

	SCOPE REQUIREMENT	Scope of Work
---	--------------------------	---------------

Title: **Rosherville Super Store
Fire Protection Project**

Unique Identifier: **15239180**

Alternative Reference
Number: **N/A**

Area of Applicability: **Gauteng**

Documentation Type: **SoW**

Revision: **0.1**

Total Pages: **10**

Next Review Date: **N/A**

Disclosure Classification: **CONTROLLED
DISCLOSURE**

Compiled by



**Jaco Prinsloo
Fire Engineer**

Date: 10/07/2026

Functional Responsibility



**Jaco Prinsloo
Fire Engineer**

Date: 10/07/2026

Authorised by



**Andre Swanepoel
Project Manager**

Date: 10/07/2026

Contents

1. INTRODUCTION.....	8
2. SUPPORTING CLAUSES	8
2.1 SCOPE.....	8
2.2 NORMATIVE / INFORMATIVE REFERENCES	8
DEFINITIONS	9
2.3 ABBREVIATIONS	11
2.4 ROLES AND RESPONSIBILITIES	12
3. DESCRIPTION OF THE SYSTEM.....	12
3.1 THE BUILDINGS.....	12
3.2 SCOPE OF CONTRACT.....	12
3.3 FIRE PROTECTION BY OTHERS	13
3.4 CONTRACTOR REQUIREMENTS.....	13
4. SCOPE OF WORK	14
4.1 SITE ASSESSMENT OF THE MUNICIPAL WATER SUPPLY TO THE FIRE HYDRANTS AND HOSE REEL TO ASCERTAIN PRESSURE AND FLOW.	14
4.2 FIRE PUMPS.	14
4.3 FIRE WATER STORAGE TANK.....	14
4.4 FIRE BRIGADE BREECHING INLET.	14
4.5 FIRE HYDRANTS.	14
4.6 FIRE HOSE REELS.	14
4.7 FIRE EXTINGUISHERS.....	14
4.8 FIRE SIGNAGE.....	14
4.9 IN-RACK SPRINKLER INSTALLATION.	14
4.10 ASSOCIATED PIPEWORK.	14
4.11 SMOKE DETECTION & FIRE ALARM SYSTEM.	14
5. DRAWINGS	14
5.1 ENGINEER'S DRAWINGS	14
5.2 CONTRACTORS DRAWINGS, EQUIPMENT SELECTION AND SAMPLE SUBMISSIONS	15
5.3 SUBMISSION PROCEDURES	16
6. FIRE PROTECTION NOTES	17
6.1 CLOSE OUT	18
7. WORK PROVIDED BY OTHERS	18
8. COMPLIANCE WITH REGULATIONS AND STANDARDS	18
9. APPROVALS	19
10. HOISTING AND RIGGING	19
10.1 HOISTING.....	19
10.2 RIGGING.....	19
11. PROGRAMMING	19
12. CONTRACT MANAGEMENT	20
13. ORGANISATION AND STAFF OF CONTRACTOR	21
14. PROTECTION AGAINST DAMAGE	21
15. ACCESS TO EQUIPMENT AND SYSTEMS.....	22
16. CLEANING AND START-UP	22

17. TESTING, COMMISSIONING, OPERATING OF PLANT AND HANDOVER	22
18. GUARANTEE.....	23
19. CERTIFICATION.....	23
19.1 CERTIFICATION REQUIRED	23
19.2 DOCUMENTATION	23
20. QUALITY MANAGEMENT SYSTEM – TESTING - INSPECTION	24
21. OPERATING AND MAINTENANCE MANUALS	24
21.1 OPERATION MANUAL	25
21.2 MAINTENANCE MANUAL	25
22. ONE YEAR'S MAINTENANCE	25
23. TRAINING	26
24. QUALITY.....	26
24.1 STANDARD OF WORKMANSHIP.....	26
24.2 QUALITY ASSURANCE	26
25. GENERAL.....	27
25.1 PROJECT DELIVERABLES	27
25.2 CODES AND STANDARDS	27
26. AUTHORISATION	27
27. REVISIONS.....	28
SECTION 2: GENERAL TECHNICAL SPECIFICATION (FIREWATER AND SPRINKLER).....	30
1. EQUIPMENT SELECTION	30
1.1 WATER SUPPLY	30
1.2 AUTOMATIC SPRINKLER SYSTEM.....	31
2. MAIN DISTRIBUTION.....	31
2.1 GENERAL	31
2.2 PIPE SUPPORTS	31
2.3 PIPE FITTINGS.....	32
3. SPRINKLERS	32
3.1 GENERAL	32
3.2 SPRINKLER SELECTION	32
3.3 SPRINKLER GUARDS AND WATER SHIELDS	33
3.4 SPRINKLER HEADS	33
3.5 SPACING OF SPRINKLERS	33
3.6 SPRINKLER LOCATION RELATIVE TO BUILDING STRUCTURE AND PLANT STRUCTURE.....	34
4. PAINTING AND PROTECTION AGAINST CORROSION	35
4.1 GENERAL REQUIREMENTS	35
4.2 PIPING	35
4.3 WELDING	36
4.4 SURFACE PREPARATION	36
4.5 PRIMING OF NEW PIPEWORK.....	36
4.6 USE OF DENSO WRAP	36
4.7 ALTERNATIVE PRODUCTS	37
4.8 COATING OF PIPEWORK	37
4.9 COATING APPLICATION	37
4.10 FASTENERS.....	37
4.11 PREVENTION OF GALVANIC CORROSION	37

4.12 INSPECTIONS AND TESTING	38
4.13 QUALITY ASSURANCE	38
4.14 PROTECTION.....	38
5. DETAILED CALCULATIONS REQUIRED.....	38
5.1 CALCULATIONS.....	38
6. SIGNS	39
6.1 BLOCK PLAN.....	39
6.2 LABELLING.....	39
6.3 SIGNAGE MATERIAL.....	40
7. VALVES	40
7.1 APPROVED VALVES	40
7.2 SPRINKLER CONTROL VALVE	41
7.3 ALARM VALVES.....	42
7.4 BOOSTER CONNECTIONS.....	42
8. ALARMS	42
8.1 WATER MOTOR ALARMS	42
8.2 FLOW SWITCH LINKED TO ELECTRONIC ALARM.....	42
8.3 AUDIO AND VISUAL ALARMS	42
9. PRESSURE GAUGES	43
9.1 PRESSURE GAUGES TYPE	43
9.2 INSTALLATION OF GAUGES	43
10. WATER SUPPLIES AND PUMPS.....	43
10.1 AUTOMATIC PUMPS - GENERAL.....	43
10.2 PUMP ROOM / HOUSE.....	44
10.3 CONTAINERIZED PUMP HOUSE	44
10.4 SUCTION PIPE WORK, DELIVERY PIPEWORK AND FITTINGS	44
10.5 JOCKEY OR MAKE UP PUMPS	44
10.6 DIESEL DRIVEN PUMPS – GENERAL FIRE WATER SYSTEMS.....	45
10.7 PUMP APPROVAL	46
10.8 DIESEL ENGINE DRIVEN PUMP, COOLING, FILTRATION, EXHAUST, SHUTDOWN, FUEL ETC.	46
10.9 TOOLS	47
10.10 SPARE PARTS	47
10.11 ELECTRIC MOTOR DRIVEN PUMP, ELECTRICAL INSTALLATIONS, POWER SUPPLIES, CABLING, CIRCUIT BREAKERS, SWITCHES, BUSBARS, FUSES ETC.	47
CONTROL PANEL AND EARTHING	48
10.12 PUMP DRIVE CONTROLLERS.....	49
10.13 MECHANICAL VENTILATION.....	50
10.14 ELECTRICAL INSTALLATION, POWER SUPPLY AND DISTRIBUTION	50
10.15 INSTRUMENTATION AND MONITORING	50
10.16 FIRE PROTECTION INSIDE PUMP HOUSE.....	50
10.17 OPERATING CONDITIONS AND MAINTENANCE	51
10.18 DOCUMENTATION AND TRAINING	51
11. ANNUNCIATORS FOR SPRINKLER/FIRE WATER PUMP ROOM INSTALLATIONS	51
11.1 GENERAL	51
11.2 PRESSURE SWITCHES, FLOW SWITCHES, PATENTS OR SPECIALISED VALVES AND COMPONENTS (APPROVAL)	51
11.3 PUMP HOUSE REMOTE ALARM NOTIFICATION AND DATA LOGGER MODULE	52
12. TANK SPECIFICATIONS	52
12.1 GENERAL	52

12.2 GALVANISED BLADDER TANKS	52
13. FIRE HYDRANTS	53
13.1 MATERIALS	53
13.2 COMPATIBILITY	54
14. HOSE REELS	54
15. FIRE EXTINGUISHERS	54
15.1 COMPLIANCE	54
15.2 SITING	55
SECTION 3: PROJECT SPECIFICATION (DETECTION)	57
1. DESCRIPTION OF THE SYSTEM	57
1.1 ONE YEAR'S MAINTENANCE	57
2. TRAINING	58
3. DESIGN CALCULATIONS	59
4. THE FIRE DETECTION SYSTEM:	59
4.1 CATEGORY OF THE SYSTEM	59
4.2 DEVIATIONS FROM THE DESIGN CODES	59
4.3 AREAS OF PROTECTION	59
4.4 CODES, STANDARDS OR REGULATIONS	59
4.5 INTERFACE WITH OTHER SYSTEMS	59
4.6 SYSTEM DESCRIPTION	60
4.7 PROVISION OF POWER SUPPLY	61
4.8 EVACUATION STRATEGY	61
4.9 STAFF ALARMS	61
4.10 SYSTEM CONFIGURATION CONCEPTS	62
5. MATERIALS	62
5.1 GENERAL	62
5.2 SUBMITTALS	62
6. COMPLETION CERTIFICATES, ADDITIONAL COMMISSIONING REQUIREMENTS AND DOCUMENTATION	62
6.1 CERTIFICATES	62
6.2 COMMISSIONING TESTS	62
SECTION 4: GENERAL TECHNICAL SPECIFICATION (ATOMATIC DETECTION AND ALARM SYSTEM)	65
1. MATERIALS	65
2. TEMPERATURE LIMITATIONS	65
3. COMPATIBILITY	65
4. IDENTIFICATION	67
5. POWER	67
5.1 GENERAL	67
5.2 NORMAL POWER SUPPLY	68
5.3 STANDBY POWER SUPPLY – SECONDARY BATTERIES	68
6. CIRCUIT DESIGN	68
6.1 GENERAL	68
6.2 CIRCUITS THAT CONTAIN FIRE DETECTORS	69
6.3 CIRCUITS THAT CONTAIN FIRE ALARM SOUNDERS	69

6.4 RING SYSTEMS	69
6.5 CIRCUITS PROTECTED AGAINST CABLE FAULTS	70
6.6 ZONES	70
6.7 LOOPS	70
6.8 SIGNAL MONITORING SCHEDULE	71
7. DEVICES - GENERAL	71
7.1 SYSTEM OPERATION	71
7.2 LOOP DEVICES - GENERAL REQUIREMENTS	72
7.3 LINE ISOLATORS	72
7.4 MANUAL CALL POINTS	72
7.5 CABLES AND CONDUCTORS	73
7.6 ADDRESSABLE FIRE DETECTION PANEL	77
7.7 DETECTOR BASES	83
7.8 ADDRESSABLE OPTICAL SMOKE DETECTORS	83
7.9 HIGH OUTPUT SOUNDER AND STROBE 120DB – (KLAXON NEXUS OR SIMILARLY APPROVED ONLY)	84
7.10 OPEN AREA SMOKE IMAGING DETECTOR (OSID OR SIMILARLY APPROVED)	84
7.11 HIGH SENSITIVITY SMOKE DETECTION (HSSD)	85
8. EMERGENCY VOICE COMMUNICATION SYSTEM	90
9. GAS SUPPRESSION	90
10. VOICE EVACUATION SYSTEM	90
SECTION 5: SCHEDULE OF DRAWINGS	92
SECTION 6: RETURNABLE SCHEDULE	94
1. GENERAL	94
2. STATEMENT OF COMPLIANCE OR OF QUALIFICATIONS BY TENDERER INCLUDING SCHEDULE OF LEAD TIMES	94
3. SCHEDULE OF INFORMATION, COMPONENTS AND EQUIPMENT	96
3.1 ADDRESSABLE DETECTION CONTROL PANELS – 4 LOOP	96
3.2 ADDRESSABLE REPEATER PANEL	96
3.3 SMS COMMUNICATOR / MODULE	96
3.4 EMERGENCY POWER SUPPLIES	96
3.5 MANUAL CALL POINT	96
3.6 OPTICAL SMOKE DETECTORS	96
3.7 BEAM DETECTORS	97
3.8 COMBINATION SIREN/STROBE (110DB) OR SIMILAR APPROVED O	97
3.9 FIRE RESISTANT CABLE	97
3.10 INTERMEDIATE LEVEL SPRINKLER	97
3.11 INSTALLATION CONTROL VALVES	97
3.12 BUTTERFLY STOP VALVES	97
3.13 NON – RETURN VALVES (WAFER)	97
3.14 TANK INFILL VALVES	97
3.15 GLYCERINE FILLED PRESSURE GAUGES	98
3.16 FLOW TEST ARRANGEMENT (TANK INFIL)	98
3.17 FLOW TEST ARRANGEMENT (PUMP TEST)	98
3.18 FLEXIBLE CONNECTIONS (PUMP DELIVERY)	98
3.19 KLAMBON OR SIMILAR CONNECTIONS	98
3.20 MALLEABLE PIPE FITTINGS	98
3.21 STEEL SECTIONAL SPRINKLER TANKS (CIRCULAR) – TO MATCH EXISTING	98
3.22 STEEL SECTIONAL HYDRANT TANKS	98
3.23 HYDRANT DIESEL PUMP	99
3.24 HYDRANT ELECTRICAL PUMP	99
3.25 ELECTRICAL JOCKEY FIRE WATER PUMP	99

3.26 4.5 & 9KG DCP STORED PRESSURE TYPE FIRE EXTINGUISHER	99
4. SCHEDULE OF RATES	100
4.1 NEW AND REPOSITIONED SPRINKLERS	100
4.2 PIPING, AND OFFSETS	100
4.3 SPRINKLERS AND ROSETTES	101
4.4 INSTALLATION CONTROL VALVES	101
4.5 MISCELLANEOUS.....	101
4.6 MANUAL FIRE FIGHTING EQUIPMENT	102
4.7 FIRE DETECTION AND ALARM	103
5. SCHEDULE OF CONTRACTOR INFORMAITON AND COMPLETED PROJECTS	103
5.1 MANAGERIAL, PROFESSIONAL AND TECHNICAL STAFF	103
5.2 SUB-CONTRACTORS.....	105
5.3 PROJECTS COMPLETED	106
5.4 MAINTENANCE CAPABILITIES.....	107

TABLES

Table 1: Abbreviations.....	11
-----------------------------	----

1. INTRODUCTION

The Rosherville Superstore fire protection project was found necessary to implement after a fire safety evaluation report that revealed several shortfalls of the existing fire protection interventions.

The superstore building located at 26.23° S, 28.11° E in Rosherville, Johannesburg, Gauteng. It is a single-story building with mezzanine floor offices and a parking lot. Is in good structural condition and has existing sprinkler protection installation that is served from a pump station and fire water storage tanks. Fire hydrants and fire hose reels are currently being served from municipal mains that have become unreliable to serve as the primary fire-fighting water source.

2. SUPPORTING CLAUSES

2.1 SCOPE

This document details the scope of work to be conducted by the contractor to supply, install and commission an upgraded fire protection system that shall have a dedicated hydrants and fire hose reels water storage tank and pumps as primary fire fighting systems to support the existing sprinkler installation. The scope shall also include some detection and fire alarm system for the whole warehouse and office space. Fire extinguishers and statutory fire signage installation shall form part of the scope of work.

2.1.1 Purpose

The purpose of the document is to define the scope of work for the contractor for the supply, install and commission an upgraded fire protection system.

2.1.2 Applicability

This document is applicable to Eskom Distribution, Gauteng operating unit, Rosherville Super Store only.

2.2 NORMATIVE / INFORMATIVE REFERENCES

Parties using this document shall apply the most recent edition of the documents listed in the following order.

2.2.1 Normative

- [1] ISO 9001 Quality Management Systems
- [2] National Building Regulations and Building Standards Act No. 103 Of 1977
- [3] 240-99527377, Inspection Manual for Civil Works at Eskom's Power Stations
- [4] SANS 10400-The Application of the National Building Regulations of South Africa
- [5] SANS 1200-Standard Specification for Civil Engineering Construction.
- [6] SANS 10100: Part 1- Design- The structural use of concrete.
- [7] Standard document number 240-52599753.
- [8] Occupational Health and Safety Act 85 of 1993

[9] Eskom Real Estate Standards

[10] Manufacturer Operation and Maintenance Manuals

DEFINITIONS

2.2.2 Disclosure Classification

Controlled Disclosure: Controlled Disclosure to external parties (either enforced by law, or discretionary).

2.2.3 Process for monitoring

The project manager and the fire engineering team monitors that the scope of work specified in this document are carried out.

The following terms shall, unless the context otherwise requires, have the meanings hereunder assigned to them:

Acceptable, Adequate, Satisfactory, Suitable	Acceptable, adequate, satisfactory or suitable in the opinion of the authority having jurisdiction.
Act	The National Building Regulations and Building Standards Act, 1977 (Act 103 of 1977) as amended.
Addressable System	A system in which signals from each detector or call point are individually identified at the control panel.
Alarm Test Valve	A valve through which water can be drawn to test the operation of the water-flow alarm.
Alarm Valve	A non-return valve that allows water to enter the installation and initiates the alarm when pressure drops.
Analogue	An initiating device that transmits a signal indicating varying degrees of condition.
Approved	Approved by the authority having jurisdiction.
Approved Installer	Any person deemed competent by a registered professional.
Assumed Maximum Area of Operation (AMAO)	The maximum area over which sprinklers are assumed to operate simultaneously.
Authority Having Jurisdiction (AHJ)	Organisation or individual responsible for approval; for this contract PSW Consulting Engineers, Fire Department or relevant authority.
Automatic Installation	Installation that performs a predetermined function without manual intervention.
Automatic Sprinkler System	System that automatically releases water when actuated by fire.
Automatic/Manual Switch	Means of converting system from automatic to manual operation.
Building Owner	Owner or authorised representative of the building.
Cavity Wall	Wall consisting of two leaves of brickwork tied together.
Class of Fire	Classification of fire types (A, B, C, D, etc.).
Clearance	Air gap between equipment and live electrical components.
Commissioning	Work necessary to place installation into normal operating condition.
Competent Person	Registered person in terms of Engineering Profession Act.
Concealed	Installed within walls, ceilings, trenches or enclosed spaces.
Condition	State of control equipment such as normal, fault or alarm.
Conventional	Device indicating on/off condition only.
Cut-Off Sprinkler	Sprinkler installed to protect openings.
Density of Discharge	Depth of water discharged over an area.

Design	Planning in accordance with engineering principles.
Design Concentration	Extinguishant concentration required for design.
Detector	Device that detects fire conditions and signals systems.
Duplicate Water Supply	Secondary water source equal to primary supply.
Engineered System	System designed with calculated pipe and nozzle sizes.
Escutcheon Plate	Decorative plate used to conceal sprinkler openings.
Exposed	Not installed underground or concealed.
Extinguishant	Fire extinguishing agent.
Extinguishing Concentration	Minimum concentration required to extinguish fire.
Extinguishing Medium	Substance used to extinguish fire.
Fire Load	Total heat energy of combustible materials.
Fire Resistance	Ability to withstand fire for a period.
Fill Density	Mass of extinguishant per unit volume.
Flow Pressure	Pressure during flow in a pipe.
Flooding Quantity	Amount of extinguishant required.
Fully Hydraulically Calculated Installation	System sized using engineering calculation.
Gas Cartridge	Container of compressed gas for extinguisher.
Halon	Halogenated extinguishing medium.
Hold Time	Time extinguishant concentration is maintained.
Hydraulically Most Favourable Location	Location of maximum flow.
Hydraulically Most Unfavourable Location	Location requiring highest pressure.
Install	To erect, mount and connect.
Installation Control Valve B Gauge	Gauge upstream of main valve.
Installation Control Valve C Gauge	Gauge downstream of alarm valve.
Isolating Valve	Valve used to isolate system.
Listed	Equipment tested and approved by recognised authority.
LOAEL	Lowest concentration at which adverse effects occur.
Low-Rise Installation	Installation where sprinklers are ≤30 m high.
Manual Call Point	Device manually used to initiate alarm.
Maximum Concentration	Highest concentration under conditions.
Maximum Working Pressure	Pressure at maximum temperature.
Mimic Diagram	Layout showing fire system zones.
Moderate-Hazard Occupancy	Occupancy with moderate fire risk.
Monitored Wiring	Wiring that indicates faults.
NOAEL	Highest concentration with no adverse effects.
Normally Unoccupied Area	Area not regularly occupied.
Occupancy Class	Classification based on use of building.
Operating Temperature	Temperature at which system operates.
Ordinary Hazard	Occupancy not high risk.
Primary Water Supply	Main water source.
Protection	Measures ensuring system integrity and safety.
Provide	Supply, install and connect ready for operation.
Range Pipe	Pipe feeding sprinklers.
Recharging	Replacement of extinguishing medium.
Reconditioning	Restoration of extinguisher condition.
Rosette Plate	See escutcheon plate.
Search Distance	Distance required to locate fire visually.
Sector	Subdivision of premises containing zones.
Selector Valve	Valve directing extinguishant.
Shall	Mandatory requirement.
Should	Recommended requirement.
Similar	Equivalent approved product.
Smoke	Products of combustion.

