer: 0-300 Sec

vii. Weekly Test Timer

viii. Pressure Deviation: 1-99 Psi

ix. Language: English

b) The following visual and audible alarms shall be provided:

- Fail To Start
- High Engine Temp.
- Low Oil Pressure
- Engine Run
- Engine Over Speed
- Low Fuel
- Battery #1 Failure
- Chgr #1 Failure
- Battery #2 Failure
- Chgr #2 Failure
- Remote Start
- Deluge Valve
- Low Pressure
- Interlock On
- Speed Switch Fault
- Low Suction
- Ecm Selector In Alt Position
- Fuel Injector Malfunction

- Starter #1 Failure
- Starter #2 Failure
- Transducer Failure
- Data Cable Disconnect
- Dc Fail

c) The controller shall have a 4 line by 40 character LCD display mounted on a panel opening in the front door. The LCD display shall indicate the following:

i. Main screen displaying system pressure. Battery # 1/#2 voltage and amperage, operation mode, shutdown mode, custom messages, alarms, timers, date, and time.

ii. Set point review screen displaying the programmed pressure start and stop points, and weekly test time.

iii. Controller statistics screen, including:

- Powered Time
- Engine Run Time
- Number of Calls to Start
- Number of Starts
- Last Engine Motor Start Time
- Last Engine Motor Run Time
- Last Low Pressure Start
- Minimum Battery #1 Voltage
- Maximum Battery #1 Voltage
- Minimum Battery #2 Voltage
- Maximum Battery #2 Voltage
- Minimum System Pressure
- Maximum System Pressure
- Last System Startup
- Last Engine Test
- Last Low Oil Pressure
- Last High Engine Temp
- Last Over speed
- Last Fail To Start

- Last Low Fuel
- Last Charger Failure
- Last Battery Failure
- Last ECM Alarm

iv. Controller diagnostics screen, including:

- Date & Time
- Firmware Version
- Shop Order Number
- Customer Order Number
- Battery Voltage
- Internal Board Voltage
- Transformer Output Voltage
- Current Transformer Outputs
- Pressure Transducer Calibrated Settings
- Input Status
- Relay Status

v. Display last messages screen that will display at least the last 10,000 alarms / messages stored in the controllers' memory.

vi. Display up to ten (10) custom messages of up to 100 characters each, which will continually scroll across the fourth line of the display.

vii. Remaining time left on active timers.

d) The controller shall be supplied with green status LED's for the following:

i. Engine Run

ii. Remote Start

iii. Low Pressure

iv. Interlock On

v. Deluge Valve

vi. Six Programmable LED's

e) The controller shall be supplied with red alarm LED's to indicate the following:

i. Battery #1 Failure

ii. Battery #2 Failure

iii. Charger #1 Failure

iv. Charger #2 Failure

v. Speed Switch Fault

vi. Ecm Selector In Alt Position

vii. Fuel Injection Malfunction

viii. Low Suction Pressure

ix. Fail To Start

x. High Engine Temp.

xi. Low Oil Pressure

xii. Engine Over Speed

xiii. Low Fuel

f) The microprocessor logic board shall be provided with:

i. A USB port for transference of message history, controller status, diagnostics, and statistics and the ability to update firmware.

ii. An Ethernet port for direct connection to a computer for data transfer.

iii. An RS485 Serial port for communication to various external software programs.

iv. An RS232 Serial Port

g) The controller shall provided complete with an embedded web page which allows viewing of the controllers' current status, data values, programmed set points, and downloadable history.

h) A Fail-to-Start alarm shall occur if the engine does not start after the crank cycle.

i) A sequential start timer, weekly test timer and AC Failure Start timer shall be provided as standard.

j) The controller shall be supplied with interlock and shutdown circuits as standard. A flashing green LED shall indicate an interlock on condition.

k) Where shutdown of the pump(s) due to low suction pressure is required, it shall be accomplished without the addition of a separate panel or enclosure. The LCD display shall indicate low suction shutdown. Resetting of the condition shall be automatic or manual as selected by the user.

l) Means shall be provided to test the operation of all LED’s to ensure their functionality.

7. Programming Menu

a) The programming menu shall have the ability to enable an entry password.

b) The programming menu shall be limited to two (2) levels of password protection.

c) The controller shall have English language as standard

d) The programming menu shall be grouped into 5 main menu headings as follows:

i. Regional Settings

ii. Pressure Settings

iii. Timer Values

iv. Input/output Menu

v. System Configuration (password protected)

8. Custom Inputs/Outputs

a) The controller shall come standard with ten (10) future inputs, six (6) future LED indicators, and two (2) future outputs, with the ability to add up to another 8 outputs via optional relay boards.

b) The user shall be able to program the future inputs/outputs and optional relays through the main programming menu.

c) The inputs shall be selectable based on the following criteria:

i. User selected message or twenty four (24) predetermined messages.

ii. Energize the common alarm relay when the input is received.

iii. Link to a future relay and/or LED indicator.

iv. Alarm latched until reset.

v. Normally open or closed input.

vi. On-delay timer.

vii. Energize the buzzer when the input is received.

d) The LED indicators shall be selectable based on the following criteria:

i. Indication based on a minimum of fourteen (14) predetermined alarms or a custom input.

e) The future relays shall be selectable based on the following criteria:

i. Output based on a minimum of forty (40) predetermined alarms, controller status or a custom input.

ii. Latched until reset.

iii. Energized under normal conditions.

iv. On or off delay timer on the output.

9. Manufacturer

a) The Controller shall be microprocessor based as manufactured by Eaton Corporation, or approved equivalent.

C. Electric Motor Operated Fire Pump Controller:

1. Approvals

a) The Fire Pump Controller shall meet the requirements of the latest edition of NFPA-20 and shall be listed by Underwriters Laboratories (UL) and approved by Factory Mutual Research (FM) and carry the CE marking for fire pump service.

2. Starting Type

a) The controller shall be of the combined manual and automatic type designed for star-delta closed transition starting.

3. Ratings

a) The Controller shall have a withstand rating of 100,000 RMS symmetrical amperes @ (400V).

4. Construction

a) The controller shall include a motor rated combination isolating switch and circuit breaker, mechanically interlocked and operated with a single externally mounted handle.

b) The isolating switch shall be rated to disconnect the motor load.

c) The isolating switch/circuit breaker combination shall be mechanically interlocked such that the enclosure door cannot be opened when the handle is in the ON position except by a tool operated defeater rnechanism.

d) The Controller manufacturer shall manufacture the contactor, isolating switch, circuit breaker, pushbuttons, and enclosures. Brand-labeled components will not be accepted.

5. Enclosure

a) The controller shall be housed in a NEMA Type 12 (IEC IP52) dust-tight, powder baked finish, frees-tanding enclosure.

6. Microprocessor Controller

a) The controller shall come complete with a 4 line by 40 character LCD display mounted on a panel opening in the front door The LCD display shall indicate the following:

i. Main screen displaying system pressure, three-phase voltage and amperage readings, system frequency date and time.

ii. Set point review screen displaying the programmed pressure start and stop points, and Weekly test time.

iii. Controller statistics screen, including

- Powered Time
- Motor Run Time
- Number of Calls to Start
- Number of Starts
- Last Motor Start Time
- Last Motor Run Time

- Last Low Pressure Start
- Minimum System Voltage
- Maximum System Voltage
- Minimum System Frequency
- Maximum System Frequency
- Minimum System Pressure
- Maximum System Pressure
- Last System Startup
- Last Phase Failure
- Last Phase Reversal
- Locked Rotor Trip
- Maximum Run Current
- Last Locked Rotor Current

iv. Controller diagnostics screen, including:

- Date & Time
- Firmware Version
- Shop Order Number
- Customer Order Number
- Transformer Output Voltage
- Current Transformer Outputs
- Pressure Transducer Calibrated Settings
- Input Status
- Output Status

v. Display last messages screen that will display up to 10,000 alarms/messages stored in the controller's memory.

vi. Display up to ten (10) custom messages of up to 100 characters each, which will continually scroll across the fourth line of the display.

vii. Remaining time left on active timers.

b) The controller shall be supplied with green Status LED's for the following:

i. Power On

ii. Pump Running

iii. Local Start

iv. Remote Start

v. Deluge Valve

vi. Emergency Start

vii. Interlock On

viii. Low Pressure

ix. Auto Shutdown Enabled

x. Programmable LED #1

c) The controller shall be supplied with ten (10) red alarm LED's to indicate the following:

i. Phase Reversal

ii. Phase Failure

iii. Fail to Start

iv. Under voltage

v. Overvoltage

vi. Low Room Temperature

vii. Locked Rotor Trip

viii. Low Suction Pressure

ix. Source 2 Disconnected

x. Programmable LED #2

d) The microprocessor logic board shall be provided with:

i. A USB port for transference of message history, controller status, diagnostics, and statistics and the ability to update firmware.

ii. An Ethernet port for direct connection to a computer for data transfer.

iii. A RS485 Serial port for communication to various external software programs.

e) The controller shall be available with an embedded web page to allow viewing of the controllers' current status, data values, programmed set points, and history.

f) A Fail-to-Start alarm shall occur if the motor controller sees less than 20% of the motor full load amps after an adjustable time delay of 1-90 seconds.

g) Locked rotor protection shall be provided. After a trip condition and restoration of power, the LCD display shall indicate "LOCKED ROTOR TRIP".

h) A sequential start timer and weekly test timer shall be provided as standard.

i) A restart time delay of two (2) seconds shall be provided to allow the residual voltage of the motor to decay prior to re-starting the motor. In the event that the pump motor continues to run after a request to stop, then the controller must display a fail to stop message to indicate this condition.

j) Overvoltage (5-20%) and under voltage (5-30%) sensing and alarming shall be provided as standard.

k) The controller shall be supplied with interlock and shutdown circuits as standard. A flashing green LED shall indicate an interlock on condition.

l) Where shutdown of the pump(s) due to low suction pressure is required, it shall be accomplished without the addition of a separate panel or enclosure. The LCD display shall indicate low suction shutdown. Resetting of the condition shall be automatic or manual as selected by the user.

m) Means shall be provided to test the operation of all LED's to ensure their functionality.

7. Programming Menu

a) The programming menu shall have the ability to enable an entry password.

b) The programming menu shall be limited to two (2) levels of password protection.

c) The controller shall have English as a standard language.

d) The programming menu shall be grouped into 6 main menu headings as follows:

i. Regional Settings

ii. Pressure Settings

iii. Timer Values

iv. Alarm Set points

v. Input/output Menu

vi. System Configuration (password protected)

8. Pressure Sensor

a) A solid-state 4-20mA pressure sensor shall be provided. The pressure Start and Stop points shall be adjustable in increments of one (1) PSI. A low pressure pre-alarm, indicated with a flashing green LED, shall denote a potential pump starting condition and will remain lit once the pump has started to indicate the starting cause.

9. Custom Inputs/Outputs

a) The controller shall come standard with nine (9) future inputs, two (2) future LED indicators, and one (1) future output, with the ability to add up to another 8 outputs via optional relay boards.

b) The user shall be able to program the future inputs/outputs through the main programming menu.

c) The inputs shall be selectable based on the following criteria:

i. User selected message or thirteen (13) predetermined messages.

ii. Energize the common alarm relay when the input is received.

iii. Link to a future relay and/or LED indicator.

iv. Alarm latched until reset.

v. Normally open or closed input.

vi. On-delay timer.

d) The LED indicators shall be selectable based on the following criteria:

i. Indication based on a minimum of twelve (12) predetermined alarms or a custom input.

e) The future relays shall be selectable based on the following criteria:

i. Output based on a minimum of twenty-seven (27) predetermined alarms, controller status or a custom input.

ii. Latched until reset.

iii. Energized under normal conditions.

iv. On or off delay timer on the output.

10. Alarm Relays

a) All relays shall be of the plug-in type. An LED on the relay panel shall indicate the energized state of the relay. All relay contacts shall be rated @ 8A, 277VAC/30VDC. Two (2) sets of Form-C contacts shall be provided for each of the following:

i. Phase Reversal

ii. Phase Failure

iii. Common Alarm

iv. Future #1

v. Pump Run.

b) The Common Alarm and Phase Failure relays shall be energized under normal conditions.

11. Audible Alarm Buzzer

a) An audible alarm buzzer, capable of being heard while the motor is operating, shall operate if Fail to Start, Hardware Malfunction or any Common Alarm condition exists.

12. Manufacturer

a) The controller shall be of the LMR Plus type as manufactured by Eaton Corporation or approved equivalent.

D. Jockey Pump Controller:

1. Approvals

a) The Jockey Pump Controller shall meet the requirements of UL 508 (Underwriters Laboratories UL).

2. Starting Type

a) The controller shall be across the line or Wye-Delta type designed for full voltage starting.

3. Ratings

a) The Controller shall have a minimum withstand Rating of 18, 000 symmetrical amperes @ 400V.

b) The horsepower rating of the controller shall not exceed 50Hp for three (3) phase units or 10Hp on single phase units.

4. Construction

a) The Controller shall include a combination Cram Breaker/Overload Motor Protector.

b) The circuit breaker shall be mechanically interlocked such that the enclosure door cannot be opened when the handle is in the ON position except by a tool operated defeater mechanism.

c) The controller manufacturer shall manufacture the contactor, circuit breaker, pushbuttons, and enclosures. Brand-labeled components will not be accepted.

5. Supply Voltage

a) The Jockey pump controller shall be suitable for 400V/3/50Hz.

6. Enclosure

a) The controller shall be housed in a NEMA Type 12 (IEC IP52) dust-tight, powder baked finish, freestanding enclosure.

7. Run Period Timer

a) An optional Run Period Timer shall be provided.

8. Languages

a) The controller shall have English language as standard.

9. Digital Indication

a) The controller shall be supplied with a digital display that shall indicate the following: System Pressure, Start Pressure, Stop Pressure.

b) The digital display shall be supplied with a solid-stale 4-20mA pressure sensor. The pressure Start and Stop points shall be adjustable in increments of one (1) PSI.

c) The digital display shall be a door-mount type that permits exterior programming with the controller door secured.

10. Options

a) The Jockey pump controller shall also be provided with the following:

i. Contacts for “Pump Run”

ii. Contacts for “AC Power Failure”

iii. “Power On” Light

iv. “Pump Run” Light

v. Low Suction Pressure Switch and Alarm Pilot Light

vi. Low Suction Shutdown

vii. Elapsed Run Time Meter

11. Manufacturer

a) The controller shall be as manufactured by EATON Corporation or approved equal.

Spares:

The Contractor shall supply spares for each of the fire pumps and Controllers suitable for 3 years of normal operation in accordance with the manufacturer's recommendations.

An "Operation and Maintenance" manual shall be supplied with the fire pump set.

Accessories:

a) The pump sets shall be furnished with:

i. Dia 8 inch Venturi Flow Meter

ii. Dia 6 inch Pilot Operated Relief Valve

iii. Dia 6 inch X 8 inch Waste cone

iv. Check valve on pump discharge

v. Automatic air release valve

vi. Compound pressure gage on suction, (-ive) 15 psi to 100 psi (Dial size 6"),

vii. Pressure gage on discharge; (Dial size 6") range approx. twice the working pressure, but not less than 300psi.

viii. Automatic Circulation relief valve, set below the shut-off pressure at minimum suction pressure. It shall provide sufficient flow to prevent the pump from overheating when operating with no discharge.

ix. Diesel Fuel system for Diesel Engine

x. Lead Acid batteries (Dry type) for Diesel Engine.

PART-3: EXECUTION

3.1 Foundation:

Foundations shall be constructed by Installation Contractor and are not covered in the scope of work of this Contractor.

3.2 Installation:

Installation of the fire pumps shall be carried out by Installation Contractor and are not covered in the scope of work of this Contractor.

This Contractor shall however provide periodical supervision services and ensure that the installation is being carried out in accordance with manufacturer's recommendations and requirements.

This Contractor shall also provide all assistance to the Installation Contractor to facilitate the installation of the Fire Pumps and Controllers.

3.3 Commissioning and Testing:

The Fire Pumps shall be commissioned and tested by this Contractor, in accordance with the manufacturer's recommendations.

The pump operational curve shall be identified by taking no-flow reading and shall be charted on the pump curve. Operational point at full flow shall be identified and submitted to the Consultant.

Tests shall be conducted and test reports submitted to the Consultant and approval obtained.

END OF SECTION 21 31 16

Specifications Of Civil Work & Fire Rated Doors

1.01 GENERAL

This Section establishes the general technical, administrative, quality, safety, and contractual requirements governing the execution of all civil, structural, architectural, demolition, fire protection, and associated works described within the Contract Documents. These requirements shall apply to every activity performed by the Contractor irrespective of whether the activity is specifically described elsewhere in the Specifications. The Contractor shall execute the Works in strict accordance with the Contract Drawings, Specifications, Bill of Quantities, approved Method Statements, approved Material Submittals, Engineer's Instructions, and all applicable statutory regulations. Where discrepancies exist between drawings, specifications, schedules, or other Contract Documents, the Contractor shall immediately notify the Engineer in writing before proceeding with the affected work. No additional payment or extension of time shall be considered for work executed without obtaining clarification where conflicts were evident.

The Contractor shall provide all labour, supervision, materials, plant, construction equipment, temporary works, transportation, tools, testing facilities, consumables, safety equipment, utilities, temporary services, protection measures, and all incidental items necessary for the proper execution and completion of the Works. The Contractor shall be solely responsible for coordinating all construction activities, sequencing the work efficiently, preventing interference between trades, maintaining continuous site operations, and ensuring that completed works remain protected until final handover. The Contractor shall continuously monitor workmanship, maintain compliance with approved quality procedures, and ensure that all personnel engaged on the project possess the necessary qualifications, competency, experience, and training appropriate to the work being undertaken.

1.02 SCOPE OF WORK

The Contractor shall undertake the complete execution of the project in accordance with the approved Contract Documents. The scope shall include, but shall not be limited to, demolition of existing structures where indicated, protection of existing facilities, concrete works, reinforcement installation, masonry construction, architectural finishes, fire stopping systems, fire-rated door installations, associated repair works, testing, commissioning, defect rectification, cleaning, and final completion of the Works. All activities shall be executed in a logical sequence that minimises

disruption to existing operations and ensures the safety of occupants, workers, visitors, and adjacent properties.

The Contractor shall thoroughly examine the Drawings, Specifications, BOQ, site conditions, utility layouts, existing structures, and project constraints before commencing work. Submission of a Tender shall constitute confirmation that the Contractor has satisfied himself regarding the nature and extent of the Works, accessibility of the Site, availability of construction materials, labour conditions, climatic conditions, groundwater conditions, existing services, and any other circumstances likely to affect the execution of the Contract. No claim arising from failure to inspect the Site or misunderstanding of site conditions shall be entertained after award of the Contract.

1.03 APPLICABLE CODES AND STANDARDS

All materials, workmanship, testing procedures, installation methods, and quality control activities shall comply with the latest editions of internationally recognised standards unless otherwise specified within the Contract Documents. The Contractor shall ensure full compliance with applicable ASTM International Standards, ACI Codes, BS EN Standards, ISO Standards, NFPA Codes, IBC Requirements, and local statutory regulations applicable to the project location. Where local regulations impose more stringent requirements than international standards, the more stringent requirement shall govern.

The Contractor shall maintain current editions of all referenced standards on Site throughout the Contract Period and shall make them available for inspection by the Engineer whenever requested. Materials manufactured in accordance with equivalent international standards may only be accepted following written approval from the Engineer together with documentary evidence demonstrating technical equivalence. Any revision of standards issued after commencement of the Contract shall only be implemented where instructed by the Engineer.

1.04 QUALITY ASSURANCE

The Contractor shall establish and implement a comprehensive Quality Assurance System covering every stage of procurement, material delivery, storage, installation, inspection, testing, documentation, and final acceptance of the Works. The Quality Management System shall be consistent with the principles of ISO 9001 or an equivalent recognised quality management framework. The Contractor shall appoint a qualified Quality Control Engineer responsible for implementing inspection procedures, maintaining quality records, coordinating laboratory testing, preparing inspection requests, and ensuring that non-conforming work is promptly identified and corrected.

No permanent work shall commence until all relevant shop drawings, material submittals, method statements, inspection and test plans, risk assessments, and quality documentation have been reviewed and approved by the Engineer. All inspections shall be documented using approved inspection forms. Any work covered or concealed before inspection and approval shall, upon instruction by the Engineer, be uncovered at the Contractor's expense for examination and reinstated without additional cost to the Employer.

1.05 CONTRACTOR'S RESPONSIBILITIES

The Contractor shall have full responsibility for planning, coordinating, supervising, and executing all construction activities necessary for completion of the Works. This responsibility shall include procurement of approved materials, mobilisation of qualified personnel, provision of construction plant, maintenance of temporary works, protection of completed works, coordination with utility authorities, implementation of safety procedures, environmental protection measures, traffic management where required, and compliance with all statutory approvals and permits.

The Contractor shall continuously supervise all work through competent Site Engineers, Supervisors, Surveyors, Safety Officers, Quality Control Engineers, and skilled tradesmen. Adequate supervision shall be maintained throughout working hours to ensure that workmanship complies with the Contract Specifications. Any defective work identified during construction or within the Defects Liability Period shall be repaired, replaced, or reconstructed entirely at the Contractor's expense to the satisfaction of the Engineer.

SECTION 02 – DEMOLITION WORKS

2.01 General

The work covered under this Section shall comprise the complete demolition, dismantling, removal, disposal, protection, temporary support, reinstatement, cleaning, and making good of all existing structures, finishes, utilities, fixtures, fittings, equipment, and associated construction elements indicated on the Contract Drawings or instructed by the Engineer. Demolition shall be executed in a carefully planned, controlled, and systematic manner to ensure the safety of personnel, protection of adjacent structures, continuity of existing services, and preservation of elements designated to remain. The Contractor shall carry out all demolition works in accordance with the approved demolition methodology, risk assessment, method statement, permit-to-work system, and relevant statutory regulations. The Contractor shall ensure that demolition activities do not adversely affect the structural stability of the remaining building or surrounding facilities and shall immediately suspend operations if any unsafe condition is observed.

Before commencing demolition, the Contractor shall undertake a comprehensive survey of the existing structure and document its condition through photographs, videos, sketches, and written records. Existing cracks, settlement, deformation, corrosion, or defects shall be recorded and submitted to the Engineer for verification. Any damage caused by demolition activities to adjacent structures, utilities, pavements, finishes, or services shall be repaired by the Contractor at his own expense to the satisfaction of the Engineer.

2.02 Demolition Methodology

Demolition operations shall be performed using methods appropriate to the nature, size, and condition of the structure being demolished. The Contractor shall prepare a detailed Demolition Method Statement describing the sequence of demolition, equipment to be used, temporary support arrangements, debris handling procedures, dust suppression measures, noise control methods, emergency response procedures, and environmental protection measures. No demolition work shall commence until the Method Statement has been reviewed and approved by the Engineer.

Mechanical demolition equipment shall only be used where adequate working space exists and where its operation will not induce excessive vibration or damage adjacent structures. Structural concrete requiring partial removal shall be demolished using controlled methods such as diamond saw cutting, wire sawing, hydraulic bursting, or diamond core drilling where specified. Impact hammers shall not be used on structural elements unless specifically approved by the Engineer.

2.03 Protection of Existing Structures

Throughout the execution of demolition works, the Contractor shall provide all necessary temporary protection measures to safeguard existing buildings, utilities, services, finishes, landscaping, roadways, footpaths, and structures designated to remain. Temporary barriers, protective plywood sheets, debris netting, scaffold screens, temporary partitions, dust curtains, protective coverings, and impact-resistant shields shall be installed wherever required. The Contractor shall continuously monitor the effectiveness of these protection measures and maintain them in satisfactory condition until completion of the Works.

Where demolition is undertaken adjacent to occupied buildings, particular care shall be exercised to minimise dust, vibration, noise, and falling debris. Construction activities shall be scheduled to minimise disruption to building occupants and ongoing operations.

2.04 Dust, Noise and Environmental Control

The Contractor shall implement effective environmental protection measures throughout demolition activities. Dust generated during demolition shall be continuously controlled through water misting, atomised spray systems, or equivalent approved methods sufficient to prevent airborne dust from migrating beyond the site boundaries. Dust suppression shall be maintained during debris loading, transportation, stockpiling, and disposal operations.

Noise levels generated by demolition equipment shall comply with applicable environmental regulations and local authority requirements. Construction equipment shall be properly maintained to minimise excessive noise emissions. Operations producing high noise levels shall be restricted to approved working hours unless otherwise authorised by the Employer.

Waste materials shall be segregated into recyclable materials, hazardous waste, inert waste, concrete rubble, steel reinforcement, timber, plastics, gypsum, and general construction debris. Disposal shall only be carried out at government-approved disposal facilities, and disposal records shall be maintained for inspection.

SECTION 03 – CONCRETE WORKS

3.01 General

This Section covers the supply, manufacture, transportation, placement, finishing, curing, protection, testing, repair, and quality control of all cast-in-place reinforced concrete, plain concrete, blinding concrete, non-shrink grout, repair mortar, and associated works required for the Project. Concrete shall be produced, transported, and placed in accordance with the Contract Documents and the latest editions of ACI 301, ACI 318, ASTM Standards, BS EN 206, and other applicable international standards. All concrete shall achieve the specified compressive strength, durability, workability, permeability, and dimensional tolerances required by the design.

The Contractor shall employ experienced personnel for batching, placing, compacting, finishing, and curing operations. Concrete shall be placed continuously to avoid cold joints and shall not be

deposited in a manner that causes segregation, excessive bleeding, or displacement of reinforcement. The Contractor shall provide adequate standby equipment to ensure uninterrupted placement during major pours.

3.02 Materials

Cement shall be Ordinary Portland Cement or Sulphate Resistant Cement, as specified in the Contract Documents, and shall comply with the applicable ASTM or BS EN Standards. Cement shall be supplied in sealed bags or bulk containers and stored under dry, weatherproof conditions on raised platforms to prevent moisture ingress. Cement showing signs of hydration, caking, contamination, or deterioration shall not be incorporated into the Works.

Fine aggregates shall consist of clean, durable, well-graded natural sand free from clay, silt, organic matter, salts, or other deleterious substances. Coarse aggregates shall comprise crushed hard stone of approved quality, properly graded to achieve the specified concrete performance. Aggregate stockpiles shall be separated by size and maintained to prevent contamination and segregation.

Water used for mixing, curing, and washing shall be clean, potable quality, and free from harmful concentrations of chlorides, sulphates, oils, acids, alkalis, or organic impurities. Water obtained from non-potable sources shall be laboratory tested and approved by the Engineer prior to use.

Chemical admixtures shall only be used where approved by the Engineer and shall comply with ASTM C494. Admixtures shall be compatible with the selected cement and shall not contain chlorides unless specifically permitted by the Engineer.

3.03 Reinforcement

Reinforcing steel shall comply with the specified grade indicated on the Contract Drawings and shall conform to applicable ASTM A615, ASTM A706, BS 4449, or equivalent recognised standards. Reinforcement shall be clean, free from loose rust, oil, grease, paint, mud, mill scale, or any substance that may impair bond with concrete. Bent or damaged reinforcement shall not be straightened by heating unless specifically approved by the Engineer.

Reinforcement shall be accurately positioned in accordance with the approved Bar Bending Schedule and securely tied using annealed binding wire to maintain its correct position during concrete placement. Adequate concrete cover shall be maintained through the use of approved concrete cover blocks, spacers, chairs, and support systems. Plastic bricks, timber blocks, broken masonry pieces, or other unsuitable materials shall not be used for supporting reinforcement.

SECTION 07 – FIRE STOPPING

7.01 General

Fire stopping systems shall be installed to maintain the integrity and fire-resistance rating of fire-rated walls, floors, shafts, partitions, and structural assemblies where penetrated by mechanical, electrical, plumbing, fire protection, communication, or other building services. The objective of fire stopping is to prevent the passage of flames, smoke, hot gases, and heat through penetrations and joints during a fire, thereby maintaining compartmentation and allowing occupants sufficient time for safe evacuation.

All fire stopping products shall be supplied by a single approved manufacturer and shall be installed strictly in accordance with the tested and certified installation details. Products shall possess independent third-party fire resistance certification demonstrating compliance with ASTM E814, UL 1479, BS EN 1366, or equivalent internationally recognised standards.

SECTION 08 – FIRE RATED DOORS

8.01 General

All fire-rated door assemblies shall provide a minimum 120-minute (2-hour) fire resistance rating and shall form an integral component of the building's passive fire protection system. Door assemblies shall be designed, manufactured, factory-finished, supplied, installed, adjusted, tested, and commissioned to maintain the fire compartmentation and life safety requirements indicated on the Contract Drawings and in accordance with the applicable building and fire codes.

Each fire-rated door assembly shall consist of a complete tested and certified system, including but not limited to the door leaf, door frame, glazing (where specified), vision panels, fire-rated glass, hinges, locks, latches, panic hardware (where required), door closers, coordinators (for double-leaf doors), smoke seals, intumescent seals, threshold assemblies, astragals, gasketing, fixings, anchors, and all accessories necessary to achieve the specified 120-minute fire resistance rating. No component shall adversely affect the certified fire performance of the complete assembly.

The complete door assembly shall be tested and certified by an internationally accredited third-party testing and certification body. Fire performance shall be demonstrated by valid certification in accordance with one or more of the following recognised standards:

- NFPA 80 – Standard for Fire Doors and Other Opening Protectives.
- NFPA 101 – Life Safety Code.
- NFPA 252 – Standard Methods of Fire Tests of Door Assemblies.
- UL 10B – Fire Tests of Door Assemblies.
- UL 10C – Positive Pressure Fire Tests of Door Assemblies.
- ASTM E2074 – Standard Test Method for Fire Tests of Door Assemblies.
- ASTM E152 (where applicable).
- BS 476 Part 22, EN 1634-1, or equivalent internationally recognised fire testing standards, where accepted by the Engineer.

Fire-rated door assemblies shall be supplied with UL Listing, Intertek (Warnock Hersey), FM Approval, Certifire, or equivalent internationally recognised certification, demonstrating compliance with the specified 2-hour fire resistance rating. Certification labels shall be permanently affixed to both the door leaf and frame and shall remain visible after installation. All certification documents, test reports, listing certificates, installation instructions, and maintenance manuals shall be submitted to the Engineer for review and approval prior to procurement and installation.

Individual components from different manufacturers shall not be incorporated into a fire-rated door assembly unless such components have been specifically tested and certified together as part of the same listed assembly. Substitution of hardware, glazing, seals, or accessories shall only be permitted

where supported by written evidence from the certification agency confirming that the revised configuration maintains the required 120-minute fire rating.

Where smoke control is required, door assemblies shall also comply with NFPA 105 – Standard for Smoke Door Assemblies and Other Opening Protectives, and shall incorporate factory-installed smoke seals and perimeter gasketing tested for smoke and air leakage. Intumescent seals shall be factory fitted around the perimeter of the door or frame and shall be compatible with the certified fire door assembly.

Installation shall be carried out strictly in accordance with the manufacturer's listed installation instructions, NFPA 80, approved shop drawings, and the requirements of the Authority Having Jurisdiction (AHJ). Any field modifications, drilling, cutting, or alteration of certified fire-rated doors or frames shall be prohibited unless specifically permitted by the certification listing and approved by the Engineer.

Upon completion, all fire-rated doors shall be inspected, adjusted, function-tested, and commissioned to verify proper operation, self-closing performance, positive latching, seal continuity, hardware operation, and compliance with the applicable NFPA requirements. The Contractor shall provide all certification records, inspection reports, operation and maintenance manuals, warranties, and as-built documentation prior to final acceptance.

SECTION 09 – ARCHITECTURAL WORKS

9.01 General

Architectural works shall include all internal and external finishes necessary to complete the Project, including masonry construction, plastering, screeding, ceramic tiling, granite, marble, painting, waterproofing, gypsum board systems, suspended ceilings, aluminium works, glazing, sealants, joinery, metal works, doors, windows, and all associated accessories. The Contractor shall execute these works using skilled craftsmen experienced in architectural finishing to achieve the quality, appearance, durability, and dimensional accuracy specified in the Contract Documents.

All architectural materials shall be new, of first-class quality, free from defects, and obtained from approved manufacturers. Samples of every material, finish, colour, texture, and profile shall be submitted to the Engineer for approval before procurement. Approved samples shall remain on Site as the reference standard for workmanship and quality throughout the duration of the Project. Finished surfaces shall be true, level, plumb, free from cracks, stains, chips, waviness, hollow areas, colour variation, and other defects that may affect appearance or performance.