Smoke Alarm	Device detecting fire and giving alarm.
Sprinkler	Heat-sensitive device discharging water.
Sprinkler Yoke	Part holding element of sprinkler.
Standby Supply	Backup power supply.
State	Output condition of detector.
Static Pressure	Pressure at zero flow.
Suitable for Use	Approved for application by authority.
Supply	To procure and deliver.
Superpressurization	Addition of gas to increase pressure.
Testing	Work to verify performance.
Types of Detectors	Includes analogue, aspirating, multi-state, two-state and OSID detectors.
Unoccupiable Area	Area not suitable for occupation.
Wiring	Electrical cabling and associated components.
Work	All labour, materials and equipment required.
Zone	Subdivision of premises for fire detection indication.

2.3 ABBREVIATIONS

Table 1 lists and describes all abbreviations used in the document, in alphabetical order.

Table 1: Abbreviations

Abbreviation	Description
ERE	Eskom Real Estate
Dx	Eskom Distribution
URS	User Requirements Specification
OEM	Original Equipment Manufacture
GC	Gauteng Cluster
ERE	Eskom Real Estate
SoW	Scope of Work
AMAO	Assumed Maximum Area of Operation
ASIB	Automatic Sprinkler Installation Bureau.
BSPT	British Standard Pipe Thread
BSS	British Standard Specification.
BSI	British Standard Institute
DIN	German Standards Institute.
FDVES	Fire Detection & Voice Evacuation System
FDIA	Fire Detection Installers Association
FM	Factory Mutual (American)
LPC	Loss Prevention Council
NFPA	National Fire Protection Association (USA).
NST	National Standard Thread (American)
SABS	South African Bureau of Standards

Abbreviation	Description
SANS	South African National Standard
UL	Underwriters Laboratories.

2.4 ROLES AND RESPONSIBILITIES

2.4.1 The contractor:

- a) Provides adequate resources including provision of equipment for required works.
- b) Manages cost and a scheduled time frame of work.
- c) Ensures the scope is carried out in full.
- d) Provides regular feedback on the status of the works.
- e) Ensures that prior to any fieldwork, all parties working on site familiarized themselves with the Employer's safety requirements and the Occupational Health and Safety (OSH) Regulations act (85 of 1993).
- f) Notifies the Employer if any impedance occurs as soon as the Contractor becomes aware of them.
- g) Ensures that all equipment has maintained required height and width clearances as advised by the Employer.

3. DESCRIPTION OF THE SYSTEM

3.1 THE BUILDINGS

This project involves the full design, supply and installation of automatic fire detection and alarm system, statutory emergency signage, fire water tank replacement, fire protections, fire water with new pumped water supplies and limited sprinkler systems for the Rosherville Eskom Super Store as provided on the Engineer's conceptual design drawings.

The building in question are made up of the following occupancy classification in terms of Regulation A20 of the *National Building Regulations and Building Standards Act (Act 103 of 1977)*:

Class of Occupancy	Occupancy
J2 (Main Use)	Moderate risk storage Occupancy where material is stored and where the stored material is liable, in the event of fire, to cause combustion with moderate rapidity but is not likely to give rise to poisonous fumes, or cause explosions.
G1 (Ancillary to the Main use)	Offices Occupancy comprising offices, banks, consulting rooms and other similar usage.

3.2 SCOPE OF CONTRACT

This contract entails the supply of a turnkey solution where the Contractor will provide a complete design-and-construct solution. The design shall be based on a concept approved by the Employer

and provided by the Contractor. The turnkey solution is to conform to all relevant standards and best engineering practices and will entail the following:

- Conducting the required Site surveys with the aim of familiarization, producing shop drawings, understanding Site limitations, etc.
- Updating the tender drawings to produce shop drawings showing additional information currently not available, including additional information to be designed by Contractor. This includes a full design review and compliance check with the necessary proposed design updates by the Contractor – the Contractor will be responsible for the design and take the necessary design liability.
- Hydraulically calculating the fire water and sprinklers systems for the entire building and ensuring that all piping is adequately sized to deliver the appropriate delivery flow rates to the various areas –
- Installation of appropriately sized fire water pump supply with backup tanks for the buildings' fire water;
- Installation of Statutory Emergency signage;
- Installation of a complete new Fire detection and alarm system;
- Demolishing existing sprinkler tank, site preparation, and installation of a new sprinkler tank;
- Installation of new sprinkler protection system as per BOQ allowance.
- Installation/amendment of fire water reticulation system – per design intent drawings by the the Employer;
- Project engineering, management and control for the entire design-and-construct solution.
- Assisting the Employer with Adhock requests that may arise from site audits that may include, but are not limited to – ironmongery upgrades etc.

3.3 FIRE PROTECTION BY OTHERS

None.

3.4 CONTRACTOR REQUIREMENTS

The Contractor responsible for the installation of the fire water system must comply with the following requirements:

- Employ at least one people who hold a certificate of competency issued by a training establishment (such as the ASIB) to the Engineers / Employer's approval;
- The Contractor is a full member in good standing with the Fire Detection Installer's Association (FDIA).
- All employees nominated for this project shall be registered with SAQCC-Fire (Detection)
- Employ their own erection workforce, adequately sized for a project of this nature.;
- Has an internal draughting office for the preparation of shop drawings and detail design;
- Has a licence for a hydraulic calculation software package such as Canute;
- Maintain a suitably stocked, staffed and equipped workshop capable of servicing the contractual obligations and emergency repairs;
- Have 24-hour availability for emergencies;
- Employ a coded/certified welder;
- Successfully completed other installations of at least the size and scope of this project – with special emphasis to pumphouse, tank, sprinkler and detection installation and commissioning within live operational environments;

Note: Proof of compliance with these requirements is to accompany the tender submissions. Additional clarifications might be requested by the Engineer in case of any uncertainties, with possible premises inspections, interviews with listed personnel or similar. Any deviations from the above is at the discretion of the Engineer and Employer.

4. SCOPE OF WORK

The Scope of Work (SoW) comprises the design, manufacture, works testing, supply and delivery to site, moving into position, erection, connecting up, site testing, witness testing, proving to the inspectors, demonstrating to the Employer's team of the complete installation as per conditions of contract, as per the specification in the bills and on drawings as follows;

- 4.1 Site assessment of the municipal water supply to the fire hydrants and hose reel to ascertain pressure and flow.
- 4.2 Fire pumps.
- 4.3 Fire water storage tank.
- 4.4 Fire brigade breeching inlet.
- 4.5 Fire hydrants.
- 4.6 Fire hose reels.
- 4.7 Fire extinguishers
- 4.8 Fire signage.
- 4.9 In-rack sprinkler installation.
- 4.10 Associated pipework.
- 4.11 Smoke detection & fire alarm system.

5. DRAWINGS

The following design drawings shall be read in conjunction with this document.

Table 2: Design Drawings

Drawing No.	Title
WH-ESKM-FP-001	FIRE PROTECTION LAYOUT
WH-ESKM-FP-002	FIRE PROTECTION DETAILS
WH-ESKM-FD-001	FIRE DETECTION SYSTEM
WH-ESKM-FD-002	FIRE DETECTION SYSTEM

5.1 ENGINEER'S DRAWINGS

The drawings prepared by the Employer show the general layout of all equipment and distribution systems, complete with schematic arrangements. These drawings, together with the Employer's Requirements, provide sufficient information to enable the Contractor to estimate the cost and to

determine how the full system must be design, installed, tested, and commissioned.

These drawings are not dimensioned shop drawings and shall not be used as shop drawings. Location dimensions shown are only indicative of the routes and zones in which the service must be installed.

Design, selection and construction details and installation arrangements for equipment and/or distribution systems which are available from either the manufacturer or supplier in their officially published literature or documentation, design and application manuals, or other authoritative sources such as SANS, BS, NFPA, etc. shall be used as the basis for shop drawings. The specific source shall be identified at the submission stage.

Where these details are non-existent or not sufficient, reference might be made to the sections and detail drawings.

5.2 CONTRACTORS DRAWINGS, EQUIPMENT SELECTION AND SAMPLE SUBMISSIONS

5.2.1 Shop Drawing Submissions

5.2.1.1 Shop Drawings shall indicate all equipment, distribution systems, testing / inspection / instrumentation positions, access requirements and builder's work requirements.

Builder's work requirements shall include all work required (holes in concrete and masonry bases, etc) as well as the sizes, capacities and positions of service connections.

5.2.1.2 Shop Drawings shall be based on the Engineer's design concept shown on the tender drawings, approved equipment selections and samples. We note that in this specific instance, there is a large design responsibility for the contractor in which the contractor will be responsible to check the Engineer's design concept for compliance as well as practical considerations that may be applicable to the site. The Shop Drawings shall be checked and passed by the Contractor's Chief Draughtsman and Project Engineer / Manager. The Shop Drawings shall be stamped to confirm that co-ordination with Architects, Structural and other affected Contractor's drawings, has taken place. No drawing will be reviewed without hydraulic calculations, support positions and detailed sections.

5.2.1.3 Copies of Shop Drawings of all parts of the contract works shall be submitted to the Engineer and Employer for approval.

5.2.1.4 The Contractor may, if he so desires, obtain "electronic / e-mail" copies of the Engineer's drawings for modifications and updating if required. These drawings shall be re-titled in accordance with the Contractor's system and shall thereafter be submitted as the Contractor's Shop Drawings. No portion of the Contractor's works shall be commenced until the shop drawing has been approved by the Engineer.

5.2.2 "As Built" Drawing Submissions

5.2.2.1 "As Built" drawings are the Shop Drawings embodying all modifications made during construction. They shall include floor and ceiling layout drawings indicating all outlet positions. SICO drawings are also "As Built" drawings indicating the intended functioning, capacity data and control functioning of all systems.

5.2.2.2 Copies of "As Built" drawings shall be submitted to the Engineer for approval.

5.2.3 Equipment Selection Submissions

5.2.3.1 The Contractor shall select equipment which complies with these specifications. These selections shall be submitted to the Employer for approval.

5.2.3.2 No equipment shall be installed until the equipment selection submission has been accepted by the Employer, if the selected equipment deviates from the design concept and/or deviates from the accepted equipment offered.

5.2.4 Sample Submissions

Samples are any samples required by the Employer or Engineer. Samples shall be physical examples to illustrate materials, equipment or workmanship, and to establish standards by which the works may be judged. Such samples, after approval, will be retained by the Architect or Engineer for a period sufficient to ascertain that the relevant component is actually provided as per such sample, but will then be returned to the Contractor for incorporation in the works.

5.3 SUBMISSION PROCEDURES

Submission for approval will consist of the following activities executed by the Contractor and other parties involved:

- 5.3.1 The Contractor shall review, stamp, date and sign to signify his approval and submit in the manner required by the Employer and with reasonable promptness and in orderly sequence so as to cause no delay in the work, all Contractor's drawings, equipment selections and/or samples required by the contract documents or subsequently by the Architect or Employer. Contractor's drawings, equipment selections and samples shall be properly identified as specified or as the Architect or Engineer may require.
- 5.3.2 At the time of submission the Contractor shall inform the Employer in writing of any deviation in the Contractor's drawings, equipment selection or samples from the requirements of the contract documents.
- 5.3.3 Each individual Equipment Selection Submission shall be accompanied by a copy of the applicable detailed technical specification. Each clause of this specification shall be marked "complies" or "Does not comply", complete with reason stated and countersigned by the Contractor.
- 5.3.4 Equipment Selection Submissions shall be indexed similar to the index for Part II Equipment of the "Operating Instructions and Maintenance Manual"
- 5.3.5 The drawings and Equipment Selections shall be submitted in a number of copies and along the channels agreed.
- 5.3.6 By submitting drawings, Equipment Selections and/or samples, the Contractor represents that he has determined and verified all site measurements, site instruction criteria, materials, catalogue numbers and similar data, or will do so, and that he has checked and coordinated each Contractor's drawing and sample with the requirements of the Works and of the contract documents.
- 5.3.7 The Employer on behalf of the Contractor, will review Contractor's drawings, Equipment Selections and samples with reasonable promptness so as to cause no delay, but only for conformance with the design concept of the contract Works and with the information given in the contract documents. The Employer's approval of a separate item shall not indicate approval of an assembly in which the item functions.

5.3.8 The Contractor shall make any corrections required by the Employer and shall re-submit the required number of corrected copies of the Contractor's drawings, Equipment Selections or new samples until approved. The Contractor shall direct specified attention in writing on resubmitted drawings to revisions other than the corrections required by the Employer on previous submissions.

6. FIRE PROTECTION NOTES

The following notes must be noted by the contractor and form part of the scope of work.

- All work to comply with act 103 of 1977 and SANS 10400 Part T - 2024
- Occupancy classification J2 and G1 as per SANS 10400-A Clause 20.
- 1 x 9kg fire extinguishers per 100 m² or part thereof to be installed in accordance with SANS 10105 and Clause 4.37 and 4.38
- 1 x 30 m hose reels, per 500 m² or part thereof, to be installed in accordance with SANS 543 and T4.34.
- 1 x 65mm hydrants, per 1000 m² or part thereof, to be installed in accordance with SANS 543 and SANS 1128-1 and T4.35.
- Existing sprinkler system to be extended to cover new in-rack sprinkler heads.
- Water supply for fire fighting purposes shall be pumped from a 144m³ storage tank and flowrate and pressure shall comply with SANS 10400-2011 Part W and with City of Johannesburg water by-laws.
- Portable fire extinguishers to be hung on meranti backing boards, on locations indicated on the fire plan.
- Doors in escape routes may only be fitted with approved push bars for double doors and thumb turn for single doors locking devices and shall comply with Clause 4.14, 4.17 and 4.19.
- Floor coverings to be non-combustible for J2 as per Clause 4.14.
- Wall coverings to be non-combustible for J2 as per Clause 4.15
- Emergency lighting with 30 min battery back-up shall be designed and installed in accordance with SANS 10400-T and SANS 10114-2 and SANS 1464-22, as per clause 4.30.
- Photoluminescent escape signs to be provided and to comply with SANS 1186 Part 1 and 5 as per Clause 4.29.
- Photoluminescent symbolic signs to be provided and to comply with SANS 1186 Part 1 and 5 as per Clause 4.32
- Suspended ceilings and its supporting members, shall be non-combustible material complying to SANS 428: 2012
- Structural elements and components shall have a minimum stability rating of 30 minutes.
- Insulation material to be non-combustible complying with SANS 428:2012.
- All penetrations through fire rated walls shall be fire sealed.
- Fire detection and alarm system shall be provided in compliance to SANS 10139 Category M and L2. access controlled doors and gates shall be de-energized by the smoke detection system in the event of a fire alarm as per Clause 4.31.

- Airconditioning plant shall be disabled on receiving a fire alarm signal as per Clause 4.43.
- Access control shall have green override buttons or be disabled after receiving a fire alarm signal.

6.1 CLOSE OUT

Upon completion of the Contract, the contractor will remove all temporal works i.e., movable sanitation facilities and reinstate the area to the satisfaction of Eskom.

Upon completion of the specified works, the contractor must submit data packs for review and close out. The data pack must, at a minimum, encompass the following components:

- Document List
- Approved Inspection and Test Plan (ITP)
- Material Certificates
- Test Results
- Notifications
- Modifications
- Concessions
- Compliance with Method Statements and Specifications
- Risk Assessments
- Technical Queries (TQs), Engineering Requests (ERs), and Communication logs with Eskom
- AS BUILT Drawings
- Operating & Maintenance Manuals

7. WORK PROVIDED BY OTHERS

None – no works will be provided by others and all works would be the responsibility of the Contractor.

8. COMPLIANCE WITH REGULATIONS AND STANDARDS

The Contractor shall comply with all Acts of Parliament and all regulations and bylaws of local and or other authorities having jurisdiction regarding the execution of the works in particular the following:

- Relevant parts of SANS 10400-T, SANS 10400-W, SANS 10139, SANS 1186 and SANS 10252.
- For pipework and pump construction for the hydrant system and requirements, we refer SANS 10287: 2025 as well as this document.
- For the extension and inrack sprinkler protection portion of the project, we refer to NFPA 13 2022 as received from the client as the applicable code;
- National Building Regulations and Building Act (Act 103 of 1977);
- The Contractor is to comply with all requirements of the Occupational Health and Safety Act (Act 85 of 1993) and all subsequent revisions thereof. Further, the Contractor undertakes to employ only people who have been duly authorised in terms thereof and who have received sufficient health and safety training to ensure that they can comply therewith. In addition, the Contractor warrants that it shall enforce the terms of this clause on any sub-Contractor employed by the Contractor in connection with the Contract;

- Government, Provincial and Local Authorities Ordinances, Regulations, By Laws, Rules and other Statutory requirements; and
- Specifications and Codes of Practice issued by the South African Bureau of Standards and British Standards Institute. The former shall have precedence over the latter where both bodies have issued conflicting specifications or codes of practice.

9. APPROVALS

The Contractor shall, before building starts, submit the following to the Engineer:

- (a) the application for the approval of the design;
- (b) a signed declaration that the installation has been designed in accordance with this standard by a competent person;
- (c) a signed undertaking that the installation will be installed by an approved installer, in accordance with the appropriate plans and drawings, and as specified in this specification and relevant standards;
- (d) appropriate plans, drawings, details and information required in terms of this specification;
- (e) particulars of the power supplies; and
- (f) a statement that the installation will comply with this standard, together with details of any deviation(s), and

The Engineer shall be provided with a summarized schedule that contains all the relevant information relating to the system.

10. HOISTING AND RIGGING

10.1 HOISTING

The Tenderer shall make all due allowances for the hoisting of his equipment and / or materials.

10.2 RIGGING

The Tenderer shall be responsible for rigging of his equipment in position.

11. PROGRAMMING

- 11.1. Contractor shall submit to the Employer within two weeks of appointment (or as requested by the Employer), a practicable work programme

This Contractor's programme shall state :

- Access dates to various areas to start installing equipment.
- Access dates to clean, safe vertical shafts to start vertical reticulation.
- Access dates to either ceiling and / or floor plenums of the different floors (or section of floors) to start installing in these areas (so called 1st Fix).
- Access dates to the various rooms with completed walls and partitioning (fully cleaned out) to start installing room equipment and connect these (so called 2nd Fix).
- Practical completion date where all the work is completed with non-critical snags remaining.

- 11.2 The section of the programme covering submission of structural and Installation Drawings, equipment selection, submission of inspection reports of completed sections of the installation, preparation of Operating Instructions and Maintenance Manuals, Testing and Commissioning shall be presented in the form GANT CHART
- 11.3. The network graphic representation must clearly depict the sequence of the activities planned by the Contractor, their interdependence, and time required to perform each activity. In developing the project network, the Contractor shall use arrow or precedence notation (on which available computer programmes are based).
- 11.4. The Contractor shall furnish with the initial programme, a tabular listing of all activities listed on the programme. For each activity there shall be listed the earliest and latest finish times and the "float". Activities on the critical path shall be so indicated.
- 11.5. The Contractor shall regularly, throughout the progress of the works, amend and update the work schedule (both the network graphic representation and the tabular list of activities) to incorporate all variations, new drawings and site instructions, and all such amendments are to be subject to the Engineer's approval and shall not amend the completion date of the project unless extensions of time have been granted by the Contractor's.
- 11.6. If, in the opinion of the Employer, the Contractor falls behind the programme, the Contractor shall take such steps as may be necessary to improve his progress. The Engineer may require him to increase the number of shifts and/or overtime operation, days of work and/or the amount of construction plant, and to submit for approval revised programmes in the form required above in order to demonstrate the manner in which the required rate of progress will be achieved, all without additional cost to the Employer.
- 11.7. Regular meetings to monitor progress will be held under the chairmanship of the Employer. The meetings must be attended by as many of the representatives of the Contractor as the Employer shall require.
- 11.8. The purpose of such meetings will be to review progress against the programme, to investigate and establish actual or impending causes of delays, to instruct on such remedial action as may from time to time be necessary and generally to ensure that the progress of the work remains on programme at all times.

12. CONTRACT MANAGEMENT

All activities, information required, approvals, etc. shall be managed by the officially appointed Contractor' to ensure completion of the Subcontract at the agreed completion date and of specified quality.

It shall be the duty and responsibility of the Employer to identify any item such as delays, activity time overrun, late information and/or approval at least fortnightly, and describe in his standard report to the Contractor proposed action to overcome the adverse conditions to maintain the planned construction schedule.

It shall be the duty and responsibility of the Contractor to prepare a detailed tabulated construction activities breakdown with related earliest and latest dates for information required, approval, area availability and inspection.

Construction activities are:

- 1. Drawing Submissions.
- 2. Equipment Selection Submissions.
- 3. Off Site Manufacturing.

4. Installation on Site.
5. Testing and Commissioning Procedures Submission.
6. Testing, of the complete works.

The Contractor shall weekly, throughout the progress of the Subcontract, amend and update the 'tabular list of activities' to incorporate all variations, delays and remedial action to ensure that the completion date will be met. He shall particularly note and report to the Contractor on unusual conditions encountered which may (or has) delayed progress of the work related to the Contractor's programme.

The Project Manager shall be capable of using network diagrams to explain the sequence and actual dates used by him in his tabular form monthly report in order to prove that 'cut off' dates are realistic and factual and not an attempt to formulate claims for delays.

13. ORGANISATION AND STAFF OF CONTRACTOR

In addition to the Site supervisor/foreman, the Contractor shall employ, (apart from the required artisans and labourers), as many trustworthy and experienced engineers, programmers, inspectors and administrators as may be necessary for the execution of the work in the Contract.

The duties and responsibilities of the Contractor engineering and management staff shall be inter alia:

- Programming of the works in agreement with the Employer as per Contract.
- Directing its employees to ensure efficient, timely and safe execution of the work, and cooperation with the Engineer and other trades to ensure such execution.
- Selection and/or engineering of equipment and components into working assemblies, all in conformance with the design concept contained in the Employer's Requirements.
- Equipment selection and submission of shop drawings for approval in accordance with the required procedures.
- Expediting of the work.
- Attendance of routine Site progress meetings and programme monitoring meetings arranged by the Engineer.
- Preparation and submission of testing and commissioning procedures and programming.

14. PROTECTION AGAINST DAMAGE

Special care shall be taken in transport, delivery, storage on the Site and installation to ensure that the entire system is in 'as new' condition at start-up.

Packaging material shall be of sufficient strength and/or temporarily reinforced during transport to and handling on the Site until installed in its final position to ensure that the equipment "packed" retains its structural and dimensional integrity during these phases of the contract.

The Contractor shall remain responsible for equipment in 'as new condition' and is not allowed to install equipment in areas or spaces where it can be subjected to damage through weather or trades for which it has not been designed.

15. ACCESS TO EQUIPMENT AND SYSTEMS

The Contractor shall familiarize himself with the proposed location of the equipment and shall be responsible for ensuring that sufficient access is available on Site to allow the largest component parts to be brought into position.

The required unobstructed space shall be left around the equipment for access, maintenance and service of the equipment in accordance with the manufacturer's instructions.

Equipment shall be installed so as to be readily accessible for testing, operation, maintenance and repair. Minor deviations from drawings may be made to accomplish this, but changes of magnitude or which involve extra costs shall not be made without the approval of the Engineer.

16. CLEANING AND START-UP

Repaired equipment/components will be accepted at "handover" of the system if defects become apparent during start-up, testing and commissioning only at the discretion of the Employer.

17. TESTING, COMMISSIONING, OPERATING OF PLANT AND HANDOVER

Concurrent with equipment submissions the Contractor shall submit full testing, balancing and commissioning procedures for each item of equipment (or as requested by the Employer).

Prior to the prestart inspection the Contractor shall submit, and have obtained approval of a fully detailed commissioning programme and required Method Statements by the Employer.

After physical completion of the contract works the Contractor shall carry out all preliminary tests necessary to satisfy himself that the materials and equipment comply with the provisions of the contract and are in a state suitable to satisfy the requirements of the acceptance tests by the Employer. The preliminary tests shall then be completed satisfactorily before the Contractor, requests the Engineer to witness the acceptance tests.

The Employer may request the Contractor to replace any portion of the contract work which does not conform to the requirements of the contract documents.

In the event of the plant or installation not conforming to the requirements of the contract documents, the Employer shall be at liberty to either recover from the Contractor or to deduct from the contract price all reasonable expenses incurred by himself or his agents attending the repeated test.

After physical completion has been reported and all defects made good, "start-up" shall take place and the above check out procedures shall be carried out.

Prior to the carrying out of acceptance tests the Contractor shall operate the entire system for as long a period as may be required to provide satisfactory performance in this specification and compliance documents.

The Contractor's Operator(s) shall be fully conversant with the equipment operation and experienced in running similar installations. The Contractor shall train the Employer's operator(s) to enable them to be responsible for and capable of operating the equipment.

The contractor shall further be responsible for the full coordination off all testing and commissioning requirements with the relevant stakeholders from the Employer's side, along with all methodology, approach, risk assessments etc. that may be requested during the execution of the contract.

Air pressure tests shall be done on newly installed pipe before the water test is conducted. This air pressure test must be to 4 bar for 1 hour and evidence of this test should be included in the handover file.

Water pressure shall also be tested to 1.5 time the working pressure for 1 hour (as required in SANS 10252) at the highest point for the new & existing components and evidence of these tests are to be included in the handover file.

All pressure tests are to be done gradually to protect the existing infrastructure as far as possible.

18. GUARANTEE

The Contractor shall guarantee that entire system / systems as part of this scope, is installed and commissioned in such a manner that it will function to the true intent and meaning of the contract documents for a period of 12 months from date of acceptance by the Employer.

19. CERTIFICATION

19.1 CERTIFICATION REQUIRED

Upon completion of the installation of a system contained in this document, the Contractor shall provide to the Employer two certificates:

1. A signed written statement, in form as follows:

“The undersigned, having installed the fire water reticulation, pumped water supply, intermediate sprinkler protection and detection system to Eskom Rosherville Superstore Buildings, confirms that the above-mentioned systems were installed in accordance with the specification provided and the instructions and directions provided to us by the manufacturers.”

2. *Any and all additional certification, check sheets, pressure test certificates, warranties, guarantees, performance tests, PSW Consulting Engineers Material Test certificates etc. that would be requested by the Engineer, upon discretion, to ensure that the functionality of the system has been properly tested and understood by all parties.*

19.2 DOCUMENTATION

The Employer may request additional documentation from the Contractor at handover, and as such it is the responsibility of the Contractor to provide documentation as requested. Typical documentation that is required include but are not limited to:

- Certificates for various systems and tests:
 - Certificates of Completion including design responsibility and liability for the works under this contract as a whole.
 - Pressure test certificates (on all new pipework in line with the design codes)
 - Flow test at most remote locations as proof of systems on the hydrant systems
 - Materials and Tests certificates (as provided by the Engineer at time of commissioning)
 - Flush certificates
 - All datasheets and certifications of all equipment used
 - System components instructions
 - Maintenance and care instructions for various systems
 - Operating and Maintenance (O&M) manuals for equipment

- All general checklists and check sheets
- Copies of accepted plans by the Employer
- Training certificates
- Detailed hydraulics data and calculations for supplied installations – fire water and sprinkler protection.
- Loop calculations
- Battery Calculations
- Cause and affect signed off by client
- All SANS 10139 documentation inclusive of a full signature on the design, installation and commissioning certificate as well as a client acceptance certificate.
- Any other certificates deemed necessary by the v for proof of compliance to the specification.

20. QUALITY MANAGEMENT SYSTEM – TESTING - INSPECTION

The tender adjudication will take into account the Tenderers official Quality Manual and Quality Control Systems, as per attached QM-58 Standard.

The manual shall not only describe in detail the qualifications, responsibilities and authority of the proposed Project Engineering, Managing and Quality Assurance personnel but also the firms technical standards and detail procedures for:

- i. Programme Submission and Contract Management.
- ii. Equipment Selection Submissions.
- iii. Installation/Shop Drawing Submissions.
- iv. Sub-systems(s) Testing and Commissioning Manual Submission.
- v. Site Installation Inspection Report Submissions.
- vi. Progress Payments and Evaluation.

The quality of managing, as reflected in the Contractor's submission of:

- i. Work programming.
- ii. Equipment selection.
- iii. Shop drawings.
- iv. Testing and Commissioning Documentation.
- v. Operating Instructions and Maintenance Manuals.
- vi. Inspection Record Cards/Checklist,

shall be in accordance with ISO-9000 or otherwise/approved.

No portion of the work shall commence before the Quality Manual has been approved by the Employer.

21. OPERATING AND MAINTENANCE MANUALS

The Contractor shall supply 2 (2) comprehensively indexed Operating and Maintenance Manuals, bound in loose leaf plastic covers.

The manuals shall be arranged in two parts:

21.1 OPERATION MANUAL

This manual should consist of two parts.

Part I - Operation Instruction

Contains information a qualified operator needs

- 1) to start and stop equipment
- 2) to control and monitor the performance of the equipment in normal modes of operation
- 3) to change from one mode of operation to another and
- 4) to operate equipment in emergency situations.

Operation procedures with proper flow charts for all integrated systems are also required. The system function should be represented pictorially and in writing.

Full trouble analysis procedures shall also be included.

Part II - Performance Verification Procedures

Contains all the information a qualified operator needs to verify equipment and overall system performance at the. Any design calculations needed for performance verification shall be included in this manual.

21.2 MAINTENANCE MANUAL

This manual should also consist of two parts.

I - Inventory

Contains a listing of all systems and pieces of equipment to be maintained as well as all the technical information needed to order spare parts. Manufacturers' catalogues are considered useful adjuncts only.

The full names, addresses and contact details of all suppliers of equipment shall be included.

II - Maintenance Programme

Contains the information necessary to perform breakdown, preventative, and predicative maintenance. These programmes include written information regarding when or how often to perform maintenance in the most efficient and economical fashion to satisfy tenant needs.

22. ONE YEAR'S MAINTENANCE

The Contractor shall furnish free of charge all maintenance on the entire contract works for a period of twelve months after completion of contract works. As part of this, the Contractor should allow for the first two 6 monthly inspections and maintenance (including access equipment, spares and certification) at no additional costs to the Employer. It is the responsibility of the appointed Contractor to arrange these maintenance directly with the Employer's facility manager / representative.

The Contractor shall in the course of such maintenance, or on call during the maintenance period, repair or replace defective parts, and shall use only genuine parts produced by the manufacturer of the original part.

The Contractor shall supply all replacement parts, lubricants, fuses, etc. during the free maintenance period.

The first year maintenance contract can be extended in accordance with the Detailed Maintenance Specification.

The maintenance activities shall comprise the activities as per design standard listed.

Weekly, monthly, quarterly and other operational testing and inspections as required by SANS 0287 will be carried out by the end user.

or r

23. TRAINING

The Contractor will at no additional cost train the staff selected by the Employer.

The training shall be continued until the Employer is satisfied that the selected staff is capable in the operation and maintenance requirements of the system(s).

24. QUALITY

24.1 STANDARD OF WORKMANSHIP

24.1.1 General

All aspects of the installation (eg. setting out, alignment, levels, positions, etc.) must be checked on site and the installation installed correctly within the parameters of applicable standards and codes.

24.1.2 Visual Appearance

The visual appearance of the Fire water system is important and the Contractor must ensure that the lines and levels followed by the installations are correct not only within the tolerances specified but also look aesthetically correct to the satisfaction of the Employer, and Engineer. No holes will be burned into the support brackets, if this is found the bracket will be removed and replaced with the correctly drilled holes.

24.2 QUALITY ASSURANCE

The Contractor shall submit quality plans in conformance with ISO 9000, for approval by the Employer. The Contractor shall establish, document and maintain throughout this project an effective and economical quality system to ensure and demonstrate that material or services conform to the specified requirements. The documented Quality System shall include Quality Management objective policies, organisation and procedures to demonstrate compliance.

The tenderer shall submit with this tender:

- The level of Quality Assurance which will be provided for this project to ensure the quality of material and services.
- Sufficient information and data to allow the evaluation of the proposed Quality Management System in order to provide the purchaser with assurance that the quality of material and service is provided in a rational and cost-effective manner.

No portion of the work shall commence before these quality plans have been approved by the Engineer.

Deviation from the below table is at the discretion of the Engineer and Employer

Sign-off	100%

25. GENERAL

25.1 PROJECT DELIVERABLES

The contractor is required to provide both an overall method statement and a detailed method statement for each specific activity. These statements must be approved before all construction work begins. Additionally, the contractor must submit an overall Quality Control Plan (QCP) and Inspection and Test Plan (ITP), as well as detailed QCPs and ITPs for each activity, all of which must be accepted by Eskom prior to commencing construction and implementing of the proposed designs.

In addition, the following deliverables must be met:

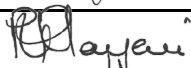
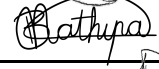
- In coming water pressure test plans
- Detailed Method Statements
- Closeout report

25.2 CODES AND STANDARDS

SANS 10400-T	The Applications of the National Building Regulations - Fire Protection
SANS 10400-Part W	The Applications of the National Building Regulations - Fire Installation
NFPA 13	Standard for the Installation of Sprinkler Systems

26. AUTHORISATION

This document has been seen and accepted by:

Name	Designation	Signature
Kith Maitisa	Regional Manager	
Phumzile Mlangeni	Project Manager	
Andries Pretorius	Site Supervisor	
Bonolo Mathipa	GIT	
Jaco Prinsloo	Fire Engineer	
Andre Swanepoel	Project Manager	

27. REVISIONS

Date	Rev.	Compiler	Remarks

SECTION 2

GENERAL TECHNICAL SPECIFICATION

FOR THE

FIREWATER & SPRINKLER (LIMITED) INSTALLATION

FOR THE

ESKOM ROSHERVILLE FIRE PROTECTION UPGRADE PROJECT

SECTION 2: GENERAL TECHNICAL SPECIFICATION (FIREWATER AND SPRINKLER)

1. EQUIPMENT SELECTION

Only equipment and components specifically designed for the proposed use may be used. To this end, all equipment must be either listed / approved by an approved testing laboratory / authority. Proof of such compliance must be provided for each item.

Equipment Selection must be included as part of the returnable of this tender. This must include, but not limited to (refer to returnable schedule later in the document.).

- Pump curve, supplier and selection
- Tank supplier and selection
- Equipment selection (i.e. FHR's FH, valves etc.)
- Etc.

Equipment Selection Submissions shall be indexed in order to form part of the O&M Manual.

The drawings and Equipment Selections shall be submitted in a number of copies and along the channels directed by the Engineer for approval. By submitting drawings, Equipment Selections and/or samples, the Contractor represents that he has determined and verified all site measurements, site instruction criteria, materials, catalogue numbers and similar data, or will do so, and that he has checked and co-ordinated each Contractor's drawing and sample with the requirements of the Works and of the contract documents.

The Engineer, on behalf of the Employer, will review Contractor's drawings, Equipment Selections and samples with reasonable promptness so as to cause no delay, but only for conformance with the design concept of the contract Works and with the information given in the contract documents. The Engineer's approval of a separate item shall not indicate approval of an assembly in which the item functions.

The Contractor shall make any corrections required by the Engineer or subsequently the Architect and shall re-submit the required number of corrected copies of the Contractor's drawings, Equipment Selections or new samples until approved. The Contractor shall direct specified attention in writing on resubmitted drawings to revisions other than the corrections required by the Engineer on previous submissions.

1.1 WATER SUPPLY

The primary water supply for the hydrant system will be from the council line which feeds a set of tanks / tank and newly introduced pump set sized sufficiently by the Contractor to feed the **fire water system**. The fire water system will be served by the new pump/s & tank/s to serve the system and or hydrant/s in operation for 1 hour.

The sprinkler system exists, and no changes to the pumps are proposed. However, the replacement of one of the sprinkler tanks are proposed.

The Contractor shall perform the required detailed design along with the appropriate hydraulic calculations to ensure that the system remains within the pumped water supply capabilities. Note that the proposed detailed design must follow the conceptual design as provided by the Engineer and any deviations must be approved by the Engineer in writing.

1.2 AUTOMATIC SPRINKLER SYSTEM

With regards the automatic sprinkler installation, the following is applicable:

Description	Value
Category of Installation (roof level)	Existing and to remain
Design Density	Unknown – not part of scope
Assumed Maximum Area of Operation (AMAO)	Unknown – not part of scope
Primary Water Supply	Existing Sprinkler pumps

The only portion of the sprinklers are the installation of intermediate level protection as allowed for in the BOQ – to that end, it would however be required from the contractor to conduct the necessary site audits to ensure that the existing systems is understood to an extent that the contractor would be able to provide accurate hydraulic calculations for the installation.

2. MAIN DISTRIBUTION

2.1 GENERAL

Only SABS compliant pipework, as specified elsewhere in the document, pressure tested to 20 bar (2 000 kPa) for 1 hour (as required in SANS 10252) at the highest point, shall be used for the fire water reticulation system – or agreed to in an approved method statement with the Engineer and client due to the concern regarding the age of the systems.

All sprinkler piping to the relevant design code as stipulated elsewhere in this document (NFPA 13 2022 Ed.). Where applicable, all pipework should be so located as to prevent damage by mobile equipment or other mechanical means.

Where applicable, all pipework should be located as to prevent damage by mobile equipment or other mechanical means.

2.2 PIPE SUPPORTS

General

Pipe supports, support fittings and associated components, and also the material from which they are manufactured, shall be suitable for sprinkler use (NFPA 13 2022., SANS 10252 and SANS 10400).

Note: Pipe supports, support fittings and associated components, the adequacy in respect of which the SABS has issued a favourable test report or a favourable evaluation certificate, are normally deemed suitable for sprinkler use.

Spacing

Sprinkler and fire hose reel and hydrant pipes are to be spaced according to the applicable design code as specified elsewhere (NFPA 13 2022., SANS 10252 and SANS 10400).

Strength

To comply with the applicable design standard as specified elsewhere in the document (NFPA 13 2022 2022, SANS 10252 and SANS 10400).

Fasteners

To comply with the applicable design standard as specified elsewhere in the document (NFPA 13 2022, SANS 10252 and SANS 10400). Any deviation or alternative fixing methods to be pre-approved by the consulting engineer and AHJ with appropriate documentation (Test certificates etc.)

2.3 PIPE FITTINGS

In cases where there are any uncertainties, the stipulation for applicable for firewater / sprinkler protection as in NFPA 13 2022, SANS 10252 and SANS 10400 takes precedence for fire water pipework installation as well. All malleable fittings to be BS 143 compliant.

3. SPRINKLERS

3.1 GENERAL

Approval

Sprinkler heads must be of makes and types approved by the UL, FM or other recognised standards body and the Engineer and not be altered, painted, changed or modified in any way after manufacture. Any sprinkler heads so damaged, altered or painted must be replaced. Sprinkler heads shall be of the type, model and finish to be agreed with the Fire Consultant in conjunction with the Architect.

New Equipment

Only new sprinklers and equipment shall be used.

Sprinklers that are contaminated by paint shall not be cleaned, but shall be replaced.

Sprinkler heads shall, after despatch from the production factory, not

- a) be altered in any respect, or
- b) be painted except for identification purposes, or
- c) have any type of ornamentation or coating applied

Classification

A sprinkler shall be of one of the following types of pattern:

- a) a conventional pattern sprinkler
- b) a spray pattern sprinkler
- c) a sidewall sprinkler; or
- d) a specialized sprinkler.

3.2 SPRINKLER SELECTION

Sprinklers shall be selected in accordance with the following table as directed by the Fire Engineer:

Fire-Hazard Class And Sprinkler Location	Type Of Sprinkler	Nominal Size Of Sprinkler Orifice, mm
Ordinary-hazard class ceiling sprinklers	Exists and not part of scope	
Ordinary-hazard class exposed sprinklers	Exists and not part of scope	
Intermediate level protection	Refer to BOQ	

3.3 SPRINKLER GUARDS AND WATER SHIELDS

Where exposed to possible physical damage, sprinklers other than ceiling sprinklers, shall be fitted with a sprinkler guard that is made of metal, fit for purpose and supplied and fitted by the manufacturer.

Similarly, should any water shields be called for, these shall be of the same manufacturer as the sprinklers and fitted in accordance with their specifications.

3.4 SPRINKLER HEADS

Temperature Ratings

Sprinkler heads rated as below are specified:

Description	Temperature Rating	RTI
Ordinary-hazard class ceiling sprinklers	Exists and not part of scope	
Ordinary-hazard class exposed sprinklers	Exists and not part of scope	
Intermediate level protection	Refer to BOQ	

Spares

To comply with the applicable design standard as specified elsewhere in the document (NFPA 13 2022)

3.5 SPACING OF SPRINKLERS

Primary and final co-ordination, it is expected from the contractor to assist the Engineer as required by reviewing the design in detail prior to fabrication. The contractor will be required to assist to co-ordinate services with others. To this end, the following requirements are to be adhered to, as well as the NFPA 13 2022 Edition Rules.

Measurements

All measurements of distance between sprinklers or of areas covered by groups of individual sprinklers shall be taken in the horizontal plane.

Orientation

Sprinklers shall be installed upright or pendent and relative, not to the horizontal plane, but to the roof, ceiling or staircase.

Sprinklers Installed Under Roofs, Ceilings And Platforms

Where the sprinklers are installed under roofs, ceilings, platforms or similar planar surfaces, the area covered by a sprinkler and the distance between adjacent sprinklers shall be not more than that for non-sidewall sprinklers, or for sidewall sprinklers, or for a combination of sidewall and non-sidewall sprinklers.

Where both sidewall and ceiling (non-sidewall) sprinklers are used, the following shall apply:

- a) the ceiling sprinklers shall be installed in standard layout;
- b) the layout shall be staggered relative to the sidewall sprinklers which shall be directly opposite the sprinklers on opposite walls;
- c) the boundary of the sidewall sprinkler coverage shall be taken as not more than 3,7 m from, and parallel to, the walls on which the sidewall sprinklers are mounted; and
- d) the space between the sidewall sprinkler boundaries parallel to the opposite walls shall be protected by ceiling sprinklers installed in standard layout.

Minimum Spacing

To comply with the applicable design standard as specified elsewhere in the document (NFPA 13 2022) or as determined by the sprinkler specific data sheet. Any uncertainty to be clarified with the consulting engineer.

3.6 SPRINKLER LOCATION RELATIVE TO BUILDING STRUCTURE AND PLANT STRUCTURE

Roofs And Ceilings Without Bays Or Beams

To comply with the applicable design standard as specified elsewhere in the document (NFPA 13 2022) or as determined by the sprinkler specific data sheet. Any uncertainty to be clarified with the consulting engineer.

Roofs and Ceilings With Beams But Without Bays

To comply with the applicable design standard as specified elsewhere in the document (NFPA 13 2022) or as determined by the sprinkler specific data sheet. Any uncertainty to be clarified with the consulting engineer.

Roofs And Ceilings With Bays, Or Deep Beams (Or Both)

To comply with the applicable design standard as specified elsewhere in the document (NFPA 13 2022) or as determined by the sprinkler specific data sheet. Any uncertainty to be clarified with the Engineer.

Suspended Ceilings

Obstructions within the ceiling space likely to interfere significantly with the water discharge from sprinklers shall be treated as boundaries for the purposes of sprinkler spacing.

Where any obstruction, for example a light fitting, is of width exceeding 800 mm, supplementary sprinklers shall be provided to discharge below the obstruction.

Columns

To comply with the applicable design standard as specified elsewhere in the document (NFPA 13 2022) or as determined by the sprinkler specific data sheet. Any uncertainty to be clarified with the Engineer.