END OF SECTIONS

STATE LIFE BUILDING NO.11

FIRE PROTECTION SYSTEM DRAWINGS

TENDER DRAWING

CLIENT:

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus
Consulting

FIRE FIGHTING GENERAL NOTES:–

1. ALL DIMENSIONS ON DRAWINGS ARE IN FEET & INCHES UNLESS OTHERWISE NOTED.
2. SWAY BRACING ON FIRE SPRINKLER SYSTEM PIPING SHALL ALSO BE PROVIDED IN ACCORDANCE WITH LATEST EDITION OF NFPA–13. HOWEVER IN ANY CASE THE MAXIMUM SPACING BETWEEN TWO LATERAL SHALL BE 12.2M (40FT) AND THE MAXIMUM SPACING BETWEEN TWO LONGITUDINAL BRACES SHALL BE BRACES 24.4M (80FT).
3. THE CONTRACTOR SHALL COMPLY WITH THE CURRENT NFPA STANDARDS (*OR RELEVANT B.S) WITH RESPECT TO ANY MATERIALS OR WORK NOT SPECIFIED IN DETAIL IN THE CONSULTANT'S SPECIFICATIONS OR DRAWINGS.
4. MISCELLANEOUS DETAILS GIVEN IN TENDER DRAWINGS SHALL BE STRICTLY FOLLOWED FOR RELEVANT APPLICATION. INDICATION OF DETAIL DRAWING REFERENCE NUMBER ON OTHER DRAWINGS IS NOT ESSENTIAL.
5. MAKING ALL OPENINGS IN PRE–ENGINEERED BUILDING, MASONRY AND CONCRETE SHALL BE THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR. ALSO PROVIDING SLEEVES AND DRAWINGS FOR EXACT LOCATION SHALL BE THE RESPONSIBILITY OF THIS CONTRACTOR.
6. THE DESIGN, CONSTRUCTION AND TESTING OF THE FIRE PROTECTION SYSTEM ARE IN ACCORDANCE WITH ALL THE LATEST RELEVANT CODES/STANDARDS OF THE NATIONAL FIRE PROTECTION ASSOCIATION (NFPA), INCLUDING BUT NOT LIMITED TO;
   a) NFPA 13 (or 13R) & 14 : FOR FIRE FIGHTING SYSTEM
   b) NFPA 20 & 22 : FOR CENTRIFUGAL FIRE PUMPS
   c) NFPA 14 & 10 : FOR FIRE HOSE CABINET & FIRE EXTINGUISHER
7. (UNLESS OTHERWISE DETAILED) THE CONTRACTOR SHALL SUBMIT BEFORE CONSTRUCTION, COMPLETE WORK SHOP DRAWINGS (PLANS & SECTIONS ... ETC.) SHOWINGS ALL NECESSARY OPENINGS IN CONCRETE STRUCTURES (TO ACCOMMODATE THE MECHANICAL, ELECTRICAL, SANITARY, FIRE SAFETY & OTHER EQUIREMENTS) FOR THE ENGINEER'S APPROVAL.
8. THE FIRE PROTECTION SYSTEM DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE CORRESPONDING ARCHITECTURAL, MECHANICAL, ELECTRICAL, SANITARY AND STRUCTURAL DRAWINGS. ANY DISCREPANCY SHALL BE BROUGHT TO THE CONSULTANT ENGINEER'S ATTENTION PRIOR TO CONSTRUCTION.
9. ALL EQUIPMENT AND DEVICES SHALL BE UL/ FM APPROVED
10. ALL SUPPORTS FOR PIPING SHALL BE FULLY HOT DIPPED GALVANISED.
11. ALL RISER TO HAVE DRAIN OUT CONNECTIONS AT LOW POINTS ALL PIPING AT LOWEST LEVELS TO BE PITCHED TOWARDS RISER.
12. SLEEVES FOR DRAINAGE PIPES ...ETC. OPENINGS TO BE PLACED BEFORE CASTING CONCRETE. THESE SLEEVES TO FIT THE PIPES SIZES WITH SUITABLE TOLERANCE.
13. ALL SUPERVISORY SWITCHES, PRESSURE SWITCHES, ZONE CONTROL VALVE ASSEMBLIES ARE OF THE ADDRESSABLE TYPE LINKED TO THE MAIN FIRE ALARM CONTROL PANEL (FACP).
14. FIRE PROTECTION SYSTEM & PIPING SHALL BE INSTALLED IN ACCORDANCE WITH LATEST EDITION OF NFPA–1
15. FIRE PROTECTION SYSTEM IS BASED ON CLASS–II HOSE PIPE AND STAND SYSTEM AS PER NFPA 14.
16. BURIED PIPING SHALL BE uPVC CLASS D SOLVENT CEMENT JOINT.
17. ABOVE GROUND PIPING SHALL BE BLACK STEEL SCHEDULE–40.
18. ALL BLACK STEEL PIPING OF DIAMETER ≤ 2 INCH SHALL BE THREADED.
19. DATA OF ELECTRICAL RATING EQUIPMENT IS INDICATIVE ONLY AND ALL ELECTRICAL WORK, VARIABLE FREQUENCY DRIVES AND MCC's SHALL MEET THE REQUIREMENTS OF FINALLY SELECTED EQUIPMENT AS PER SPECIFICATIONS.
20. ALL DIMENSIONS ON DRAWINGS ARE IN MILLI–METER (mm) UNLESS OTHERWISE NOTED.

PLAN LEGEND

SYMBOL	DESCRIPTION
	IDENTIFICATION NUMBER, SCHEDULED OR DETAILED
	FIRE WATER PIPE
	FLUE DUCT
	OS & Y VALVE
	BATTERY SET
FP	PUMP CONTROLLER
	PRESSURE RELIEF VALVE
	CHECK VALVE
	WASTE CONE WITH SIGHT GLASS
	FLOW METER
	SUCTION GAUGE
	BALL VALVE
	GATE VALVE
	SILENCER
	DIESEL ENGINE OPERATED PUMP
	ELECTRIC MOTOR OPERATED PUMP
	ELECTRIC MOTOR OPERATED JOCKEY PUMP
	PENDENT CONCEALED SPRINKLER
	UPRIGHT SPRINKLER
	REDUCER
ZCV	ZONE CONTROL VALVE
	FIRE BRIGADE CONNECTION
	FIRE HOSE REEL
	LANDING VALVE
	CO2 EXTINGUISHER
	DRY CHEMICAL EXTINGUISHER
	AUTOMATIC CO2 EXTINGUISHER TANK
	DOYMA SLEEVE
	STRAINER
FHC	FIRE HOSE CABINET
	FIRE HYDRANT (WALL MOUNTED)

LIST OF DRAWINGS

S. NO.	DWG. NO.	DRAWING TITLE	SCALE
01	FP–00	TITLE SHEET	N.T.S
02	FP–01	LIST OF DRAWING, NOTES & LEGENDS	N.T.S
03	FP–02	STANDARD DETAILS	N.T.S
04	FP–03	SCHEMATIC DIAGRAM AT FIRE PROTECTION SYSTEM	N.T.S
05	FP–04	FIRE PROTECTION SYSTEM AT LOWER BASEMENT	1/8" = 1'–0"
06	FP–05	FIRE PROTECTION SYSTEM AT UPPER BASMEENT	1/8" = 1'–0"
07	FP–06	FIRE PROTECTION SYSTEM AT GROUND FLOOR	1/8" = 1'–0"
08	FP–07	FIRE PROTECTION SYSTEM AT MEZZANINE FLOOR	1/8" = 1'–0"
09	FP–08	FIRE PROTECTION SYSTEM AT 2ND FLOOR	1/8" = 1'–0"
10	FP–09	FIRE PROTECTION SYSTEM AT 3RD FLOOR	1/8" = 1'–0"
11	FP–10	FIRE PROTECTION SYSTEM AT 4TH FLOOR	1/8" = 1'–0"
12	FP–11	FIRE PROTECTION SYSTEM AT 5TH FLOOR	1/8" = 1'–0"
13	FP–12	FIRE PROTECTION SYSTEM AT 6TH FLOOR	1/8" = 1'–0"
14	FP–13	FIRE PROTECTION SYSTEM AT 7TH FLOOR	1/8" = 1'–0"
15	FP–14	FIRE PROTECTION SYSTEM AT 8TH FLOOR	1/8" = 1'–0"
16	FP–15	FIRE PROTECTION SYSTEM AT 9TH FLOOR	1/8" = 1'–0"
17	FP–16	FIRE PROTECTION SYSTEM AT 10TH FLOOR	1/8" = 1'–0"
18	FP–17	FIRE PROTECTION SYSTEM AT 11TH FLOOR	1/8" = 1'–0"
19	FP–18	FIRE PROTECTION SYSTEM AT 12TH FLOOR	1/8" = 1'–0"
20	FP–19	FIRE PROTECTION SYSTEM AT 13TH FLOOR	1/8" = 1'–0"

CLIENT:-
STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

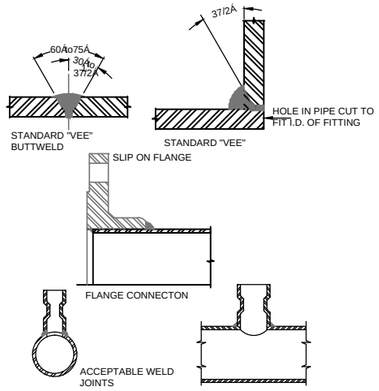
CONSULTANT:
Nexus Consulting
Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsultingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-
STATE LIFE BUILDING NO.11

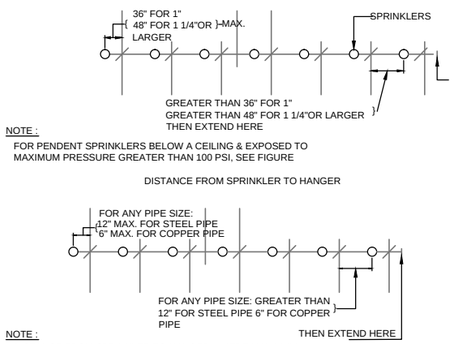
TITLE:-
LIST OF DRAWING, NOTES & LEGENDS

REV #	DATE	DESCRIPTION	CHK'D	APP'D
00	02-07-2026	ISSUED FOR TENDER		

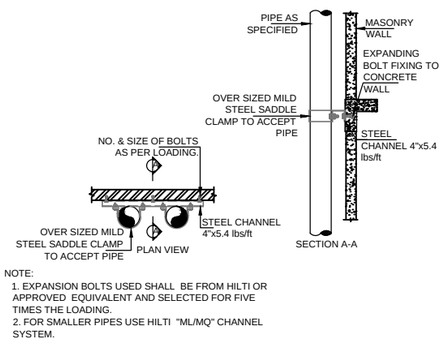
Project Ref: .
DATE: JUNE.2026
DRAWN BY: A-A
SCALE: 1/8" = 1'-0"
CHECKED BY: W-S
DWG. NO.: FP-01



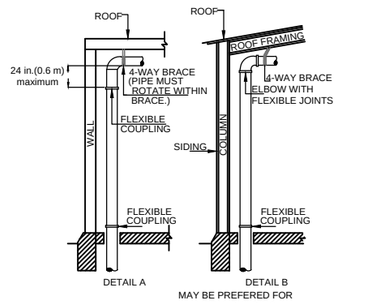
ACCEPTABLE WELD JOINTS



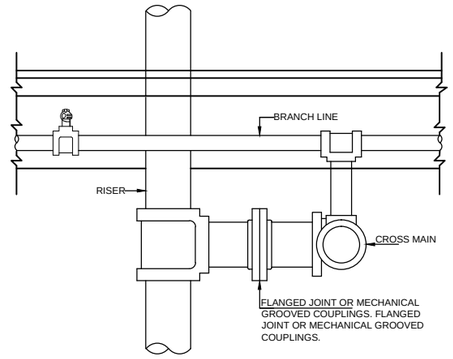
DISTANCE FROM SPRINKLER TO HANGER



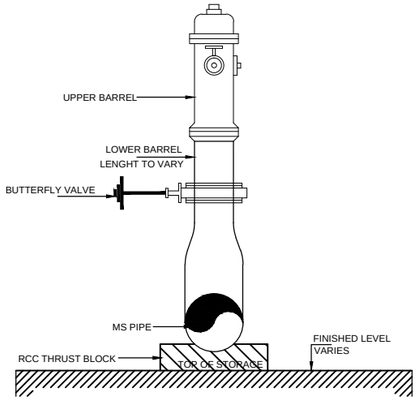
TYPICAL SUPPORT FOR VERTICAL PIPING RISER FOR PIPES



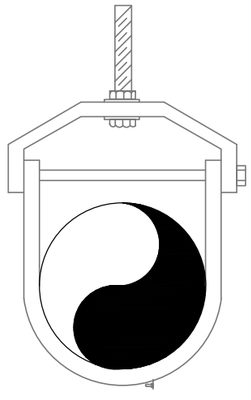
RISER DETAIL



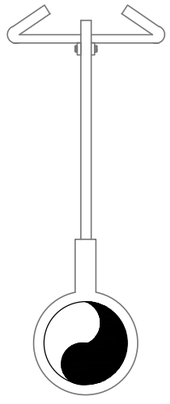
ARRANGEMENT OF FLANGED JOINT AT SPRINKLER RISER



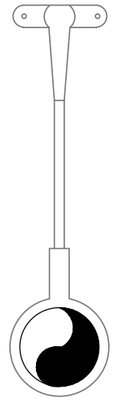
TYPICAL PILLAR HYDRANT DETAIL (FOR MAIN PIPE ABOVE FLOOR)



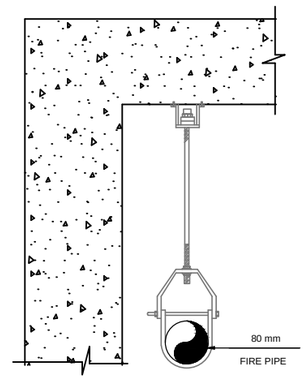
CLEVIS HANGER



ADJUSTABLE COACH SCREW CLIP FOR BRANCH LINE



ADJUSTABLE CLIP FOR BRANCH LINES



CLEVIS SUPPORT FOR PIPES RUNNING ALONG CEILING OF MEZZANINE /FIRST FLOOR

CLIENT:- STATE LIFE INSURANCE CORPORATION OF PAKISTAN

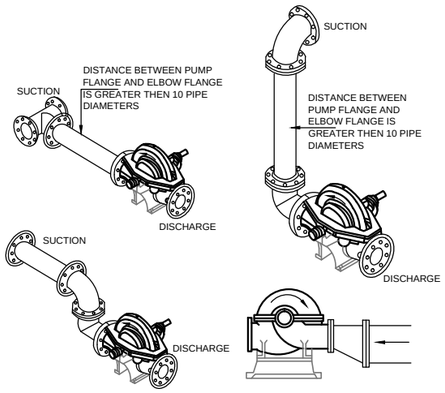
CONSULTANT: Nexus Consulting
Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsultingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:- STATE LIFE BUILDING NO.11

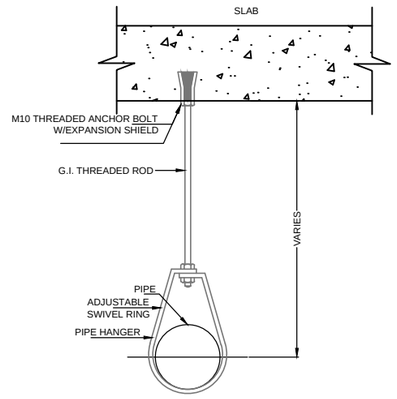
TITLE:- STANDARD DETAILS

REV #	DATE	DESCRIPTION	CHK'D	APP'D
00	02-07-2026	ISSUED FOR TENDER		

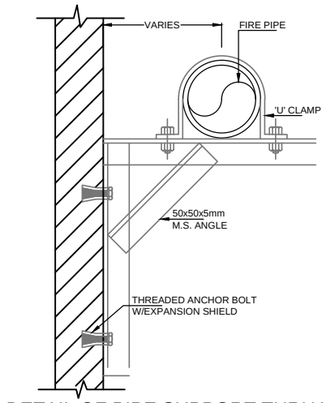
Project Ref: .
DATE: JUNE.2026
DRAWN BY: A-A
SCALE: 1/8" = 1'-0"
CHECKED BY: W-S
DWG. NO.: FP-02A



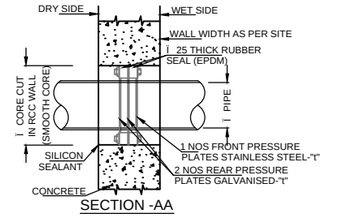
ACCEPTABLE PUMP SUCTIONS ARRANGEMENT



DETAIL OF PIPE HANGER



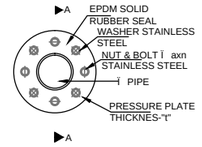
DETAIL OF PIPE SUPPORT THRU WALL



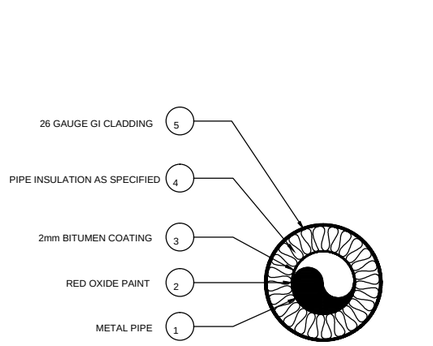
SECTION -AA

PIPE	CORE CUT IN RCC WALL	BOLT a	NO OF BOLTS n	t
	mm	mm	mm	mm
50	150	13	6	12
65	150	13	6	12
80	150	13	6	12
100	200	13	6	12
125	200	13	6	12
150	250	13	6	12
200	300	13	8	20

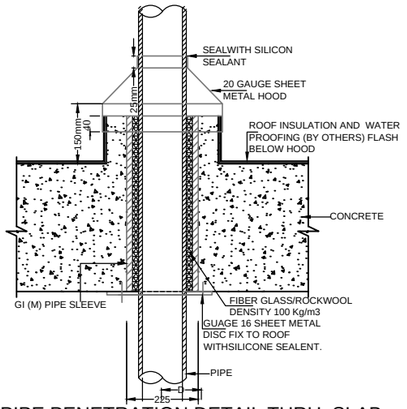
NOTES:
* PRESSURE PLATE & RUBBER SEALS BY UNITED ENGINEERING.



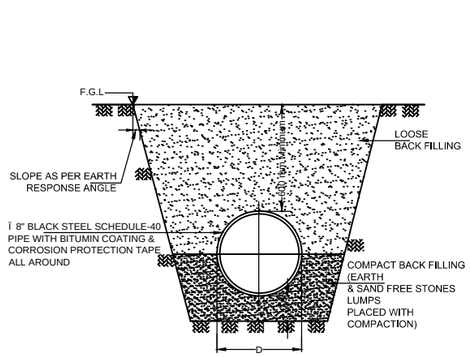
DOYMA SLEEVE DETAIL



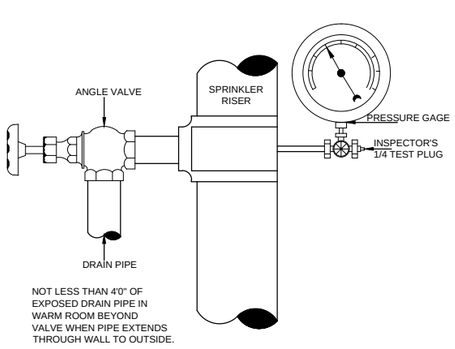
BURIED INSULATED PIPE INSTALLATION DETAIL



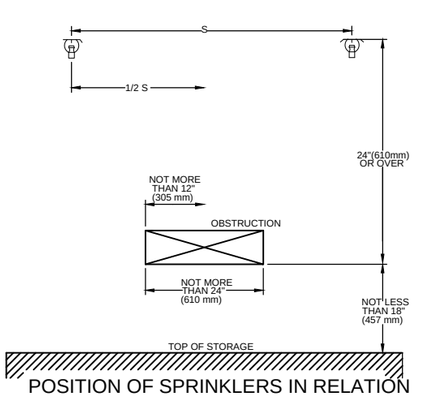
PIPE PENETRATION DETAIL THRU SLAB



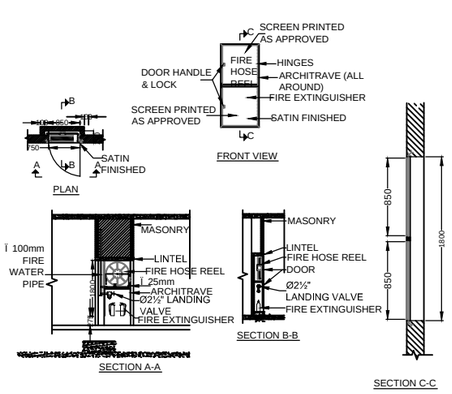
TYPICAL DETAIL FOR PIPE TRENCH



DRAIN CONNECTION FOR SYSTEM RISER



POSITION OF SPRINKLERS IN RELATION TO OBSTRUCTION LOCATED 24 N.(610mm)OR MORE BELOW DEFLECTORS



DETAIL FOR FIRE HOSE REEL CABINET WITH LANDING VALVE

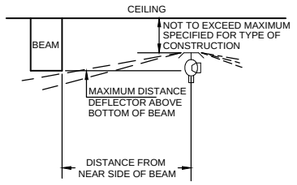
CLIENT:- STATE LIFE INSURANCE CORPORATION OF PAKISTAN	CONSULTANT: Nexus Consulting Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan Phone:021-37240670 Email:nexusconsulttingcompany@gmail.com Web:www.Nexuscon.pk	PROJECT:- STATE LIFE BUILDING NO.11	TITLE:- STANDARD DETAILS	REV #	DATE	DESCRIPTION	CHK'D	APP'D
				00	02-07-2026	ISSUED FOR TENDER		

Project Ref: .	DATE JUNE.2026
DRAWN BY A-A	SCALE 1/8" = 1'-0"
CHECKED BY W-S	DWG. NO. FP-02B

POSITION OF DEFLECTOR WHEN LOCATED ABOVE BOTTOM OF BEAM

DISTANCE FROM SPRINKLER TO SIDE OF BEAM	MAXIMUM ALOWABLE DISTANCE DEFLECTOR ABOVE BOTTOM OF BEAM
LESS THAN 1 FT	0 IN.
1 FT TO LESS THAN 2 FT	1 IN.
2 FT TO LESS THAN 2 FT 6 IN.	2 IN.
2 FT 6 IN. TO LESS THAN 3 FT	3 IN.
3 FT TO LESS THAN 3 FT 6 IN.	4 IN.
3 FT 6 IN. TO LESS THAN 4 FT	6 IN.
4 FT TO LESS THAN 4 FT 6 IN.	7 IN.
4 FT 6 IN. TO LESS THAN 5 FT	9 IN.
5 FT TO LESS THAN 5 FT 6 IN.	11 IN.
5 FT 6 IN. TO LESS THAN 6 FT	14 IN.

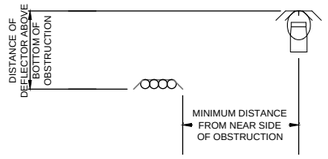
For SI Units: 1 in. = 25.4 mm; 1 ft = 0.3048 m.



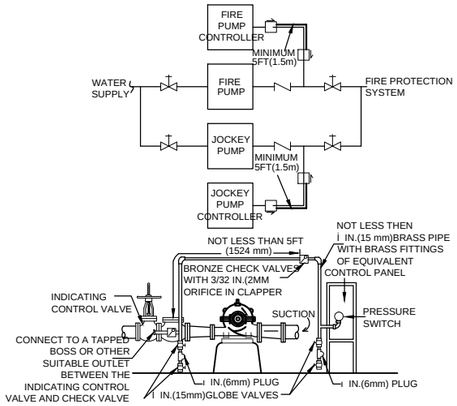
POSITION OF DEFLECTOR; UPRIGHT, OR PENDENT SPRINKLER WHEN LOCATED BELOW CEILING

POSITION OF SPRINKLERS IN RELATION TO OBSTRUCTIONS LOCATED ENTIRELY BELOW THE SPRINKLERS

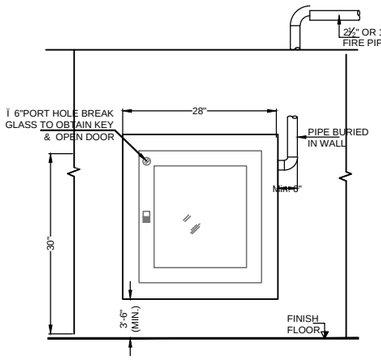
DISTANCE OF DEFLECTOR ABOVE BOTTOM OF OBSTRUCTION	MINIMUM DISTANCE FROM NEAR SIDE OF OBSTRUCTION,ft
LESS THAN 6 IN.	1½
6 IN TO LESS THAN 12 IN.	3
12 IN TO LESS THAN 18 IN.	4
18 IN TO LESS THAN 24 IN.	5



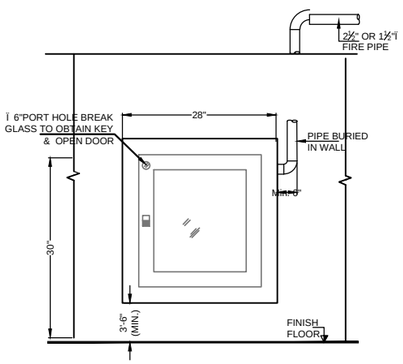
POSITION OF SPRINKLERS IN RELATION TO OBSTRUCTIONS LOCATED ENTIRELY BELOW THE SPRINKLERS



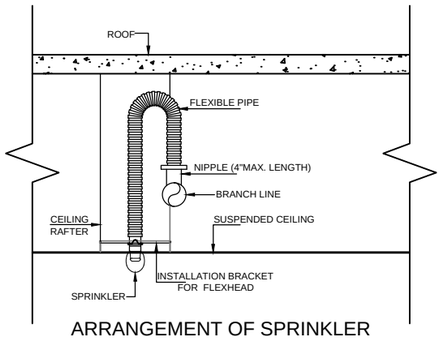
PIPING CONNECTION FOR AUTOMATIC PRESSURE SWITCH (PRESSURE SENSING LINE) OF FIRE PUMP CONTROLLER



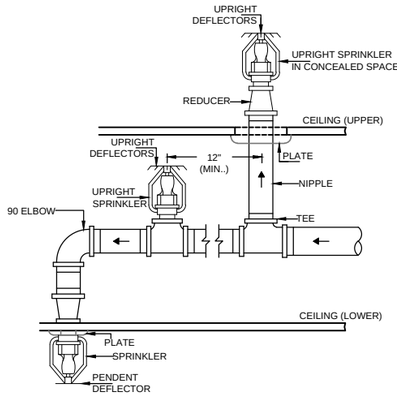
ELEVATION FOR INSTALLATION OF FIRE HOSE REEL CABINET (FHRC)



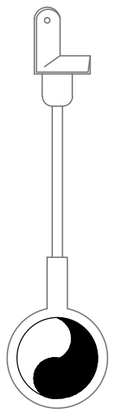
ELEVATION FOR INSTALLATION OF FIRE HOSE REEL CABINET (FHRC)



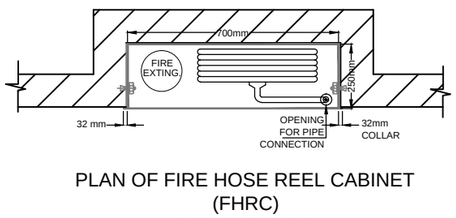
ARRANGEMENT OF SPRINKLER IN BELOW CEILING (PENDENT TYPE)



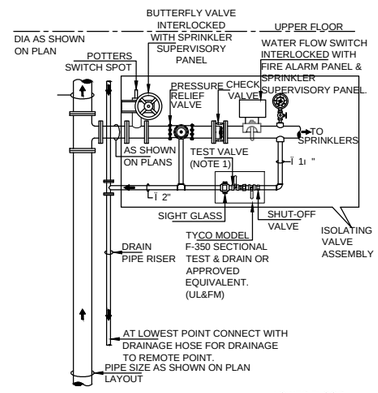
ARRANGEMENT OF BRANCH LINES SUPPLYING SPRINKLERS ABOVE & BELOW CEILING



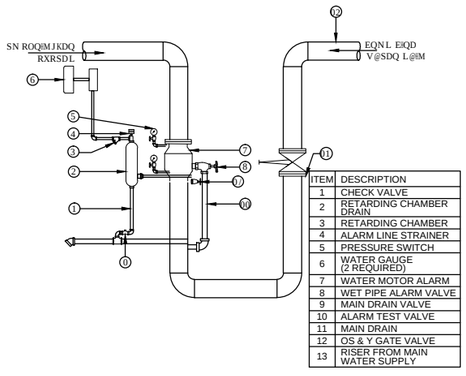
SIDE BEAM ADJUSTABLE HANGER



PLAN OF FIRE HOSE REEL CABINET (FHRC)
(RECESSED TYPE)

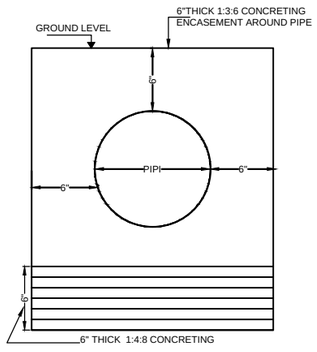


ZONE CONTROL VALVE WITH PRV ASSEMBLY DETAIL



ITEM	DESCRIPTION
1	CHECK VALVE
2	RETARDING CHAMBER DRAIN
3	RETARDING CHAMBER
4	ALARM LINE STRAINER
5	PRESSURE SWITCH
6	WATER GAUGE (2 REQUIRED)
7	WATER MOTOR ALARM
8	WET PIPE ALARM VALVE
9	MAIN DRAIN VALVE
10	ALARM TEST VALVE
11	MAIN DRAIN
12	OS & Y GATE VALVE
13	RISER FROM MAIN WATER SUPPLY

ALARM CHECK VALVE ASSEMBLY

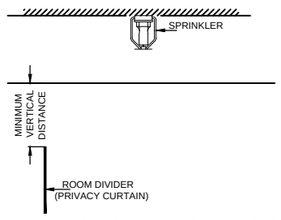


BURIED PIPE DETAIL

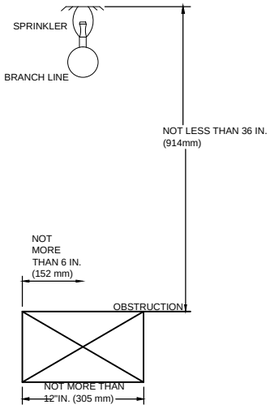
HORIZONTAL AND MINIMUM VERTICAL DISTANCES FOR SPRINKLERS

HORIZONTAL DISTANCE	MINIMUM VERTICAL DISTANCE BELOW DEFLECTOR
6 IN. OR LESS	3 IN.
MORE THAN 6 IN. UP TO 9 IN.	4 IN.
MORE THAN 9 IN. UP TO 12 IN.	6 IN.
MORE THAN 12 IN. UP TO 15 IN.	8 IN.
MORE THAN 15 IN. UP TO 18 IN.	9½ IN.
MORE THAN 18 IN. UP TO 24 IN.	12½ IN.
MORE THAN 24 IN. UP TO 30 IN.	15½ IN.
MORE THAN 30 IN.	18 IN.

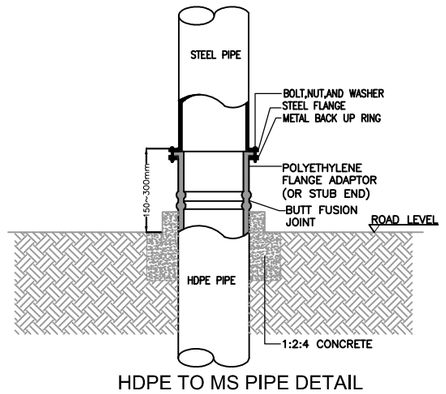
For SI Units: 1 in. = 25.4 mm.



STANDARD SPRINKLER INSTALLED NEAR PRIVACY CURTAINS, FREE-STANDING PARTITIONS, OR ROOM DIVIDERS. (TO BE USED WITH TABLE ABOVE)



POSITION OF SPRINKLERS IN RELATION TO OBSTRUCTION RUNNING PARALLELT0 & DIRECTLY BELOW BRANCH LINES



HDPE TO MS PIPE DETAIL

CLIENT:-

STATE LIFE INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus Consulting
Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsultingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

STANDARD DETAILS

REV #	DATE	DESCRIPTION	CHK'D	APP'D
00	02-07-2026	ISSUED FOR TENDER		

Project Ref: .

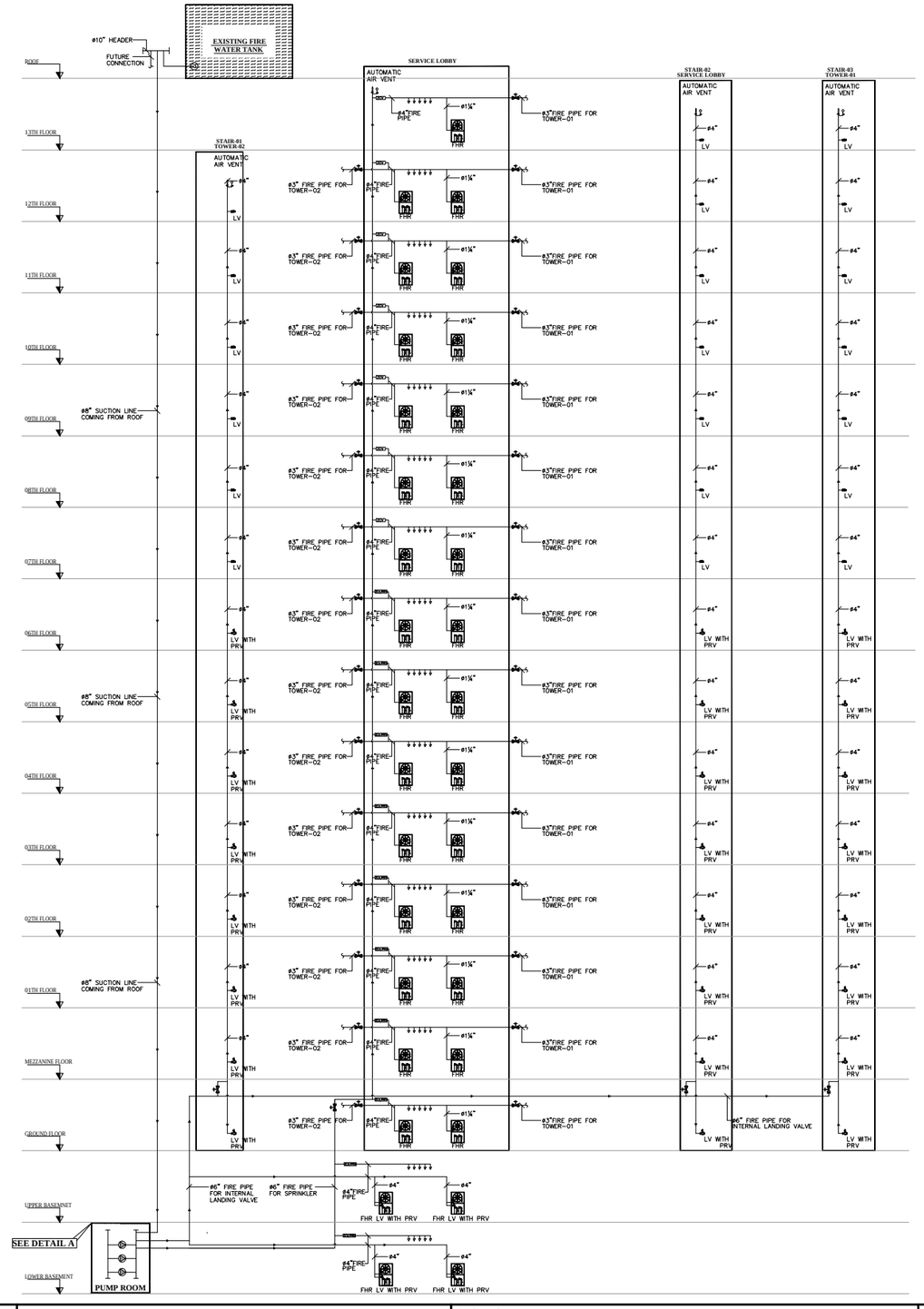
DRAWN BY A-A

CHECKED BY W-S

DATE JUNE.2026

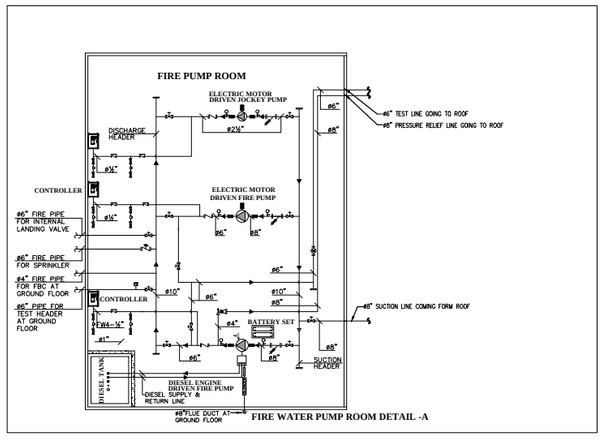
SCALE 1/8" = 1'-0"

DWG. NO. FP-02C



SYMBOL	DESCRIPTION
	IDENTIFICATION NUMBER, SCHEDULED OR DETAILED
	FIRE WATER PIPE
	DIESEL PIPE
	DRAIN PIPE
	FLEXIBLE CONNECTOR
	PRESSURE GAUGE WITH COCK
	BALL VALVE
	OS & Y GATE VALVE
	INSPECTOR TEST & DRAIN VALVE
	GATE VALVE
	AUTOMATIC AIR VENT WITH BALL VALVE
	LANDING VALVE / HYDRANT VALVE
	ALARM CHECK VALVE
	CHECK VALVE
	PRESSURE RELIEF VALVE
	WASTE CONE
	FLOW METER
	STRAINER WITH BALL VALVE
	FIRE PUMP

S.NO	TAG	DESCRIPTION	FLOW USGPM	HEAD (BAR)
1	FP 01	DIESEL ENGINE OPERATED FIRE PUMP	1000	7.5
2	FP 02	ELECTRIC MOTOR OPERATED FIRE PUMP	1000	7.5
3	JP 01	ELECTRIC MOTOR OPERATED JOCKEY PUMP	20	08



FIRE WATER PUMP ROOM DETAIL -A

PUMP RATING (gpm)	MINIMUM PIPE SIZES (NOMINAL) (in.) AS PER NFPA 20						
	SUCTION	DISCHARGE	RELIEF VALVE	RELIEF VALVE DISCHARGE	METER DEVICE	NUMBER AND SIZE OF HOSE VALVE	HOSE HEADER SUPPLY
750	6	6	4	6	6	3–2½	6
1000	8	8	4	8	8	4–2½	8
1250	8	8	6	8	6	6–2½	8
1500	8	8	6	8	8	6–2½	8
2000	10	10	6	10	8	6–2½	8

CLIENT:-

STATE LIFE INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus Consulting
Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsultingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

SCHEMATIC DIAGRAM AT FIRE PROTECTION SYSTEM

REV #	DATE	DESCRIPTION	CH'K'D	APP'D
00	02-07-2026	ISSUED FOR TENDER		

Project Ref: .