Girders

To comply with the applicable design standard as specified elsewhere in the document (NFPA 13 2022) or as determined by the sprinkler specific data sheet. Any uncertainty to be clarified with the Engineer.

Roof Trusses

To comply with the applicable design standard as specified elsewhere in the document (NFPA 13 2022) or as determined by the sprinkler specific data sheet. Any uncertainty to be clarified with the Engineer.

4. PAINTING AND PROTECTION AGAINST CORROSION

4.1 GENERAL REQUIREMENTS

The Contractor shall be responsible for ensuring that the coating manufacturer's instructions, including, but not limited to:

- Surface preparation and cleaning.
- Preparation and application of coating materials; and
- Shelf life and storage requirements are adhered to.

NO unpainted pipes or fitting to be delivered to site. Only approved coating materials as detailed in the specification shall be used. These shall not be mixed with materials from different manufacturers. The Contractor shall ensure that piping and proprietary equipment are adequately protected when stored on site to prevent internal corrosion.

4.2 PIPING

4.2.1 Above-Ground Pipework

All above ground sprinkler/firewater pipework installed inside buildings up to and including 150mm diameter shall be of Medium Grade Black Piping to SANS 62. Where above-ground pipework exceeds 150 mm diameter, this shall be of Medium Quality Black Piping to SABS 719 having a wall thickness of at least 4.5mm.

In isolated cases, where specified in the BOQ and tender drawings, the pipework will be upgraded to galvanized pipework for an increased resistance to environmental factors. The pipework will require the necessary banding as per requirements of the local fire brigade.

4.2.2 Pipework Below Ground

All piping below ground level smaller than 150 mm is to be of heavy quality black piping to SANS 62 suitably protected against corrosion with two layers of fully overlapping Denso wrap or equally approved, or Class 16 uPVC may be used for pipes always under pressure as per SANS 966 Code of Practice. Pipes in excess of 150 mm diameter shall be heavy quality black piping to SABS 719 with two layers of fully overlapping Denso wrap or equally approved or uPVC piping to SANS 966 as

above.

In isolated cases, where specified in the BOQ and tender drawings, the pipework will be upgraded to galvanized pipework for an increased resistance to environmental factors. The pipework will require the necessary banding as per requirements of the local fire brigade.

Note: No HDPE piping is allowed.

4.3 WELDING

No welding will be allowed to take place on site without written approval of the Engineer. **Require a certified welder on site. Welder certification to be send to the Engineer.** All welding (off site) is to be SANS 044. Only coded welders shall be allowed to weld fire water pipe work, and welder's certification shall be submitted prior to commencing the installation. The engineer reserves the right to request proof of compliance to this clause, but it is the responsibility of the tenderer to ensure compliance.

Only where unavoidable, welding will be allowed on site with written approval by the Engineer or Employer representative.

4.4 SURFACE PREPARATION

All sharp edges, burrs, rags and weld splatter shall be removed, and weld areas shall be abraded and/or ground. The surface shall be degreased and rinsed with solutions supplied by the coating manufacturer prior to mechanical cleaning (Section 4.4 of SANS 064 Code of Practice). Surface preparation shall be in accordance with ISO 8501-1 and SANS 064 and shall be conducted before erection of pipes.

4.5 PRIMING OF NEW PIPEWORK

All concealed and exposed piping shall have a red oxide prime coat which is factory applied. All damaged areas are to be wire-brushed and re-primed where necessary, prior to final coat being applied.

In case of Galvanized pipework, this will not be required.

4.6 USE OF DENSO WRAP

Where Denso protection is required, the following specifications must be adhered to:

- Piping to be prepared using Denso Primer, Denso HT Inner Wrap and Denso PVC Outer Wrap;
- Fittings and pipework other than cast iron must be hot dip galvanised prior to wrapping;
- Denso HT shall be applied by hand and wrapped in a clockwise direction with a minimum 55% overlap; A second layer shall then be installed.
- Denso PVC Outer Wrap must be wrapped in an anticlockwise direction with a minimum 25% overlap;
- Buried flanges are to be encapsulated in Denso Mastic prior to the application of the Denso HT tape; and
- The wrapping of pipework must extend at least 150mm above finished ground level and be secured with bandit strapping. In such cases, the PVC tape must be painted with an appropriately compatible ultraviolet resistant paint.

4.7 ALTERNATIVE PRODUCTS

Should the applicator or manufacturer wish to propose alternative products or coating materials, he shall submit a detailed motivation to PSW Consulting Engineers. The motivation shall include, but not be limited to the following:

- Benefit to the Employer;
- Product licensor and technical back-up available;
- Location, experience and ISO quality rating of the production facility;
- Detailed case histories;
- Performance guarantee offered; and
- Manufacturer's data sheets for each product.

4.8 COATING OF PIPEWORK

All exposed pipework is to be coated with a high-quality gloss enamel red coloured paint of an exact specification acceptable to the Architect. Due to the extreme tight building programme, all piping shall be shop cut, welded and fully primed and painted before delivery to site. Painting shall be properly repaired where damaged during erection.

4.9 COATING APPLICATION

The Contractor shall submit a quality plan to ensure that the application work is carried out in strict accordance with the most recent Product Data Sheet from the coating manufacturer. The product data sheet shall be deemed to be part of this specification. Coatings shall not be applied when surface may become damaged due to rain, dust, condensation, surface temp or excessive humidity (>85%). All surfaces shall be coated as specified. Special attention shall be given to cracks, crevices and edges to ensure complete coverage and paint thickness. The primer shall be applied as soon as possible after the surface preparation operation, but within 4 hours. Concealed surfaces shall be completely coated. All edges, corners, bolt holes and cut ends shall be stripe coated by brush application, prior to the application of the second coat. No coating shall be applied to any surface containing traces of grit, grease, soil, loose rust, surface contaminants (i.e. dust) or loose corrosion product of any kind. Surface rust on steelwork shall not exceed Grade B of ISO 8501-1.

4.10 FASTENERS

All applicable fasteners to comply with the applicable design standard as specified elsewhere in the document. Where there is any uncertainty, SANS 10287 : 2025 takes precedence.

4.11 PREVENTION OF GALVANIC CORROSION

Care must be taken to prevent or mitigate the corrosion caused by dissimilar metal contact on cooling coils, tubes and tube plates, pipes, flanges, frames etc. Typical metals encountered would be copper, aluminium, zinc, mild steel and stainless steel. The junctions between dissimilar metals must be electrically insulated where possible. Pipe flanges between dissimilar metals must be insulated using insulating gaskets for the flange faces and insulating sleeves and washers for all nuts and bolts. Where the insulation of the junction between dissimilar metals is not practical, the cathode surface on the electrolyte or "wet" side must be coated for a minimum distance of 100 mm from the junction. The applied coating must effectively isolate the coated surface from the electrolyte.

4.12 INSPECTIONS AND TESTING

The following inspections and tests shall be performed by the Contractor and witnessed by the Engineer / Employer, in accordance with the approved Quality Plan on corrosion protection. Visual inspection for paint film defects shall be performed after each coat is applied – it is the responsibility of the Contractor to call for these inspections and compliance.

All defects including pinholes, sags and runs shall be corrected before the next full coat is applied. Dry film thickness shall be measured in accordance with SANS Method 141 Clause 3.3 (smooth disc). The required dry film thickness given in "windows" for each coat in the relevant coating specification, i.e. required minimum and acceptable maximum. Any reading outside this range is cause for rejection and may require the removal of the entire coating and reapplication thereof. Actual readings and not averages shall be recorded.

4.13 QUALITY ASSURANCE

4.13.1 Contractor Qualification

The design team may, at its discretion, require a Quality Audit of the painting Contractor to ensure that he has the management, facilities, skilled staff and quality control facilities and staff, to carry out quality control during application of coatings to ensure compliance with specification. The Contractor shall accept full responsibility for the quality of his work and of materials used, irrespective of any quality surveillance that may be carried out by the design team.

4.13.2 Guarantees

Performance guarantees for the applied coating systems shall be offered jointly by the coating manufacturer and coating applicator. Whilst the period of guarantee will vary from situation to situation, the criteria for failure will not exceed Re2 on the European Scale of Degrees of Rusting. All guarantees in the terms of protection against corrosion shall be ceded to the Employer.

4.14 PROTECTION

Special care shall be taken in transport, delivery, storage on site and installation to ensure that equipment and/or components are protected, installed and cleaned to ensure that the entire system is in 'as new' condition at start-up. The Contractor shall be responsible for all hoisting and rigging of equipment/material into its final position in the building. Equipment enclosed packaging shall be of sufficient strength and/or temporarily reinforced during transport to - and handling on site, until installed in its final position, to ensure that it retains its structural and dimensional integrity during these phases of the contract. No "repaired" equipment/components (after damage by either own or other parties/construction trades either prior to, during or after installation) will be accepted at handover. Contractor shall remain responsible for equipment in 'as new condition' and is not allowed to install equipment in areas or spaces where it can be subjected to damage through weather or trades for which it has not been designed.

5. DETAILED CALCULATIONS REQUIRED

5.1 CALCULATIONS

The preparation of shop drawings and installation of all pipework shall be based on full hydraulic calculations of the entire system approved by the Engineer prior to commencement of installation.

All hydraulics should comply with the applicable design standard as specified (**SANS 10287 : 2025 / ASIB for the hydrant systems, and NFPA 13 2022 for the sprinkler protection system**) and be pre-approved by the respective Engineer and 3rd party where applicable, before manufacturing. This will be based on the Contractor's own site surveys / audits. We further note that the Engineer is not in possession of any as-built documentation or similar for the existing systems, and the Contractor will be responsible for their own site surveys to accurately calculate the sprinkler protection for the entire facility. Including the preparation of a new block plan for the entire facility, with the new intermediate level protection.

6. SIGNS

6.1 BLOCK PLAN

A block plan of the system with the position of the main control valves clearly indicated thereon shall be fitted in the Pumphouse.

The block plan shall show the following:

- a) the installation number and the location of the corresponding main control valve(s), the location of subsidiary valves.;
- b) Details of the pumped water supply – pump duties, information plates, suppliers, information regarding tanks, date of installation;
- c) each separate area of fire-hazard classification, the relevant fire-hazard class and the maximum storage height;
- d) the calculated hydraulic criteria of the installation(s);

6.2 LABELLING

6.2.1 Labelling Of Valves

A sign bearing the wording:

MAIN STOP VALVE

in letters of height at least 20 mm shall be fitted close to the main and any subsidiary control valves.

NOTE The wording should be in white letters against a red background.

Where the Main Stop valve is enclosed by a door, the sign shall be on the outside of the door, and a second sign in white letters against a blue background, bearing the wording:

KEEP LOCKED / SHUT

in letters of height at least 5 mm shall be on the inside of the door.

6.2.2 Labelling Of Booster Connection

The symbolic sign for pump connections shall comply with SANS 1186-1, shall be fitted close to the position of any pump connection, and shall bear the wording:

BOOSTER CONNECTION

In letters of height at least 20 mm.

The following wording shall appear directly below:

PRESSURE LIMIT 1 200 kPa

in letters of height at least 10 mm and where 1 200 (is the maximum allowable pressure, in kilopascals.)

6.3 SIGNAGE MATERIAL

All fire signs such as stack storage heights, terminal test points, valve location plates, block plans, operating instructions and so forth are to be fabricated from material such as **anodised aluminium or chromadeck**, neatly mechanically fixed to the closest structure / wall.

7. VALVES

7.1 APPROVED VALVES

The following alarm, control, test, drain and flush valves are normally deemed suitable for sprinkler use (depending on the particular application):

- a) those that are LPC approved or FM approved;
- b) butterfly to FM or LPC approved
- c) cast steel gate valves that comply with the requirements of SASS 191;
- d) water taps (metallic) that comply with the requirements of SASS 228;
- e) copper alloy gate valves that comply with the requirements of SASS 778; and
- f) cast iron gate valves that comply with the requirements of SASS 884 or SASS 665 and the following:
 - face to face dimensions as for class 125 and class 10118 of SASS 664;
 - material construction as for bronze trim valves (see SASS 884 or SASS 885, as appropriate);
 - sealed body ends;
 - each rising spindle valve should incorporate a back seat to facilitate replacing of valves under pressure; and
 - the body is to be dried, tapped 10 mm BSPT and plugged on either side of the gets to facilitate the fitting of a pressure gauge, if necessary.

General

All installation stop valves must be right-handed with clear indication as to the direction to be turned to close.

Colour Coded Installation Control Valves

The system must be provided with various sets of installation control valves (as per plan) each comprising, amongst others and not limited to:

Description
Butterfly or sluice valve along with a padlock and chain / strap.
Automatic wet alarm valve.

Description
Water motor alarm and gong.
Pressure gauges to specifications elsewhere.
50mm drain and test control valve.
Fire Brigade Boosters, externally located.
Flow measuring device.

Installation Main Stop Valves - Flanged

To comply with the applicable design standard as specified elsewhere in the document (NFPA 13 2022) or as determined by the sprinkler specific data sheet. Any uncertainty to be clarified with the Engineer.

Main Stop Valves

Note: All valves shall be **monitored** to NFPA 13 2022 requirements and connected back to the detection system by others.

7.2 SPRINKLER CONTROL VALVE

The construction and layout of the sprinkler control valves shall comply with the NFPA 13 2022 Rules. The control valve arrangement shall include the following items (but not limited to only):

An alarm valve with drain and test valves and pressure gauges to indicate pressures above and below the valves.

Each stop valve is to be supplied with a position indicator and pressure gauges.

Automatic hydraulically operated alarm bells shall be installed and connected to the control valves so that an audible alarm shall sound upon operation of the control valves.

Note: All valves shall be monitored valves to NFPA 13 2022 requirements.

Test Facilities

The valves for the test facilities at the remote points of each system are to be permanently piped to drain or to a suitable position outside the building. This is to allow testing without the need to attach hosepipes to the valves to prevent flooding and water damage.

Stop Valves Controlling Water Supplies

All control valves must be opened and secured in the open position by means of a chain at least 25mm thick and padlocked.

Non-Return (Reflux) Valves

A reflux / non-return valve is to be fitted to the water supply connection with testing arrangement. This valve must be so positioned that it can easily be tested and maintained.

A non-return valve-suitable for firewater / sprinkler use shall be installed at the following positions:

- a) on each water supply from a mains;
- b) on a fire brigade inlet or a booster pump connection;
- c) between a pump connection and the communication pipe that serves the installation; and
- d) on any pipe that is provided with a fire brigade or a booster pump connection and that is connected to a storage tank in such a position and way as to prevent the flow of water into the tank when the pump connection is in operation.

Pressure Release Valves

Pressure release valves must be installed where necessary as indicated by the Engineer's conceptual design and drawings.

Only pressure release valves approved by the Engineer shall be used and any uncertainty is to be communicated with the Engineer

7.3 ALARM VALVES

Alarm valves must be of an approved type and positioned directly above the main stop valve prior to any take-off point to the installation.

7.4 BOOSTER CONNECTIONS

Two 65mm booster connection must be provided with 65mm instantaneous male fire hose couplings to enable the fire department to boost the pressure of the sprinkler installation. The boosters shall be mounted at the site entrance. A sign instructing a maximum pressure of 1 200kPa not to be exceeded must be provided adjacent to the connections on the outside of the building.

8. ALARMS

8.1 WATER MOTOR ALARMS

The system must be provided with a suitably approved water motor alarm gong situated as near as possible to the alarm valve and be supplied by **galvanised pipework** of 15 mm nominal diameter where the length does not exceed six metres, otherwise it must be of 20 mm nominal diameter throughout. A 15mm test valve on the installation side of the alarm valve must be provided in order to test the alarm gong.

8.2 FLOW SWITCH LINKED TO ELECTRONIC ALARM

One off flow switch is to be provided above each installation control valve for connection by others.

8.3 AUDIO AND VISUAL ALARMS

All pump houses are to include a single continuous siren and strobe light securely mounted at a high level as indicated in the Engineer's conceptual drawings.

All alarms are to be wired to activate when the fire water / sprinkler system pumps activate.

9. PRESSURE GAUGES

9.1 PRESSURE GAUGES TYPE

To comply with the applicable design standard as specified elsewhere in the document (SANS 10287) or as determined by the sprinkler specific data sheet. Any uncertainty to be clarified with the Engineer.

9.2 INSTALLATION OF GAUGES

The Contractor shall ensure that all permanently installed instrumentation necessary for monitoring of status and performance of the system shall be of such dimensions and mounted in position so that they are easily and accurately readable by an operator standing on the floor.

Further, all gauges to be fitted with gauge cock, and with discharge holes mounted away from the operator.

10. WATER SUPPLIES AND PUMPS

It is the responsibility of the Contractor to adequately size, detail design, supply, install and commission a new dedicated set of pumps and tanks as per concept tender drawings for the hydrant system and described within this document, as well as the complete replacement of one of the existing sprinkler tanks with a suitable replacement. Where uncertainty, the pumps should comply with the requirements of SANS 10287:2025 for sprinkler protection, but

10.1 AUTOMATIC PUMPS - GENERAL

The Contractor shall be responsible for the supply, delivery, installation, testing, commissioning and handover of new automatic pump set which must conform to the Engineer's conceptual design and drawings.

Under no circumstance may any pump be stopped for any reason whatsoever other than that which is allowed in this specification document.

A duplicate water supply is proposed with a primary electric and secondary diesel driven pump is required for fire water installation.

The Contractor is to also design and supply electronic driven jockey / makeup pumps sized to keep the pressure in the fire water pipework within acceptable norms as detailed in this specification document.

The pump and drivers supplied by the Contractor should of uniform brand across all sites that forms part of this contract.

While we note that there was no specific specification received from the Employer for the specific pumps, the Engineer's proposed equipment and supplier is as follows:

- Preferred Pump supplier: SPP, Gauteng pumps, Davron Equipment or other ASIB approved pump supplier
- Pump: SPP or KSB

A full equipment list must be provided to the Engineer prior to the ordering pumps and approval in writing from the Engineer must be first received before the ordering of the pumps.

Alternatives may however be suggested by the Contractor, however the main offer is to comply with the brands stipulated and approval must be provided by the Engineer before any changes to the equipment brand is made.

10.2 PUMP ROOM / HOUSE

To comply with the applicable design standard as specified elsewhere in the document. Any uncertainty to be clarified with the Employer.

In case where there are any uncertainties, the stipulation for applicable for sprinkler protection as in SANS 10287 : 2025 takes precedence for fire water installation as well.

All aspects to be adhered to, including but not limited to:

- Ventilation
- Locks
- Location
- Stop valves
- Drainage
- Lighting (no less than 500 lux)
- Internal sprinkler protection (93° Celsius and no closer to 800mm from exhaust etc.)
- Grouting of base plate is a MUST and must be Painted to match the colour of the pump housing (or as per instruction from the engineer)
- Etc.

Refer to the consulting engineer for any uncertainty or proposed deviations for approval prior to commencing the works.

10.3 CONTAINERIZED PUMP HOUSE

This is not to be used in this project.

10.4 SUCTION PIPE WORK, DELIVERY PIPEWORK AND FITTINGS

To comply with the applicable design standard as specified elsewhere in the document. Any uncertainty to be clarified with the Engineer.

Note:

- The minimum acceptable diameter of suction pipe for this installation shall be confirmed as being acceptable, or otherwise, by the Contractor prior to submitting his offer.
- No orifice plates or FSD Devices will be allowed – only FM Approved direct flow measuring devices may be used;
- Caution to be taken to ensure adequate supports on all pipework;
- Where it is impracticable to dispose of the water discharged under a full load test condition, details of the facilities available must be submitted to the consultant for consideration.
- Labelling on Auto-start arrangement, and all valves, to be installed prior to system commissioning, complete with pressure settings, valve positions etc.

10.5 JOCKEY OR MAKE UP PUMPS

The supplied jockey pump is to be a vertical multistage single phase pump with a basic controller sized to operate a minimum of two FHR (60l/min at 300kPA) at the furthest and highest FHRs.

The jockey pump shall also be able to keep the pressure within the fire water pipework between acceptable norms – **ordinarily between 300 – 600 kPA. Detail hydraulics to be still be concluded.**

Any uncertainty is to be clarified with the Engineer with approval in writing.

Note:

- No threaded rods may be used in the fastening of any system components.
- Dedicated fasteners (Nuts and bolts) to be used as stipulated in the design guide.
- Sight glass on delivery line to not be forgotten.
- Pump to be installed on dedicated plinth above finished floor level.
- Pump can be a signal phase 230VAC pump

10.6 DIESEL DRIVEN PUMPS – GENERAL FIRE WATER SYSTEMS

The supplied diesel driven fire pump sets shall each comprise a centrifugal pump, spacer shaft, coupling and driver; aligned and securely fixed to a purpose made steel bed plate - thus forming a single assembly.

These pump sets must be provided with the following:

- A 3 tier auto-start arrangement connected with pressure switches and gauges
- A single-phase electrical installation at 16 amps
- An approved float-operated air release valve with a nominal diameter not less than 12.5 mm which discharges to atmosphere

The Contractor must supply pump sets that can satisfy the flow rate and pressure requirements of any fire water system under consideration when the suction tank level is at the low water line.

Additionally, the pump set must provide a pressure of at least **50 kPa** higher than that required for the system demand.

The system requirement was calculated in the project conceptual stage by the Engineer and the results are shown on each of the design intent drawings. The pump shall therefore not be less than the values listed in the aforementioned drawings but this will have to be checked for accuracy by the Contractor and approved in writing by the Engineer before ordering of the pumps and tanks.

Note: It is the Contractor's responsibility to ensure that his submission is accompanied by the necessary pump curves proving that they remain within the conceptual system curves at all times. Detail hydraulics will determine the final pump selection after detail hydraulics by the Contractor.