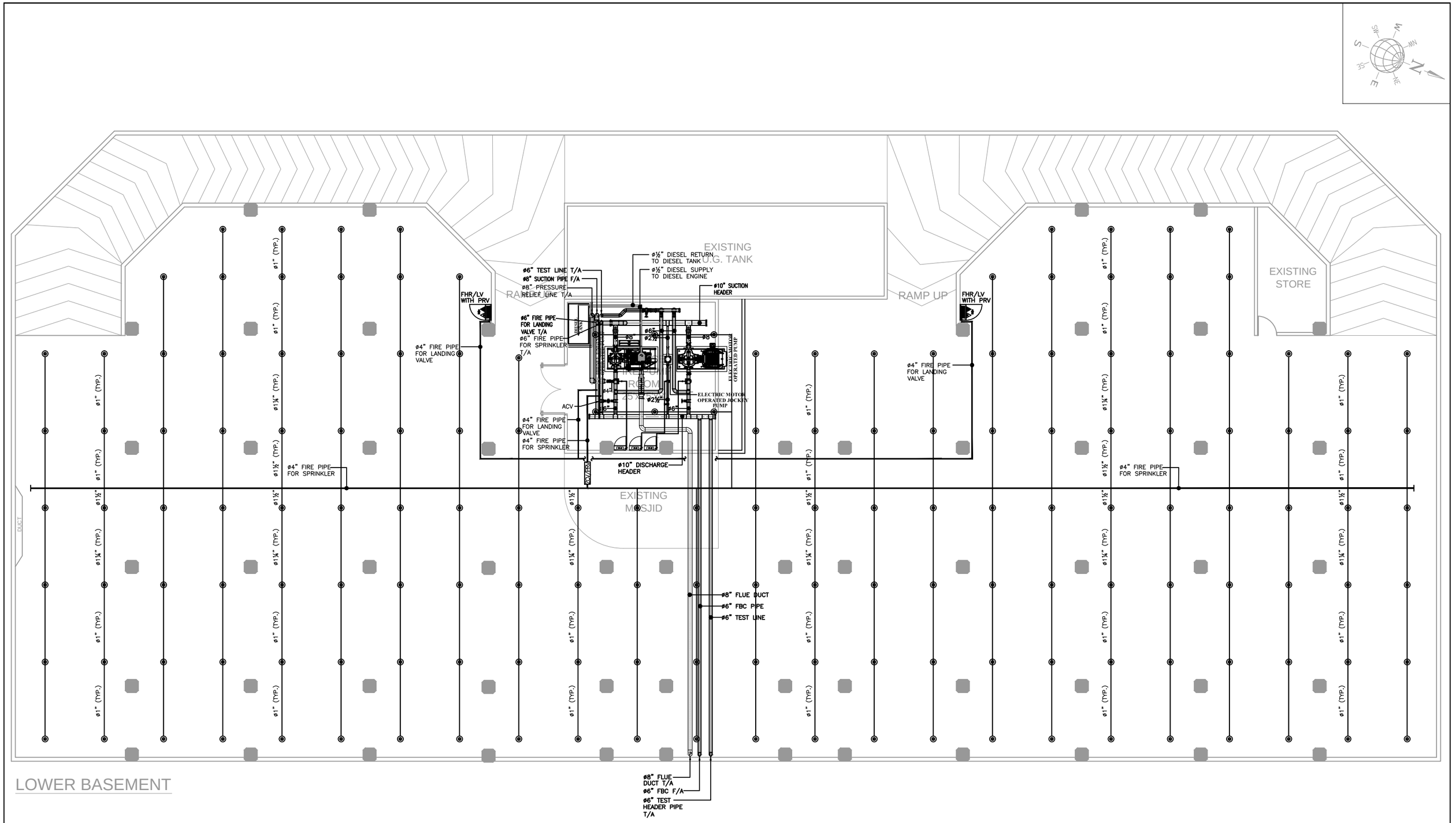
DATE: JUNE.2026

DRAWN BY: A-A

SCALE: 1/8" = 1'-0"

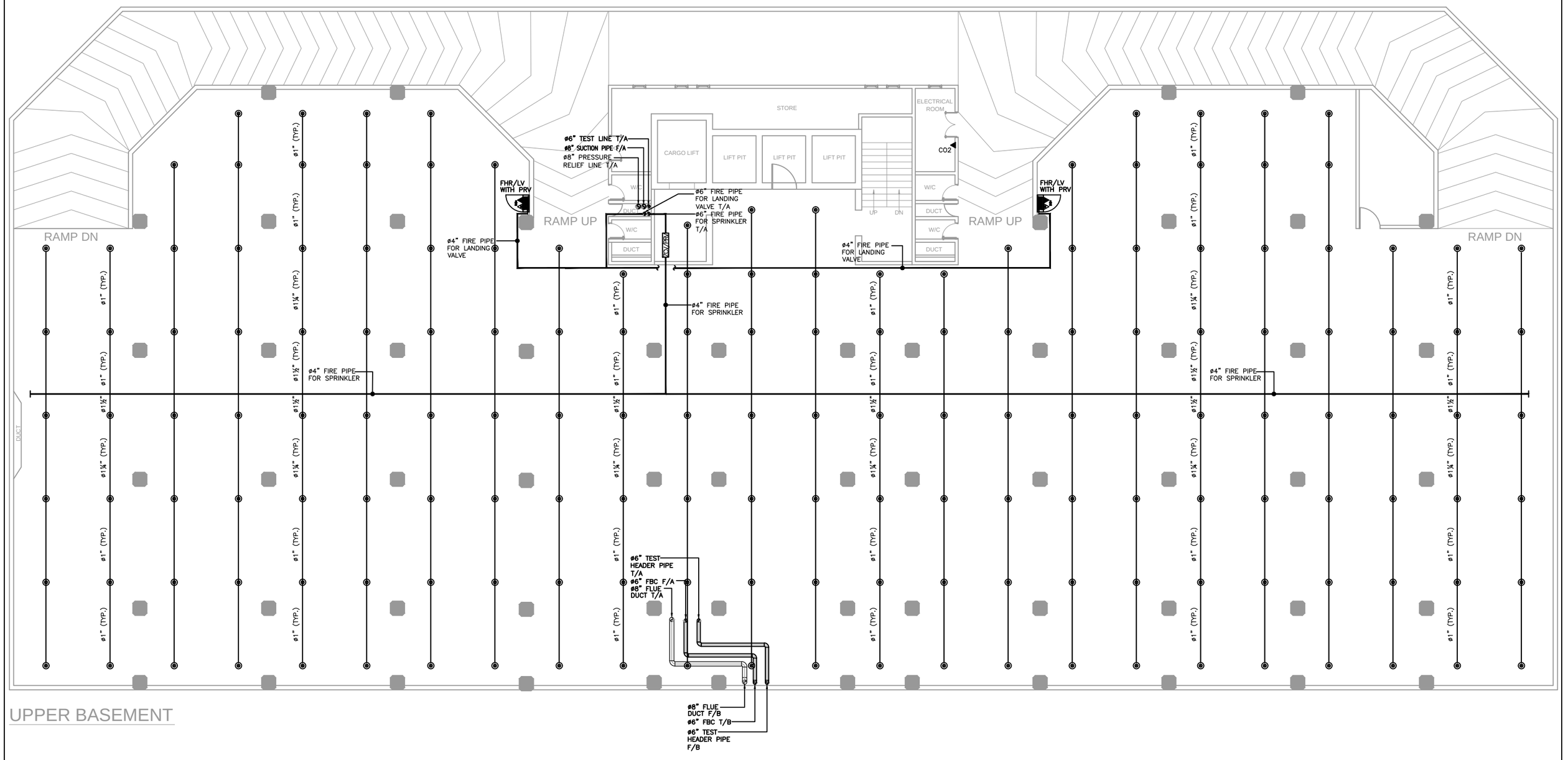
CHECKED BY: W-S

DWG. NO.: FP-03



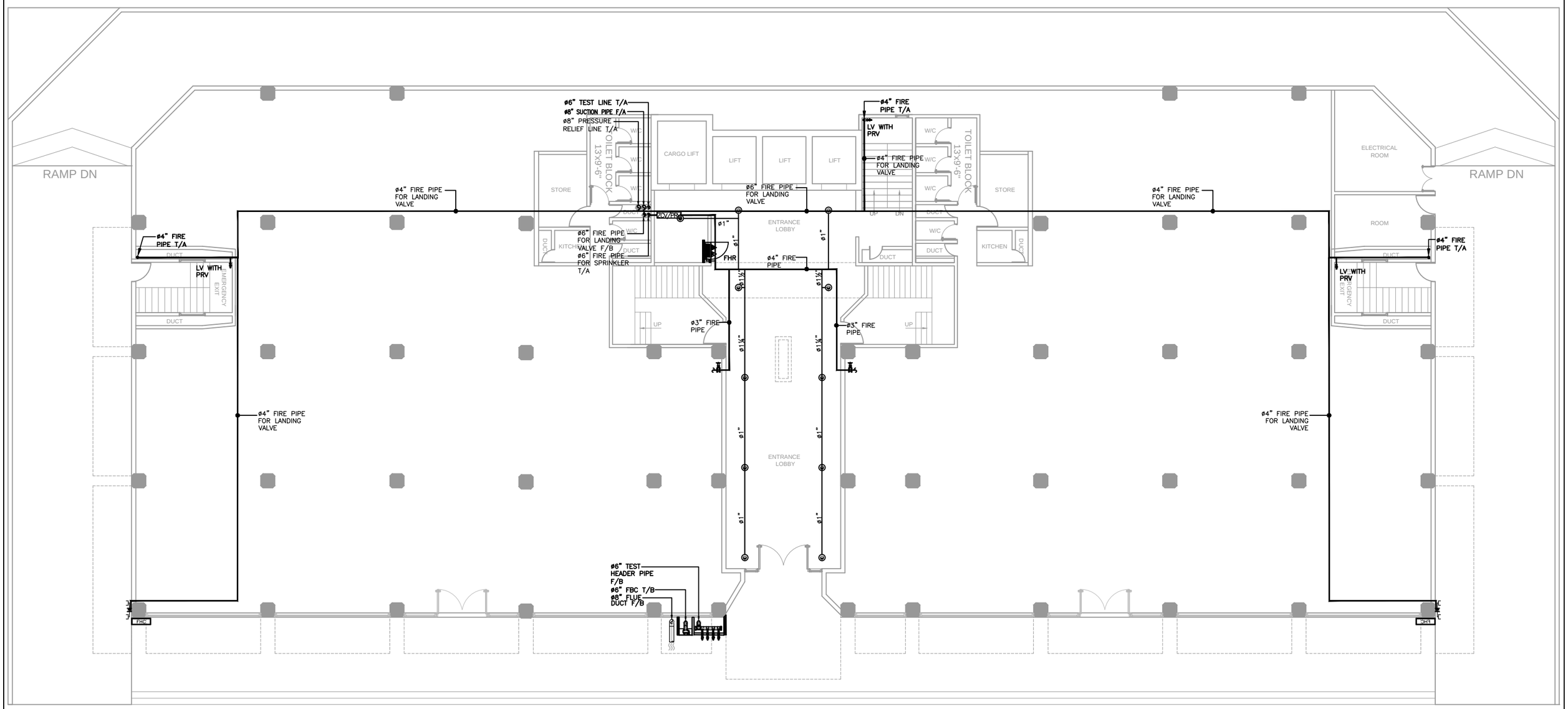
LOWER BASEMENT

CLIENT:- STATE LIFE INSURANCE CORPORATION OF PAKISTAN	CONSULTANT: Nexus Consulting, Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan Phone:021-37240670 Email:nexusconsultingcompany@gmail.com Web:www.Nexuscon.pk	PROJECT:- STATE LIFE BUILDING NO.11	TITLE:- FIRE PROTECTION SYSTEM AT LOWER BASEMENT	REV # / DATE / DESCRIPTION / CHK'D / APP'D: 00 / 02-07-2026 / ISSUED FOR TENDER	Project Ref: .	DATE: JUNE.2026	DRAWN BY: A-A	SCALE: 1/8" = 1'-0"
					CHECKED BY: W-S	DWG. NO.: F-04		



UPPER BASEMENT

CLIENT:- STATE LIFE INSURANCE CORPORATION OF PAKISTAN	CONSULTANT: Nexus Consulting, Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan Phone:021-37240670 Email:nexusconsultingcompany@gmail.com Web:www.Nexuscon.pk	PROJECT:- STATE LIFE BUILDING NO.11	TITLE:- FIRE PROTECTION SYSTEM AT UPPER BASEMENT	REV #	DATE	DESCRIPTION	CHK'D	APP'D	Project Ref: .	DATE JUNE.2026
				00	02-07-2026	ISSUED FOR TENDER			DRAWN BY A-A	SCALE 1/8" = 1'-0"
									CHECKED BY W-S	DWG. NO. F-05



GROUND FLOOR

CLIENT:-

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus Consulting
Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsultingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

FIRE PROTECTION SYSTEM AT GROUND FLOOR

REV #	DATE	DESCRIPTION	CH'K'D	APP'D
00	02-07-2026	ISSUED FOR TENDER		

Project Ref: .

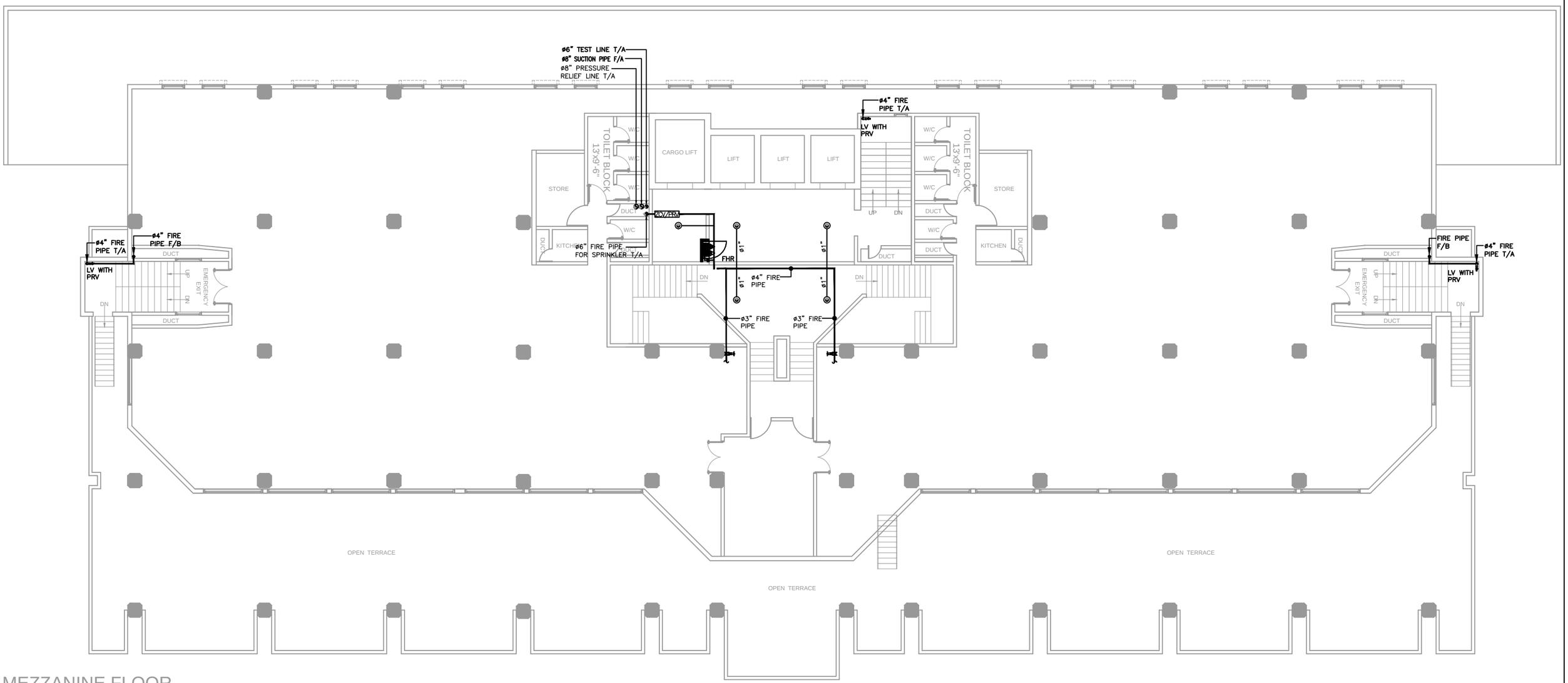
DATE: JUNE.2026

DRAWN BY: A-A

SCALE: 1/8" = 1'-0"

CHECKED BY: W-S

DWG. NO.: F-06



MEZZANINE FLOOR

CLIENT:-

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus Consulting
Office A-202, Second Floor,Blossom Trade Center Opposite NED University
University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsultingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

FIRE PROTECTION SYSTEM AT MEZZANINE FLOOR

REV #	DATE	DESCRIPTION	CHK'D	APP'D
00	02-07-2026	ISSUED FOR TENDER		

Project Ref: .

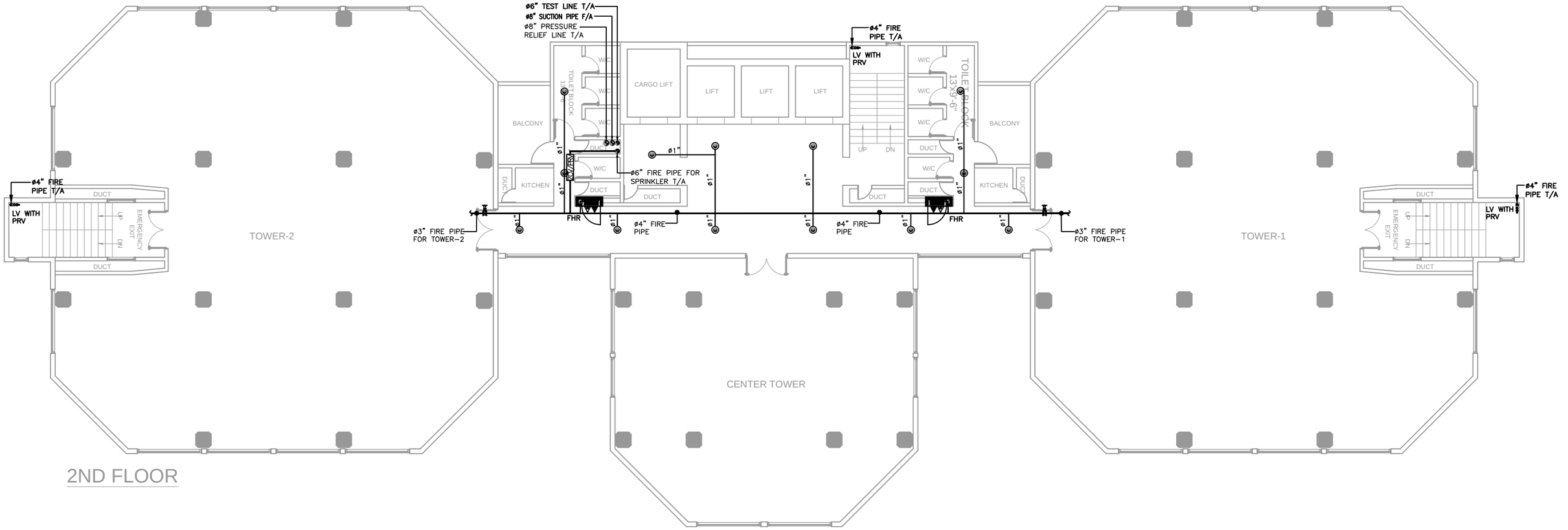
DRAWN BY A-A

CHECKED BY W-S

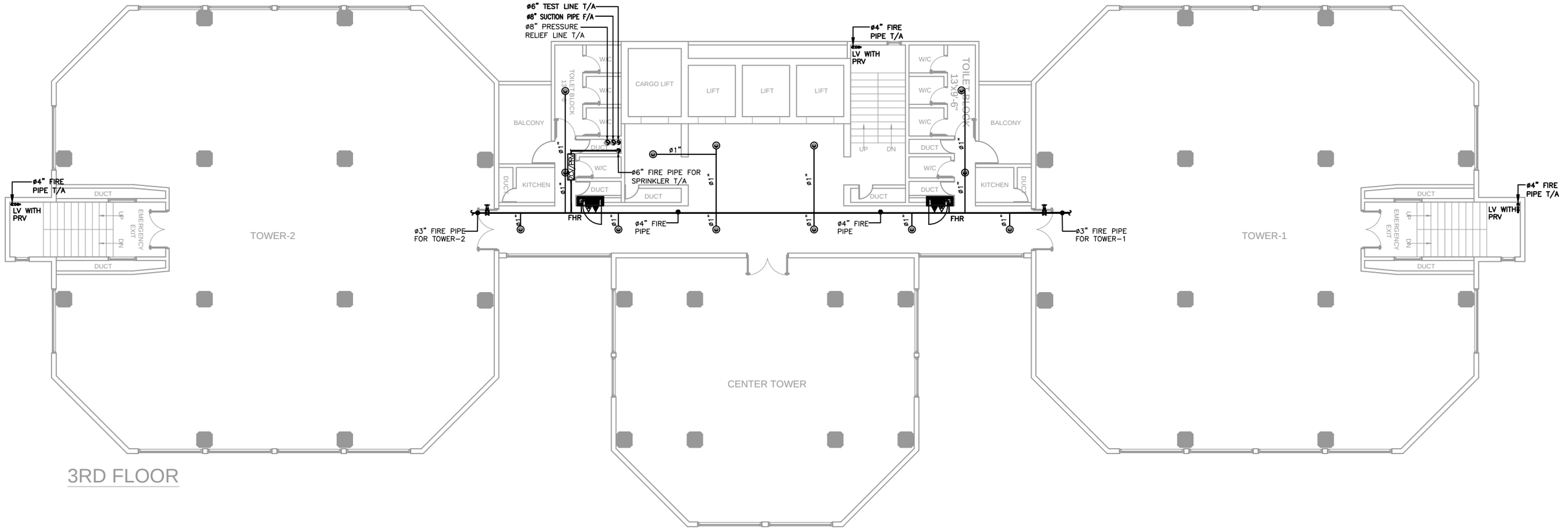
DATE JUNE.2026

SCALE 1/8" = 1'-0"

DWG. NO. F-07



CLIENT:- STATE LIFE INSURANCE CORPORATION OF PAKISTAN	CONSULTANT: Nexus Consulting Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan Phone:021-37240670 Email:nexusconsulttingcompany@gmail.com Web:www.Nexuscon.pk	PROJECT:- STATE LIFE BUILDING NO.11	TITLE:- FIRE PROTECTION SYSTEM AT 2ND FLOOR	REV #	DATE	DESCRIPTION	CHK'D	APP'D	Project Ref: .	DATE JUNE.2026
				00	02-07-2026	ISSUED FOR TENDER			DRAWN BY A-A	SCALE 1/8" = 1'-0"
									CHECKED BY W-S	DWG. NO. F-08



CLIENT:- STATE LIFE INSURANCE CORPORATION OF PAKISTAN	CONSULTANT: Nexus Consulting Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan Phone:021-37240670 Email:nexusconsulttingcompany@gmail.com Web:www.Nexuscon.pk	PROJECT:- STATE LIFE BUILDING NO.11	TITLE:- FIRE PROTECTION SYSTEM AT 3RD FLOOR	REV #	DATE	DESCRIPTION	CHK'D	APP'D	Project Ref: .	DATE JUNE.2026
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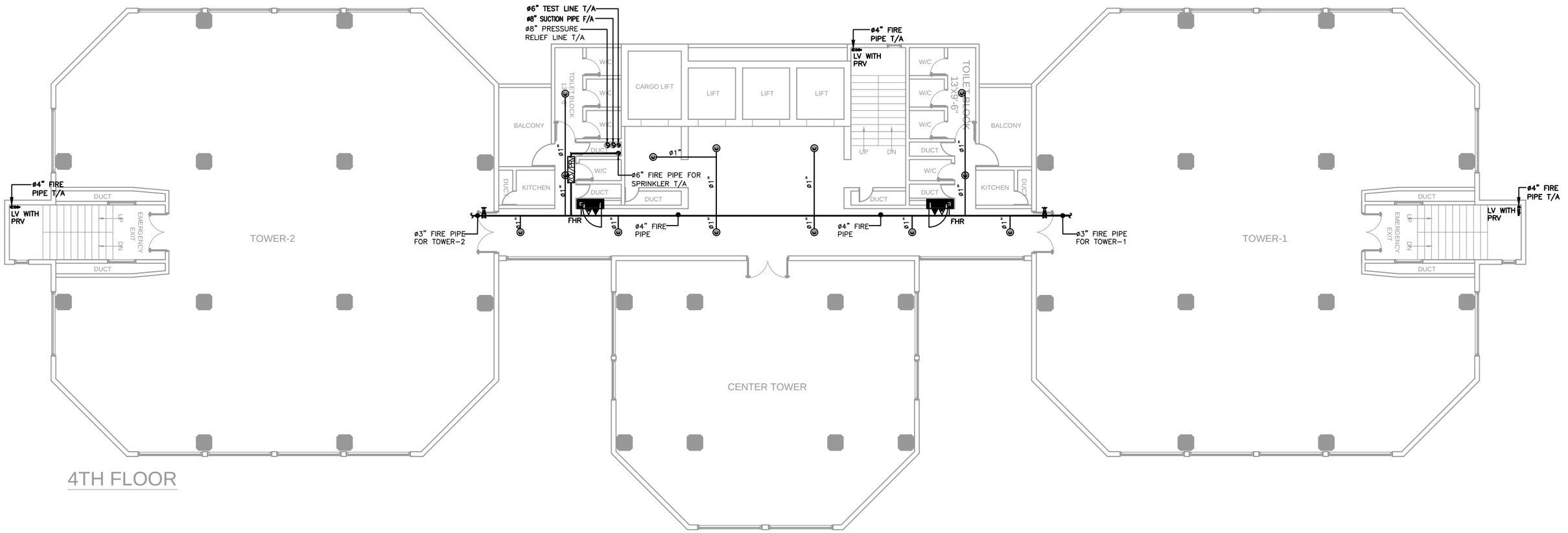
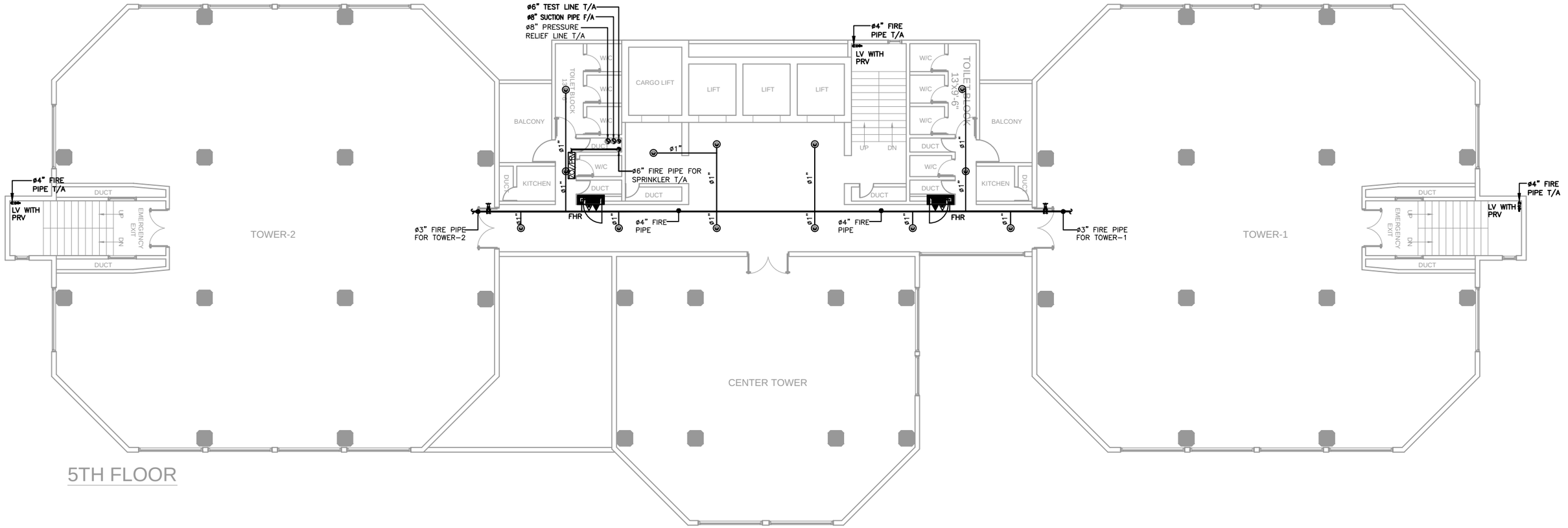
									CHECKED BY W-S	DWG. NO. F-09



4TH FLOOR

CLIENT:- STATE LIFE INSURANCE CORPORATION OF PAKISTAN	CONSULTANT: Nexus Consulting Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan Phone:021-37240670 Email:nexusconsultingcompany@gmail.com Web:www.Nexuscon.pk	PROJECT:- STATE LIFE BUILDING NO.11	TITLE:- FIRE PROTECTION SYSTEM AT 4TH FLOOR	REV #	DATE	DESCRIPTION	CHK'D	APP'D	Project Ref: .	DATE JUNE.2026
				00	02-07-2026	ISSUED FOR TENDER			DRAWN BY A-A	SCALE 1/8" = 1'-0"
									CHECKED BY W-S	DWG. NO. F-10



CLIENT:-

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus Consulting
Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsultingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

FIRE PROTECTION SYSTEM AT 5TH FLOOR

REV #	DATE	DESCRIPTION	CHK'D	APP'D
00	02-07-2026	ISSUED FOR TENDER		

Project Ref: .