In all cases each pump must be provided with a name plate stating the following (as a minimum);

- The churn pressure of the pump
- The calculated flow rating
- The pressure at the calculated flow rating
- The pump model number
- The pump serial number
- The impeller diameter
- The rotational speed
- The maximum power absorbed at the flow rate given

The supplied diesel pump set does **not** need to comply with the relevant part of the A.S.I.B standards for sprinkler or combination-fire water system, however it must be approved by the Engineer in writing and of an approved brand as specified elsewhere in this document.

Note: For combination sprinkler and fire water systems, no "high pressure" signal shall cause any fire pump to stop automatically, as any combination pump must be manually stopped by attending personnel should this signal occur.

10.7 PUMP APPROVAL

A supplier standard performance / endurance test should be conducted for the fire water pump set with evidence of this test provided in writing prior to delivery to site and included in handover documentation – as per BOQ, the request is that the endurance test be conducted in line with ASIB standards and witnessed accordingly by the ASIB . .

Endurance Test for fire water system – Diesel Engine Driven Pump shall comply with the following:

- The pump set shall be run at the calculated flow rate for 3 hours at an approved testing laboratory.
- At the end of the test the engine speed, the suction and delivery pressure must be recorded at zero, 25%, 50%, 75%, 100% and 110% of the calculated flow rate or at any design flow rate which may be required. Information to be included:
 - The pump manufacturer
 - The pump model
 - The pump serial number
 - The pump impeller diameter
 - The pump efficiency curve
 - Pressure at calculated flow
 - Nett Positive Suction Head required at calculated flow
 - Power absorbed at calculated flow

Diesel Engine

- Make of engine
- Speed of engine
- Rated power output

The following hourly records shall be made:

- Ambient temperature
- The lubricating oil temperature
- The rise in temperature of the cooling water
- The cooling water flow rate
- The engine speed
- If the engine is fitted with a heat exchanger, the initial temperature and the rise in temperature of the engine closed-circuit cooling water
- The pump gland temperature
- Ambient temperature
- Motor bearing temperatures
- Stator temperature

The results of the abovementioned tests, is to be issued to the Engineer for review and acceptance, prior to delivery of pumpset to site.

10.8 DIESEL ENGINE DRIVEN PUMP, COOLING, FILTRATION, EXHAUST, SHUTDOWN, FUEL ETC.

The Contractor must supply each diesel driven pump with a diesel tank sufficient to run the pump for 3 hours and an extra 3 hours of spare diesel that is always kept on site.

The diesel tanks are to be stored within the pump house and the Contractor must include a bund for each tank in the construction of the pump house.

For this tender, the fire water pump is to start automatically, and stop automatically.

Cooling and exhaust for the pump sets are to be included in the construction of the pump house as specified elsewhere in this document and in the Engineer's conceptual drawings, and this would entail the use of louvred doors, mechanical extraction fans and exhaust pipe work in the construction of the pump house as specified elsewhere in this document.

Any uncertainty is to be clarified with the Engineer and refer to SANS 10287 : 2025.

Note:

- No threaded rods may be used in the fastening of any system components.
- Dedicated fasteners (Nuts and bolts) to be used as stipulated in the design guide.
- The engine exhaust system shall be lagged or guarded, as necessary, for the safety of personnel.
- The tenderer shall allow for all exhaust pipework (inclusive of lagging) from the pump room to the exterior of the building.
- A rain rap or bird mesh shall be fitted to the end of exhaust piping
- Attention is drawn to the need to ensure that the point of exit of the exhaust pipe from the engine house does not pose any fire risk to the structure, and that exhaust fumes cannot be drawn into the engine house or into any occupied building.
- The fuel tank shall be full at the time of hand over to the Employer, after testing and commissioning.
- No copper or plastic pipes may be used on any part of the fuel supply to the diesel engine.
- Deration Factors to be taken carefully considered in the diesel pump driver selection as governed by the applicable design standard

10.9 TOOLS

A standard kit of tools as recommended by the engine manufacturer must be provided with the engine and kept on hand at all times.

10.10 SPARE PARTS

Spare parts recommended by the engine manufacturer must be supplied with and kept on hand at all times.

10.11 ELECTRIC MOTOR DRIVEN PUMP, ELECTRICAL INSTALLATIONS, POWER SUPPLIES, CABLING, CIRCUIT BREAKERS, SWITCHES, BUSBARS, FUSES ETC.

The Contractor is responsible for the full electrical installation required to operate the electric motor driven pumps and the construction of the pump house must include all necessary electrical equipment, power supplies, cabling, circuit breakers, switches, busbars etc. for operation.

No electrical cables are to be floor mounted and are to be mounted a minimum of 300 mm AFFL using baskets or an equivalent alternative approved by the Engineer.

To comply with the applicable design standard as specified elsewhere in the document (SANS 10287) or as determined by the pump manufacturer. Any uncertainty is to be clarified with the Engineer.

Note:

- No threaded rods may be used in the fastening of any system components.

- Dedicated fasteners (Nuts and bolts) to be used as stipulated in the design guide.
- Taking of power for light and plug circuits or any other devices from drive controllers or monitoring panels is strictly prohibited.
- The pump room MV switchboard, pump drive controllers, monitoring panels, etc., may be incorporated in one common panel within the pump room, provided that general arrangement drawings, detailed wiring diagrams, component scheduled and operating instructions are submitted to the Engineer for approval.
- The feed to the electrical pump may not be from a back-up generator

CONTROL PANEL AND EARTHING

The Contractor must include a control panel for each diesel driven and electric driven jockey pump as indicated by the Engineer's conceptual design drawings. This includes full electrical installation, earthing, cabling etc. required for full operation.

As per the Engineer's conceptual design, all supplied control panels are to meet the following specifications:

Supply Voltage	230 V at 16 amp
Control Circuit Voltage	12 V / 24 V DC
Rated Fault Level	10 kA
Max. Current Consumption	0.5 amp
IP Rating	65
Cable Entry	Bottom
Powder Coating	Signal Red 80 – 100 Microns
Material	Mild Steel 2mm

The control panels must include the following additional features:

- 1 x EMI/EMC line filter
- 1 x Alarm accept push button
- 1 x Engine running hour meter
- 1 x Charger ammeter
- 1 x Mains AC voltmeter
- 1 x Engine Rev. counter
- 1 x Start attempt cycle controlled DT400m Relay
- 1 x Dt136 Namur rev-counter relay
- 1 x Pump run relay
- 1 x Pump fail alarm relay
- 1 x Flow switch relay – Fire Alarm
- 1 x High Engine Temperature

Should the Contractor deem it necessary for the supplied control panels to deviate from the Engineer's specifications, approval must first be obtained in writing from the Engineer before an alternative is ordered.

Note:

- Current-carrying parts of any control circuits and panels shall be at least 300 mm above floor level.
- Sprinkler pipe work shall be not used as a means of earthing electrical equipment.
- External overhead cables shall be not used for electrically driven pumps.

10.12 PUMP DRIVE CONTROLLERS

10.12.1 General

Each pump must have its own controller which shall be specifically designed for fire pump service and all pump manufacturers must use the panels which were approved in conjunction with their units.

The controller shall be completely assembled, wired and tested by the manufacturer and witnessed by independent authority before shipment from the factory to site.

The controller shall be labelled in accordance with this tender document and the nameplate shall show plainly the name of the manufacturer, the identifying designation, the complete electrical rating, and the certificate of approval number.

It shall be the responsibility of the Contractor to make the necessary arrangements for the services of a manufacturer representative, when needed, for installation and adjustment of the equipment.

Pumps and drivers supplied by the Contractor should all be of the same make and model.

10.12.2 Labels, starting, control, location, construction of etc.

To comply with the applicable design standard as specified elsewhere in the document. Any uncertainty to be clarified with the Engineer.

Note:

Current-Plastic embossed stick-on tape labels are not acceptable.

10.12.3 Diesel Engine Controller

To comply with the applicable design standard as specified elsewhere in the document. Any uncertainty to be clarified with the Engineer and refer to SANS 10287.

Note:

- Electrically separate potentially free contacts wired out to clearly identified terminals are to be provided for the following conditions to be monitored:
 - Fire alarm
 - Power failure, (battery charger electrical supply)
 - Pump failure
 - Pump running
 - Low oil pressure
 - Charger failure, (from both charger outputs in parallel)
 - Control circuit failure, (from the end of the control circuit)
 - Battery low level

10.13 MECHANICAL VENTILATION

The Contractor shall provide both an exhaust system for the diesel driven pumps to exhaust all fumes outside the pump house and a louvred wall mounted ventilation fan that extracts air from inside the pumphouse.

As previously mentioned, to provide additional ventilation to the pumphouse and ensure adequate airflow, all doors in the pumphouse shall be louvred doors.

The Contractor shall locate louvres at a low level while the mechanical exhaust system and ventilation fan shall exhaust at a high level as indicated in the Engineer's drawings.

Both the mechanical extraction system and exhaust system shall be sized by the Contractor such that acceptable operating conditions are maintained within the pump house. Note that all exhaust piping shall be fitted with a rain rap or bird mesh.

The Contractor shall be liable for any damages that may occur to all equipment in the pump house due to an incorrectly supplied extraction and exhaust system.

10.14 ELECTRICAL INSTALLATION, POWER SUPPLY AND DISTRIBUTION

The Contractor is responsible for the full electrical installation required by the pump house for functional operation including 16 Amp three phase electrical power to the pumphouse during construction with all necessary cables, wall boxes, wiring, galvanised steel conduits, electrical equipment and required trenching.

External electrical connections are to be made to the closest existing DB and the contractor is to include all necessary low voltage cables (230/400V) (PVC/SWA/PVC) with sleeves a minimum of 35mm² and 4 cores.

Cable routing and containment systems must be provided by the Contractor in the pump house in addition to cable racks and trays to route cables from motors to control panels.

All electrical cables are to be mounted a minimum of 300 mm AFFL.

The Contractor shall also include two separate 50 mm diameter PVC sleeves for data and electricity with the required trenching also performed by the Contractor.

The Contractor must supply a redundant power source for an emergency generator and a battery backup for critical control functions and diesel engine starting and this power source must be sized by the Contractor appropriately.

In the event of an improperly sized emergency generator and battery backup that leads to damages due to non-functional pump house equipment, the Contractor shall be held responsible for said damages.

10.15 INSTRUMENTATION AND MONITORING

The Contractor shall supply with each pump house a FM approved flow measuring device that is fitted inside the pump house.

Any uncertainty to be clarified with the Engineer.

10.16 FIRE PROTECTION INSIDE PUMP HOUSE

The Contractor must provide fire protection, suppression and detection systems as specified within the Engineer's drawings and the pumphouse must be constructed to comply with SANS 10400:2024 Part T.

The walls of brick-and-mortar pump houses must be fire rated at a minimum of 120 min.

All penetrations in the constructed pumphouse should also include passive fire protection by Contractor as approved by the Engineer.

DCP fire extinguishers are to be provided in all pump houses as indicated in the Engineer's drawings and a sprinkler system with the following specifications is to be installed inside the pump houses:

- Ø20 Upright spray type sprinklers with a temperature rating of 93°C
- Sprinklers that are spaced and positioned such that
 - A maximum distance of 3m is maintained between all sprinklers
 - A maximum distance of 1.5 is maintained from a wall
 - And that the required coverage of 9m² per sprinkler is always maintained

10.17 OPERATING CONDITIONS AND MAINTENANCE

The temperature of the pump room should be maintained above 10°C where compression ignition type engines are used, and the Contractor shall ensure that the pump house is constructed to be able to maintain this operating requirement.

All equipment within the pump room must be clearly labelled and tagged by the Contractor and this in turn shall relate to comprehensive operating instructions detailing the required testing and maintenance routine.

During construction of the pumphouse, all equipment shall be located to ensure that adequate space is available around all pumps for maintenance as accounted for in the Engineer's drawings.

10.18 DOCUMENTATION AND TRAINING

The Contractor is obligated to provide as-built drawing of the constructed pumphouse including the arrangement and layout of all equipment within the pump house.

The Contractor shall additionally provide training sessions for the operational personnel for all equipment within the pumphouse with the logistics of the training sessions to be finalised with the Engineer and Employer.

All equipment within the pump room must be clearly labelled and tagged by the Contractor including comprehensive operating instructions detailing the required testing and maintenance routine.

11. ANNUNCIATORS FOR SPRINKLER/FIRE WATER PUMP ROOM INSTALLATIONS

11.1 GENERAL

To comply with the applicable design standard as specified elsewhere in the document (SANS 10287) or as determined by the pump manufacturer Any uncertainty to be clarified with the Engineer.

11.2 PRESSURE SWITCHES, FLOW SWITCHES, PATENTS OR SPECIALISED VALVES AND COMPONENTS (APPROVAL)

These components and others shall be submitted for approval and subsequent changes of design after initial approval shall be similarly submitted before being put into use.

11.3 PUMP HOUSE REMOTE ALARM NOTIFICATION AND DATA LOGGER MODULE

The pump house shall be equipped with a remote alarm notification and data logger module to enable remote monitoring of the pump house events and retrieval of data.

The data logging module shall have:

- The ability to locally log all events that occur within the pump house facility
- The ability to remotely log all events that occur within the pump house facility
- Send pump house alarms to personnel via SMS or pager
- Send pump house alarms to a computer via SMS or pager

12. TANK SPECIFICATIONS

12.1 GENERAL

Refer to tender drawings. Where required in the Bills Of Quantities:

Tanks to be sectional steel type tanks or round tanks depending on location. Tanks are to comply with the applicable design standard as specified elsewhere in the document (SANS 10287). Any uncertainty to be clarified with the consulting engineer.

Detailed workshop drawings will be required at an early stage for the coordination of the puddle flanges, infill mains and associated pipework.

The Contractor shall be responsible for the full installation of the tanks including external mains and connections along with testing.

A concrete ring beam as designed and signed off by the Contractor's appointed Structural Engineer shall also be included in all tank installations.

General notes

- Tank information plate as required by the design code to be installed on a visible location. Information plate material to be Chromodeck, aluminium or similarly approved.
- Flow control for tank in-fill and all other associated valves shall be readily accessible for exercising, testing and maintenance.
- There must be means available to refill the tank automatically. In order to measure the inflow, a direct reading flow measuring device shall be fitted to the water inlet pipe. The inflow to a tank shall not be less than that required in order to fill the tanks within 36 hours.
- Content gauges must be provided which shall be an indicator of the flag and ball float type or other approved indicator type, showing the depth of water therein. The use of glass or plastic tube which indicates the level of the water is not acceptable due to clouding.
- Overflow pipes and drainage facilities must be provided. Where necessary these shall be taken to a suitable drainage point.
- A town main bypass connection shall be provided. The connection is to be taken to the delivery side of the pump downstream of the non-return and stop valve. The bypass shall be the same diameter of the water supply connection and shall be fitted with a non-return valve. Stop valves, chained in the closed position, shall be fitted on the upstream and the downstream side of the non-return valve.

12.2 GALVANISED BLADDER TANKS

The preferred tank supplier shall be SBS but alternatives may be offered to the client.

The tanks shall be a circular, bolted, roofed high tensile steel panel tank with multi-layer woven scrim base liner.

The roof structure shall be domed with a centre height not less than 200mm above the tank wall and the roof sheets shall overhang the tank walls by 100mm nominally.

Roof trusses, ladders, and other steel components shall, where applicable, be of carbon steel that complies with the relevant requirements of SANS 1431. Fabricated items, without exception will be hot dipped galvanized in accordance with SANS121: 2011 after fabrication, no items will be welded on site. When specified, stainless steel items such as ladders and tank connectors shall be fabricated in accordance with SANS 10162-4.

The liner material must be internationally certified by a recognised authority or testing body for use in contact with drinking water. All liners must be 'supported' by way of an internal central layer / scrim. No unsupported liners will be acceptable.

If required by the procuring body, the liner material must demonstrate that the seams will not leak or permanently deform by undergoing a flume test using a tube made up of the relevant liner material and with a standard welded seam along its length. The sample must withstand a constant pressure of 3 bar for 30 minutes without evidence of leaks / weeping or permanent deformation.

The completed liner must be provided with a non-leak guarantee backed by the manufacturer for a minimum of **ten years**.

The liner material must be capable of being easily repaired on site in the event of damage.

All tanks must be supported by a Certificate issued by a Professional Engineer (or other similar approved Certification method) to the effect that the tanks are structurally stable and satisfactory for use under the conditions listed in the Certificate. This is the responsibility of the Contractor and not that of the Engineer. A Certificate of compliance for the installation from the contractor shall serve as confirmation that this has been attended to by the contractor.

All tank components are to be hot dipped galvanised including all fasteners.

13. FIRE HYDRANTS

13.1 MATERIALS

Only products and materials specifically designed for the proposed use may be used. To this end, all products shall be either listed / approved by an approved testing laboratory / authority. Proof of such compliance shall be provided for each item.

All materials used for the fire hydrant installation shall comply with all relevant legislated and Code requirements, including the following:

- SANS 62 Parts 1 and 2 : Pipes and pipe threading
- SANS 1128 Part 2 : Fire hydrants
- SANS 0252 Part 1 : Water supplies
- SANS 1109 : Pipe threads
- SANS 10282.
- Municipal By-Laws

A hydrant shall comply with the requirements of SANS 1128-1, and be installed in accordance with SANS 10105-2

The fire hydrants shall be installed to a finished height to no less than 1 000mm and no more than 1 200mm above finished ground level.

The hydrants shall be installed so that the discharge outlet is directed away from any planted areas, parking spaces or other obstacles (permanent or temporary) and shall be easily reachable from a firm surface (eg. roadway, path or otherwise).

13.2 COMPATIBILITY

All components, systems, methods and products shall be mutually compatible.

Compliance of an individual component with any standard or approval does not necessarily guarantee that it will work satisfactorily in conjunction with another component that complies with another standard.

Only approved systems, products, methods and components shall be used without any variation or alteration to that specified by the manufacturer or favourable independent test report from a recognised laboratory. No interchanging of materials, methods or components will be allowed.

14. HOSE REELS

Each hose reel shall be:

- (a) provided with not more than 30m reinforced rubber or reinforced plastics hose that has a nominal internal diameter of at least 20mm, and
- (b) fitted with a nozzle of the adjustable light alloy spray type (**not plastic**), of diameter not exceeding 7,5mm.

Hose reels that comply with the requirements of SANS 543 and bear the SABS mark shall be deemed to be acceptable.

Any hose reel installed in such building shall comply with the requirements in SANS 543, shall be installed in accordance with SANS 10105-2 and SANS 10400-W

The hose reel shall be fitted with a hose guard to prevent hose from jamming or entering the space behind the rear disc. The steel shall be chemically treated prior to application of epoxy powder coating in a red colour. The unit shall be fitted with a SABS approved chromium plated hand operated wheel valve of 25mm diameter with female BSP treads on both sides.

The CP valve shall be marked with an arrow and words "OOP – OPEN" to indicate direction of opening.

The hose reel shall be securely fixed to the wall or structure by using all 4 bolts fixing points.

15. FIRE EXTINGUISHERS

15.1 COMPLIANCE

It shall be the responsibility of the Contractor to ensure that all equipment and methods used in the installation of fire extinguishers comply with all relevant statutory regulations and amendments thereto in particular the following:

Code	Description
SANS 10105 Part 1	Classification, Use and Control of Fire Fighting Equipment : Portable Fire Extinguishers
SANS 1475 Part 1	Production and Reconditioning of Fire Fighting Equipment – Portable Rechargeable Fire Extinguishers

SANS 810	Portable Rechargeable Fire Extinguishers – Dry Powder Type Extinguishers
SANS 1567	Portable rechargeable fire extinguishers — CO ₂ type extinguishers
SANS 019	Portable metal containers for compressed gases: basic design criteria, use and maintenance
SANS ISO 6406	Periodic inspection and testing of seamless steel gas cylinders.

In addition, the Contractor is to comply with all requirements of the *Occupational Health and Safety Act (Act 85 of 1993)* and all subsequent revisions thereof. Further, the Contractor undertakes to employ only people who have been duly authorised in terms thereof and who have received sufficient health and safety training to ensure that they can comply therewith. In addition, the Contractor warrants that it shall enforce the terms of this clause on any sub-Contractor employed by the Contractor in connection with the contract.

Portable fire extinguishers installed in a building shall comply with the requirements in SANS 1910, and shall be installed, maintained and serviced by competent persons in accordance with SANS 1475-1 and with SANS 10105-1.

All fire extinguishers to be installed on dedicated backing boards and **varnished accordingly**

15.2 SITING

Extinguishers are to be located in conspicuous positions on purpose-made brackets in purpose-made cabinets, with the carrying handles of the extinguishers at an approved height not higher than 1.25 metres from the floor. The extinguishers shall easily be seen by persons following an escape route.

Extinguishers shall be so installed that the identification and instruction labels are clearly visible from the direction of approach.

SECTION 3

GENERAL PROJECT SPECIFICATION

FOR THE

DETECTION INSTALLATION

FOR THE

ESKOM ROSHERVILLE FIRE PROTECTION UPGRADE PROJECT

Description		Daily	Weekly	Monthly	Three-Monthly	Six-Monthly	Annual
1	Maintained in accordance with SANS 10139	At All Times					
2	Clear space of at least 500mm below detectors maintained at all times	By End-user			☐		
3	Check that manual call points are accessible and conspicuous				☐		
4	Review logbook and automatic alarm log				☐		
5	Repair/reinstate after activation of fire (within 24 hours)	At All Times					
6	Check that the panel is in Normal mode (no faults)	By End-user			☐		
7	Record any faults in the log				☐		
8	Repair any faults identified	Within 8 Hours of Discovery					
9	Test communication with the Fire Department	By End-user			☐		
10	Visual inspection of backup batteries				☐		
11	Full test of backup batteries				☐		
12	Test each zone of the detection system				☐		
13	Test each individual detector						☐

Description		Daily	Weekly	Monthly	Three-Monthly	Six-Monthly	Annually
14	Visual inspection of cables						☐
15	Complete certificate as per SANS 10139 on completion of testing						☐
16	Check the following after a fire: - Each detector and break glass unit in fire area is tested. - Visual inspection of all other parts of the system. - Batteries and battery charger; and - Issue certificate as per Annex	Immediately Following a Fire					
17	After any false alarm check: - Which device caused the false alarm. - If a device is not faulty, identify the cause of the device trigger (e.g. Someone smoking, etc.)	Immediately Following a False Alarm					

The Contractor shall, during such maintenance or on call during the maintenance period, repair or replace defective parts and shall use only genuine parts produced by the manufacturer of the original part (This shall only be applicable to new equipment supplied and installed by the Contractor. Existing equipment breakdowns shall be quoted/priced as per market-related rates for consideration/approval by the Employer).

The Contractor shall supply all replacement parts, as required at no cost where work is of a routine nature (i.e. not maliciously damaged) (This shall only be applicable to new equipment supplied and installed by the Contractor. Existing equipment breakdowns shall be quoted/priced as per market-related rates for consideration/approval by the Employer).

2. TRAINING

The Contractor shall train the staff selected by the Employer and the cost of such cost shall be deemed to have been included in the Contract Price.

The training shall be continued until the Contractor is satisfied that the selected staff is competent in the operation and maintenance requirements of the system(s).

All Employer's personnel who may be expected to inspect, test, maintain or operate fire-extinguishing systems shall be trained and kept adequately trained in the functions they are expected to perform.

3. DESIGN CALCULATIONS

The Contractor shall submit for approval by the Employer copies of its detailed design calculations within the times specified in the Contract. These calculations shall include at least the following:

- Loop isolator positions, battery calculations, detection zoning, alarm zoning, etc., aspirating unit pipe design and flow calculations (if applicable), gas suppression detail design with piping layouts (all complying with SANS 10139) – as required for the applicable scope of works

4. THE FIRE DETECTION SYSTEM:

The fire detection and alarm/notification system shall comply with the following:

4.1 CATEGORY OF THE SYSTEM

The fire alarm system shall comply with the requirements as defined by the latest revision of SANS 10139 Code of Practice, SANS 322 and SANS 14520 and shall comply with the requirements of an L1/M fire detection category.

4.2 DEVIATIONS FROM THE DESIGN CODES

No deviations from the design codes are foreseen in this project. The Contractor shall notify the Engineer of any deviations from the design codes for the Engineer's review and approval by the Employer.

4.3 AREAS OF PROTECTION

All areas shown on the design drawings are to be protected, with no exceptions. The Contractor shall review the Engineer's design and notify any apparent compliance issues.

4.4 CODES, STANDARDS OR REGULATIONS

The Contractor shall comply with all acts of parliament and all regulations and bylaws of local and or other authorities having jurisdiction regarding the execution of the works. Refer to previous sections regarding applicable codes.

4.5 INTERFACE WITH OTHER SYSTEMS

The system must be capable of interfacing with other systems via Input/Output units, relays and similar equipment. All relays and equipment beyond the Input/Output units will be provided by others. The systems to be interfaced include:

System	Action
Beams Detection	Interface and monitoring of Beam detection, fire and fault–if applicable.
Any Fresh Air Systems	To shut down fresh air supplies – where applicable
Fire or Smoke Dampers	Closing/Opening of any fire and or smoke dampers (if installed)
Smoke ventilation	To activate ventilation if installed

Access Control Doors	Interfaces to any automated/access control doors to open/release on a fire signal.
Gas suppression	To monitor the gas protected rooms as required (if installed)

Note: Final connections between the fire detection system and associated equipment shall be carried out by the Contractor.

Prior to the installation of any interfaces, the Contractor shall conduct the required Site surveys, and meetings with the on-Site personnel and artisans, and issue a proposed layout of equipment to the Engineer for approval.

4.6 SYSTEM DESCRIPTION

Briefly, the system can be described as a full Class L1/M Fire detection system consisting of various devices as per the Engineer's drawings.

The system comprises the following equipment:

4.6.1 Addressable Detection Control Panel

The panel should for this project be an **Analogue** Addressable panel with positions indicated on the design drawings sent along with this document.

4.6.2 Detectors And Manual Call Points

The building utilizes a mixture of fire detection technologies in different areas. As per the Employer drawings, the design intent is to utilize the following detectors in the following areas:

- a) Roof protection (offices): optical smoke Detection
- b) Roof protection (warehouse): beam detectors
- c) Office and supplementary areas: Optical Smoke detection
- d) Kitchen and kitchenettes: Heat detection
- e) Cold rooms higher than 5°C – Optical smoke detectors
- f) Cold rooms 5°C and lower – aspirating detection systems as per technical specifications of this document

Manual call points are to be installed as per the detailed design drawings submitted by the Contractor – generally mounted next to each escape door.

4.6.3 Short circuit Isolators

As per the technical specification section of this document, it is the Contractor's responsibility to ensure compliance.

4.6.4 Fire Siren (Notification) and Visual Notification

This project utilized alarm sounders in line with SANS 10139

4.6.5 Aspirating detectors

Not currently envisioned

4.6.6 Cables

All cables to be used shall be as per the technical specification portion of this document. PH30 is deemed acceptable for a detection loop in this case.

Where exposed, these are to be mounted within Bosal conduit against the wall/slabs or fixed to the underside of the structure with steel clips as allowed by SANS 10139:2021.

No unfixed cables or cables supported on top of ceiling grids will not be accepted. If this is found, strict remedial requirements will be enforced to rectify this on the Site.

4.6.7 Batteries

Each of the control panels and gas control units are to be fitted with backup batteries as per SANS 10139.

4.6.8 Gas Control Panel

Not envisioned at this stage of the project and by separate appointment

4.6.9 Block Plans

A full set of A3, or larger, framed block plans, are to be installed at the end of the project. These Plans are to be mounted directly next to each of the control panels and mimic/repeater panels and should indicate the location of the various fire zones. They must be easily visible and to the Employer's satisfaction.

4.6.10 Fire detection and alarm Zones

It is the responsibility of the Contractor to ensure that the fire detection and alarm zones are programmed correctly as per SANS 10139:2021. This shall be submitted with the shop drawings for comments.

4.6.11 Fire Sirens/Strobe lights

Visual alarm has been allowed for as per the Engineer's drawings at predetermined locations. Currently, the design has allowed standalone sounder strobes directly.

4.6.12 Emergency Voice Communication system

Not envisioned at this stage of the project and by separate appointment

4.7 PROVISION OF POWER SUPPLY

By electrician.

4.8 EVACUATION STRATEGY

While still in conceptual nature, the current envisioned evacuation strategy is a complete simultaneous evacuation upon receipt of double knock incident.

4.9 STAFF ALARMS

There are proposed staff alarms. Typically on single knock event or faults on the system.

4.10 SYSTEM CONFIGURATION CONCEPTS.

A full system cause and effect matrix will be drawn up during the Contract. The points below about general system configuration concepts should be taken into account during tender pricing. These points may change.

Single knock = single detector, single beam detector or similar is to activate the staff alarms only.

Double knock = two detectors, two beam detectors or a single red break glass unit, is considered a confirmed fire and to activate visual and audible alarms.

4.10.1 Gas Control and Detection Procedures

Gas protection currently does not form part of this project. This will be dealt with under a separate appointment where required.

5. MATERIALS

5.1 GENERAL

Only equipment and components specifically designed for the proposed use may be used. To this end, all equipment shall be either listed/approved by an approved testing laboratory/authority. Proof of such compliance shall be provided for each item, and in the case of the gaseous extinguishing system, the system as a whole. For more details, please refer to the technical specification portion of this document.

5.2 SUBMITTALS

A copy of the manufacturer's installation, operation and maintenance manuals shall be supplied upon completion of the installation.

System commissioning data shall be supplied (in a format recommended by the manufacturer and per the instructions provided by the manufacturer) within the time specified in the Employer's Requirements.

Installation, commissioning and Employer acceptance certificates are required prior to project completion.

6. COMPLETION CERTIFICATES, ADDITIONAL COMMISSIONING REQUIREMENTS AND DOCUMENTATION

6.1 CERTIFICATES

Refer to the section earlier in the document regarding the requirements for certification.

6.2 COMMISSIONING TESTS

The Contractor shall allow for the manufacturer's representative to attend the commissioning of the entire installation in the presence of the Employer. Take special note of additional check sheet requirements set out in the bill of quantities.

All necessary instrumentation, equipment, materials and labour shall be provided by the Contractor.

The Contractor shall record all tests and system calibrations, and a copy of these results shall be

retained on the Site in the System Logbook.

A wire burn test will be required during the commissioning and handing-over of the HSSD systems and shall be demonstrated to the Engineer and the Employer.

System Checks

Visually check all pipes to ensure that all joints, fittings, bends, sampling points, etc., comply with the Specification.

Check the system to ensure the following features are operational and programmed in accordance with the specifications.

- Alarm threshold levels (for both day and night settings),
- Detector address,
- Time and date,
- Time delays,
- Airflow fault thresholds,
- External buttons operable (Reset/Disable/Test/Instant Fault Finder, Auto Learn Smoke and AutoLearn Flow),
- Referencing (if VESDAnet card is used)
- Units set to U.S./S.I. (for the US only) or metric for other regions

Check to ensure that all ancillary warning devices operate as specified.

Check interconnection with the Fire Alarm Control Panel to ensure correct operation.

Tests

Introduce smoke into the detector assembly to provide a basic Go/No-Go functional test.

Verify that transport time from the farthest sampling port does not exceed the local code requirements.

Activate the appropriate fire alarm zones and advise all concerned that the system is fully operational. Fill out the logbook and commissioning report accordingly.

SECTION 4

GENERAL TECHNICAL SPECIFICATIONS

FOR THE

DETECTION INSTALLATION

FOR THE

ESKOM ROSHERVILLE FIRE PROTECTION UPGRADE PROJECT

SECTION 4: GENERAL TECHNICAL SPECIFICATION (ATOMATIC DETECTION AND ALARM SYSTEM)

1. MATERIALS

Only equipment and components specifically designed for the proposed use may be used. To this end, all equipment shall be either listed/approved by an approved testing laboratory/authority. Proof of such compliance shall be provided for each item, with proof of compatibility with the system as a whole.

Under normal conditions of use, all materials shall be free from defects, which are liable to cause undue deterioration or failure. Materials shall not shrink, warp or cause mould or odours and shall be resistant to attack by local vermin and destructive pests.

Materials shall be stored in areas on the Site allocated by the Employer, but there is very limited storage space inside the facility. Stored materials shall not overload the floor construction beyond design limits.

2. TEMPERATURE LIMITATIONS

All devices shall be designed for the service they will encounter and shall not readily be rendered inoperative or susceptible to accidental operation. Devices normally shall be designed to function properly from -20°C to +50°C, or marked to indicate temperature limitations, or in accordance with manufacturers' specifications, which shall be marked on the nameplate, or (where there is no nameplate) in the manufacturer's instruction manual.

3. COMPATIBILITY

All the components of a fire alarm system shall be mutually compatible.

Compliance of an individual component with any standard or approval does not necessarily guarantee that it will work satisfactorily in conjunction with another component that complies with another standard.

The Contractor shall consider the subjects below, and the data provided with each item shall provide the information necessary for the consideration of its compatibility with other items. All specifications and details are to be forwarded to the Engineer for approval.

In relation to a given control and indicating panel, such consideration shall include at least the following:

a) for all devices:

- the requirements of the system in order to satisfy electrical safety requirements.
- any provision for earthing.
- the earth insulation resistance.
- the method of adjustment where adjustment is required to ensure compatibility.
- any preferred method(s) for monitoring line continuity.
- whether the current taken or delivered has an appreciable reactive component.
- the characteristics of any signals that pass between components.

- the ability of the control and indicating equipment to operate in conjunction with the number of devices to which it will be connected.
- any software provided for programming the system or its components, and the compatibility of other components with the software; and
- any limitations on the numbers, types, sizes or other parameters (such as impedance) of wires that can be connected.

b) for fire detectors:

- the form of output.
- the operating voltage, including tolerances.
- the quiescent current.
- the alarm current or maximum permissible alarm current rating.
- the method of resetting the device after an alarm.
- the states of the detector that indicate normal conditions, fault conditions and fire conditions.
- any requirements for indications of operation to be provided in the vicinity of a detector, together with any resultant changes in system conditions, e.g. Reliability or power consumption; and
- the number of conductors required.

c) for alarm devices:

- whether a polarized connection is required.
- whether precautions might be required in order to suppress any interference generated by the device.
- what methods for monitoring the interconnections can be used.
- whether the power supply arrangements can provide sufficient power.
- whether a high starting current is required.

d) for manual call points:

- whether they are of open or closed circuit operation.
- whether they are of polarized operation.
- the method of discrimination between alarm and fault conditions.
- the method of resetting the device after an alarm.

e) for power supplies:

- the correct voltage for the type of battery used (i.e. Lead-acid or alkaline types).
- the correct charging characteristics for the type of battery (i.e. Constant current or constant voltage).
- the relationship between polarity and earth, or whether the potential is earth-free.
- the current rating in relation to calculated maximum demand.
- the permissible limits of ripple.
- the degree of stabilization.

- the formula for power capacity for the system, including the storage capacity of the standby supplies and the required standby duration.
- the permissible range for the supply voltage; and
- whether the standby power supplies are able to provide the necessary current for the specified duration.

f) for automatic fire protection equipment:

- whether the energy required by the automatic fire protection equipment is available from the control and indicating equipment or whether additional power supplies will be required.
- whether the voltage(s) required by the automatic fire protection equipment are compatible with those available from the control and indicating equipment.
- whether the equipment is compatible with the proposed monitoring facilities.
- whether the equipment requires positive or negative switched input; and
- whether the equipment is normally energized or normally de-energized.
- the functions provided.
- the signal conditions for each function; and
- the terminal connections.

Equipment for transmitting fire alarms and fault warnings to remote manned centres should be compatible with the equipment at the remote manned centre.

4. IDENTIFICATION

A label shall be provided under each device, detector, relay, controller and panel identifying the equipment controlled and/or performance indication by such items.

The labels shall consist of a non-corroding material with a non-glossy appearance, engraved with black lettering on a white background.

A battery room or cabinet should be secured against unauthorized admission and should display notices indicating its purpose, the importance of not smoking, and the need to use insulated tools and to remove metallic personal adornment to avoid accidental short-circuits.

In addition to the warning and information labels that should be provided in accordance with SANS 10142, a label should be provided on any isolating protective device that affects the fire alarm system and should read as follows:

“Warning: this switch also controls the supply to the fire alarm system”

“DO NOT SWITCH OFF”

5. POWER

5.1 GENERAL

Provision is made for a normal power supply and a standby power supply, each shall be capable of supplying the largest load to be placed on it under normal, fire and fault conditions.

Transition between supplies shall not cause momentary interruptions. Where devices such as fuses are fitted in order to protect power supplies, the operation of a single protective device shall not interrupt both power supplies and cause the system to fail.

The condition of the normal supply shall be indicated by a green pilot light, which lights up when the normal supply is on.

The largest alarm load is the maximum load imposed by the fire alarm system on a power supply under fire conditions. It will include the power required to operate the sounders, detectors, fault warning devices, the illumination and any ancillary services powered by the fire alarm system, etc.

Any power required for a display should be derived from the fire alarm system power supply and should be taken into account when assessing the capacity of the power supply.

The load imposed on the power supply by the simultaneous operation of detectors, or a manual call point (or both) shall not cause an existing fire alarm to cease. In systems using microprocessors or stored programs, the imposition of the maximum alarm load should not cause incorrect operation.

5.2 NORMAL POWER SUPPLY

The normal supply for the fire detection and alarm system shall be derived from the public supply system and transformed or modified as necessary.

5.3 STANDBY POWER SUPPLY – SECONDARY BATTERIES

Where secondary batteries with an automatic charger are used, they should be of a type that has a life of at least 4 years under the conditions of use likely to be experienced in the fire alarm system. Automotive lead-acid batteries (e.g. the type normally used for starting cars) are not acceptable.

Because the life of the battery frequently depends on its charging conditions, care should be taken to ensure that the battery charger satisfies any requirement specified by the battery supplier. Where replacement batteries or battery chargers are used, similar care should be taken to ensure charging compatibility. Replacement cells shall be compatible with the existing cells in both charge and discharge characteristics. The supplier of the system shall specify a method of test that is likely to predict the failure of the battery in the interval between routine tests.

The charging rate of the battery shall be such that, having been discharged to its final voltage, the battery can be charged sufficiently to comply with the recommendations after a charging period of 24 hours.

The battery calculation sheet shall be completed and approved by the Engineer prior to the commencement of installation activities.

6. CIRCUIT DESIGN

6.1 GENERAL

Note: The Engineer's drawings are intended to show the principal layout of the system. As specified elsewhere in this document, it will be the responsibility of the Contractor to complete the circuit design in terms of the guidelines provided and the SANS 10139 Code of Practice & SANS 322

Care should be taken to ensure compatibility of all components that are part of the fire alarm system or connected with it in any way.

Circuits should be so arranged that an indication is given at the control and indicating equipment within 100 seconds of the occurrence of any disconnection, open or short circuit in a cable that would disable one or more detectors or call points (or both), or of a failure of any other interconnection, and this should be done without giving a false alarm.

Even where the wiring of a system is monitored, regular routine testing is important and should be

considered during installation.

The Contractor shall provide a method of manually testing of circuits.

6.2 CIRCUITS THAT CONTAIN FIRE DETECTORS

The wiring arrangement of the system shall be such that:

- a) if separate circuits are used for each zone, a fault or faults on one circuit shall not affect any other circuit,
- b) if any circuit is used for more than one zone, a fault or faults on one circuit shall not affect any other circuit,
- c) if a circuit is used for more than one zone and multiple faults within one fire compartment could remove protection from an area greater than that allowed for a zone, the circuit within that division is suitably protected, and
- d) two simultaneous faults shall not remove protection from an area greater than 10,000 m².

If the system is such that the removal of a detector or call point from the circuit could affect the operation of other detectors or call points

- a) removal of a detector or call point shall cause a 'fault' signal to be generated at the control equipment, indicating the need to replace the missing detector or call point as soon as possible, and
- b) the operating instructions shall draw the user's attention to any adverse effects on the remainder of the system due to the removal of one or more detectors or call points (or a combination of these).

6.3 CIRCUITS THAT CONTAIN FIRE ALARM SOUNDERS

If alarm sounders use the same wiring as detectors, no alarm sounder shall be affected by the removal of any detector. Any sounder that is necessary in order to reach the audibility levels recommended shall only be removable by the use of a special tool, and removal shall generate a fault warning at the control and indicating equipment.

The wiring of sounder circuits shall be so arranged that should a short circuit develop in any part of the wiring of sounder circuits during a fire, at least one alarm sounder will continue to sound. This minimum provision shall ensure that a general alarm can be given at the start of a fire and for a significant period thereafter and that, in the event of the fire's burning through a sounder cable, the alarm will be maintained at, at least one point in the building, usually near the control equipment.

6.4 RING SYSTEMS

If devices such as detectors, call points or sounders are connected to control equipment by a ring circuit, then, provided that the devices can receive or send signals in either direction, they will continue to operate even with a single open circuit or high series resistance in the ring. Such faults shall be indicated at the control and indicating equipment within 60 seconds of their occurrence. A simple ring circuit, however, cannot give protection against short-circuit faults, and hence, such faults have to be indicated without giving a false fire alarm within 100 seconds. Where sounders are used on simple ring circuits, the distribution wiring to each sounder circuit should be protected against overload owing to a short circuit by a fuse or similar device.

6.5 CIRCUITS PROTECTED AGAINST CABLE FAULTS

In some ring systems (usually those using computer techniques with addressable devices), short-circuit isolating devices can be provided such that a short circuit will only affect the section between the isolators. The isolators could be independent devices or could be contained within other devices on the circuit. In such a system a single fault, whether to open-circuit or to short-circuit conditions, can affect at most the section of the loop between the nearest isolators. (other circuit arrangements that have the same general effect are possible). Where the effect of the fault is to reduce to one the number of signal paths to any detector or call point, the control equipment should indicate the fault within 60 seconds of its occurrence and should preferably indicate the position of the fault. It is essential that action be taken to repair such faults since if a fault is left unprepared, the system has no protection against further faults. However, if, because of redundancy in the circuit design, at least two signal paths to each detector and each call point remain, it is necessary to ensure the indication of the fault only within 24 hours of its occurrence.

6.6 ZONES

When a signal of fire is given, it is vital that there should be no confusion about the zone from which it is received. To facilitate response by people who provide assistance, the zone should be small enough for a fire to be located quickly. It is often important that there should be adequate fire separation between the zones; this is particularly so if the initial evacuation procedures in the building usually entail movement from the zone of the fire to one of temporary refuge.

On larger premises in particular, the fire alarm system should, therefore, be so designed and arranged that it is both fully compatible with the emergency procedures and provides at some central or convenient point, or points, an indication of the zone in which an alarm has originated. In the case of two-stage alarms, clear and unambiguous signals should indicate the emergency procedure to be adopted throughout each zone.

In general, the signals used in different zones on the same premises should be the same unless the background noise in one or more zones is such as to require different sounders.

If the system has been installed for purposes of safety of life (type I or m), each zone should be readily accessible from the point(s) where the indication of the location of fire is provided. In general, access to any zone should be by normal circulation routes; however, where small areas of the building are defined as zones for specific purposes (such as the existence of a special risk), it might be permissible for access in the immediate vicinity of that zone to be by another route, for example through another room.

Note: in systems other than addressable systems, signals coming from individual detectors or groups of detectors cannot be separately identified. In these systems, therefore, to allow zone identification, it is usual for each zone to be fed by a separate circuit. It has thus become common for the concepts of 'zones' and 'circuits' to be used interchangeably. In addressable systems, however, several zones (defined as subdivisions of the premises) can be fed from a single circuit while retaining zone identification. It is, therefore, important that in such systems, the concepts of 'zones' and 'circuits' be treated separately.