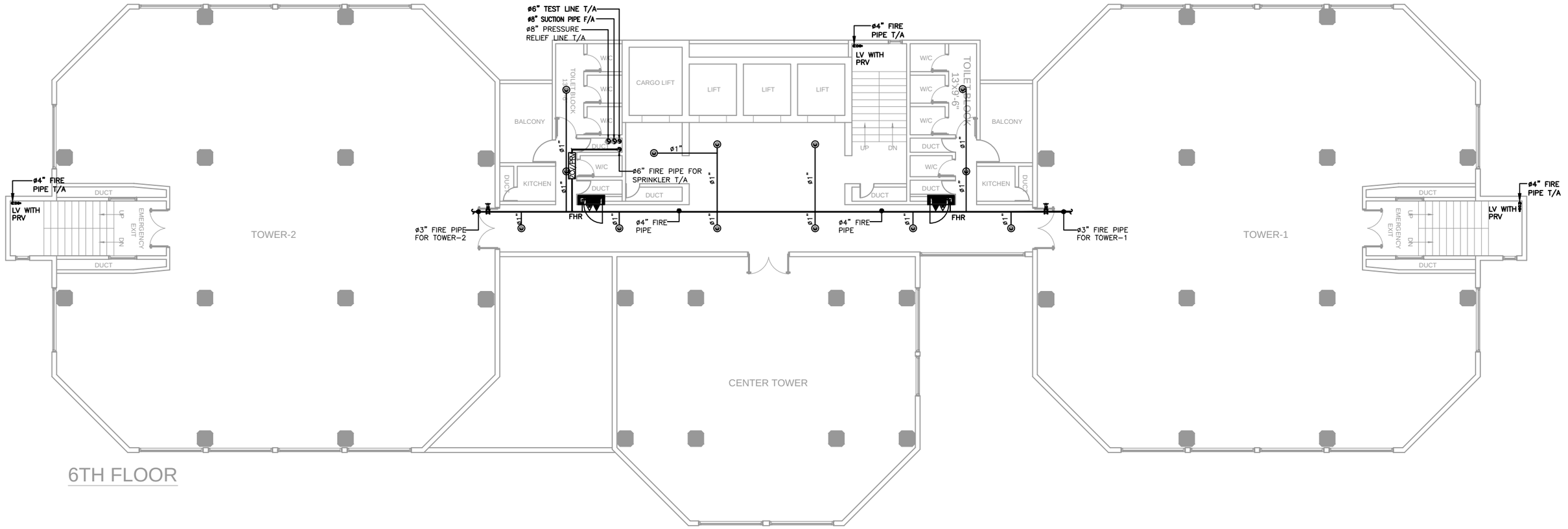
DATE: JUNE.2026

DRAWN BY: A-A

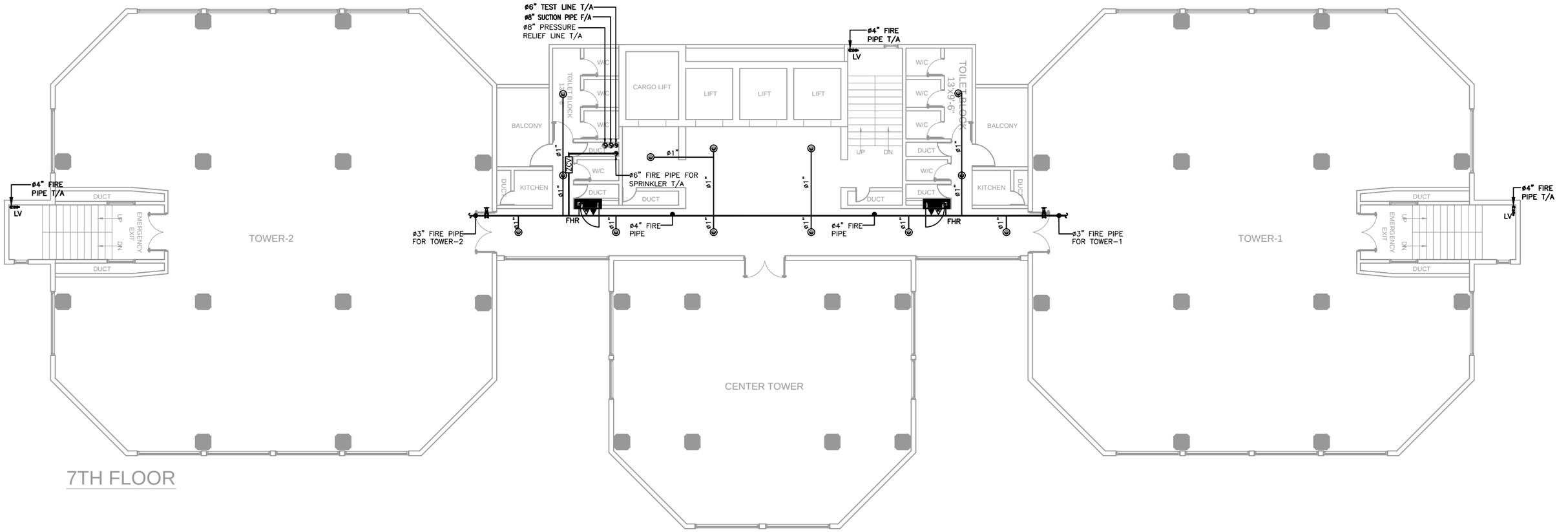
SCALE: 1/8" = 1'-0"

CHECKED BY: W-S

DWG. NO.: FP-11



CLIENT:- STATE LIFE INSURANCE CORPORATION OF PAKISTAN	CONSULTANT: Nexus Consulting Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan Phone:021-37240670 Email:nexusconsultingcompany@gmail.com Web:www.Nexuscon.pk	PROJECT:- STATE LIFE BUILDING NO.11	TITLE:- FIRE PROTECTION SYSTEM AT 6TH FLOOR	REV #	DATE	DESCRIPTION	CHK'D	APP'D	Project Ref: .	DATE JUNE.2026
				00	02-07-2026	ISSUED FOR TENDER			DRAWN BY A-A	SCALE 1/8" = 1'-0"
									CHECKED BY W-S	DWG. NO. FP-12



CLIENT:- STATE LIFE INSURANCE CORPORATION OF PAKISTAN	CONSULTANT: Nexus Consulting Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan Phone:021-37240670 Email:nexusconsulttingcompany@gmail.com Web:www.Nexuscon.pk	PROJECT:- STATE LIFE BUILDING NO.11	TITLE:- FIRE PROTECTION SYSTEM AT 7TH FLOOR	REV #	DATE	DESCRIPTION	CHK'D	APP'D	Project Ref: .	DATE JUNE.2026
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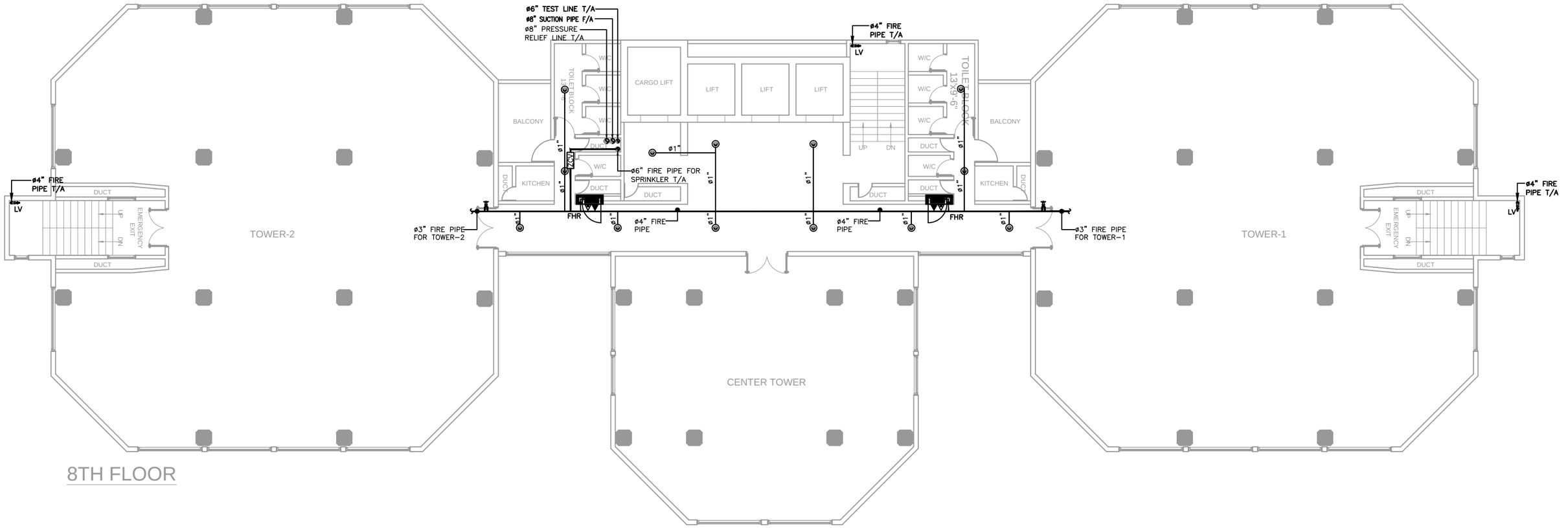

CLIENT:- STATE LIFE INSURANCE CORPORATION OF PAKISTAN	CONSULTANT: Nexus Consulting Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan Phone:021-37240670 Email:nexusconsultingcompany@gmail.com Web:www.Nexuscon.pk	PROJECT:- STATE LIFE BUILDING NO.11	TITLE:- FIRE PROTECTION SYSTEM AT 8TH FLOOR	REV #	DATE	DESCRIPTION	CHK'D	APP'D	Project Ref: .	DATE JUNE.2026
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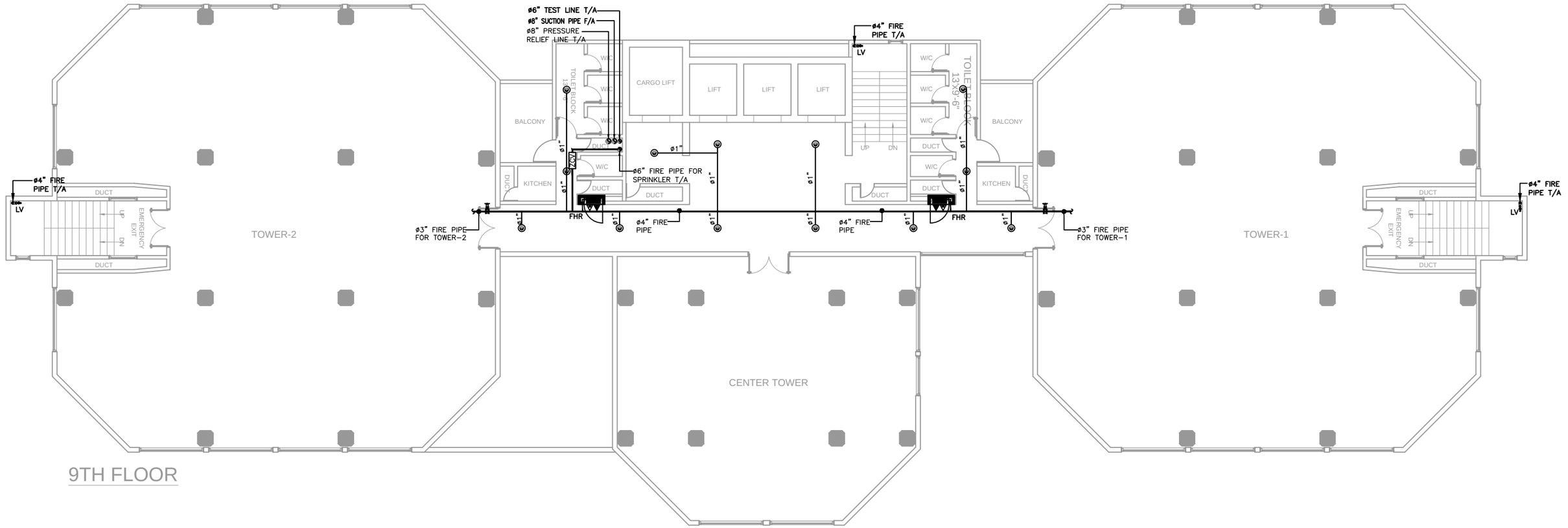

CLIENT:- STATE LIFE INSURANCE CORPORATION OF PAKISTAN	CONSULTANT: Nexus Consulting Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan Phone:021-37240670 Email:nexusconsultingcompany@gmail.com Web:www.Nexuscon.pk	PROJECT:- STATE LIFE BUILDING NO.11	TITLE:- FIRE PROTECTION SYSTEM AT 9TH FLOOR	REV #	DATE	DESCRIPTION	CHK'D	APP'D	Project Ref: .	DATE JUNE.2026
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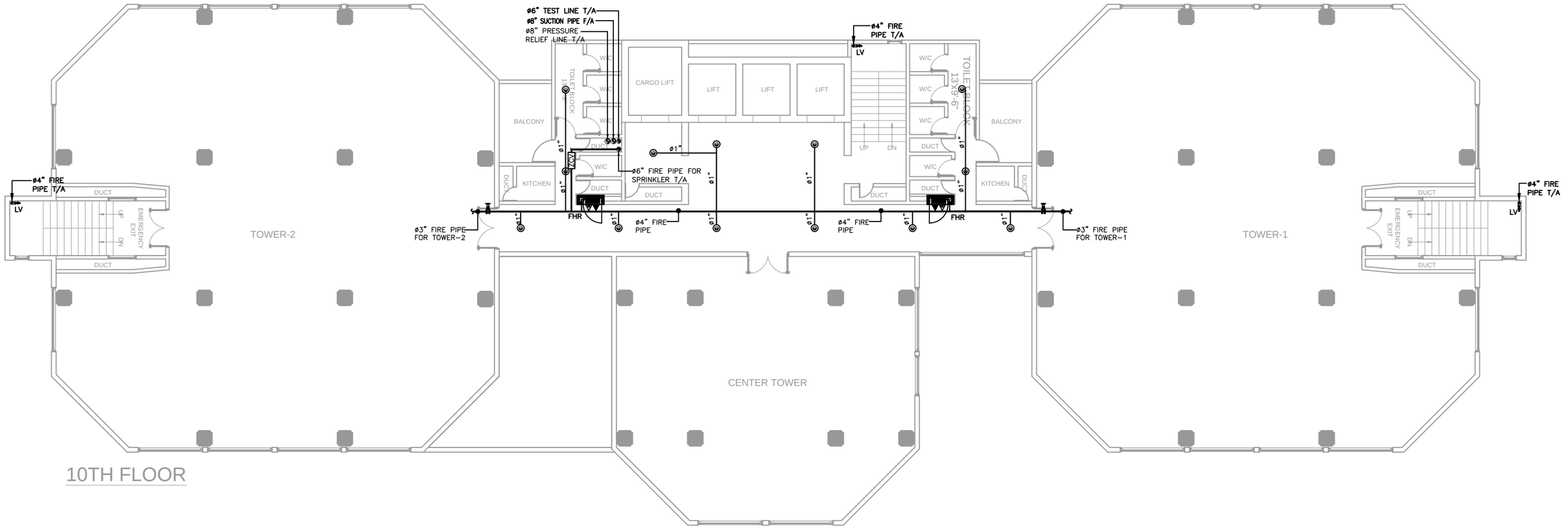

CLIENT:- STATE LIFE INSURANCE CORPORATION OF PAKISTAN	CONSULTANT: Nexus Consulting Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan Phone:021-37240670 Email:nexusconsultingcompany@gmail.com Web:www.Nexuscon.pk	PROJECT:- STATE LIFE BUILDING NO.11	TITLE:- FIRE PROTECTION SYSTEM AT 10TH FLOOR	REV # / DATE / DESCRIPTION / CHK'D / APP'D 00 / 02-07-2026 / ISSUED FOR TENDER	Project Ref: .	DATE: JUNE.2026	DRAWN BY: A-A	SCALE: 1/8" = 1'-0"
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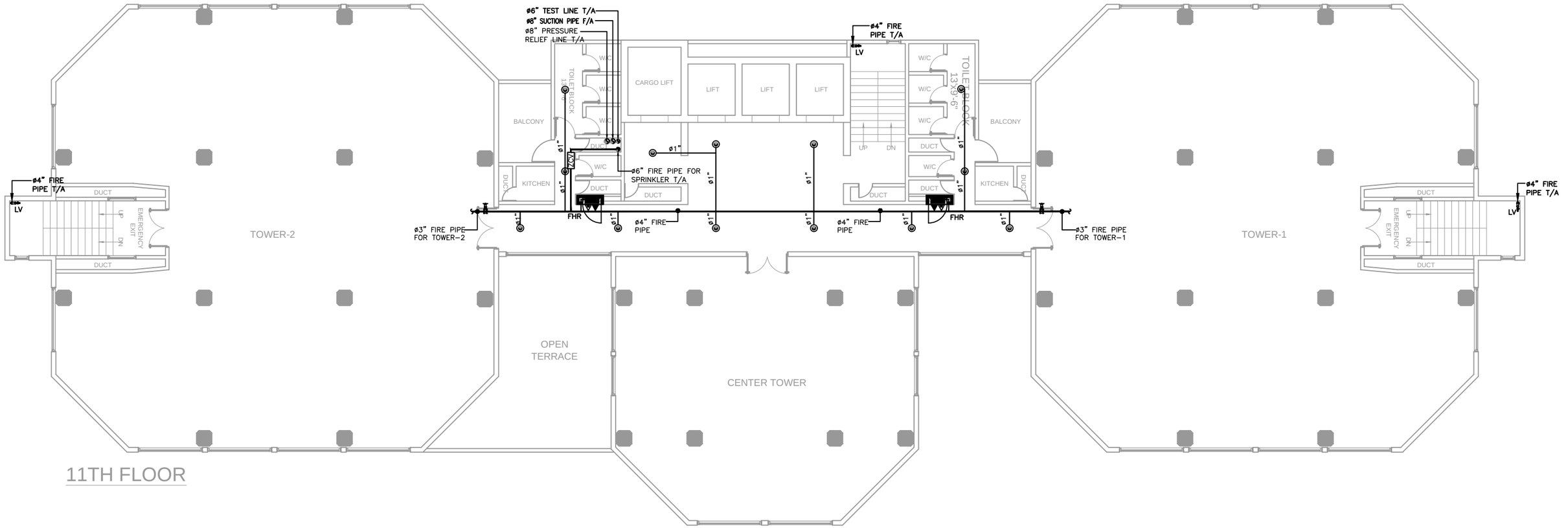
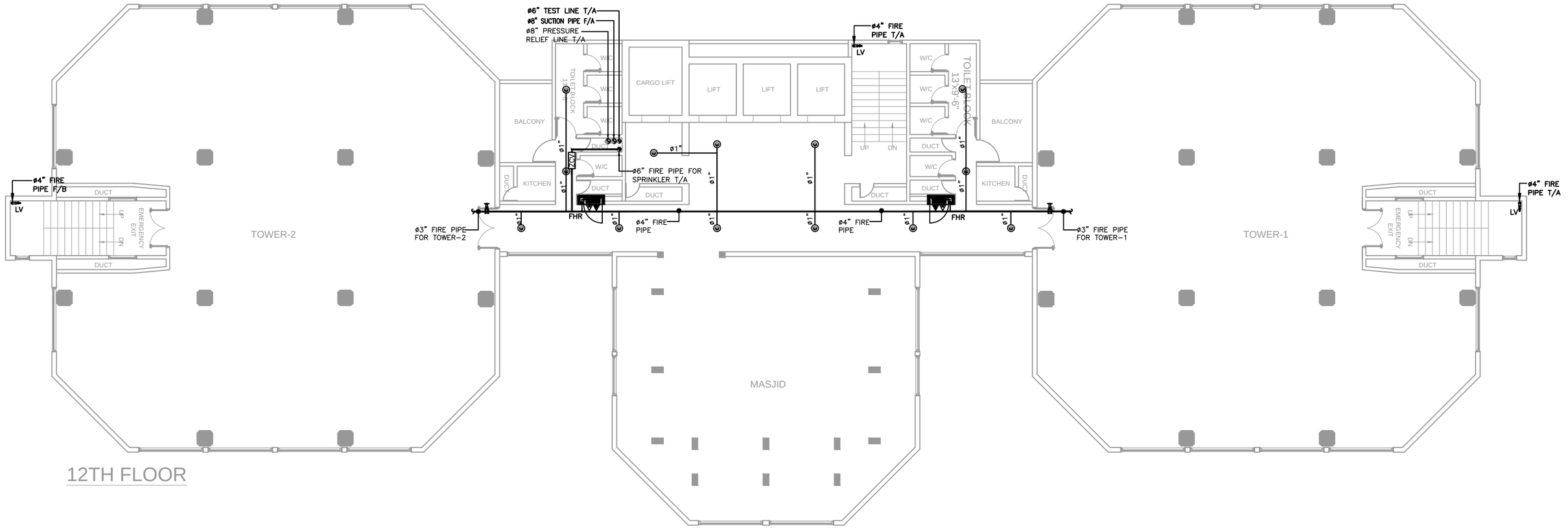
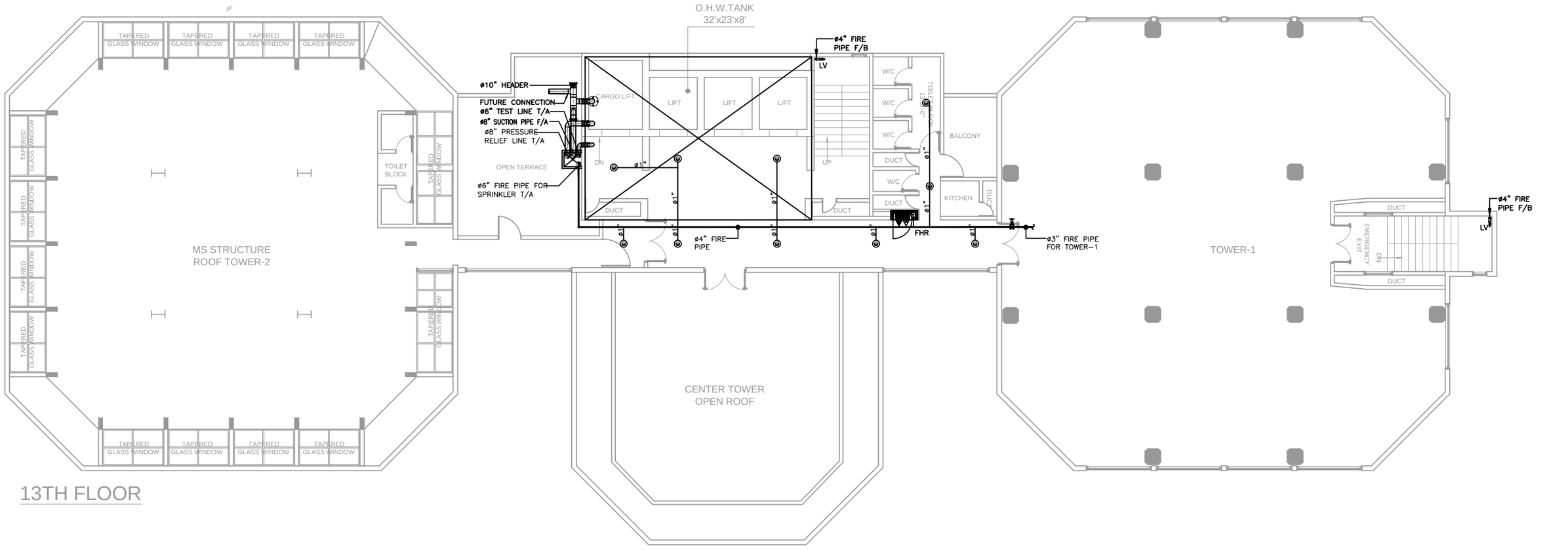


CLIENT:- STATE LIFE INSURANCE CORPORATION OF PAKISTAN	CONSULTANT: Nexus Consulting Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan Phone:021-37240670 Email:nexusconsultingcompany@gmail.com Web:www.Nexuscon.pk	PROJECT:- STATE LIFE BUILDING NO.11	TITLE:- FIRE PROTECTION SYSTEM AT 11TH FLOOR	REV #	DATE	DESCRIPTION	CHK'D	APP'D	Project Ref: .	DATE JUNE.2026
				00	02-07-2026	ISSUED FOR TENDER			DRAWN BY A-A	SCALE 1/8" = 1'-0"
									CHECKED BY W-S	DWG. NO. FP-17



CLIENT:- STATE LIFE INSURANCE CORPORATION OF PAKISTAN	CONSULTANT: Nexus Consulting Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan Phone:021-37240670 Email:nexusconsultingcompany@gmail.com Web:www.Nexuscon.pk	PROJECT:- STATE LIFE BUILDING NO.11	TITLE:- FIRE PROTECTION SYSTEM AT 12TH FLOOR	REV #	DATE	DESCRIPTION	CHK'D	APP'D	Project Ref: .	DATE JUNE.2026
				00	02-07-2026	ISSUED FOR TENDER			DRAWN BY A-A	SCALE 1/8" = 1'-0"
									CHECKED BY W-S	DWG. NO. FP-18



CLIENT:- STATE LIFE INSURANCE CORPORATION OF PAKISTAN	CONSULTANT: Nexus Consulting, Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan Phone:021-37240670 Email:nexusconsultingcompany@gmail.com Web:www.Nexuscon.pk	PROJECT:- STATE LIFE BUILDING NO.11	TITLE:- FIRE PROTECTION SYSTEM AT 13TH FLOOR	REV #	DATE	DESCRIPTION	CH'K'D	APP'D	Project Ref: .	DATE JUNE.2026
				00	02-07-2026	ISSUED FOR TENDER			DRAWN BY A-A	SCALE 1/8" = 1'-0"
									CHECKED BY W-S	DWG. NO. FP-19

STATE LIFE BUILDING NO.11

FIRE ALARM SYSTEM DRAWINGS

TENDER DRAWING

CLIENT:

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus
Consulting

DWG NO.	SHEET NO.	INDEX	DRAWING TITLE	REV NO.
FIRE ALARM SYSTEM WORK				
FA-01	01 OF 01	-	ELECTRICAL LIST OF DRAWINGS	00
FA-02	01 OF 01	-	GENERAL NOTES FIRE ALARM SYSTEM	00
FA-03	01 OF 01	-	GENERAL FIRE ALARM SYSTEM DETAIL	00
FA-04	01 OF 01	-	FIRE ALARM SYSTEM LOWER BASEMENT	00
FA-05	01 OF 01	-	FIRE ALARM SYSTEM UPPER BASEMENT	00
FA-06	01 OF 01	-	FIRE ALARM SYSTEM GROUND FLOOR	00
FA-07	01 OF 01	-	FIRE ALARM SYSTEM MEZZANINE FLOOR	00
FA-08	01 OF 01	-	FIRE ALARM SYSTEM SECOND FLOOR	00
FA-09	01 OF 01	-	FIRE ALARM SYSTEM THIRD FLOOR	00
FA-10	01 OF 01	-	FIRE ALARM SYSTEM FOURTH FLOOR	00
FA-11	01 OF 01	-	FIRE ALARM SYSTEM FIFTH FLOOR	00
FA-12	01 OF 01	-	FIRE ALARM SYSTEM SIXTH FLOOR	00
FA-13	01 OF 01	-	FIRE ALARM SYSTEM SEVENTH FLOOR	00
FA-14	01 OF 01	-	FIRE ALARM SYSTEM EIGHT FLOOR	00
FA-15	01 OF 01	-	FIRE ALARM SYSTEM NINTH FLOOR	00
FA-16	01 OF 01	-	FIRE ALARM SYSTEM TENTH FLOOR	00
FA-17	01 OF 01	-	FIRE ALARM SYSTEM ELEVENTH FLOOR	00
FA-18	01 OF 01	-	FIRE ALARM SYSTEM TWELVETH FLOOR	00
FA-19	01 OF 01	-	FIRE ALARM SYSTEM THIRTEENTH FLOOR	00
FA-20	01 OF 01	-	FIRE ALARM SYSTEM RISER	00

CLIENT:-

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus Consulting

Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsultingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

ELECTRICAL LIST OF DRAWINGS

REV #	DATE	DESCRIPTION	CHK'D	APP'D

Project Ref:
.

DRAWN BY
HASSAN KHAN

CHECKED BY
WAQAS SHAHAB

DATE
JUNE. 2026

SCALE
AS SHOWN

DWG. NO.
FA-01

GENERAL NOTES – ADDRESSABLE FIRE ALARM SYSTEM

1. The fire alarm system shall be a fully addressable, intelligent fire detection and alarm system.
2. All equipment, materials, and installation shall comply with the project specifications, applicable local authority requirements, and the latest editions of NFPA 72 and other relevant codes and standards.
3. The contractor shall submit shop drawings, product data, wiring diagrams, and flow chart for approval before installation.
4. All fire alarm equipment shall be listed and approved by the relevant certification authority and shall be supplied by a single manufacturer.
5. The contractor shall verify all field dimensions and site conditions before commencing installation.
6. Device locations shown on the drawings are approximate and shall be coordinated with architectural, structural, mechanical, and electrical services.
7. Fire alarm cables shall be installed in conduit as specified and shall be separated from power cables in accordance with applicable codes.
8. All addressable devices shall have unique addresses and shall be clearly labeled for identification.
9. Smoke detectors shall not be installed until construction activities that generate dust are complete.
10. Manual Call Points (MCPs), smoke detectors, sounders, and other devices shall be installed at the locations shown on the approved drawings and in accordance with the manufacturer's recommendations.
11. All cable terminations shall be properly identified and tested before commissioning.
12. The fire alarm control panel shall continuously monitor all initiating devices, notification appliances, communication loops, and power supplies for alarm, fault, and supervisory conditions.
13. Interface modules(I/O Device) shall be provided where required for monitoring and controlling other building systems, including HVAC, elevators, generators, fire pumps, sprinkler systems, and other life safety equipment.
14. Each tenant shall install an individual fire alarm system. The tenant fire alarm system shall be interfaced with the building Fire Alarm Control Panel (FACP) in accordance with the approved drawings and project specifications.
15. The contractor shall perform complete testing, commissioning, and programming of the fire alarm system before handover.
16. Upon completion, the contractor shall provide as-built drawings, operation and maintenance manuals, test reports, and user training.
17. All installations shall be inspected and approved by the Engineer and the relevant authority before occupancy.
18. The contractor shall provide all accessories, mounting hardware, junction boxes, and interface modules required for a complete and fully operational system, whether specifically shown on the drawings or not.
19. The fire alarm system shall remain fully operational during a power failure through standby batteries sized in accordance with NFPA 72 and the manufacturer's recommendations. In addition, the fire alarm control panel shall be provided with an uninterruptible power supply (UPS) backup to ensure continuous operation.
20. All circuits shall be tested for continuity, insulation resistance, and correct polarity before energizing the system.
21. Any deviations from the approved drawings or specifications shall require written approval from the Engineer before implementation.

CLIENT:-
STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:
Nexus Consulting
Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsulttingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-
STATE LIFE BUILDING NO.11

TITLE:-
GENERAL NOTES
FIRE
ALARM SYSTEM

REV #	DATE	DESCRIPTION	CHK'D	APP'D

Project Ref:
.

DRAWN BY
HASSAN KHAN

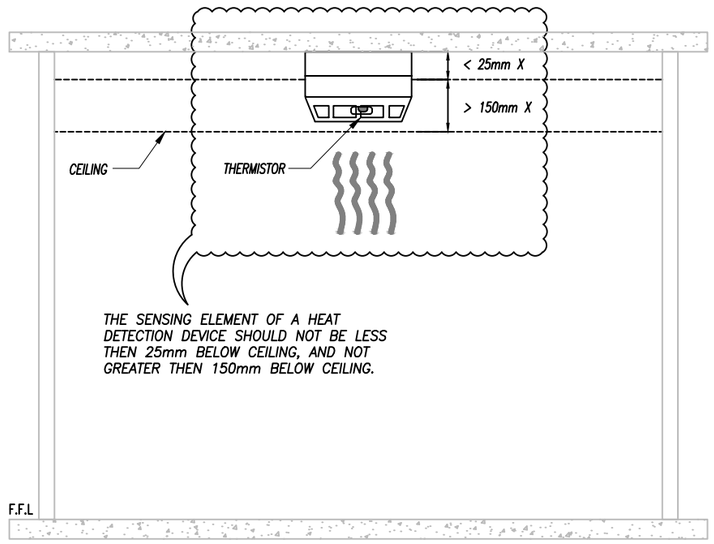
CHECKED BY
WAQAS SHAHAB

DATE
JUNE. 2026

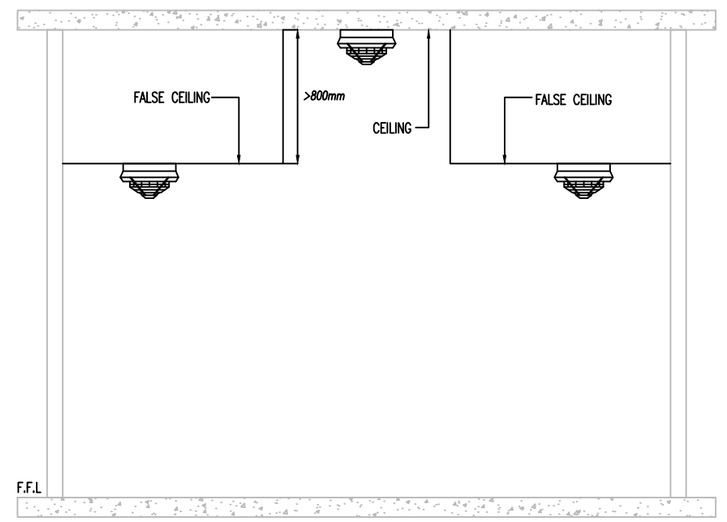
SCALE
AS SHOWN

DWG. NO.
FA-02

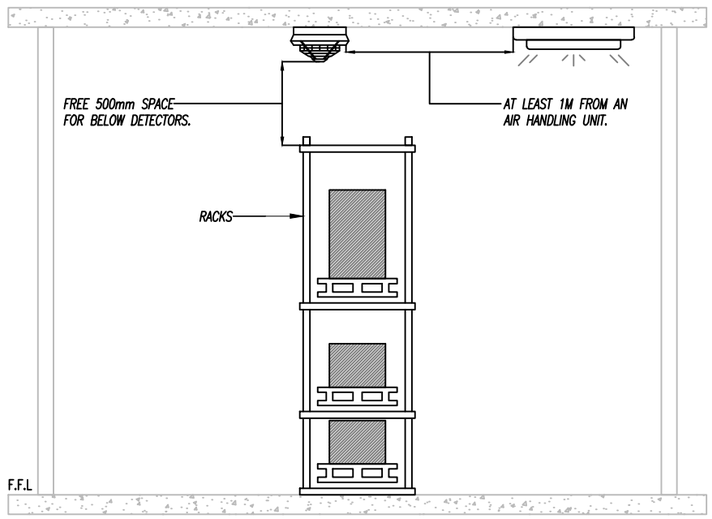
HEAT DETECTOR. (WITH REF. CODE OF BS5839 SECTION 22.23)



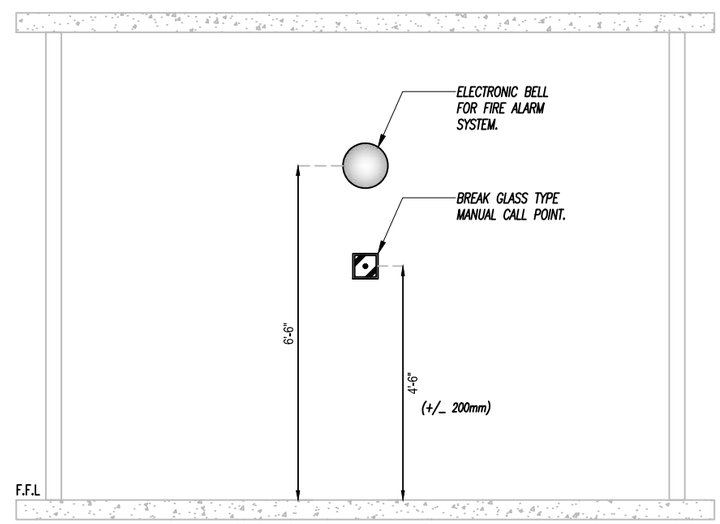
DISTANCE OF CEILING TO FIRE ALARM DEVICES. (WITH REF. CODE OF BS5839 SECTION 22.23)



DISTANCE OF RACK'S AND AIR HANDLING UNIT TO FIRE ALARM DEVICES. (WITH REF. CODE OF BS5839-1:2002)



MOUNTING HEIGHT-F.A BELL AND MCP. (WITH REF. CODE OF BS5839 SECTION 22.23)



CLIENT:-

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus Consulting
Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsulttingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

GENERAL
FIRE ALARM SYSTEM
DETAIL-01

REV #	DATE	DESCRIPTION	CHK'D	APP'D

Project Ref:
.