6.7 LOOPS

It shall be possible to connect the following detectors/devices to the control unit addressable loop.

- multisensors – optical/thermal type
- optical smoke sensors – analogue type
- high sensitivity smoke detector – loop/address interface
- open-area smoke imaging detection (OSID)/beam detectors– loop/address interface

- heat sensors – analogue type
- manual call point “break-glass” units
- wireless radio-based analogue multi-sensors – optical/thermal (with loop interface)
- wireless radio-based analogue sensors – heat type (with loop interface)
- wireless radio-based call points (with loop interface)
- addressable relays, i.e. Output devices
- addressable sounders (loop powered)
- sounder circuit controllers
- addressable remote LED indicators
- gas discharge control units
- line isolators

Note: detectors within any area protected by a gaseous suppression system shall be connected to at least two loops.

6.8 SIGNAL MONITORING SCHEDULE

The Contractor shall be responsible for the detailed design, programming, testing, commissioning and handing over of a complete system of interface relays in order to ensure that the signals specified below are monitored on a 24-hour basis via the Employer’s PLC or other platforms capable of interfacing with other systems via Input/Output units, relays and similar equipment.

The signals to be monitored include:

System	Signals
Beam Detectors	Fault - General Fire 1
Main Building Addressable System	Fault - General Fire
Power Supplies to beam detection	Fault - General
All aspirating units	Fault - General Fire

7. DEVICES - GENERAL

7.1 SYSTEM OPERATION

7.1.1 Device Address

Each device online must be uniquely identifiable by the control unit. This must be achieved by pre-setting the address of each device.

Removal of a detector head from its base must extend a fault condition to the control unit.

7.1.2 Device Identification

The identification of each type of address unit and each type of sensor (i.e. multi-sensor, ionisation detector, heat detector, sprinkler switch, etc.) must be transmitted to the panel on each polling scan.

7.1.3 Device Status

The condition of each line device, including circuit, calibration and contamination, must be transmitted to the panel on each polling scan.

7.2 LOOP DEVICES - GENERAL REQUIREMENTS

Sensors shall have complete electromagnetic and electrostatic protection against externally generated noise and the effects of devices such as fluorescent light fixtures, variable frequency motor controllers, cellular telephones, and electrical surges from other sources. Protection must meet the European directive CE 336/89 and must comply with the following standards:

- (a) IEC 801-1 : general surge protection requirements
- (b) IEC 801-2 : electrostatic discharge
- (c) IEC 801-3 : radiated electromagnetic interference
- (d) IEC 801-4 : voltage transients – fast transient bursts
- (e) IEC 801-5 : process equipment: surge immunity requirements
- (f) in addition, sensors must be fully resistant to RFI interference to a signal strength of 10 V/m over a frequency range of 1mHz to 1000 mHz, and a signal strength of 50 V/m over 50v/m over cellular telephone signal ranges 450-466 mHz and 890 – 960 mHz.

An indicator LED shall be provided on the detector, which illuminates when the detector is in an alarm condition. The indicator shall be operated independently of the detector from the central point panel.

Provision shall be made from an output from the detector suitable for the operation of a remote indicator LED. The output shall be operated independently of the smoke detector from the central point panel.

The unique address of the detector shall be set by the installer using high integrity sealed dipswitches.

7.3 LINE ISOLATORS

It shall be possible to fit loop isolators at a maximum spacing of one per 20 devices. The isolators shall protect against short circuits and partial short circuits on the loop by isolating that section of the loop where the short circuit occurred, thus maintaining the integrity of the remainder of the system.

7.4 MANUAL CALL POINTS

Manual call points shall be clearly identifiable and simple to use without the need for instructions regarding their method of operation. The method of operation of all manual call points in an installation shall be identical. If necessary, a striker shall be provided adjacent to the call point to facilitate breaking the cover. The delay between the operation of a call point and the giving of the general alarm shall, therefore, not exceed 3 seconds.

Call points shall be fixed at a height of 1.4 metres above the floor, at points as indicated on the drawings. Manual call points shall be sited against a contrasting background to assist in easy recognition. They may be flush mounted in locations where they will be seen readily, but where from the side (e.g. In corridors) they should be surface mounted or semi-recessed in order to present a side-profile area of not less than 750mm.

7.5 CABLES AND CONDUCTORS

7.5.1 Cables

It is essential that connections between detectors or call points and the control equipment should be able to maintain the alarm without a continued signal from the detector or call point, i.e. Destruction of the connection after the initial operation shall not affect the sounding of the alarm.

Where multi-core cable, flexible cable, or flexible cords are used for interconnections in fire alarm circuits, none of the conductors shall be used for circuits other than those of fire alarms.

Electric cables should:

- a) be suitable in the opinion of the authority that has jurisdiction for a particular application and comply with approved standards where relevant,
- b) be selected, handled and installed in accordance with SANS 10198-2, SANS 10198-4 and SANS 10198-8,
- c) be protected from direct exposure to fire, and
- d) be appropriately insulated and armoured, be enclosed in appropriate conduit, or be mineral-insulated and copper-sheathed.

Note the following types of cable are normally deemed to be suitable, subject to the restrictions on their use and the recommendations for further protection:

- i) impregnated-paper-insulated metal-sheathed cables that comply with SANS 97.
- ii) cables designed for the detection of heat that comply with SANS 529.
- iii) polymeric or rubber insulated cables that comply with SANS 1268.
- iv) cross-linked polyethylene (XPPE)-insulated electric cables that comply with the requirements of SANS 1339; and
- v) cables with solid dielectric insulation that comply with SANS 1507.

Note: FR-20 cable is not considered acceptable.

Cable shall be red in colour.

7.5.2 Applications

General

A wide variety of different cables can be used in various parts of a fire alarm system. However, because of their varying abilities to resist both fire and electrical or mechanical damage, many of these cables might be restricted in their suitability for specific applications. The applications are classified according to the need for fire protection.

Applications in Which Prolonged Operation during a Fire Is Required

Cables used for the interconnection of components of a fire alarm system are required to continue operating after a fire is first discovered (e.g. Sounders, control and indicating equipment and power supplies) unless they are protected against cable failure. Cables used within protected premises for the transmission of the alarm to a remote centre should also be protected against cable failure. In general, it may be assumed that interconnections between sounders, control and indicating equipment and power supplies that can resist fire for at least 0,5 hours will be satisfactory. In special cases, however, longer periods might be required (for example, in buildings with a two-stage alarm

system).

Applications in Which Prolonged Operation during a Fire Is Not Required

Cables that are not required to continue operating for appreciable periods after the fire is discovered or after they are attacked by fire will usually be only those to detectors or call points but might also include those to ancillary devices (such as door holders), in which case a failure of the cable due to a fire will not lead to a dangerous condition.

Protection from Fire

i. Applications that do not require prolonged operation during a fire

Where prolonged operation during a fire is not required, any of the cables listed may be used without additional fire protection.

Cables designed for the detection of heat, or coaxial cable, may be used for the interconnection of detectors within a zone, provided that the system is such that it gives a fire alarm in response to the occurrence of fire at such a cable.

ii. Applications requiring prolonged operation during a fire

Cables that are required to continue operating during exposure to fire should be protected against exposure to the fire by either:

- a) burial in the structure of the building and protection by the equivalent of at least 12 mm of plaster, or
- b) separation from any significant fire risk by a wall, partition or floor that will resist a fire for at least 0,5 hours.

Note: the mechanical protection of cables by conduit, ducting or trunking should not be considered as giving protection against fire.

iii. Reduced protection

Where possible, cables should be routed through areas of low fire risk. Where cables pass through areas of very low fire risk or where cables are protected by an automatic extinguishing system or sprinkler installation, a reduction in the degree of fire protection recommended might be acceptable following consultation with interested parties.

Protection of Cables from Electrical or Mechanical Damage

i. Electrical protection

Cables designed for the detection of heat should be used within the manufacturer's ratings.

ii. Mechanical protection

Some types of cable are not sufficiently robust to withstand the mechanical hazards that they might be exposed to in practice, such as impact, abrasion, or attack by rodents. In order to protect such cables from damage both during and after installation, it will be necessary to provide mechanical protection by installation in conduit, ducting or trunking or by laying the cable in a channel.

Cables should be given mechanical protection when appropriate if

- a) they are not monitored,
- b) they are less than 2,25 m above the floor, or

c) physical damage or rodent attack is likely.

The above recommendations for resistance to mechanical damage would be expected to be sufficient for most applications. However, where particularly severe conditions might be experienced (such as impact by forklift trucks), it might be necessary to provide additional protection designed to withstand the expected hazards. Armoured cable should be used where appropriate.

7.5.3 Joints

Unless specifically approved otherwise by the Engineer, all connections shall be made at the devices (so-called loop-in, loop-out arrangement). No other joints shall be allowed.

7.5.4 Segregation Of Wiring

Conductors that carry fire alarm power or signals should be separated from conductors that are used for other systems. The separation may be by one or more of the following methods:

- a) installation in conduit, ducting, trunking or a channel reserved for fire alarm conductors.
- b) a mechanically strong, rigid and continuous partition of non-combustible material.
- c) mounting at a distance of at least 300 mm from conductors of other systems; or
- d) wiring in mineral-insulated copper-sheathed cable with an insulating sheath or barrier.

If a cable that should be segregated from cables of other services is not enclosed in ducting, trunking or a channel reserved for fire alarm circuits, it should be suitably marked or labelled at intervals not exceeding 2 metres to indicate its function and the need for segregation. Ducting, trunking or a channel reserved for fire alarm circuits should be marked to indicate this reservation. The fire alarm cable should be completely enclosed when the cover of the ducting, trunking or channel is in place, and all covers should be securely fixed.

Segregation of the fire alarm power supply cables need not be applied on the supply side of the isolating protective device. Cables carrying power in excess of extra-low voltage should be separated from other fire alarm cables. In particular, the main supply cable should not be brought in through the same cable entry as cables carrying extra-low voltage power or signals.

7.5.5 Telecommunication Cables

Public telecommunication operator lines used for the transmission of alarms to the fire brigade should be mechanically protected and should be considered as required to give prolonged operation during a fire.

7.5.6 Alternative Cables

Types of cable or cable systems other than those described above may be used only if it can be shown that in the application in which they are to be used:

- a) their resistance to heat and fire is suitable for the application,
- b) their resistance to ambient conditions, including resistance to mechanical impact and abrasion, is suitable for the application,
- c) they are not prone to faulty assembly or installation,
- d) their electrical properties under both normal and fault conditions are suitable for the application, and

e) they are operated within their manufacturer's ratings.

Where possible, alternative types of cable should be certified or approved under a recognized certification or approval scheme as satisfactory for their application.

7.5.7 Damp, Corrosive or Underground Locations

Cables intended for installation in damp, corrosive or underground locations or in plasters or cement that have corrosive effects on metallic sheathing should be PVC-sheathed overall. Where the environment can attack PVC, a suitable alternative sheath should be adopted. In some locations, further protection might be necessary.

7.5.8 Conductors

General

Conductors should

- a) be suitable in the opinion of the authority that has jurisdiction for a particular application and comply with approved standards, where relevant, and
- b) have an appropriate temperature rating for their intended use.

Note: the following are normally deemed to be suitable (depending on the application):

- i heat-resisting wiring cables complying with SANS 529; and
- ii. single-core, PVC insulated, annealed copper conductors of 600 V grade in accordance with SANS 1507.

Conductor Sizes

In selecting conductor sizes, physical strength and limitations imposed by voltage drop should be taken into account. Voltage drop in a cable should not be such as to prevent devices from operating within their specification limits, even under minimum supply and maximum load conditions. Consideration should be given to any possible extensions to the system.

Unless otherwise recommended, conductors shall be of multi-strand copper, each with a cross-sectional area of not less than 1.0mm².

Ambient Temperatures

Care should be taken that the combination of ambient temperature and temperature rise caused by load current does not result in a conductor temperature that exceeds the limit for the insulation.

Subject to any overruling consideration, safety factors and consultation with the relevant authority, the fire alarm system may be so designed that detectors or call points (or both), in addition to giving an alarm and calling the fire brigade, will close or open circuits of ancillary services by means of relays or similar devices.

Note: examples of ancillary services include the

- a) actuation of fixed fire-extinguishing systems,
- b) control of ventilating systems, and

Means to temporarily disable an item or items of ancillary equipment for routine servicing or maintenance of that equipment may be provided if it does not affect the operation of the fire alarm system.

If the operation of the fire alarm system during servicing or testing can have undesirable effects on ancillary equipment, means should be provided for disabling the automatic operation of the ancillary equipment. The disablement may take the form of a transfer from automatic to manual operation. A visual indication of disablement should be provided.

Power supplies to ancillary services should be such that the power supply to the fire alarm system is not prejudiced. Indications of both the state of ancillary systems and that of ancillary systems that take power only when there is a fire may be operated from the fire alarm supply, but ancillary systems that take power (other than for indicators) in the non-fire state should not be operated from the fire alarm supply. Any additional loads taken by ancillary systems should be taken into account in the calculations of power supply capacity.

7.5.9 Conduit And Trunking

All conduits, trunking, sleeves and associated provisions will be provided by and installed by the Contractor.

7.6 ADDRESSABLE FIRE DETECTION PANEL

7.6.1 Panel Description

The fire alarm panel shall be a 24-volt analogue addressable unit designed to communicate with the sensors and field devices. It shall be a microprocessor-based unit and shall incorporate all hardware and software to enable it to make decisions based on information received from sensors and operate appropriate outputs to initiate required alarms and signals.

The panel shall comply fully with standard EN54: Part 2 and 4

The control unit shall continuously monitor the analogue status of all sensing devices and initiate action when a fire or smoke condition is present.

The alarm management shall be field configurable from the control panel via a keypad to enable the system to be tailored to suit the protected building, and to permit future changes. This configuration shall be maintained under power failure conditions.

The control unit shall have a front panel comprising indicating LEDs, a control keyboard, and an LCD display, as described in detail later.

The system will comprise one main addressable fire detection panel(1 having **four** loops and one (1) addressable repeater panel. The zones must be fully field programmable to permit sensors to be allocated to any zone. The zoning must be manually configured on system start-up, or on request by an authorised operator.

The panel must provide facilities for the operator to inspect the zoning configuration and inhibit or activate devices. Facilities must be provided for identifying all active and inhibited addressed, and all connected device types.

7.6.2 Panel Operation

Four levels of access to the system menu via the keypad are to be provided.

These are to be as follows:

- Level 1 : Operating (no access code required)
- Level 2 : Maintenance Technician (access code required)
- Level 3 : Commissioning (access code plus key)

- Level 4 : Access Code Changes (access code plus key)

Facilities for “locking-off” controls are to be provided.

The panel is to incorporate a keyboard and push-button with the following functions:

- numeric keyboard
- system reset button
- alarm accept button/silence alarm button
- alarm sound button
- panel buzzer “mute” button
- lamp test function
- control buttons as required for system operation
- menu functions for maintenance and commissioning

7.6.3 Polling

The system is to incorporate a polling system which polls each sensor individually and reads information at regular intervals to the control unit. The idle value shall be continuously updated in order to compensate for ageing and atmospheric conditions. The panel shall make decisions based on the number of devices attached to the loop.

All communication shall be under the control of the panel, which shall sequentially poll each device in turn and authorise communication. No device shall communicate with the control panel without authority.

The control panel must be able to read information from a device or send instructions to a device.

The panel shall monitor each device on every scan and give a fault signal for any of the following conditions within 30 seconds:

- (a) detector removed
- (b) address unit removed
- (c) incorrect device type
- (d) faulty calibration or sensitivity

7.6.4 Calibration

The system must check the calibration of each analogue line device and record changes caused by environmental contamination.

When maximum calibration adjustment is reached, the panel must indicate a “maintenance” signal. This must be a dedicated signal and must be separate from the pre-alarm” signal.

The build-up of dirt or similar contamination on the optical surface will cause the output signal from the detector to gradually change. The control panel shall be capable of monitoring this slow change in signal and, at a predetermined level, indicate that the detector is in need of servicing.

7.6.5 Panel Display

All display and indicators shall be LCD for text and LED for lamp indication.

The type, calibration, sensitivity and status of each device must be able to be displayed on the control

panel.

The control panel shall be able to physically identify the zone in which each sensor or device address resides and shall give a "configuration-fault" signal if a sensor or device address is located in the incorrect zone.

Fire indication shall be by zone, displayed on LED indicators and the LCD text display.

Fault, maintenance, pre-alarm, and device/zone disabled signals shall be indicated visually by LCD text display and audibly, in the control unit.

The top portion of the LCD text display shall always show the first alarm received. The lower portion of the LCD text display shall show the last alarm received. It must be possible to manually scroll through all alarms on the lower portion of the screen using the "up" and "down" scroll buttons.

The display must show the total number of alarm events currently in the system.

Fire alarms shall take priority when displaying. However, it must be possible to view all events currently in the system, displayed devices, and other events.

It shall be possible to view the devices, by address, that initiated the alarm on the LCD text display on manual request. When viewing the device, a 40-character location message specific to each device shall be displayed.

The visual indications must be arranged so that the different warnings are clearly distinguished. (i.e. amber for fault, red for alarm).

The internal audible signal device may be the same for all alarms, but either tone variation or time switching shall be used to differentiate the signals.

Outputs shall be provided for audible alarms, control functions, remote mimics and connection for computers and printers.

The LCD text display must be able to simultaneously display a minimum of the following information in each display mode.

One display mode:

- type of alarm
- 2 zones (first and last)
- alarm count
- total number of alarms
- 40-character zone location message for each zone
- time and date

Device display mode:

- type of alarm
- 2 zones (first and last)
- alarm count
- total number of alarms
- 40-character zone location message for each zone
- time and date

Device display mode:

- loop number, zone number, detector address

- alarm count
- detector in alarm
- alarm type
- active or accepted
- time and date

The LCD must be at least a 160-character display.

7.6.6 Software Algorithms

The data from a sensor must be evaluated by intelligent software algorithms to identify the presence of fire or smoke and any possible faults present.

The system must support a number of software different algorithms, each tailored to suit the profile of a different hazard or protected area. These algorithms must be specifically matched to provide the optimum protection for each type of area. It must be possible to allocate selected algorithms independently to each sensor in the system. In addition, different algorithms must be automatically allocated to the same sensor at different times.

It must be possible to customise algorithms to take into account special conditions that may exist in certain specific hazards. This customisation should incorporate the features below.

Alarm sensitivity relative to each analogue detector shall be individually adjustable, device by device, by the control panel. Not less than four levels of sensitivity adjustment are required for each device, as follows:

- smoke sensors
 - (1) 1.5%/m obs
 - (2) 2.5%/m obs
 - (3) 3.5%/m obs
 - (4) 5.0%/m obs
- heat sensors
 - (1) 42 °C
 - (2) 58 °C
 - (3) 70 °C
 - (4) 82 °C

There shall be no limit to the number of devices which may be in alarm simultaneously.

Every analogue detector must have the facility for verifying the validity of an alarm signal over a 20 second period, before initiating an alarm. This alarm verification function must be able to be enabled or disabled, on a device-by-device basis from the control panel.

Alarm Outputs

The panel must incorporate two monitored audible alarm outputs for the switching-on of bells of electronic sounders.

These outputs must be continuously monitored for open and short circuits.

Each output must be rated at 0.75 A at 24V dc.

It shall be possible to independently display either of the alarm bell output by means of a control push button.

A test facility shall be provided in order to test each of the alarm bell out outputs. When the test is initiated, the selected alarm bell will operate intermittently.

Both the alarm bells will have a delay facility, which is selected by controls on the front panel. Manual call points will override this delay.

Alarm Contacts

One voltage free change-over contact must be provided. This must operate on a “fire” condition and is to remain “on” until the system is reset.

The contacts are to be rated 2 A at 24 V dc.

Double-Knock (Coincidence) Operation

It shall be possible to programme any of the control outputs or addressable relays to operate upon an alarm from any two sensors in the programmed group.

Silencing Operation

It shall be possible to programme any of the control outputs or addressable relays to operate in either “silencing” mode or “non-silencing” mode.

In “silencing” mode, the relay or outputs shall de-activate when the “alarm accept” button is pressed, or when the “reset” button is pressed, or when the “reset” button is pressed.

In “non-silencing” mode, the relay or output shall be deactivated only when the “reset” button is pressed.

7.6.7 Activation Delay

It shall be possible to programme any of the control outputs or addressable relays to activate after a delay period from receipt of the control signal.

This delay shall be 0-16 minutes, in one second increments.

7.6.8 Software Control

All the above functions shall be under software control and programmed through the panel's keyboards or by means of a computer.

It must be possible, as an option, to programme the panel off-line on a computer and download the programme into the panel.

It must be possible to save the programme to disk for future reference.

7.6.9 Remote Panel Outputs

An optional serial port shall be provided for connecting to remote panels and computers.

The remote units must have the following display and controls:

Remote 160-character LCD text display, which repeats all events being displayed on the panel display.

- numeric keyboard
- system reset button
- alarm accept button/silence alarm button
- alarm sound button
- panel buzzer “mute” button
- lamp test function
- “help” button
- control buttons as required for system operation
- menu functions for maintenance and commissioning

7.6.10 Processor Monitoring

The panel must be provided with fault tolerance enabling monitoring and resetting of the microprocessor in the event of microprocessor failure. For diagnostic purposes, a counter must allow the viewing of the incidents that the processor has reset by the system. This information must be stored in non-volatile memory, enabling it to be viewed even if the panel has been turned off. The counter must only be able to be reset by an authorised engineer under a level 3 access code.