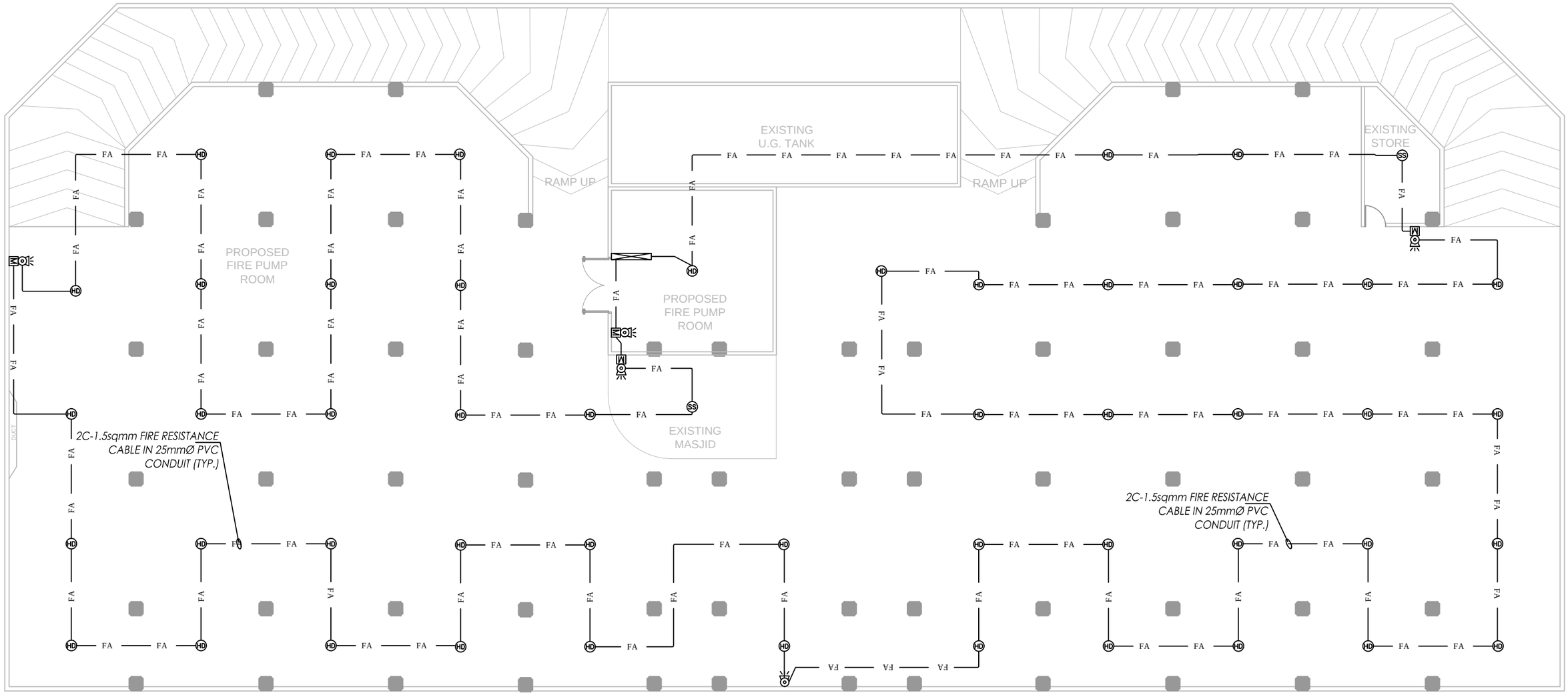
DATE
JUNE. 2026

DRAWN BY
HASSAN KHAN

SCALE
AS SHOWN

CHECKED BY
WAQAS SHAHAB

DWG. NO.
FA-03



LOWER BASEMENT

LEGENDS

SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
	SOUNDER WITH FLASHER	8'-0" FFL
M	MANUAL BREAK GLASS	3'-6" FFL
I/O MOUDLE	INPUT/OUTPUT MODULE	WALL
FACP	FIRE ALARM CONTROL PANEL	3'-6" FFL

CLIENT:-

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus Consulting
Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsultingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

FIRE ALARM SYSTEM
LOWER BASEMENT

REV #	DATE	DESCRIPTION	CHK'D	APP'D

Project Ref:
.

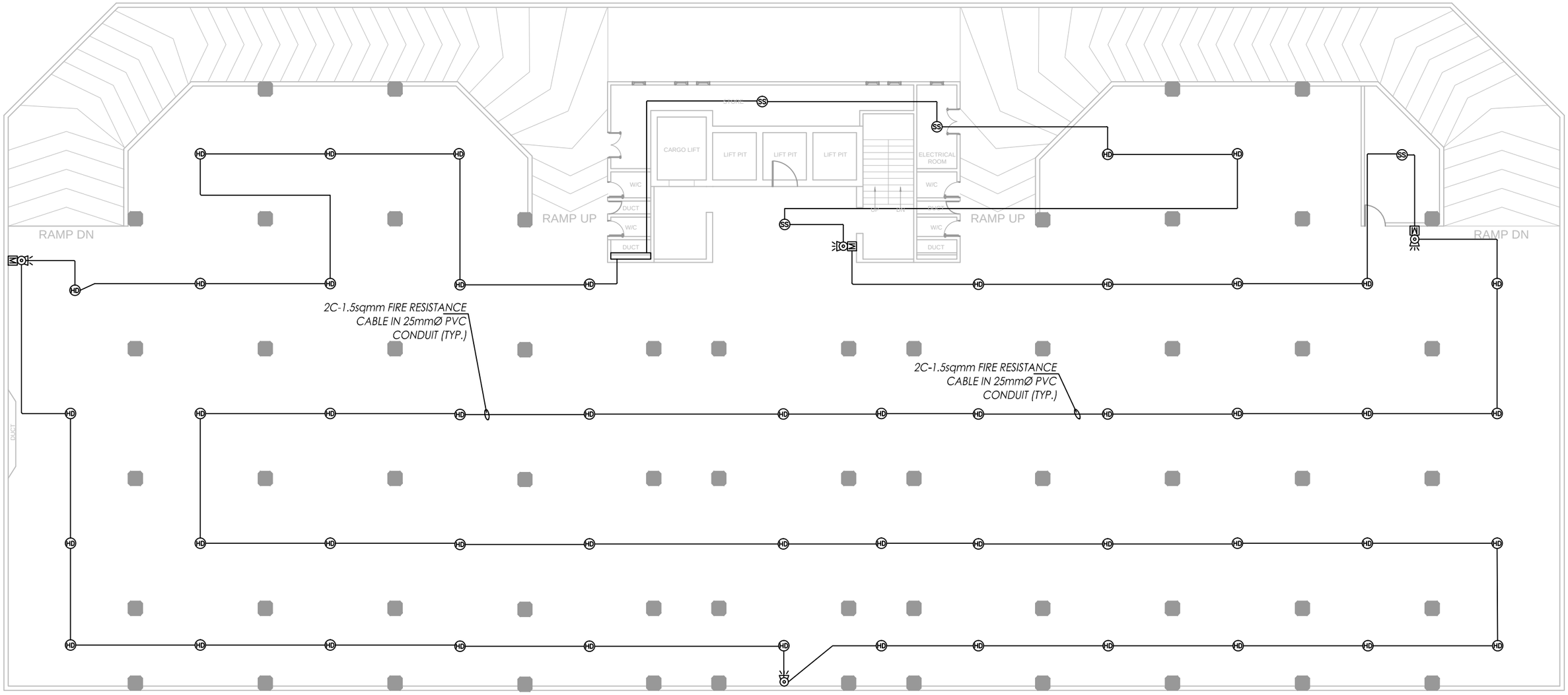
DATE
JUNE. 2026

DRAWN BY
HASSAN KHAN

SCALE
AS SHOWN

CHECKED BY
WAQAS SHAHAB

DWG. NO.
FA-04



LEGENDS

SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
	SOUNDER WITH FLASHER	8'-0" FFL
M	MANUAL BREAK GLASS	3'-6" FFL
I/O MOUDLE	INPUT/OUTPUT MODULE	WALL
FACP	FIRE ALARM CONTROL PANEL	3'-6" FFL

CLIENT:-

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus Consulting
Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsulttingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

FIRE ALARM SYSTEM
UPPER BASEMENT

REV #	DATE	DESCRIPTION	CHK'D	APP'D

Project Ref:
.

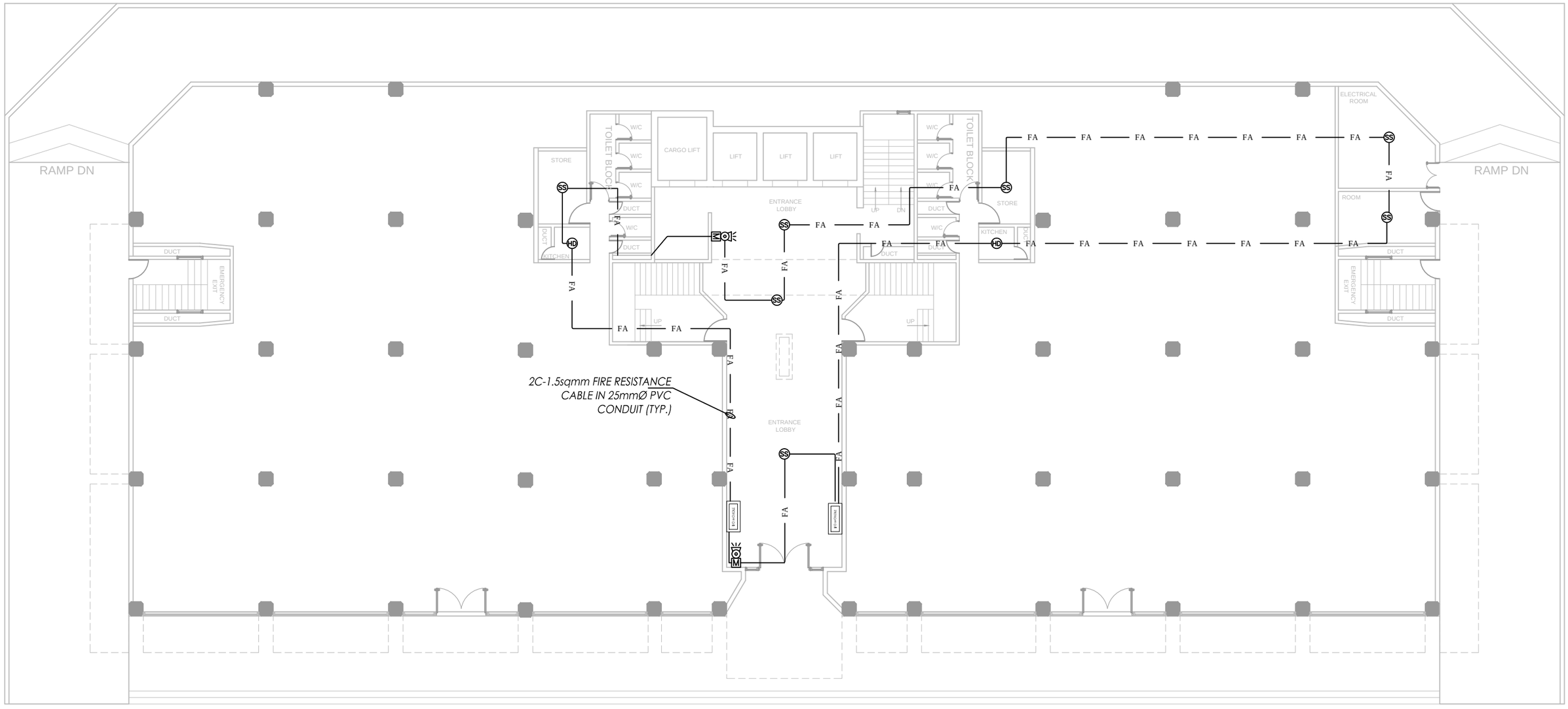
DRAWN BY
HASSAN KHAN

CHECKED BY
WAQAS SHAHAB

DATE
JUNE. 2026

SCALE
AS SHOWN

DWG. NO.
FA-05



LEGENDS

SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
	SOUNDER WITH FLASHER	8'-0" FFL
M	MANUAL BREAK GLASS	3'-6" FFL
I/O MOUDLE	INPUT/OUTPUT MODULE	WALL
FACP	FIRE ALARM CONTROL PANEL	3'-6" FFL

CLIENT:-

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus Consulting
Office A-202, Second Floor,Blossom Trade Center Opposite NED University
University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsultingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

FIRE ALARM SYSTEM
GROUND FLOOR

REV #	DATE	DESCRIPTION	CHK'D	APP'D

Project Ref:
.

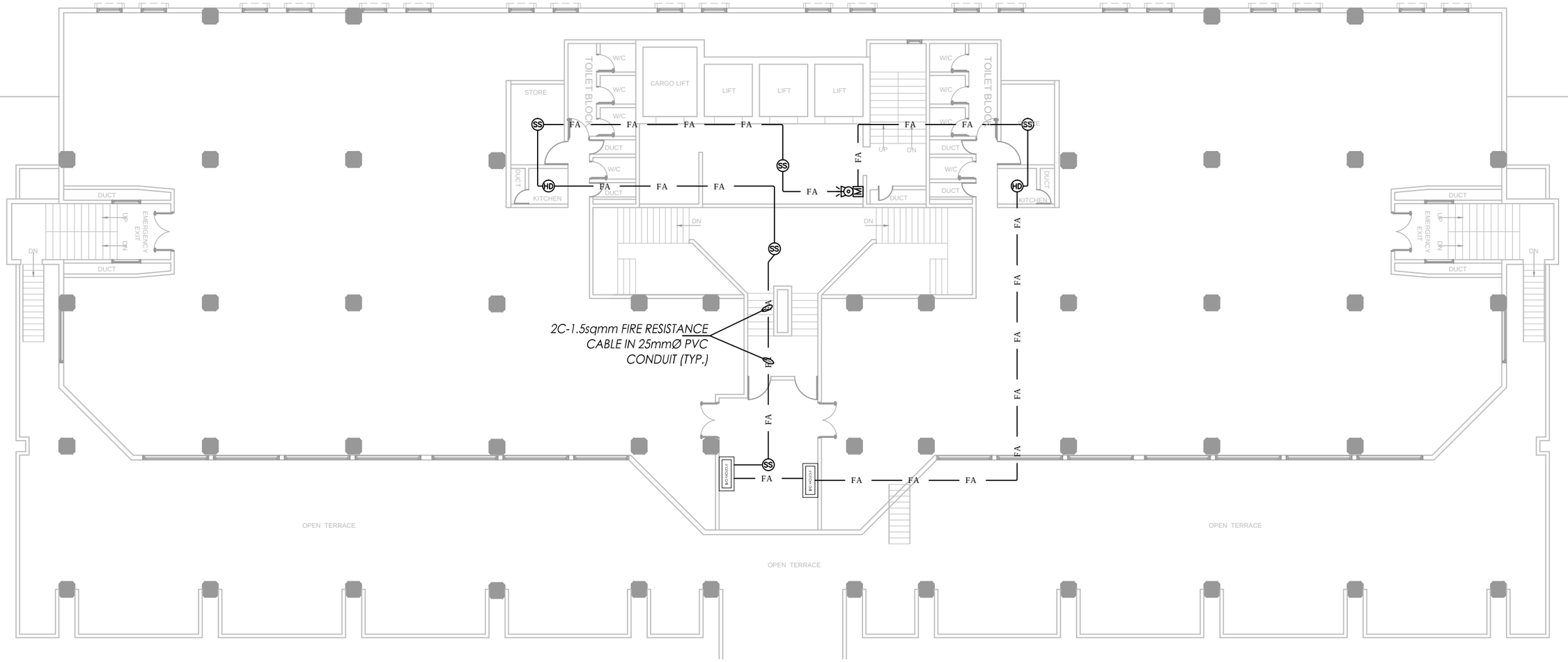
DATE
JUNE. 2026

DRAWN BY
HASSAN KHAN

SCALE
AS SHOWN

CHECKED BY
WAQAS SHAHAB

DWG. NO.
FA-06



LEGENDS

SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
	SOUNDER WITH FLASHER	8'-0" FFL
M	MANUAL BREAK GLASS	3'-6" FFL
I/O MOUDLE	INPUT/OUTPUT MODULE	WALL
FACP	FIRE ALARM CONTROL PANEL	3'-6" FFL

CLIENT:-

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus Consulting
Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsulttingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

FIRE ALARM SYSTEM
MEZZANINE FLOOR

REV #	DATE	DESCRIPTION	CHK'D	APP'D

Project Ref:
.

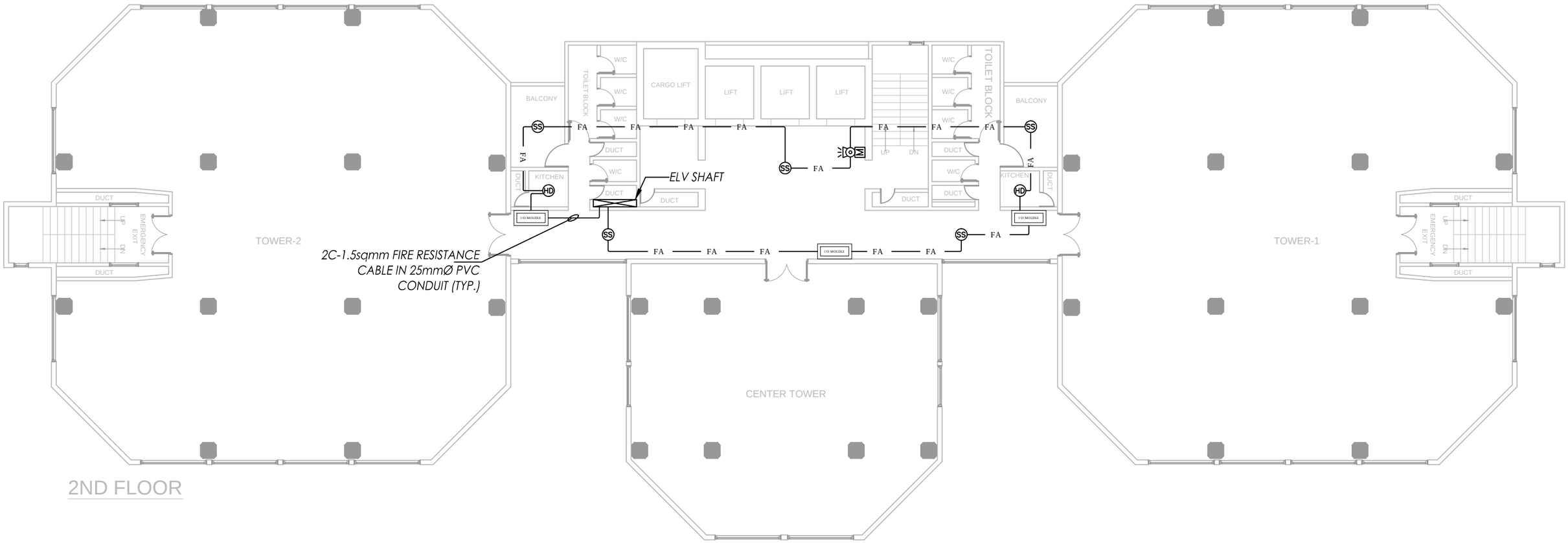
DRAWN BY
HASSAN KHAN

CHECKED BY
WAQAS SHAHAB

DATE
JUNE. 2026

SCALE
AS SHOWN

DWG. NO.
FA-07



LEGENDS

SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
	SOUNDER WITH FLASHER	8'-0" FFL
M	MANUAL BREAK GLASS	3'-6" FFL
I/O MOUDLE	INPUT/OUTPUT MODULE	WALL
FACP	FIRE ALARM CONTROL PANEL	3'-6" FFL

CLIENT:-

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus Consulting
Office A-202, Second Floor,Blossom Trade Center Opposite NED University
University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsulttingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

FIRE ALARM SYSTEM
SECOND FLOOR

REV #	DATE	DESCRIPTION	CHK'D	APP'D

Project Ref:
.

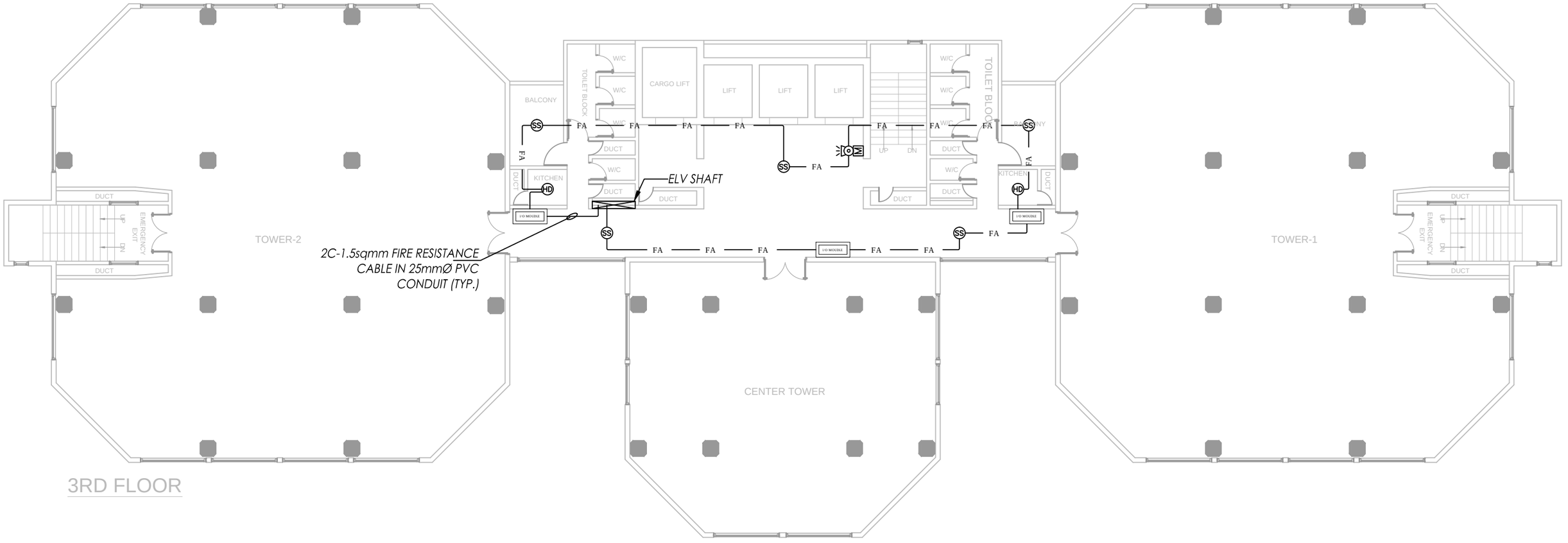
DRAWN BY
HASSAN KHAN

CHECKED BY
WAQAS SHAHAB

DATE
JUNE. 2026

SCALE
AS SHOWN

DWG. NO.
FA-08



LEGENDS

SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
	SOUNDER WITH FLASHER	8'-0" FFL
M	MANUAL BREAK GLASS	3'-6" FFL
I/O MOUDLE	INPUT/OUTPUT MODULE	WALL
FACP	FIRE ALARM CONTROL PANEL	3'-6" FFL

CLIENT:-

STATE LIFE INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus Consulting
Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsulttingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

FIRE ALARM SYSTEM
THIRD FLOOR

REV #	DATE	DESCRIPTION	CHK'D	APP'D

Project Ref:
.

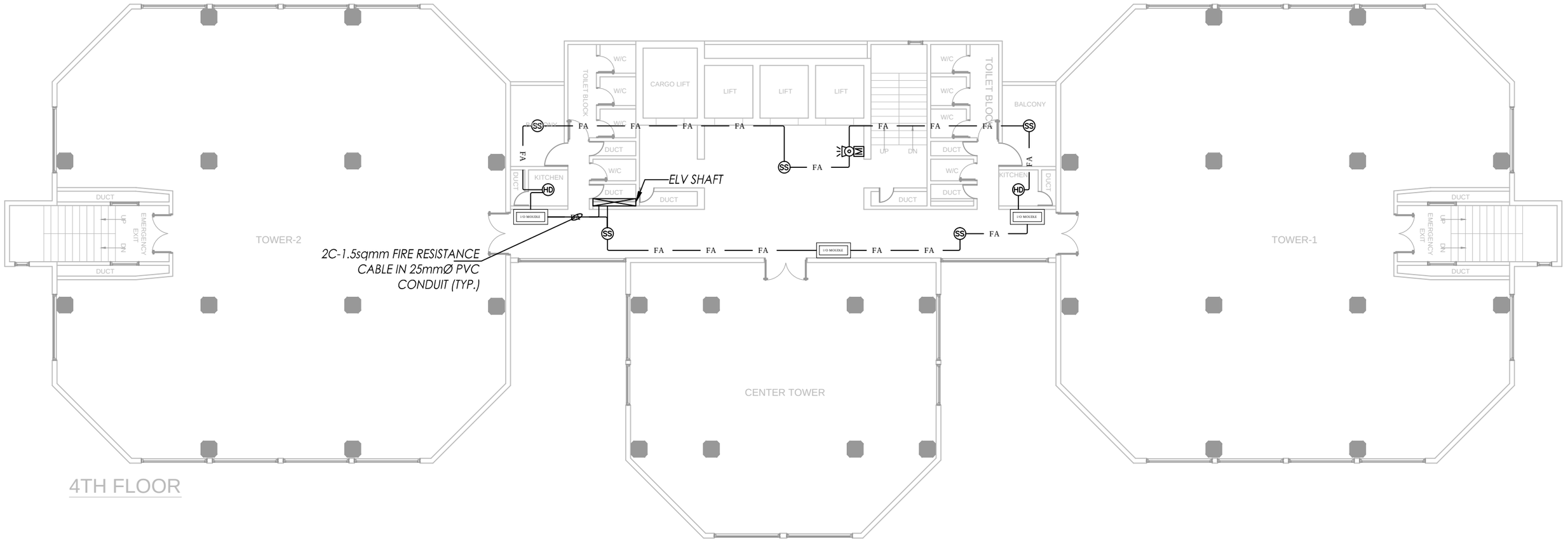
DATE
JUNE. 2026

DRAWN BY
HASSAN KHAN

SCALE
AS SHOWN

CHECKED BY
WAQAS SHAHAB

DWG. NO.
FA-09



LEGENDS

SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
	SOUNDER WITH FLASHER	8'-0" FFL
M	MANUAL BREAK GLASS	3'-6" FFL
I/O MOUDLE	INPUT/OUTPUT MODULE	WALL
FACP	FIRE ALARM CONTROL PANEL	3'-6" FFL

CLIENT:-

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus Consulting
Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsultingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

FIRE ALARM SYSTEM
FOURTH FLOOR

REV #	DATE	DESCRIPTION	CHK'D	APP'D

Project Ref:
.

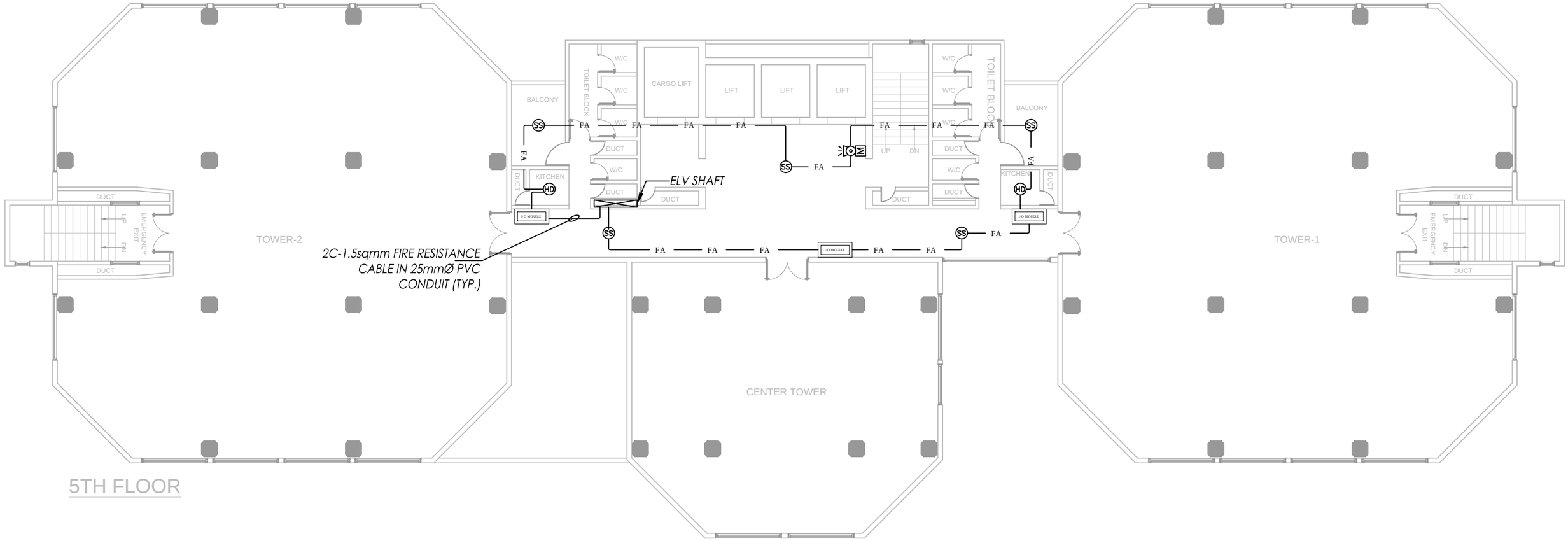
DATE
JUNE. 2026

DRAWN BY
HASSAN KHAN

SCALE
AS SHOWN

CHECKED BY
WAQAS SHAHAB

DWG. NO.
FA-10



LEGENDS

SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
	SOUNDER WITH FLASHER	8'-0" FFL
M	MANUAL BREAK GLASS	3'-6" FFL
I/O MOUDLE	INPUT/OUTPUT MODULE	WALL
FACP	FIRE ALARM CONTROL PANEL	3'-6" FFL

CLIENT:-

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus Consulting

Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsulttingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

FIRE ALARM SYSTEM
FIFTH FLOOR

REV #	DATE	DESCRIPTION	CHK'D	APP'D

Project Ref:
.

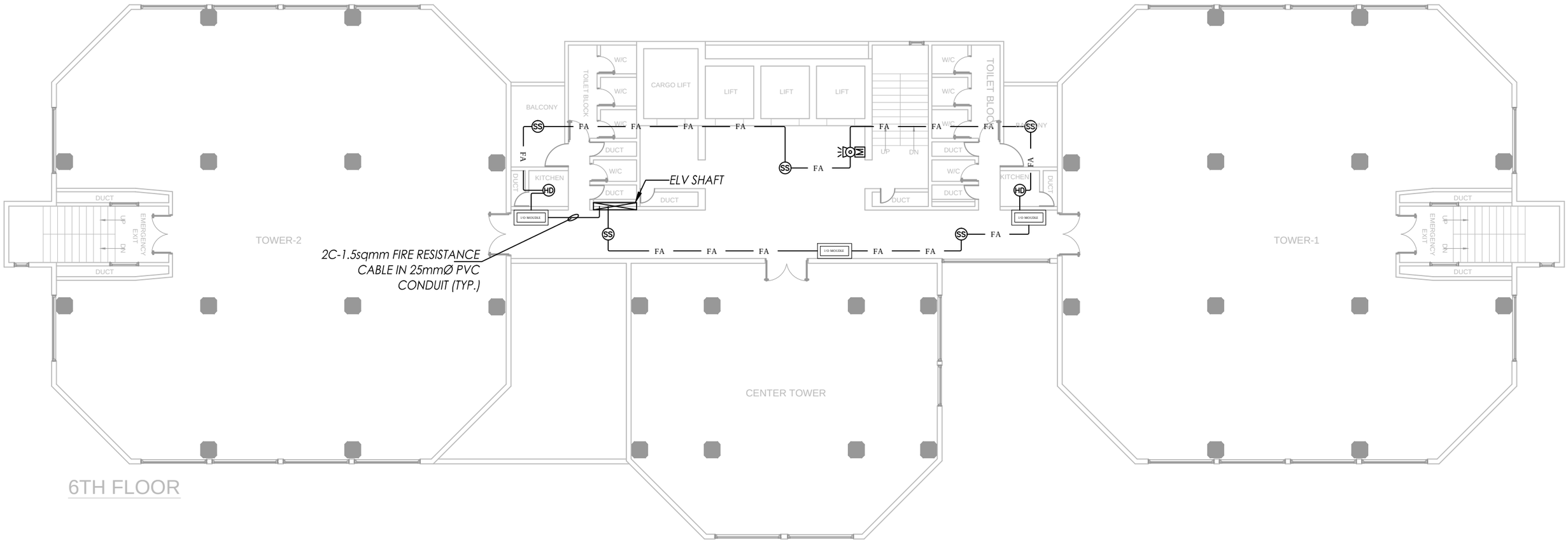
DRAWN BY
HASSAN KHAN

CHECKED BY
WAQAS SHAHAB

DATE
JUNE. 2026

SCALE
AS SHOWN

DWG. NO.
FA-11



LEGENDS

SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
	SOUNDER WITH FLASHER	8'-0" FFL
M	MANUAL BREAK GLASS	3'-6" FFL
I/O MOUDLE	INPUT/OUTPUT MODULE	WALL
FACP	FIRE ALARM CONTROL PANEL	3'-6" FFL

CLIENT:-

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus Consulting
Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsultingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

FIRE ALARM SYSTEM
SIXTH FLOOR

REV #	DATE	DESCRIPTION	CH'K'D	APP'D

Project Ref:
.

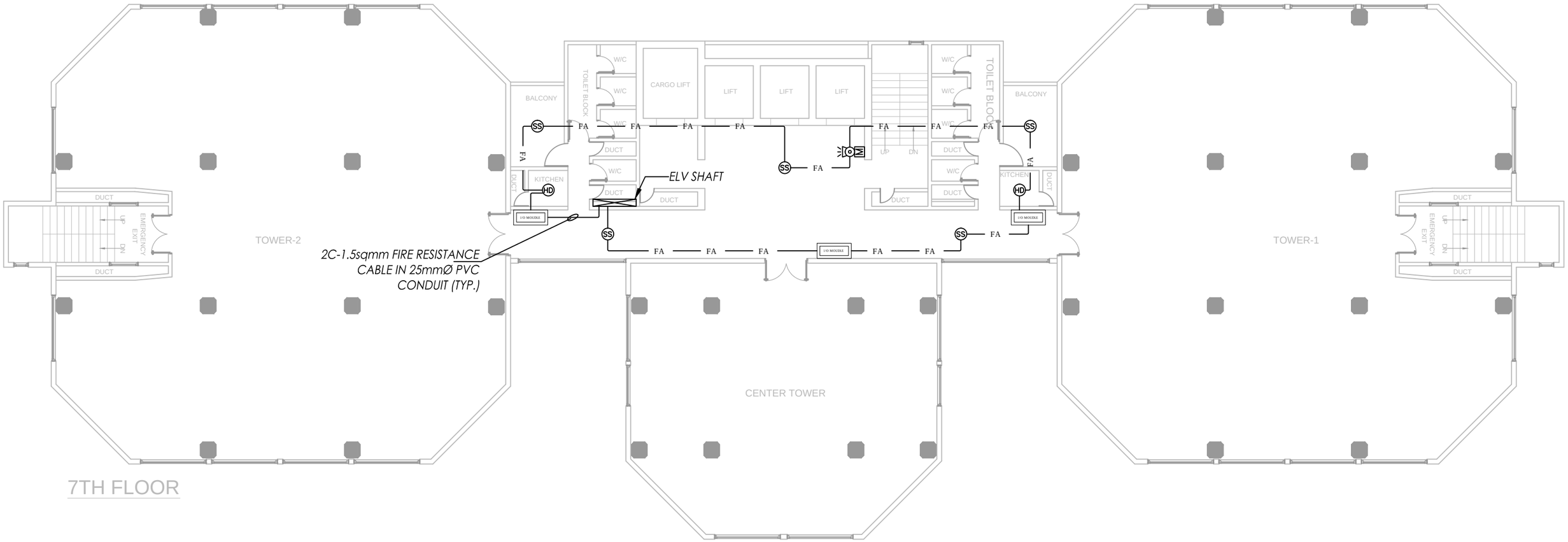
DATE
JUNE. 2026

DRAWN BY
HASSAN KHAN

SCALE
AS SHOWN

CHECKED BY
WAQAS SHAHAB

DWG. NO.
FA-12



7TH FLOOR

LEGENDS

SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
	SOUNDER WITH FLASHER	8'-0" FFL
M	MANUAL BREAK GLASS	3'-6" FFL
I/O MOUDLE	INPUT/OUTPUT MODULE	WALL
FACP	FIRE ALARM CONTROL PANEL	3'-6" FFL

CLIENT:-

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus Consulting
Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsulttingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

FIRE ALARM SYSTEM
SEVENTH FLOOR

REV #	DATE	DESCRIPTION	CHK'D	APP'D

Project Ref:
.

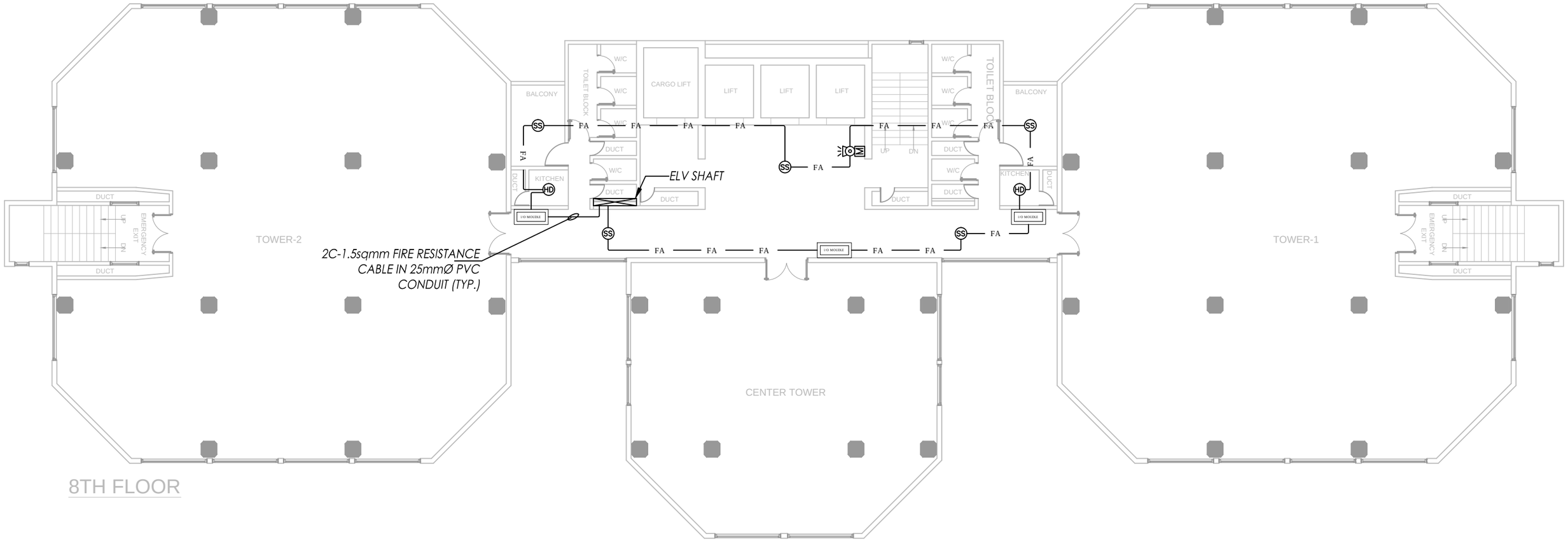
DATE
JUNE. 2026

DRAWN BY
HASSAN KHAN

SCALE
AS SHOWN

CHECKED BY
WAQAS SHAHAB

DWG. NO.
FA-13



8TH FLOOR

LEGENDS

SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
	SOUNDER WITH FLASHER	8'-0" FFL
M	MANUAL BREAK GLASS	3'-6" FFL
I/O MOUDLE	INPUT/OUTPUT MODULE	WALL
FACP	FIRE ALARM CONTROL PANEL	3'-6" FFL

CLIENT:-

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus Consulting
Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsultingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

FIRE ALARM SYSTEM
EIGHT FLOOR

REV #	DATE	DESCRIPTION	CH'K'D	APP'D

Project Ref:
.

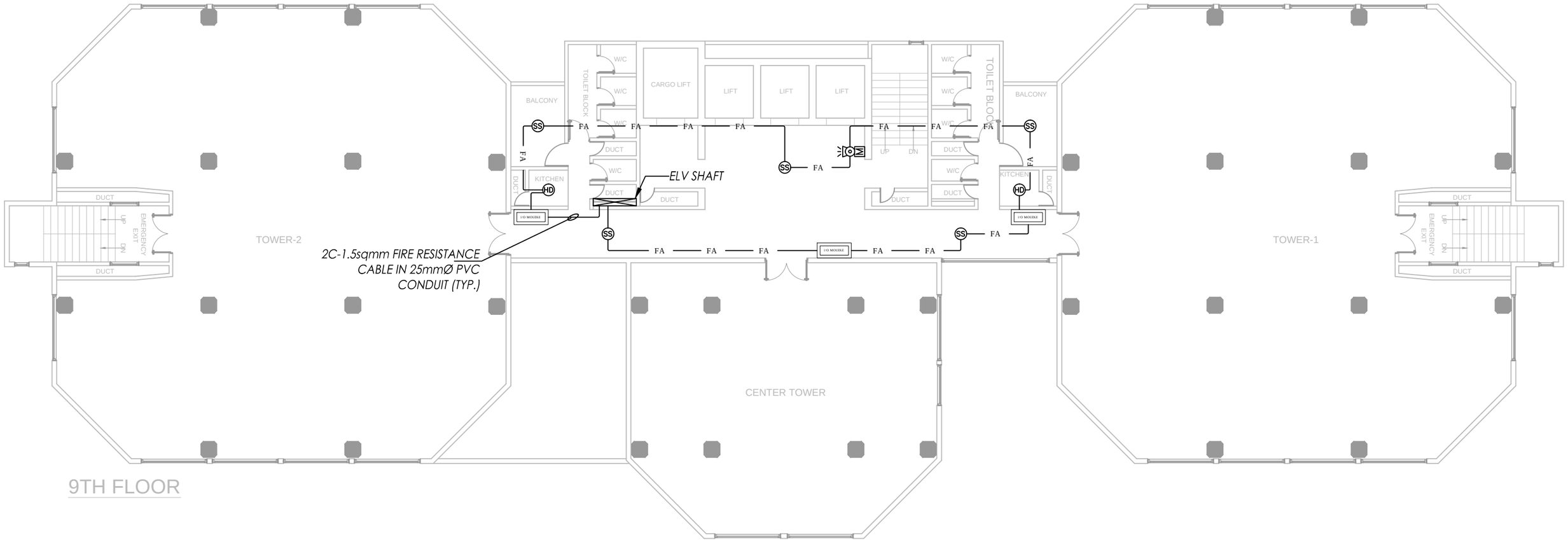
DRAWN BY
HASSAN KHAN

CHECKED BY
WAQAS SHAHAB

DATE
JUNE. 2026

SCALE
AS SHOWN

DWG. NO.
FA-14



9TH FLOOR

LEGENDS

SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
	SOUNDER WITH FLASHER	8'-0" FFL
M	MANUAL BREAK GLASS	3'-6" FFL
I/O MOUDLE	INPUT/OUTPUT MODULE	WALL
FACP	FIRE ALARM CONTROL PANEL	3'-6" FFL

CLIENT:-

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus Consulting
Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsultingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

FIRE ALARM SYSTEM
NINTH FLOOR

REV #	DATE	DESCRIPTION	CHK'D	APP'D

Project Ref:
.

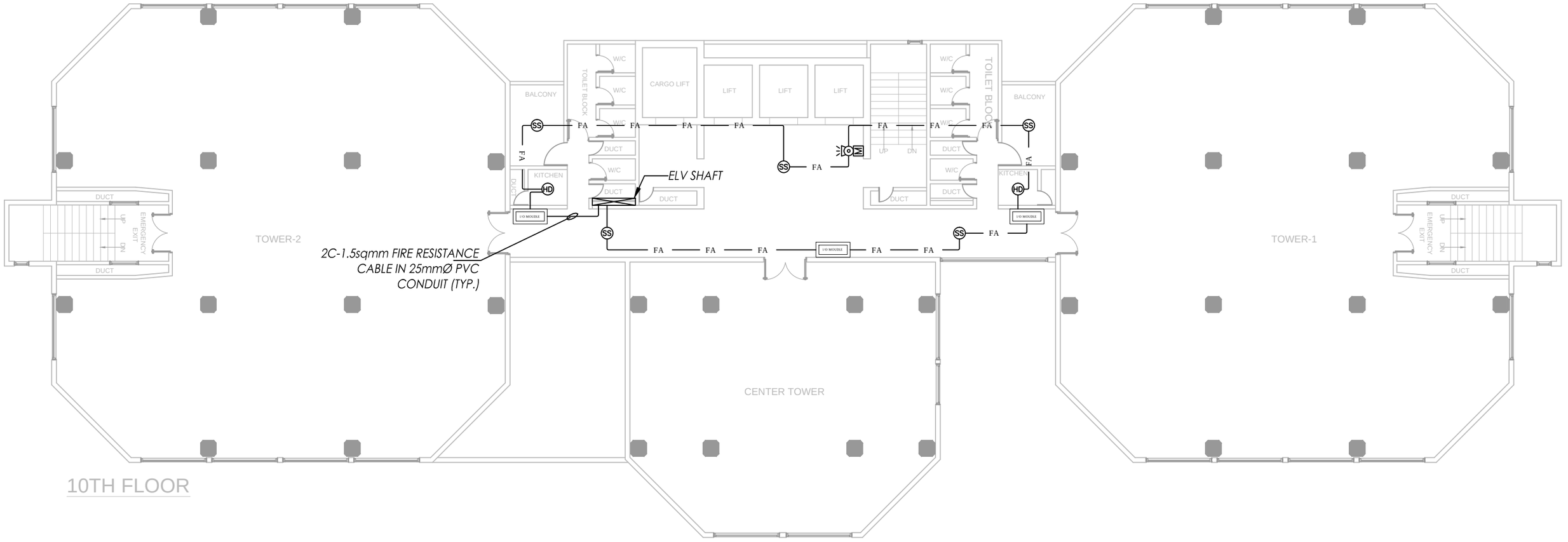
DATE
JUNE. 2026

DRAWN BY
HASSAN KHAN

SCALE
AS SHOWN

CHECKED BY
WAQAS SHAHAB

DWG. NO.
FA-15



10TH FLOOR

LEGENDS

SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
	SOUNDER WITH FLASHER	8'-0" FFL
M	MANUAL BREAK GLASS	3'-6" FFL
I/O MOUDLE	INPUT/OUTPUT MODULE	WALL
FACP	FIRE ALARM CONTROL PANEL	3'-6" FFL

CLIENT:-

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus Consulting
Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsultingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

FIRE ALARM SYSTEM
TENTH FLOOR

REV #	DATE	DESCRIPTION	CHK'D	APP'D

Project Ref:
.

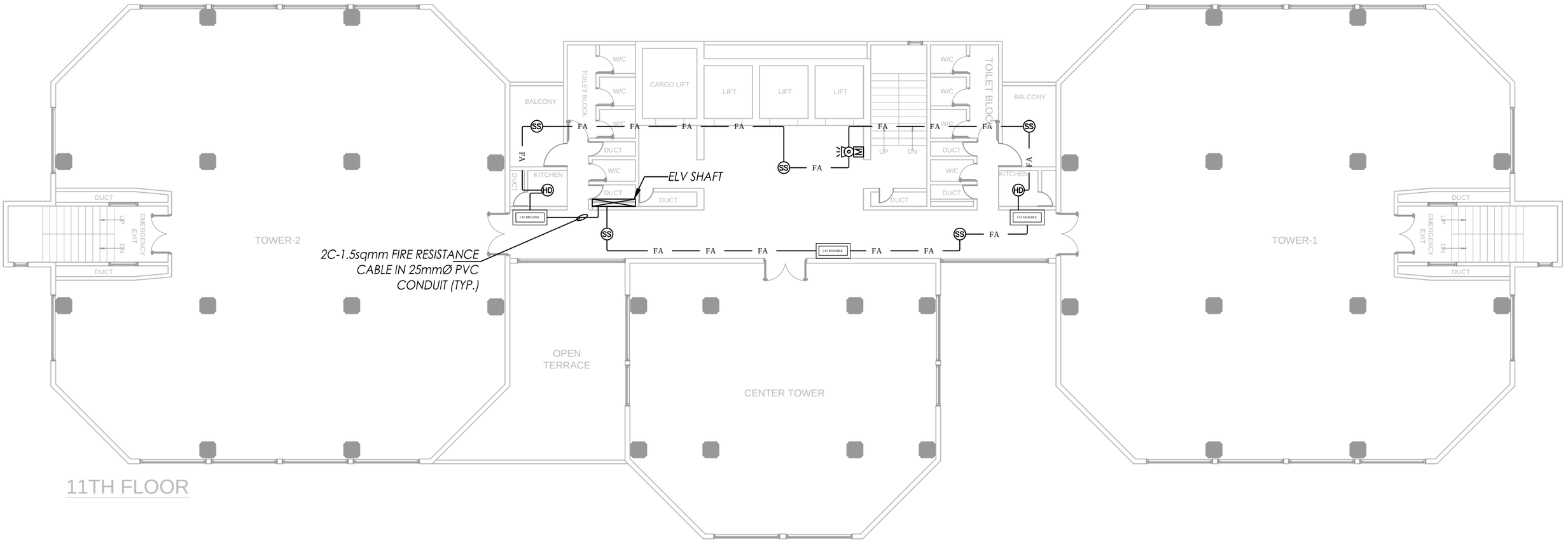
DATE
JUNE. 2026

DRAWN BY
HASSAN KHAN

SCALE
AS SHOWN

CHECKED BY
WAQAS SHAHAB

DWG. NO.
FA-16



LEGENDS

SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
	SOUNDER WITH FLASHER	8'-0" FFL
M	MANUAL BREAK GLASS	3'-6" FFL
I/O MOUDLE	INPUT/OUTPUT MODULE	WALL
FACP	FIRE ALARM CONTROL PANEL	3'-6" FFL

CLIENT:-

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus Consulting
Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsultingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

FIRE ALARM SYSTEM
ELEVENTH FLOOR

REV #	DATE	DESCRIPTION	CHK'D	APP'D

Project Ref:
.

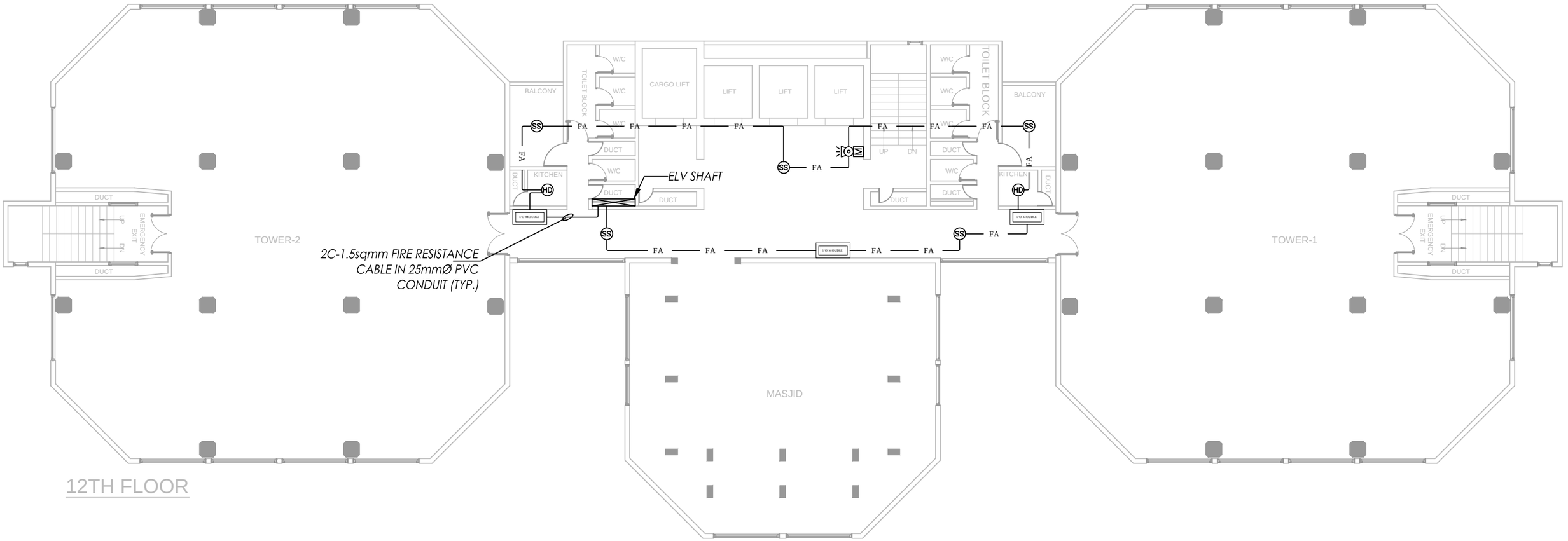
DATE
JUNE. 2026

DRAWN BY
HASSAN KHAN

SCALE
AS SHOWN

CHECKED BY
WAQAS SHAHAB

DWG. NO.
FA-17



12TH FLOOR

LEGENDS

SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
	SOUNDER WITH FLASHER	8'-0" FFL
M	MANUAL BREAK GLASS	3'-6" FFL
I/O MOUDLE	INPUT/OUTPUT MODULE	WALL
FACP	FIRE ALARM CONTROL PANEL	3'-6" FFL

CLIENT:-
STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:
Nexus Consulting
Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsultingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-
STATE LIFE BUILDING NO.11

TITLE:-
FIRE ALARM SYSTEM
TWELFTH FLOOR

REV #	DATE	DESCRIPTION	CH'K'D	APP'D

Project Ref:
.

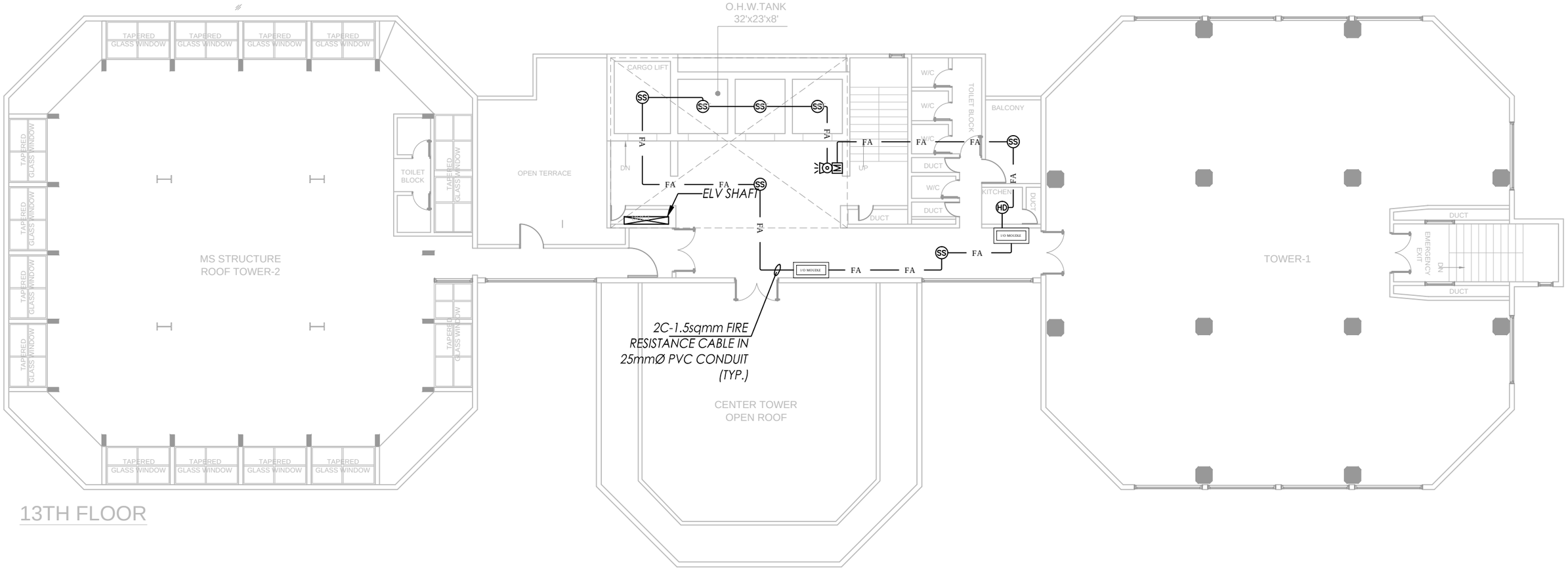
DATE
JUNE. 2026

DRAWN BY
HASSAN KHAN

SCALE
AS SHOWN

CHECKED BY
WAQAS SHAHAB

DWG. NO.
FA-18



LEGENDS

SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
	SOUNDER WITH FLASHER	8'-0" FFL
M	MANUAL BREAK GLASS	3'-6" FFL
I/O MOUDLE	INPUT/OUTPUT MODULE	WALL
FACP	FIRE ALARM CONTROL PANEL	3'-6" FFL

CLIENT:-

STATE LIFE INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus Consulting
Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsulttingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

FIRE ALARM SYSTEM
THIRTEEN FLOOR

REV #	DATE	DESCRIPTION	CHK'D	APP'D

Project Ref: .

DATE: JUNE. 2026

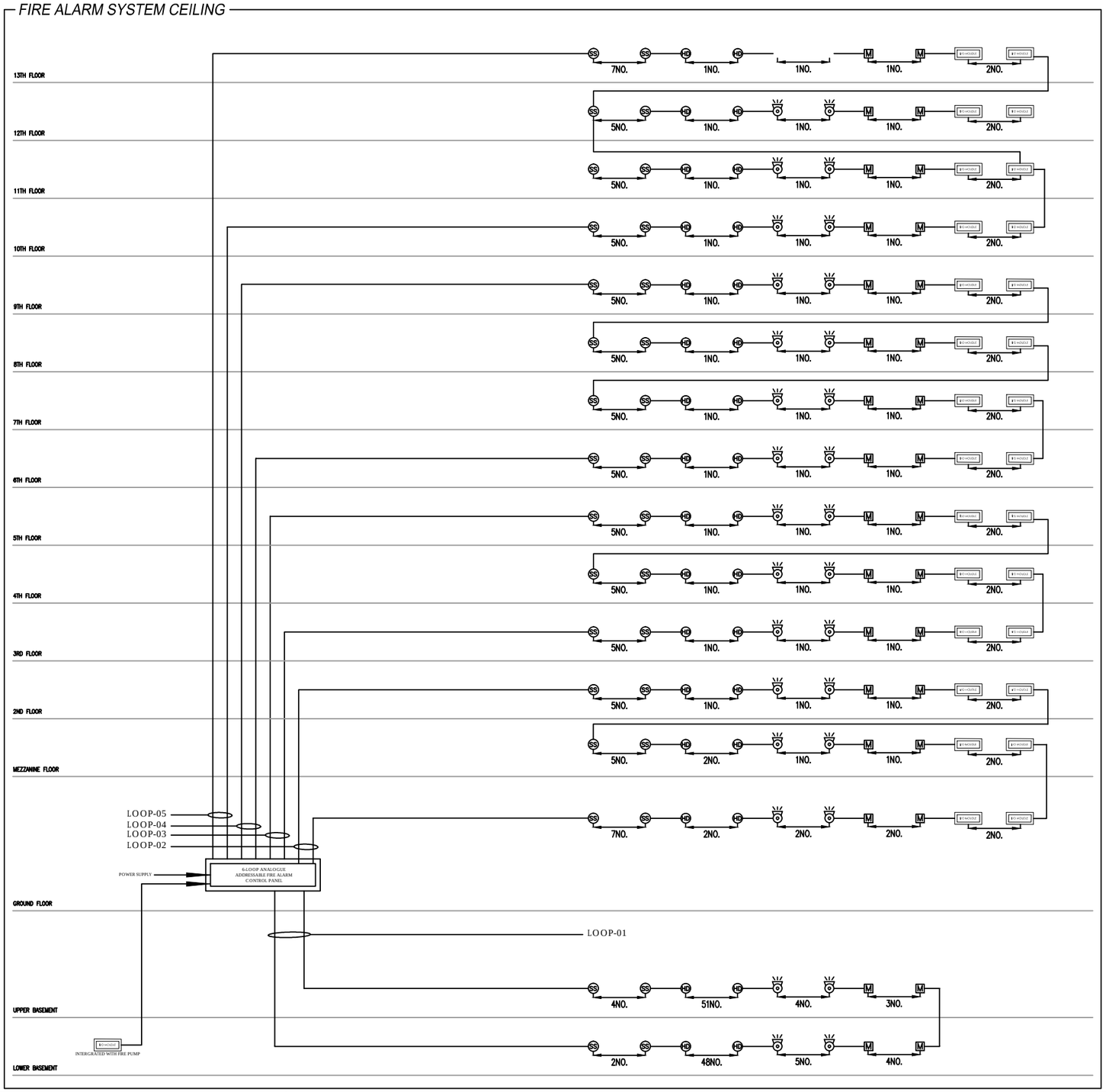
DRAWN BY: HASSAN KHAN

SCALE: AS SHOWN

CHECKED BY: WAQAS SHAHAB

DWG. NO.: FA-19

FIRE ALARM SYSTEM CEILING



CLIENT:-

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus Consulting

Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsulttingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

FIRE ALARM SYSTEM RISER

REV #	DATE	DESCRIPTION	CHK'D	APP'D

Project Ref:
.

DATE
JUNE. 2026

DRAWN BY
HASSAN KHAN

SCALE
AS SHOWN

CHECKED BY
WAQAS SHAHAB

DWG. NO.
FA-20

STATE LIFE BUILDING NO.11

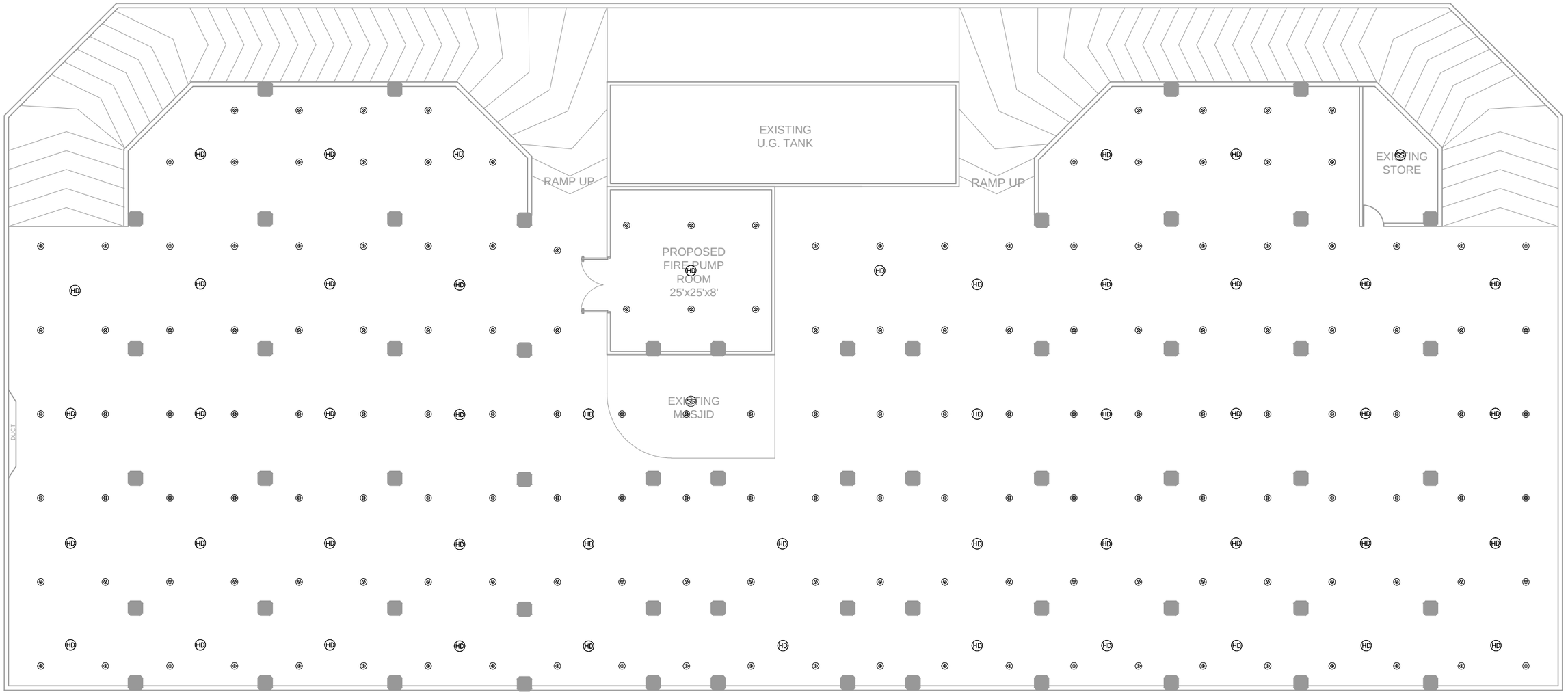
(LOWER BASEMENT, TO 13th FLOOR)

CLIENT:

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus
Consulting



LOWER BASEMENT

LEGENDS		
SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
	PENDENT CONCEALED SPRINKLER	CEILING
	UPRIGHT SPRINKLER	
	REELECTED CEILING AREA	

CLIENT:-

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus
Consulting
Office A-202, Second Floor,Blossom Trade Center Opposite NED University
University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsulttingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-

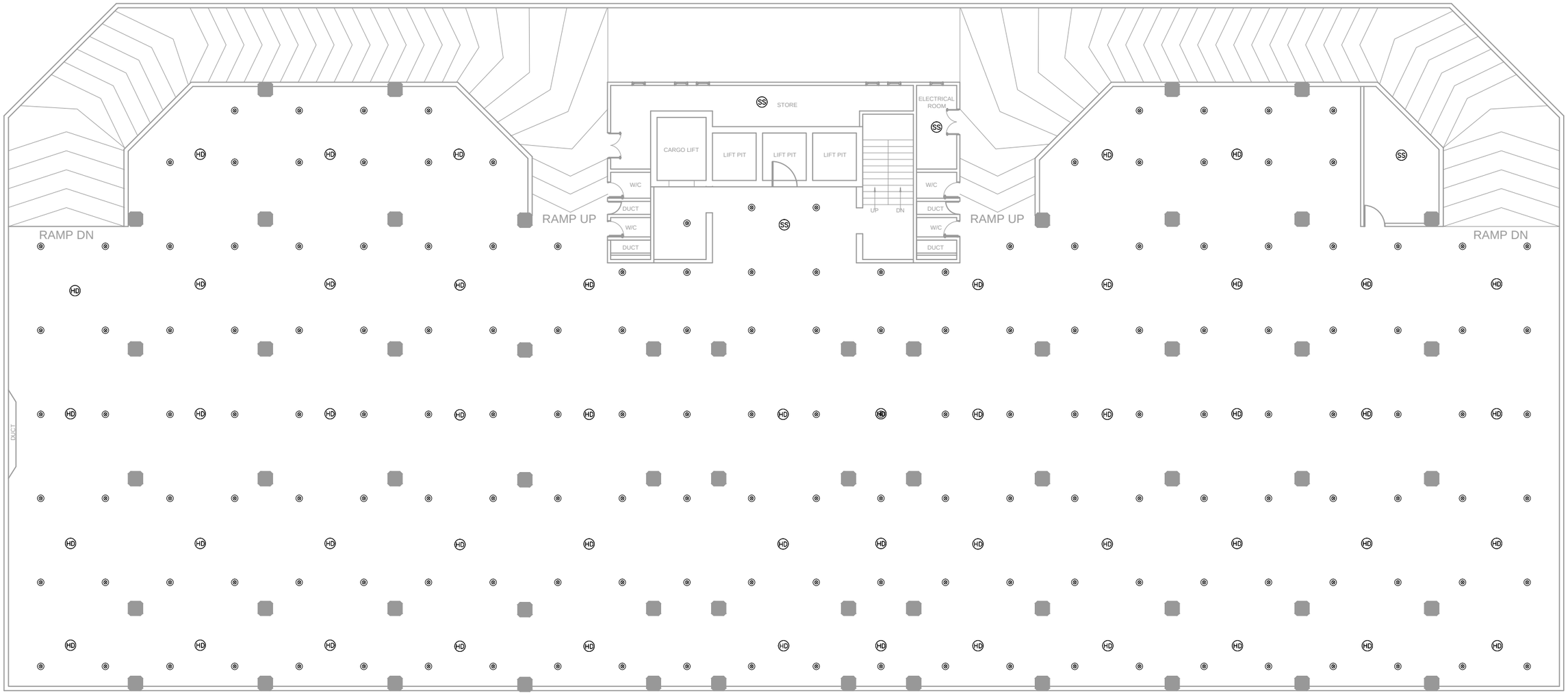
STATE LIFE BUILDING NO.11

TITLE:-

BUILDING
CEILING PLAN

REV #	DATE	DESCRIPTION	CHK'D	APP'D

Project Ref: .	DATE JULY. 2026
DRAWN BY A-A	SCALE AS SHOWN
CHECKED BY O-A	DWG. NO. BC-01



UPPER BASEMENT

LEGENDS		
SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
	PENDENT CONCEALED SPRINKLER	CEILING
	UPRIGHT SPRINKLER	
	REELECTED CEILING AREA	

CLIENT:-

STATE LIFE INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus Consulting
Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
Phone:021-37240670
Email:nexusconsulttingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

BUILDING CEILING PLAN

REV #	DATE	DESCRIPTION	CHK'D	APP'D

Project Ref: .

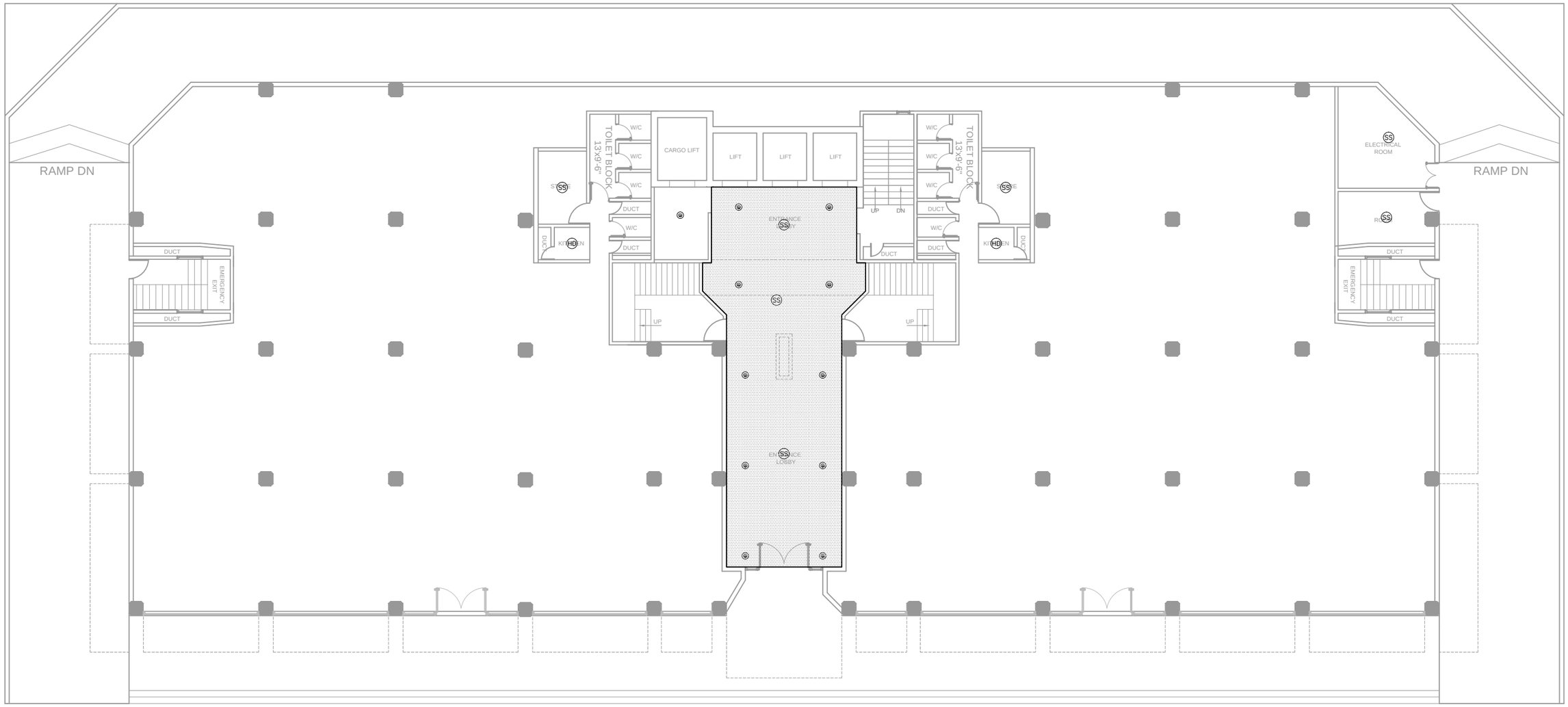
DRAWN BY A-A

CHECKED BY O-A

DATE JULY, 2026

SCALE AS SHOWN

DWG. NO. BC-02



GROUND FLOOR

LEGENDS		
SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
	PENDENT CONCEALED SPRINKLER	CEILING
	UPRIGHT SPRINKLER	
	REELECTED CEILING AREA	

CLIENT:-

STATE LIFE INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus Consulting
Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
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PROJECT:-

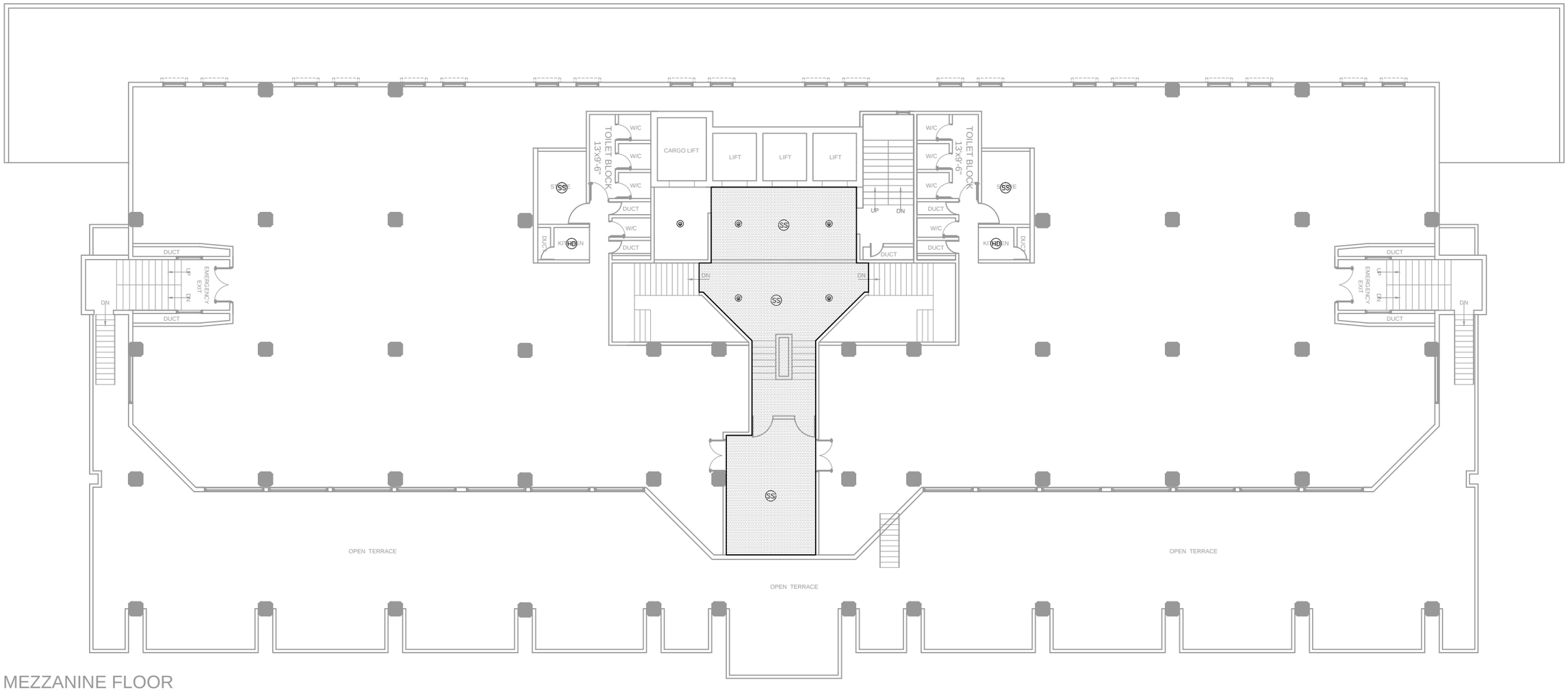
STATE LIFE BUILDING NO.11

TITLE:-

BUILDING CEILING PLAN

REV #	DATE	DESCRIPTION	CHK'D	APP'D

Project Ref: .	DATE JULY. 2026
DRAWN BY A-A	SCALE AS SHOWN
CHECKED BY O-A	DWG. NO. BC-03



MEZZANINE FLOOR

LEGENDS		
SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
	PENDENT CONCEALED SPRINKLER	CEILING
	UPRIGHT SPRINKLER	
	REELECTED CEILING AREA	

CLIENT:-

STATE LIFE INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

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PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

BUILDING CEILING PLAN

REV #	DATE	DESCRIPTION	CH'K'D	APP'D

Project Ref: .

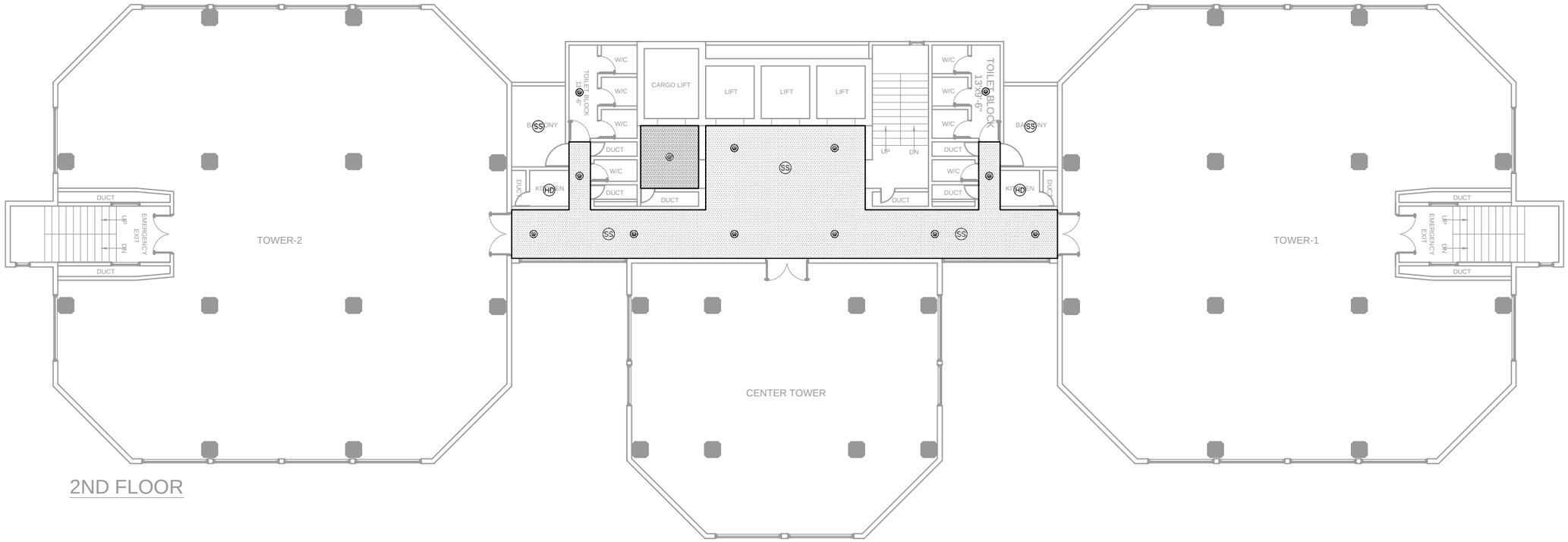
DATE: JULY. 2026

DRAWN BY: A-A

SCALE: AS SHOWN

CHECKED BY: O-A

DWG. NO.: BC-04



2ND FLOOR

LEGENDS		
SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
	PENDENT CONCEALED SPRINKLER	CEILING
	UPRIGHT SPRINKLER	
	REELECTED CEILING AREA	

CLIENT:-

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

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PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

BUILDING CEILING PLAN

REV #	DATE	DESCRIPTION	CHK'D	APP'D

Project Ref: .

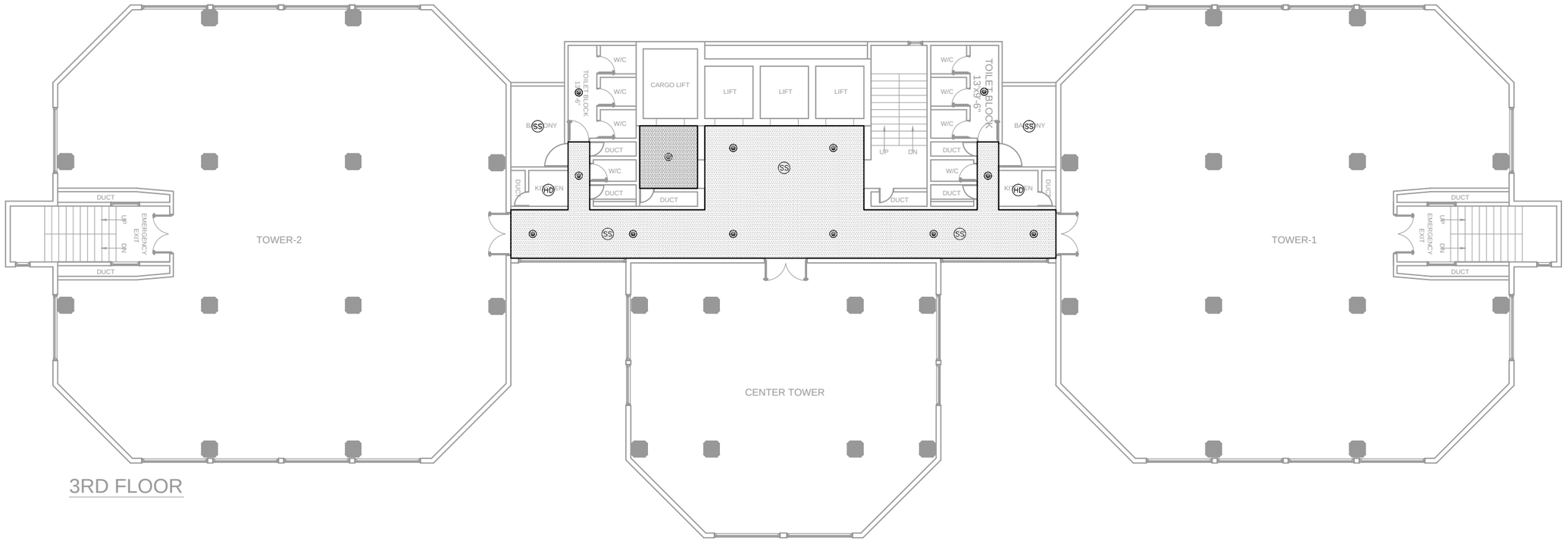
DRAWN BY A-A

CHECKED BY O-A

DATE JULY. 2026

SCALE AS SHOWN

DWG. NO. BC-05



3RD FLOOR

LEGENDS		
SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
⊗	PENDENT CONCEALED SPRINKLER	CEILING
⊗	UPRIGHT SPRINKLER	
	REELECTED CEILING AREA	

CLIENT:-

STATE LIFE
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PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

BUILDING CEILING PLAN

REV #	DATE	DESCRIPTION	CH'K'D	APP'D

Project Ref: .

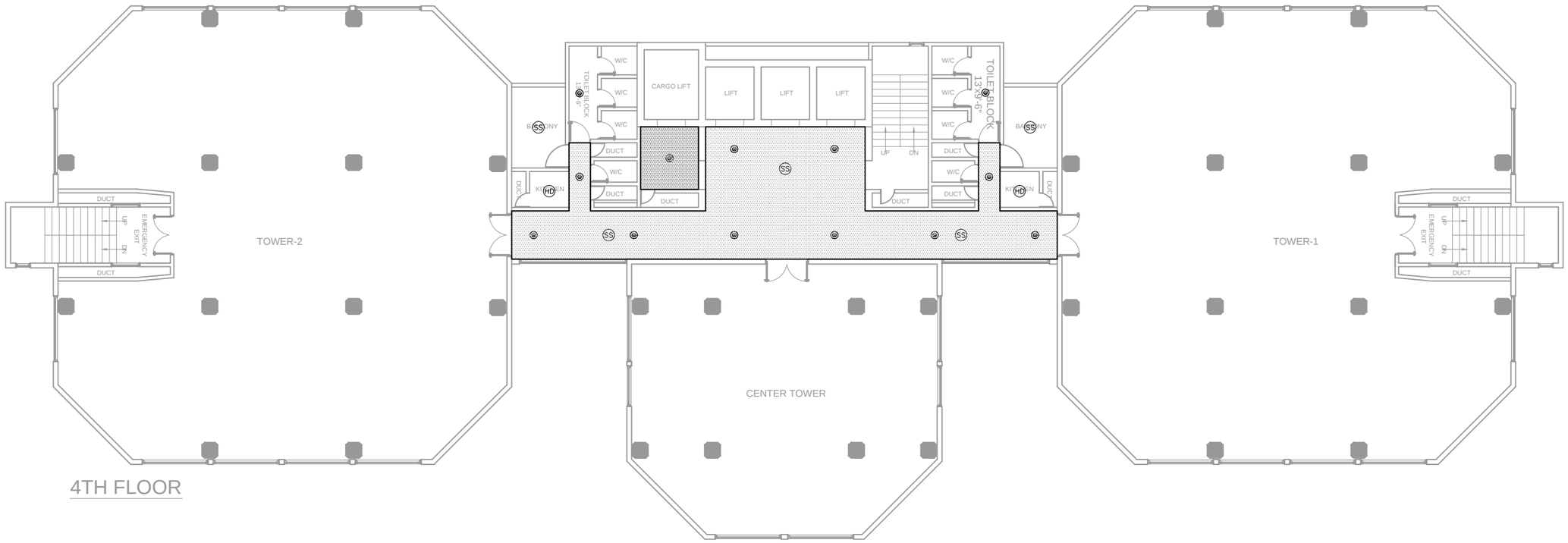
DRAWN BY A-A

CHECKED BY O-A

DATE JULY. 2026

SCALE AS SHOWN

DWG. NO. BC-06



4TH FLOOR

LEGENDS		
SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
	PENDENT CONCEALED SPRINKLER	CEILING
	UPRIGHT SPRINKLER	
	REELECTED CEILING AREA	

CLIENT:-

STATE LIFE INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

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PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

BUILDING CEILING PLAN

REV #	DATE	DESCRIPTION	CHK'D	APP'D

Project Ref: -

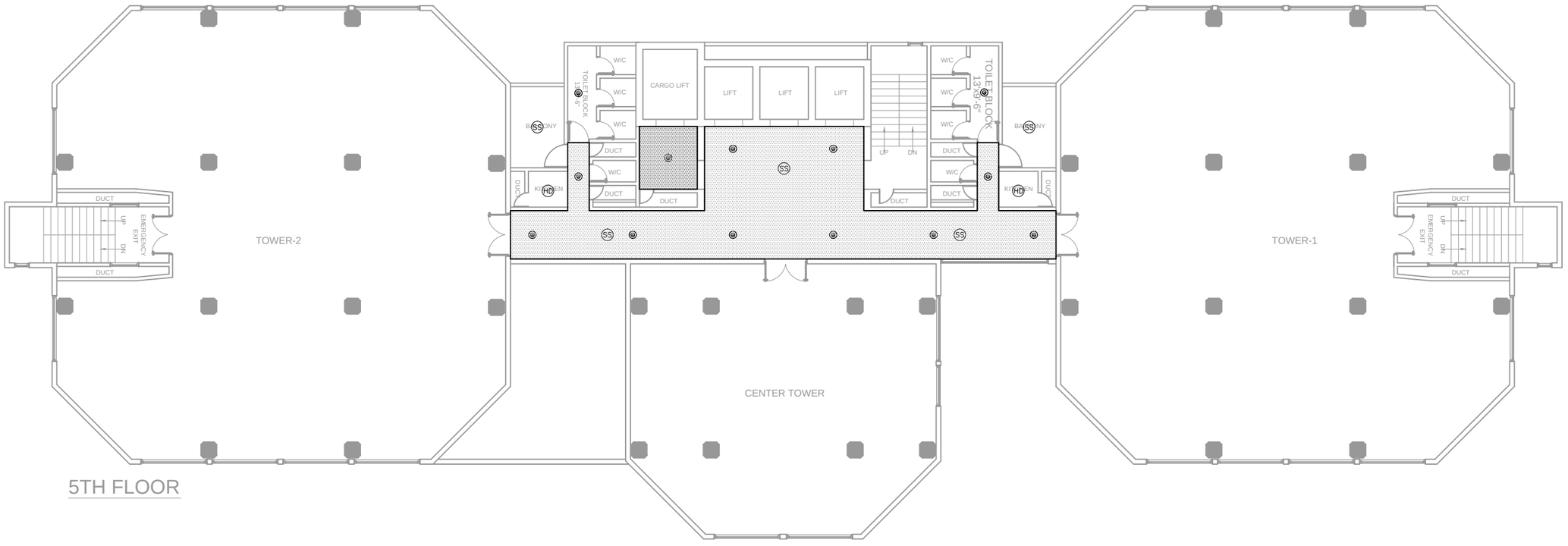
DRAWN BY A-A

CHECKED BY O-A

DATE JULY. 2026

SCALE AS SHOWN

DWG. NO. BC-07



5TH FLOOR

LEGENDS		
SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
	PENDENT CONCEALED SPRINKLER	CEILING
	UPRIGHT SPRINKLER	
	REELECTED CEILING AREA	

CLIENT:-

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus Consulting
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Phone:021-37240670
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PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

BUILDING CEILING PLAN

REV #	DATE	DESCRIPTION	CH'K'D	APP'D

Project Ref: .

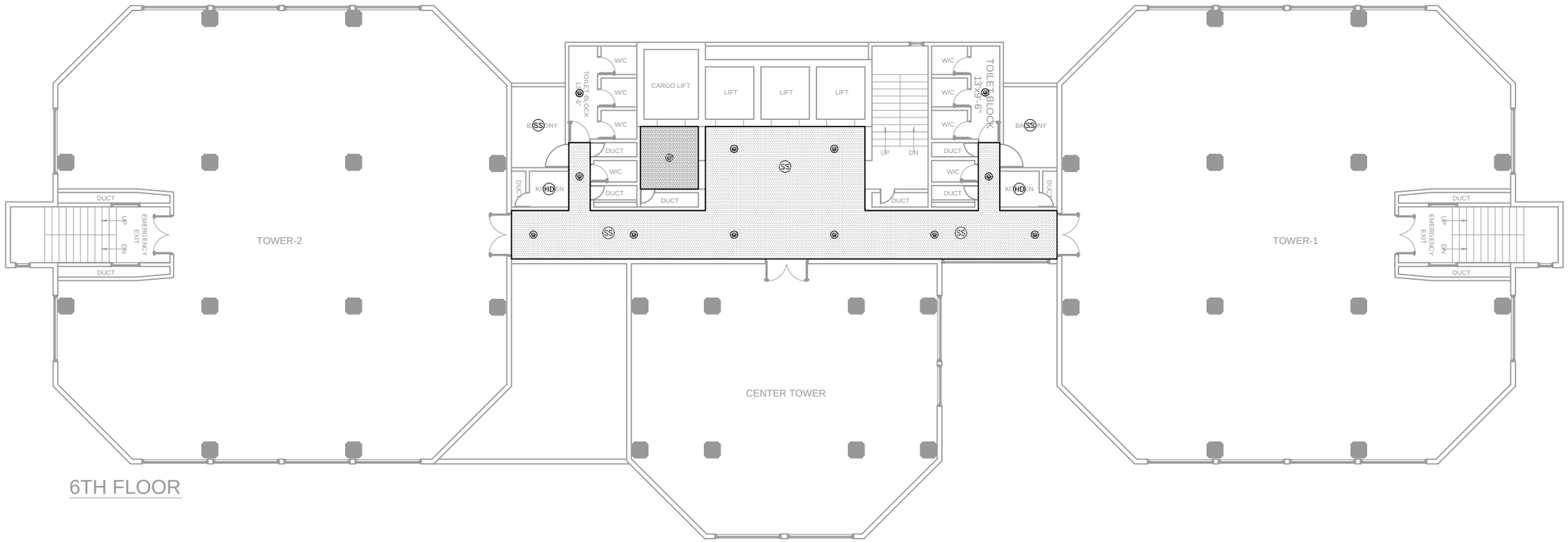
DATE: JULY, 2026

DRAWN BY: A-A

SCALE: AS SHOWN

CHECKED BY: O-A

DWG. NO.: BC-08



LEGENDS		
SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
	PENDENT CONCEALED SPRINKLER	CEILING
	UPRIGHT SPRINKLER	
	REELECTED CEILING AREA	

CLIENT:-

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

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Phone:021-37240670
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PROJECT:-

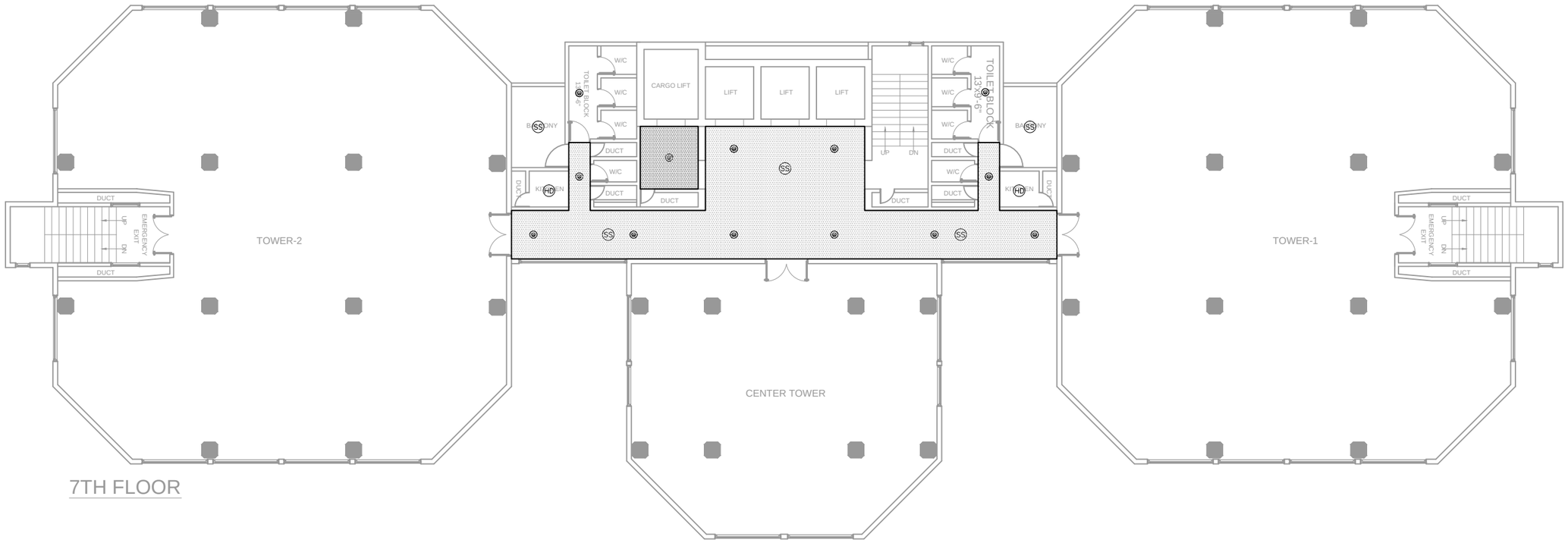
STATE LIFE BUILDING NO.11

TITLE:-

BUILDING CEILING PLAN

REV #	DATE	DESCRIPTION	CH'K'D	APP'D

Project Ref: .	DATE JULY. 2026
DRAWN BY A-A	SCALE AS SHOWN
CHECKED BY O-A	DWG. NO. BC-09



7TH FLOOR

LEGENDS		
SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
	PENDENT CONCEALED SPRINKLER	CEILING
	UPRIGHT SPRINKLER	
	REELECTED CEILING AREA	

CLIENT:-

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

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Office A-202, Second Floor,Blossom Trade Center Opposite NED University
University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
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PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

BUILDING CEILING PLAN

REV #	DATE	DESCRIPTION	CH'K'D	APP'D

Project Ref:
.

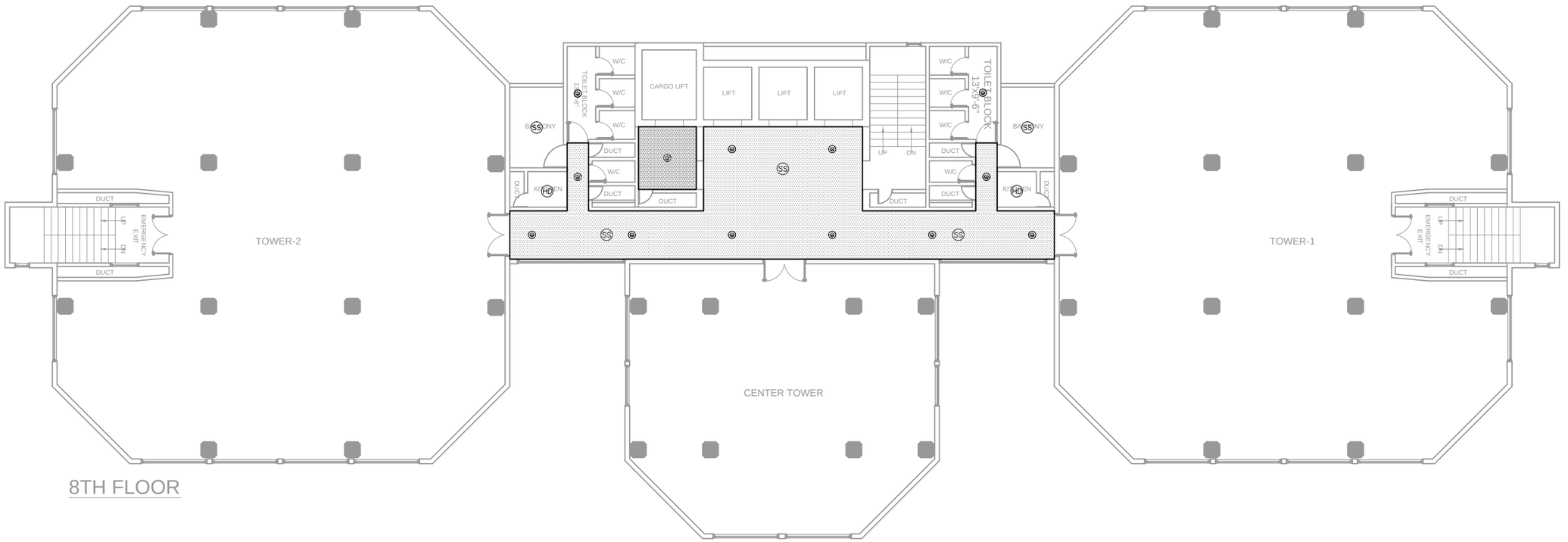
DATE: JULY. 2026

DRAWN BY: A-A

SCALE: AS SHOWN

CHECKED BY: O-A

DWG. NO.: BC-10



LEGENDS		
SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
⊗	PENDENT CONCEALED SPRINKLER	CEILING
⊗	UPRIGHT SPRINKLER	
	REELECTED CEILING AREA	

CLIENT:-

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PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

BUILDING CEILING PLAN

REV #	DATE	DESCRIPTION	CH'K'D	APP'D

Project Ref:
.

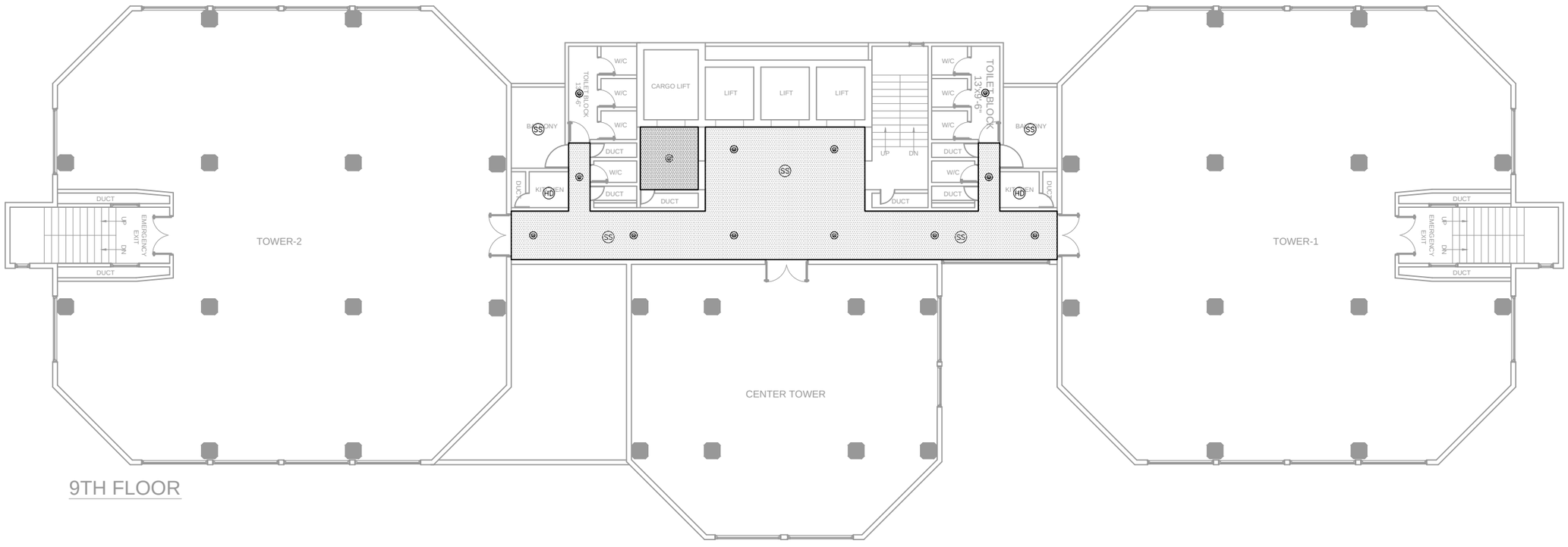
DATE
JULY. 2026

DRAWN BY
A-A

SCALE
AS SHOWN

CHECKED BY
O-A

DWG. NO.
BC-11



9TH FLOOR

LEGENDS		
SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
	PENDENT CONCEALED SPRINKLER	CEILING
	UPRIGHT SPRINKLER	
	REELECTED CEILING AREA	

CLIENT:-

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

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PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

BUILDING CEILING PLAN

REV #	DATE	DESCRIPTION	CH'K'D	APP'D

Project Ref: .

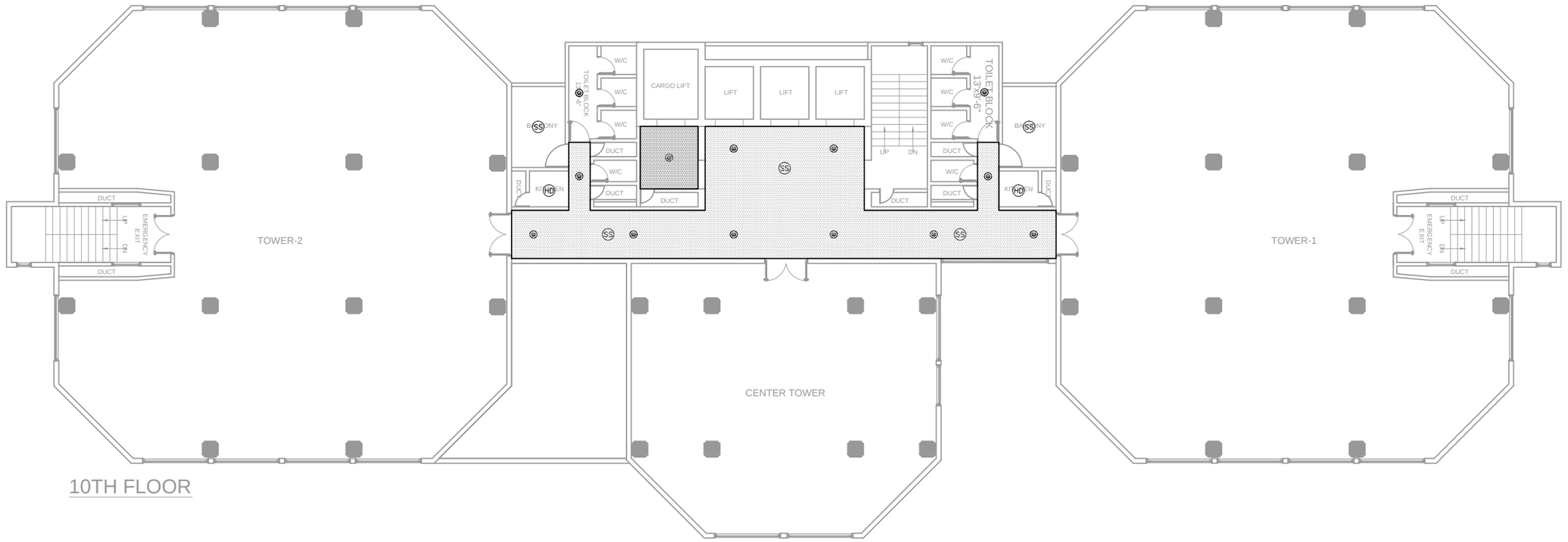
DATE: JULY, 2026

DRAWN BY: A-A

SCALE: AS SHOWN

CHECKED BY: O-A

DWG. NO.: BC-12



10TH FLOOR

LEGENDS		
SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
⊗	PENDENT CONCEALED SPRINKLER	CEILING
⊗	UPRIGHT SPRINKLER	
	REELECTED CEILING AREA	

CLIENT:-

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

Nexus Consulting
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University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
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Email:nexusconsulttingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

BUILDING
CEILING PLAN

REV #	DATE	DESCRIPTION	CH'K'D	APP'D

Project Ref:
.

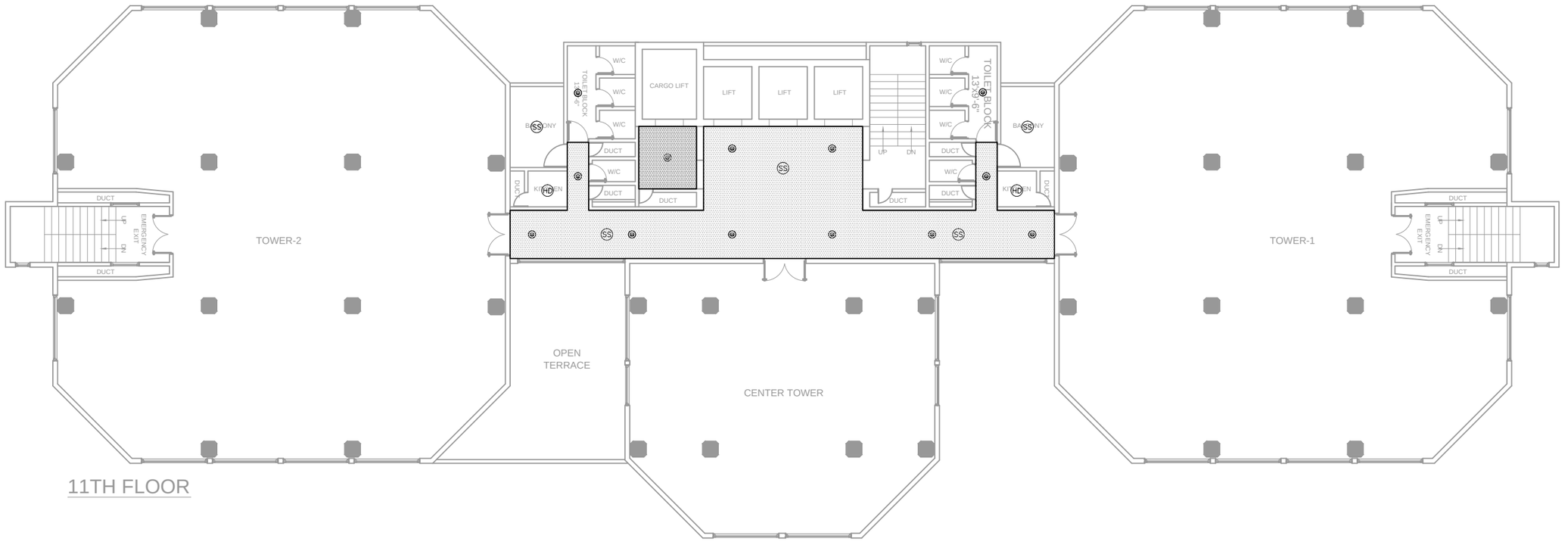
DATE
JULY. 2026

DRAWN BY
A-A

SCALE
AS SHOWN

CHECKED BY
O-A

DWG. NO.
BC-13



11TH FLOOR

LEGENDS		
SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
⊗	PENDENT CONCEALED SPRINKLER	CEILING
⊗	UPRIGHT SPRINKLER	
	REELECTED CEILING AREA	

CLIENT:-

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

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PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

BUILDING CEILING PLAN

REV #	DATE	DESCRIPTION	CH'K'D	APP'D

Project Ref:
.

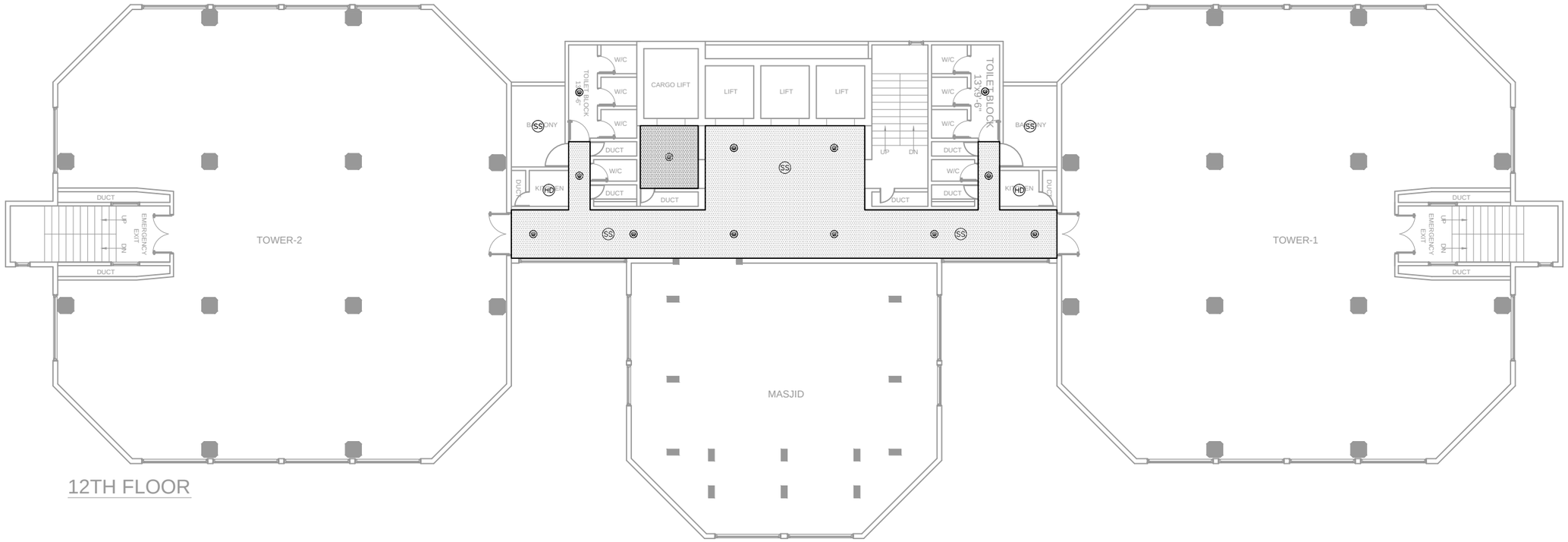
DATE
JULY. 2026

DRAWN BY
A-A

SCALE
AS SHOWN

CHECKED BY
O-A

DWG. NO.
BC-14



12TH FLOOR

LEGENDS		
SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
	PENDENT CONCEALED SPRINKLER	CEILING
	UPRIGHT SPRINKLER	
	REELECTED CEILING AREA	

CLIENT:-

STATE LIFE
INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

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PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

BUILDING CEILING PLAN

REV #	DATE	DESCRIPTION	CH'K'D	APP'D

Project Ref: .

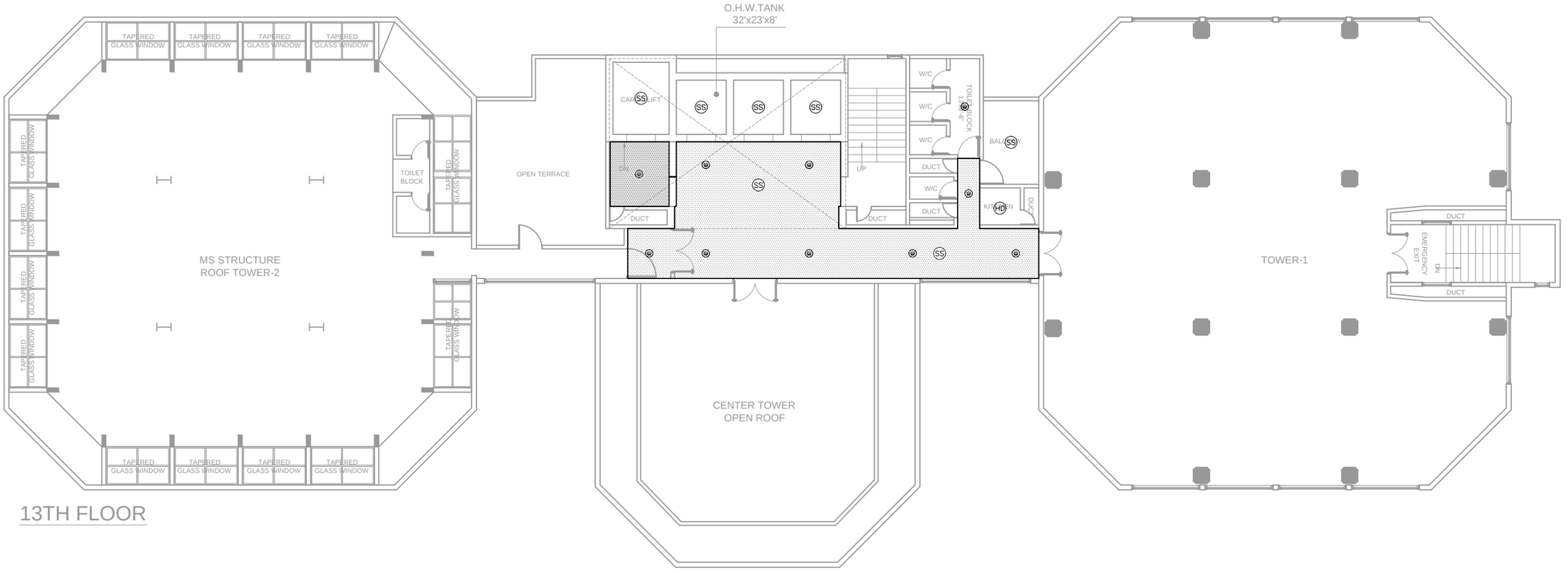
DATE: JULY. 2026

DRAWN BY: A-A

SCALE: AS SHOWN

CHECKED BY: O-A

DWG. NO.: BC-15



LEGENDS		
SS	SMOKE DETECTOR	CEILING
HD	HEAT DETECTOR	CEILING
	PENDENT CONCEALED SPRINKLER	CEILING
	UPRIGHT SPRINKLER	
	REELECTED CEILING AREA	

CLIENT:-

STATE LIFE INSURANCE CORPORATION OF PAKISTAN

CONSULTANT:

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PROJECT:-

STATE LIFE BUILDING NO.11

TITLE:-

BUILDING CEILING PLAN

REV #	DATE	DESCRIPTION	CHK'D	APP'D

Project Ref: .

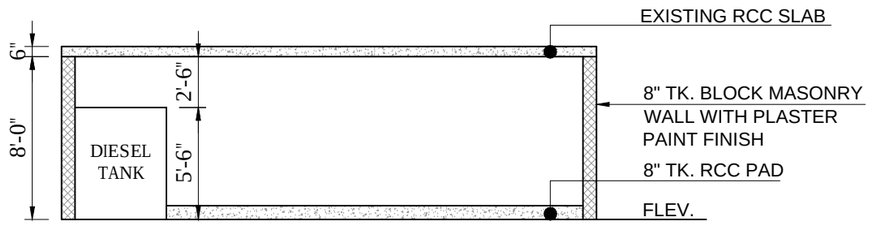
DATE: JULY. 2026

DRAWN BY: A-A

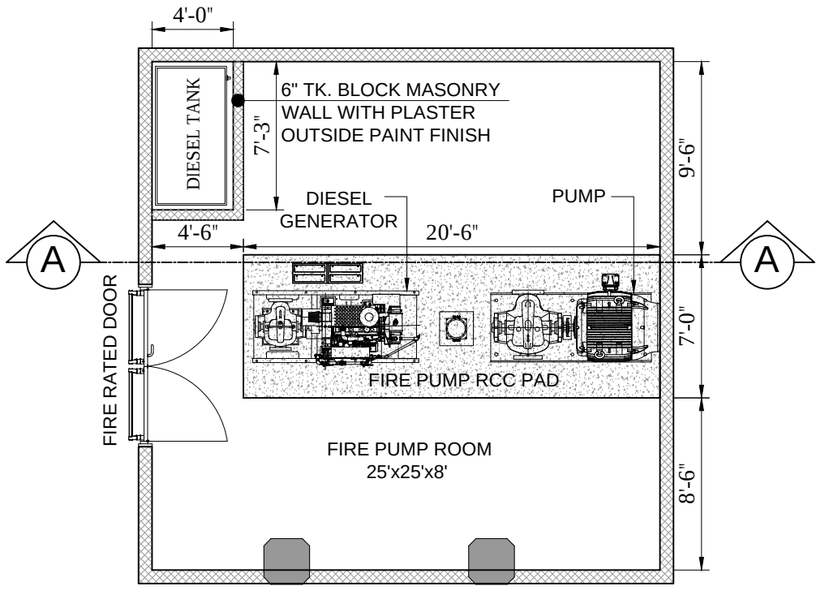
SCALE: AS SHOWN

CHECKED BY: O-A

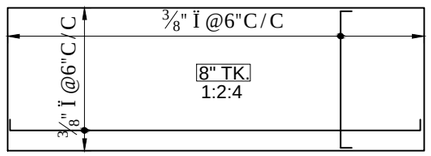
DWG. NO.: BC-16



SECTION A-A



PUMP ROOM PLAN



PAD REINFORCE DETAILS

INTERIOR FINISHES (FLOORING)

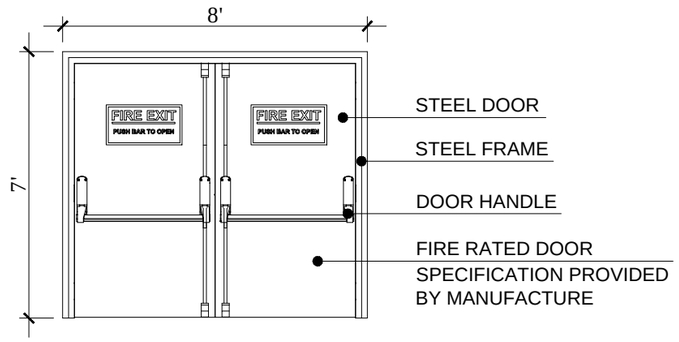
DESCRIPTION		SUB FLOOR			MAIN FLOORING			
TYPICAL FLOOR		COMPACTED EARTH FILLING	6" SOLING	4" PCC 1:4:8	2" PCC 1:2:4	PORCELAIN TILE	MALBLE TILE	PCC FLOOR
1	FIRE PUMP ROOM							◉
2	DIESEL TANK							◉
3								

INTERIOR FINISHES (PLASTER/ PAINT/ VERNISHED

DESCRIPTION							
TYPICAL FLOOR		FALSE CEILING	WALL PLASTER	CEILING PAINT DISTEMPER	WALL PAINT DISTEMPER	WALL TILE	WEATHER SHEET
1	FIRE PUMP ROOM		◉	◉	◉		
2	DIESEL TANK		◉		◉		
3							

EXTERIOR FINISHES

PAINT	◉				
PLASTER	◉				



DOOR DETAILS

CLIENT:- STATE LIFE INSURANCE CORPORATION OF PAKISTAN

CONSULTANT: Nexus Consulting
Office A-202, Second Floor,Blossom Trade Center Opposite NED University University Road, SB-26,Block No.01 Gulistan-e-Jouhar, Karachi Pakistan
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Email:nexusconsultingcompany@gmail.com Web:www.Nexuscon.pk

PROJECT:- STATE LIFE BUILDING NO.11

TITLE:- FIRE PUMP ROOM DETAILS

REV #	DATE	DESCRIPTION	CH'K'D	APP'D

Project Ref: .
DATE: JULY. 2026
DRAWN BY: A-A
SCALE: AS SHOWN
CHECKED BY: O-A
DWG. NO.: BC-17

Bill of Quantities for Fire Protection System & Civil Works Allied To Fire Fighting Works For Statelife Building # 11, Karachi		
BOQ Summary		
S.No.	**Description**	**Total Amount (Rs.)**
1	**Bill of Quantities for Fire Protection System Works for Statelife Building # 11, Karachi**	
2	**Bill of Quantities for Fire Protection System (Civil Works) for Statelife Building # 11, Karachi**	
	Grand Total	

NOTE:The above quoted rates should be inclusive of all revelent applicable taxes , profit , levies and transportation charges e.t.c

Total Amount in Words: _____

Signature and Seal of Tenderer: _____

Bill of Quantities for Fire Protection System Works for Statelife Building # 11, Karachi		
BOQ Summary		
Item No.	Description	Total Cost of supply and Installation (Rs.)
1	FIRE PUMP SET	
2	OS & Y GATE VALVE	
3	CHECK VALVE	
4	STRAINERS WITH BALL VALVE WITH MATERIAL/FLANGES/UNIONS etc.	
5	FLEXIBLE CONNECTOR	
6	DOYMA SLEEVE	
7	PORTABLE FIRE EXTINGUISHER	
8	HIGH DENSITY POLYETHYLENE PIPE (HDPE) FOR BURRIED APPLICATIONS	
9	BLACK STEEL SCHEDULE 40 PIPING	
10	FIRE BRIGADE CONNECTION	
11	FIRE HOSE REEL & HYDRANT VALVES	
12	FIRE PROTECTION SYSTEM ACCEPTANCE TEST	
13	PAINTING COATING & STENCILING	
14	ALARM CHECK VALVE ASSEMBLY	
15	ZONE CONTROL VALVE ASSEMBLY	
16	FIRE SPRINKLERS	
17	MISCELLANEOUS Of Fire	
	Total Amount in Rupees (Rs.)	
	_ _% SST on Installation (Rs.)	
	Grand Total Amount in Rupees including SST (Rs.)	

NOTE:The above quoted rates should be inclusive of all revelent applicable taxes , profit , levies and transportation charges e.t.c

Total Amount in Words: _____

Signature and Seal of Tenderer: _____

Bill of Quantities for Fire Protection System Works for Statelife Building # 11, Karachi								
Item No.	Description	Qty.	Unit	Material		Installation		Total
				Rate (Rs.)	Amount (Rs.)	Rate (Rs.)	Amount (Rs.)	Amount (Rs.)
					(3) x (5)		(3) x (7)	(6) + (8)
1	2	3	4	5	6	7	8	9
1.0	**FIRE PUMP SET**							
1.1	Supply and Installation of Fire Pump 1 No. Electrical Motor Driven, 1 No. Diesel Engine driven fire pump & 1 No. Electric Motor Driven Jockey pump Complete With Controller including supply of all consumables with supply & installation of flow meter, waste cone, pressure relief valve etc. including supply of all consumables required for installation complete in all respects.	1	Job					
1.2	Foundation & Support for Diesel Engine, Electric Engine Fire Pumps and Jockey Pump and Diesel Tank with containment bund.	1	Job					
1.3	Supply and Installation of Wiring between Diesel Fire Pump Sets and Controller	1	Job					
1.4	Supply and Installation of Wiring between Electric Fire Pump Sets and Controller	1	Job					
1.5	Supply and Installation of Wiring between Jockey Pump Set and Controller	1	Job					
1.6	Fuel Piping Connection to Diesel Engine & Fuel Sensing Line	1	Job					
1.7	Supply & Installation of Fire Engine Exhaust Pipe (MS) - Ø 8" with 4" thick Rockwool Insulation & Cladding	1	Job					
1.8	Fire Pumps Water Pressure Sensing Lines							
1.8.1	Stainless Steel tubing & their hookup with controller As Per NFPA	1	Job					
1.8.2	Stainless Steel Globe Valve - Ø 1/2 inch	12	Nos.					
1.8.3	Stainless Steel Tee - Ø 1/2 inch With 1/4 Inch Plug	6	Nos.					
1.8.4	Ø1/2 inch - Stainless Steel Check Valve with 3/32 Inch Orifice in Clapper	6	Nos.					
1.9	Testing & Commissioning of Fire Pumps	1	Job					
							Total	

Item No.	Description	Qty.	Unit	Material		Installation		Total
				Rate (Rs.)	Amount (Rs.)	Rate (Rs.)	Amount (Rs.)	Amount (Rs.)
					(3) x (5)		(3) x (7)	(6) + (8)
1	2	3	4	5	6	7	8	9
2.0	**OS & Y GATE VALVE**							
2.1	Ø8 inch (Pressure Class 300 / PN 20)	2	No.					
2.2	Ø6 inch (Pressure Class 300 / PN 20)	6	No.					
2.3	Ø4 inch (Pressure Class 300 / PN 20)	1	No.					
2.4	Ø3 inch (Pressure Class 300 / PN 20)	16	No.					
2.5	Ø3 inch (Pressure Class 235 / PN 16)	14	No.					
2.6	Ø 2 1/2 inch (Pressure Class 300 / PN 20)	2	No.					
							Total	
3.0	**CHECK VALVE**							
3.1	Ø6 inch (Pressure Class 300 / PN 20)	2	No.					
3.2	Ø4 inch (Pressure Class 300 / PN 20)	2	No.					
3.3	Ø2 1/2 inch(Pressure Class 300 / PN 20)	1	No.					
							Total	
4.0	**STRAINERS WITH BALL VALVE WITH MATERIAL/FLANGES/UNIONS etc.**							
4.1	Ø 2 ½ inch (Pressure Class 300 / PN 20)	1	No.					
							Total	
5.0	**FLEXIBLE CONNECTOR**							
5.1	Ø 8 inch (Pressure Class 300 / PN 20)	2	Nos.					
5.2	Ø 6 inch (Pressure Class 300 / PN 20)	2	Nos.					
5.3	Ø 2 ½ inch (Pressure Class 300 / PN 20)	2	No.					
							Total	
6.0	**DOYMA SLEEVE**							
6.1	Ø 8 inch	2	Nos.					
6.2	Ø 6 inch	2	Nos.					
	Total							
7.0	**PORTABLE FIRE EXTINGUISHER**							
7.1	Supply & Installation of 6kg Dry Powder Extinguisher (ABC)	31	Nos.					
7.2	Supply & Installation of 5kg CO2 Fire Extinguisher	32	Nos.					
7.3	Supply & Installation of K type Wet Chemical 6kg Fire Extinguisher	13	Nos.					
							Total	
8.0	**HIGH DENSITY POLYETHYLENE PIPE (HDPE) FOR BURRIED APPLICATIONS**							
	All Indicated Pipe Diameters are internal Pipe Diameter							
8.1	Ø 6 inch (150 mm)	-	Rft		Rate Only		Rate Only	Rate Only
8.2	Ø 8 inch (200 mm)	-	Rft		Rate Only		Rate Only	Rate Only
							Total	

Item No.	Description	Qty.	Unit	Material		Installation		Total
				Rate (Rs.)	Amount (Rs.)	Rate (Rs.)	Amount (Rs.)	Amount (Rs.)
					(3) x (5)		(3) x (7)	(6) + (8)
1	2	3	4	5	6	7	8	9
9.0	**BLACK STEEL SCHEDULE 40 PIPING**							
9.1	Ø 10 inch	20	Rft					
9.2	Ø 8 inch	300	Rft					
9.3	Ø 6 inch	1,180	Rft					
9.4	Ø 4 inch	4,550	Rft					
9.5	Ø 3 inch	160	Rft					
9.6	Ø 2 1/2 inch	80	Rft					
9.7	Ø 2 inch	20	Rft					
9.8	Ø 1 1/2 inch	410	Rft					
9.9	Ø 1 1/4 inch	1,390	Rft					
9.10	Ø 1 inch	4,950	Rft					
							Total	
10.0	**FIRE BRIGADE CONNECTION**							
10.1	Fire Brigade Connection (Pressure Class 300 / PN 20)	2	No.					
10.2	Cabinet of Fire Brigade Connection	2	No.					
							Total	
11.0	**FIRE HOSE REEL & HYDRANT VALVES**							
11.1	Fire Hose Reel With Double Cabinet, PRV, Lock Sheild Valve - Ø 1 inch x 100ft (Powder Coated)	31	Nos.					
11.2	External Fire Hydrant - Floor Mounted (Pressure Class 300 / PN 20) with PRV & Quick Coupling	-	Nos.					
11.3	Ø 2 1/2 inch External Fire Hydrant - Double Headed Hydrant Valve (Pressure Class 300 / PN 20) with PRV & Quick Coupling	2	Nos.					
11.4	Ø 2 1/2 inch Hydrant Valve with Quick Coupling	18	Nos.					
11.5	Ø 2 1/2 inch Hydrant Valve with PRV (Pressure Class 300 / PN 20) with Quick Coupling	32	Nos.					
11.6	Fire Hose Cabinet with 2 x 100Ft , Ø 2 1/2 inch Quick Coupling Hose, 2 Nos. Diffuser Nozzle	52	Nos.					
							Total	
12.0	**FIRE PROTECTION SYSTEM ACCEPTANCE TEST**							
12.1	Fire Protection System Acceptance Test	1	Job					
							Total	

Item No.	Description	Qty.	Unit	Material		Installation		Total
				Rate (Rs.)	Amount (Rs.)	Rate (Rs.)	Amount (Rs.)	Amount (Rs.)
					(3) x (5)		(3) x (7)	(6) + (8)
1	2	3	4	5	6	7	8	9
13.0	**PAINTING COATING & STENCILING**							
	Painting, Coating							
13.1	Ø 10 inch	20	Rft					
13.2	Ø 8 inch	300	Rft					
13.3	Ø 6 inch	1,180	Rft					
13.4	Ø 4 inch	4,550	Rft					
13.5	Ø 3 inch	160	Rft					
13.6	Ø 2 1/2 inch	80	Rft					
13.7	Ø 2 inch	20	Rft					
13.8	Ø 1 1/2 inch	410	Rft					
13.9	Ø 1 1/4 inch	1,390	Rft					
13.10	Ø 1 inch	4,950	Rft					
13.11	Stenciling & Identification Tags of Valves	1	Job					
13.12	Signage as per NFPA (For Example: Signage of Fire Hose Reel, Landing Valve etc)	1	Job					
							Total	
14.0	**ALARM CHECK VALVE ASSEMBLY**							
14.1	Alarm Check Valve Assembly (Pressure Class 300 / PN 20) - Ø6 inch (150 mm)	1	No.					
							Total	
15.0	**ZONE CONTROL VALVE ASSEMBLY**							
15.1	Ø6 inch (150 mm) Zone Control Valve Assembly with PRV Including Butterfly Valve (Pressure Class 300 / PN20) with Flow Switch, PRV with Guages, Check Valve, Pressure Gauge, Drain Assembly & Sight Glass Complete in all respects	10	No.					
15.2	Ø6 inch (150 mm) Zone Control Valve Assembly including Butterfly Valve with Flow Switch, Check Valve, Pressure Gauge, Drain Assembly & Sight Glass Complete in all respects	7	No.					
							Total	

Item No.	Description	Qty.	Unit	Material		Installation		Total
				Rate (Rs.)	Amount (Rs.)	Rate (Rs.)	Amount (Rs.)	Amount (Rs.)
					(3) x (5)		(3) x (7)	(6) + (8)
1	2	3	4	5	6	7	8	9
16.0	**FIRE SPRINKLERS**							
16.1	Fire Sprinkler-Pendent Ceiling Concealed, Quick Response	182	No.					
16.2	Fire Sprinkler-Upright, Quick Response	329	No.					
16.2	Fire Sprinkler-Upright with guard, Quick Response	-	No.					
16.3	Cabinet complete with 06 Spare Sprinklers (Upright Quick response)	2	Nos.					
16.4	Cabinet complete with 06 Spare Sprinklers (Pendent Ceiling Concealed, Quick Response)	1	Nos.					
							Total	
17.0	**MISCELLANEOUS**							
17.1	Hydrostatic Testing	1	Job					
17.2	Shop Drawings	1	Job					
17.3	As Built Drawings	1	Job					
17.4	Automatic Air Vent - Ø 3/4 inch	4	Nos.					
17.5	Ball Valve - Ø 3/4 inch	4	Nos.					
17.6	Fire Stoping of Walls & Structure Openings (For Small Openings - Hilti FS - ONE or Approved Equivalent)	1	Job					
17.7	Pipe Sleeves	1	Job					
17.8	Stainless Steel Vortex Plate as per detail	1	Job					
17.9	Isolation / Gate Valves Locks (Wire / Chain Type)	41	Nos.					
17.10	Structural Openings & Core Cuts	1	Job					
17.11	Operation & Maintenance Manuals	1	Job					
17.12	Stainless Steel Vortex Plate - As per Pipe Dia mentioned in drawing and detail	1	Job					
17.13	Engineering Support System for Fire Protection System	1	Job					
17.14	Inspector Test and Drain valve Assembly (UL/FM approved)	17	Nos.					
17.15	Hooter & Light - to be Connected to Fire Pump Controller - To be Installed/ Provided outside the Pump Room	1	Nos.					
17.16	Pressure Relief Valve Ø 2 1/2 inch complete in all respects	1	Job					
							Total	
							Grand Total	-

Bill of Quantities for Fire Protection System Civil Works for Statelife Building # 11, Karachi		
BOQ Summary		
Item No.	**Description**	**Total Amount (Rs.)**
	CIVIL & ALLIED WORKS TO FIRE FIGHTING SYSTEM	
1	**DEMOLITION, CUTTING & DISMANTLING**	
2	**PIPE PENETRATION & REPAIR**	
3	**FALSE CEILING RESTORATION**	
4	**FIRE PUMP ROOM MODIFICATION**	
5	**PUMP FOUNDATIONS**	
6	**MISCELLANEOUS Of Civil Works**	
	Total Amount in Rupees (Rs.)	
	_ _% SST (Rs.)	
	Grand Total Amount in Rupees including SST (Rs.)	

NOTE:The above quoted rates should be inclusive of all revelent applicable taxes , profit , levies and transportation charges e.t.c

Total Amount in Words: _____

Signature and Seal of Tenderer: _____

CIVIL WORKS ALLIED TO FIRE FIGHTING SYSTEM					
Sr.	**Description**	**Unit**	**Qty**	**Rate (Rs.)**	**Amount (Rs.)**
A. DEMOLITION, CUTTING & DISMANTLING					
1	providing and performing Core Cutting through RCC Slabs (100–350 mm dia.)	No.	90		
2	providing and performing Core Cutting through RCC Walls/Shear Walls	No.	45		
3	providing and performing Core Cutting through Brick/Concrete Block Walls	No.	90		
4	providing and performing Wall Chasing for Concealed Fire Fighting Pipes	Rft	2000		
5	providing and performing Removal of Existing Gypsum Board False Ceiling	Sft	24000		
6	providing and performing Removal of Existing Ceiling Suspension Framework	Sft	24000		
7	providing and performing Removal of Existing Access Panels	No.	80		
8	providing and performing Removal of Existing Floor Screed	Sft	1200		
9	providing and performing Removal of Existing Floor Tiles	Sft	1000		
10	providing tools and performing Debris Removal & Disposal	LS	1		
				Total	
B. PIPE PENETRATION & REPAIR					
11	providing and fixing GI Pipe Sleeves	No.	275		
12	providing and Repair RCC Openings	No.	275		
13	providing and Repair Masonry Openings	No.	250		
14	providing and applying Epoxy Bonding Agent	Ltr	120		

15	providing and applying Polymer Modified Repair Mortar	Bag	80		
16	providing and applying Fire Rated Sealant	No.	275		
17	providing and applying Fire Rated Mortar Packing	No.	275		
18	providing and performing UL/FM Fire Stopping	No.	275		
				Total	
C. FALSE CEILING RESTORATION					
19	providing and installing Moisture Resistant Gypsum Ceiling	Sft	24000		
20	providing and installing GI Framework	Sft	24000		
21	providing and installing Joint Treatment	Sft	24000		
22	providing and installing Access Panel	No.	80		
23	providing and installing Ceiling Paint	Sft	24000		
24	providing and installing Matching Existing Finish	LS	1		
				Total	
D. FIRE PUMP ROOM MODIFICATION					
25	providing and installing 8" Concrete Block Masonry	Cft	480		
26	providing and installing 20mm Cement Plaster Both Sides	Sft	1440		
27	providing and performing Plastic Emulsion Paint	Sft	1440		
28	providing and performing Heavy Duty Floor Repair	Sft	625		
29	providing and performing Waterproof Cement Screed	Sft	625		
30	providing and installing 2-Hour Fire Rated Double Leaf Door	No.	1		
31	providing and installing 2-Hour Fire Rated Single Leaf Door	No.	1		

32	providing and installing Porcelain Tiles for Fire Pump Room	Sft	625		
				Total	
E. PUMP FOUNDATIONS					
33	providing and constructing Main Fire Pump Foundation	No.	1		
34	providing and constructing Diesel Pump Foundation	No.	1		
35	providing and constructing Jockey Pump Foundation	No.	1		
36	providing and constructing Housekeeping Pads	No.	3		
37	providing and applying Non-shrink Grouting	Bag	30		
38	providing and constructing Anchor Bolt Grouting	Bag	30		
				Total	
G. MISCELLANEOUS					
39	Providing and performing Cleaning & Disposal	LS	1		
Grand Total Amount (Rs.)					