The microprocessor must perform full diagnostic tests on all memory devices on start-up, as follows:

RAM Test	(running data)
EPROM Checksum Verification	(programme storage)
EEPROM Checksum Verification	(Site configuration storage)

Should any test fail, an audible and visual fault indication must be given, and the LCD display must indicate the nature of the fault.

The control unit shall perform periodic checksum tests, at intervals not exceeding 60 minutes, on the RAM, EPROM, EEPROM memories and give an audible, visual, and LCD text fault indication in the event of a discrepancy.

It must be possible to view the original and current checksums for all memories on the panel LCD display, as a maintenance (Level 2) function.

In the event of a fault condition where the processor will not restart within 20 seconds, the panel must give an audible and visual alarm indication.

7.6.11 System Maintenance

The control panel shall keep statistics for each of the system sensors. These statistics shall be able to be displayed on demand by a level 2 operator.

The following statistics shall be displayed:

- maximum value attained by the sensor as well as the date and time.
- the minimum value attained by the sensor as well as the data and time.
- the average idle value attained by the sensor.
- communication error rate

It shall be possible to put up to 1 Zone (20 detectors) in soak test mode. Sensors in soak test mode will log their conditions in the vent buffer without raising fire alarms. It shall be possible to display or

print out the result of the soak-test.

7.7 DETECTOR BASES

Sensors must plug into separate mounting bases with a twist-lock action. The bases shall be fitted with corrosion resistant connector springs and terminal screws with captive clamping plates.

All bases shall incorporate a concealed security lock to prevent unauthorised removal of tampering with sensors. It shall be possible to activate the security lock in areas where required. With the security lock activated, it must only be possible to remove a sensor from its base using a special tool.

There shall be a facility on the base for attaching a label indicating the address of that detector. A similar facility shall be available on the detector, enabling the fitting of a label indicating its address. When the detector is fitted to its base, both the detector and base address labels shall be visible and aligned adjacent to each other.

7.8 ADDRESSABLE OPTICAL SMOKE DETECTORS

Optical smoke sensors must comply with standard EN 54.

Optical smoke sensors will be suitable for detecting invisible products of combustion as well as visible smoke and be of the dual chamber source type to provide good stability in changing environmental conditions.

The detector shall be capable of operating within the following environmental limits:

Description	Value
Temperature operating range	–20°C to +60°C
Humidity operating range	0% to 95% RH (excluding condensation)
Wind	Up to 10 m/s

7.8.1 Key features

- Optical technology - responds quickly to slow smouldering fires
- CE marked
- Designed for use with the Firewatch single and two loop fire alarm panels
- Self- extinguishing white polycarbonate case
- Unaffected by wind or atmospheric pressure
- Supply voltage: 17 to 28 Volts dc
- Operating temperature: -20°C to +60°C
- IP23D rating

7.8.2 Approvals/Certifications

- Certified to EN54 – 7 by the LPCB
- Loss Prevention Certification Board (LPCB) and/or VdS approved.

7.9 HIGH OUTPUT SOUNDER AND STROBE 120DB – (KLAXON NEXUS OR SIMILARLY APPROVED ONLY)

Key features

- EN54 – 3 Type B certified
- Built-in Strobe
- The supply voltage is between 10VDC and 60VDC
- 120dB at 1 metre
- 64 different tones
- 2nd and 3rd stage alarms
- Fire retardant red case
- Quarter turn fasteners for ease of installation
- First-fix, wire to base technology
- Volume control for greater flexibility - 20dB
- operating temperature ranges between -20°C and 70°C
- IP66 rated
- Three alarm stages
- Low in-rush current (LED only)
- Static/flashing mode (LED only)
- Separate connections for sounder & beacon

7.10 OPEN AREA SMOKE IMAGING DETECTOR (OSID OR SIMILARLY APPROVED)

Open Area Smoke Imaging Detectors (OSID) are to comply with EN 54 and meet the following performance criteria:

Description	Value
Maximum detection range	Up to 150 meters
Status LEDs	Fire, trouble and power
Interrogation	Dust and intrusive solid-object rejection
Alignment	Easy alignment with large adjustment and viewing angles
Configuration	DIP switch configuration
Alarm thresholds	Configurable

7.10.1 Further Features

- High tolerance to building flex and vibration.
- Dual wavelength LED-based smoke detection. (UV and IR wavelength spectrums)
- Limited maintenance requirements.
- Configurable alarm thresholds

7.11 HIGH SENSITIVITY SMOKE DETECTION (HSSD)

A High Sensitivity Smoke Detection System shall be installed throughout the areas nominated on the drawings.

The installation Contractor shall be responsible for the design, supply and commissioning of a fully supervised Aspirating Fire & Smoke Detection System as specified herein and indicated on the relevant drawings. Where necessary the installation Contractor shall employ the services of the manufacturer to assist with any or all aspects of the system design, supply, commissioning and maintenance to ensure the completed system meets the requirements for the project. (Refer to the Employer drawings attached.)

The aspirating detection system shall consist of Fire Detection PLC micro-processor based aspirating fire & smoke detectors, standby power supply units and a network of air sampling pipework.

The system consists of a highly sensitive laser-based smoke detector using aspirated air sampling and is connected to sampling pipes. It shall be provided with a single sample pipe inlet, internal flow monitoring, smoke detection and a facility for exhaust pipe connection.

Reset, disable, test and fault determination functions will be available via the field service access door. System configuration will be provided through Auto Learn Smoke and Flow functions, also available via the field service access door.

The system shall support Pre-Engineered sampling pipe network designs with verified calculations in addition to custom sampling pipe network designs using a computer-based design modelling tool. Sampling pipe material shall be UL 1887 approved for use in air sampling smoke detection systems and shall be red in colour.

The High Sensitivity Smoke Detection System must be of a type submitted to, tested, approved, and/or listed by nationally recognized testing laboratories as follows:

- UL (Underwriters Laboratories Inc)
- ULC (Underwriters Laboratories Canada)
- FM (Factory Mutual)
- FM approved for Hazardous Locations, Class 1, Div.2, Groups A, B, C, D (3020906)
- CSFM (California State Fire Marshall)
- LPCB (Loss Prevention Certification Board)
- ActivFire
- VdS (Verband der Sachversicherer e. V.)
- AFNOR
- VNIPO
- CFE
- KFI

The system shall be formally approved by a notified body (such as VdS or LPCB) to EN54-20 Class A, B and C and shall carry appropriate CE marking to confirm this approval.

The smoke detection system shall be installed to comply with one or more of the following codes or standards:

- AS 1670.1-2004, AS1603.8 – 1996, , ASNZS 3000
- Fire Industry Association (FIA), Code of Practice for Design, Installation, Commissioning & Maintenance of Aspirating Smoke Detector (ASD) Systems
- NFPA Standards, US
- NEC Standards, US
- NZS 4512: 2003
- Local codes and standards

General requirements

- The detector shall consist of a highly sensitive laser-based smoke detector, an aspirator, and a dual-stage filter cartridge.
- The detector shall have control switches for Reset, Disable, Test and restricted access switches for Alarm Setup and Flow Setup.
- The detector shall have individual illuminated indicators for:
 - Four alarm levels (Alert, Action, Fire 1 & Fire 2).
 - Fault, Power & Disabled.
 - Alarm Setup and Flow Setup.
- The detector shall have a front-panel, 10 segment, illuminated, yellow-coloured circular smoke dial for the purpose of indicating the current smoke level and detector status.
- The detector shall have individual relay outputs for Fault, Action and Fire 1.
- The detector shall have an RS232-compatible serial control port for the purpose of configuration, control, status monitoring, event log extraction and upgrade.
- The detector shall provide for the addition of one interface card.
- The detector shall provide a general-purpose input to allow either Reset, Disable, Reset & Disable, Standby, External and Nighttime Thresholds.
- The detector may also be configured by a PC and allow programming of four smoke threshold alarm levels, time delays, faults including airflow, detector, power and filter as well as an indication of the urgency of the fault and three relay outputs for remote indication of alarm and fault.
- The detector shall consist of an air sampling pipe network to transport air to the detection system and support pre-engineered designs. Complex designs shall be supported by calculations from a computer-based design-modelling tool.
- The detector shall incorporate an ultrasonic flow sensor in the pipe inlet port for airflow monitoring purposes.

Performance Requirements

- The detection system shall be listed and approved to cover up to 250m² and be capable of operating without fault in temperatures up to -40 degrees Celsius.
- The detection system shall be approved to provide very early warning smoke detection and provide up to four output levels corresponding to Alert, Action, Fire 1 and Fire 2. These levels shall be programmable and able to be set at sensitivities ranging from 0.025-20% obs/m.
- The detector shall provide fault indication on the unit using the Instant Fault Finder function.
- The detector shall be self-monitoring for filter contamination.
- The detector shall provide staged airflow faults via the use of an ultrasonic flow sensor in the pipe inlet port.
- The detector and pipework shall be capable of operating continuously without fault in the cold rooms/freezers with the correct condensate traps, nozzles, etc., suited for the application.
- The design intent, as per the drawings, is to initially be in a position to receive an addressable address for each of the cold rooms. Therefore, either multipipe systems, with multiple optical chambers (smoke detectors), or stand-alone single pipe systems are required for this system as indicated on the Engineer's drawings. A sampling pipe is not allowed to be shared between multiple rooms.

Product data and Site drawings shall be submitted and shall include pipe layout, operational calculations and performance criteria.

A copy of the manufacturer's installation, operation and maintenance manuals shall be supplied upon completion of the installation.

System commissioning data shall be supplied (in a format recommended by the manufacturer and per the instructions provided by the manufacturer) within 30 days of completion of the installation.

Quality Assurance

- The manufacturer shall have a minimum of 15 years of production experience in the manufacture and design of high sensitivity air sampling smoke detection systems.
- The manufacturer shall be certified as meeting ISO 9001:2008 for manufacturing.

Technology

The Laser Detection Chamber shall be of the mass Light Scattering type and capable of detecting a wide range of smoke particle types of varying sizes.

A smoke-hours method shall be used for the purpose of monitoring contamination of the filter (dust & dirt etc.) to automatically notify when maintenance is required.

The Laser Detection Chamber shall incorporate a separate secondary clean air feed from the filter, providing clean air barriers across critical detector optics to eliminate internal detector contamination.

The detector shall not use adaptive algorithms to adjust the sensitivity from that set during commissioning. A learning tool shall be provided to ensure the best selection of appropriate alarm thresholds during the commissioning process.

Equipment Supplier

The equipment supplier shall be authorized and trained by the manufacturer to calculate/design, install, test and maintain the air sampling system and shall be able to produce a certificate stating such on request.

Detector Assembly

The Detector, Filter, Aspirator and Relay Outputs shall be housed in a mounting box and shall be arranged in such a way that air is drawn from the fire risk area and a sample passed through the Dual Stage Filter and Detector by the Aspirator.

The Detector shall be laser-based type and shall have an obscuration sensitivity range of 0.025-20% obs/m.

The Detector shall have four independent field programmable smoke alarm thresholds across its sensitivity range with adjustable time delays for each threshold between 0-60 seconds.

The detector shall also incorporate the facility to transmit a fault via a relay.

The detector shall have a single pipe inlet that must contain an ultrasonic flow sensor. High flow faults (urgent and non-urgent) and low flow faults (urgent and non-urgent) can be reported.

The filter must be a two-stage disposable filter cartridge. The first stage shall be capable of filtering particles in excess of 20 microns from the air sample. The second stage shall be ultra-fine, removing more than 99% of contaminant particles of 0.3 microns or larger to provide a clean air barrier around the detector's optics to prevent contamination and increase service life.

The aspirator shall be a purpose-designed aspirator assembly.

When using pre-engineered sampling pipe networks shall be capable of supporting combined sampling pipe length up to 100m with a transport time per applicable local codes. Custom sampling pipe network designs shall be supported using calculation software.

The assembly must contain relays for basic alarm and fault conditions. The relays shall be software programmable (latching or non-latching). The relays must be rated at 1A at 30 VDC.

The assembly shall have built-in event and smoke logging. It shall have separate event log storage for smoke levels, alarm conditions, operator actions and faults. The date and time of each event shall be recorded. Each detector (zone) shall be capable of storing up to 128 events on a first-in-first-out (FIFO) basis.

Displays

- The detector will be provided with LED indicators.
- Each Detector shall provide the following features at a minimum:
 - Alert, Action, Fire 1 and Fire 2 corresponding to the alarm thresholds of the detector.
 - Circular Smoke Dial display to represent the level of smoke present in the protected area.
 - Fault indicator.

- Power indicator.
- Disabled indicator.
- Buttons supporting the following features shall be accessible to authorized personnel:
 - Reset – (press and release) un-latches all latched alarms and faults.
 - Disable – (press and release) disables the fire relay outputs from actuating and indicates a fault.
 - Test – (press and release) simulates a Fire 1 condition.

Digital Communication Port

- An RS 232 compatible serial port will be provided on the detector for configuration, status monitoring, command input, event log extraction and software upgrades. It shall comply with the EIA RS232 Protocol.
- The unit shall support an Open Detector Control Protocol (ODCP) for connection to 3rd party embedded devices. The ODCP shall provide the following:
 - Alarm Status for all VLF alarm levels
 - Current smoke level
 - Current flow level (% flow and litres/min)
 - VLF Detector state (Running, Disable & Standby)
 - Fault Status
 - Remaining Days for Filter Life
 - Smoke Threshold levels
 - Detector's product ID (serial number)
 - Reset
 - Disable
 - Standby
 - Normalise
 - Set smoke thresholds

Application

The standard laser-based air sampling detection system is supplied with two alarm relay outputs (Alert and Fire 1). For four-relay alarm levels, use the optional relay interface card.

The standard alarm outputs may be used as follows:

- Alert (Alarm Level 1)
 - Activate a visual and audible alarm in the direct vicinity around and inside the fire risk area (if applicable).
- Action (Alarm Level 2)
 - Activates the electrical/electronic equipment shutdown relay and activates visual and audible alarms in the Security Office or other appropriate locations.

The additional alarm outputs, with the optional relay interface card, may be used as follows:

- Fire 1 (Alarm Level 3)
 - None
- Fire 2 (Alarm Level 4)
 - Activate a suppression system and/or other suitable countermeasures (e.g. evacuation action or shutdown of systems).

Initial settings for the alarm levels shall be determined by the requirements of the fire zone. Default settings of the unit shall be:

- | | |
|--------------------------|-------------|
| • Alarm Level 1 (Alert) | 0.08% obs/m |
| • Alarm Level 2 (Action) | 0.14% obs/m |
| • Alarm Level 3 (Fire 1) | 1.0% obs/m |
| • Alarm Level 4 (Fire 2) | 4.0% obs/m |

Initial (factory default) settings for the alarm delay threshold shall be:

- | | |
|--------------------------|------------|
| • Alarm Level 1 (Alert) | 10 seconds |
| • Alarm Level 2 (Action) | 10 seconds |

- Alarm Level 3 (Fire 1) 10 seconds
- Alarm Level 4 (Fire 2) 10 seconds
- Fault Alarm 5 seconds

The Detector Fault relay shall be connected to the appropriate alarm zone on the Fire Alarm Control Panel (FACP) in such a way that a Detector Fault would register a fault condition on the FACP. The fault relay shall also be connected to the appropriate control system.

The system shall be powered from a regulated supply of nominally 24V DC. The battery charger and battery shall comply with the relevant Codes, Standards or Regulations. Typically, 24 hours standby battery backup is required, followed by 30 minutes in an alarm condition in accordance with EN 54: Part 4.

7.11.1 Sampling Pipe

The sampling pipe shall have a smooth bore. Normally, a pipe with an outside diameter (OD) of 25mm and an internal diameter (ID) of 21mm shall be used.

The pipe material should be suitable for the environment in which it is installed or should be the material as required by the specifying body (UL 1887 Plenum rated CPVC).

All joints in the sampling pipe must be airtight and made by using solvent cement, except at entry to the detector.

The pipe shall be identified as Air Sampling/Aspirating Smoke Detector Pipe (or similar wording) along its entire length at regular intervals not exceeding the manufacturer's recommendation or that of local codes and standards.

All pipes should be supported at not less than 1.5m centres or that of the local codes or standards.

The far end of each trunk or branch pipe shall be fitted with an end cap and made air-tight by using solvent cement. The use of an end cap will be dependent on detailed calculations.

All sampling pipes shall be red in colour.

Sampling holes shall not be separated by more than the maximum distance allowed for conventional point detectors as specified in the local codes and standards. Intervals may vary according to calculations.

Each sampling point port shall be identified.

Consideration shall be given to the manufacturer's recommendations and standards in relation to the number of sampling points and the distance of the sampling points from the ceiling or roof structure and forced ventilation systems.

Sample port size shall be as specified by detailed calculations.

The Contractor shall install the system in accordance with the manufacturer's System Design Manual.

Where false ceilings are installed, the sampling pipe shall be installed above the ceiling, and capillary sampling points shall be installed on the ceiling and connected by means of a capillary tube.

The typical internal diameter of the capillary tube shall be 5mm, and the maximum length of the capillary tube shall be 8m unless the manufacturer, in consultation with the Engineer, have specified otherwise.

The Capillary tube shall terminate at a Ceiling Sampling Point specifically designed and approved by the manufacturer. The performance characteristics of the Sampling Points shall be taken into account during the system design.

For specific performance requirements that fall outside the pre-engineered designs, a sampling pipe aspiration-modelling program shall provide air sampling pipe network calculations. Pipe calculations shall be supplied with the proposed pipe layout design to indicate the following performance criteria:

- **Transport Time**
Wherever possible, the transport time (i.e. the time taken by smoke sampled to reach the detector) for the least favourable sampling point shall be less than 60 seconds for open hole sampling and less than 90 seconds for capillary tubes.
- **Balance %**
The sample point balance for the pipe shall not be less than 70%. That is, the volume of air drawn from the last sampling point shall not be less than 70% of the average volume of air through the other holes.

8. EMERGENCY VOICE COMMUNICATION SYSTEM

Not currently envisioned as part of this project.

9. GAS SUPPRESSION

Gas suppression is not part of this immediate project and is by separate appointment where needed.

10. VOICE EVACUATION SYSTEM

Not part of this immediate project and is by separate appointment where needed.

SECTION 5

SCHEDULE OF DRAWINGS

SECTION 5: SCHEDULE OF DRAWINGS

Drawing No.	Title
WH-ESKM-FP-001	FIRE PROTECTION LAYOUT
WH-ESKM-FP-002	FIRE PROTECTION DETAILS
WH-ESKM-FD-001	FIRE DETECTION SYSTEM
WH-ESKM-FD-002	FIRE DETECTION SYSTEM

SECTION 6

RETURNABLE SCHEDULE

SECTION 6: RETURNABLE SCHEDULE

1. GENERAL

The following documents are to be completed and returned as they constitute the tender. Whilst many of the returnable documents are required for the purpose of evaluating the tender, some will form part of the subsequent contract, as they form the basis of the tender offer. For this reason, it is very important that tenderers return all information requested.

2. STATEMENT OF COMPLIANCE OR OF QUALIFICATIONS BY TENDERER
INCLUDING SCHEDULE OF LEAD TIMES

Explanatory remarks with regard to variations to the design of the Installation, or remarks regarding the Specification, Drawings or Conditions of Contract, shall be described in the space provided below, or in a separate letter accompanying the proposal and also enumerated in the space below. Should no remarks be made, it shall be interpreted that the installation offered in the proposal fully complies with this Document, the Drawings and Conditions of Contract and Tender.

Alternative Offers shall clearly be stated.

SECTION	CLAUSE NO.	QUALIFICATION

Scope of Work for the Rosherville Superstore
Fire Protection

Unique Identifier: 15239180
Revision: 0.1
Page: 95 of 107

DESCRITPION / EQUIPMENT		ESTIMATED LEAD TIME

Signed: _____ Date: _____

Name: _____

Tenderer: _____

3. SCHEDULE OF INFORMATION, COMPONENTS AND EQUIPMENT

The tenderer shall complete in this schedule the required information of proposed suppliers of equipment and materials. The selection of equipment may be used in the adjudication of tenders. Equipment indicated in the schedules shall comply in all respects with the contract documents. If it appears that the offered equipment does not comply, then the Contractor shall be responsible for replacing such equipment at its own cost.

Final approval of equipment and materials will be subject to full submission of required information at the equipment submission stage to check conformance with the performance specification and design concept. Omission or ambiguity in the data submitted may invalidate this tender.

3.1 ADDRESSABLE DETECTION CONTROL PANELS – 4 LOOP

- 1.Make :
- 2.Name of supplier :
- 3.Model and type :

3.2 ADDRESSABLE REPEATER PANEL

- 1.Make :
- 2.Name of supplier :
- 3.Model and type :

3.3 SMS COMMUNICATOR / MODULE

- 1.Make :
- 2.Name of supplier :
- 3.Model and type :

3.4 EMERGENCY POWER SUPPLIES

- 1.Make :
- 2.Name of supplier :
- 3.Model and type :

3.5 MANUAL CALL POINT

- 1.Make :
- 2.Name of supplier :
- 3.Model and type :

3.6 OPTICAL SMOKE DETECTORS

- 1.Make :
- 2.Name of supplier :
- 3.Model and type :

3.7 BEAM DETECTORS

- 1. Make :
- 2. Name of supplier :
- 3. Model and type :

3.8 COMBINATION SIREN/STROBE (110DB) OR SIMILAR APPROVED O

- 1. Make :
- 2. Name of supplier :
- 3. Model and type :

3.9 FIRE RESISTANT CABLE

- 1. Make :
- 2. Name of supplier :
- 3. Model and type :

3.10 INTERMEDIATE LEVEL SPRINKLER

- 1. Make :
- 2. Model K Factor :
- 3. Approved by :

3.11 INSTALLATION CONTROL VALVES

- 1. Make :
- 2. Approved by :

3.12 BUTTERFLY STOP VALVES

- 1. Make :
- 2. Approved by :

3.13 NON – RETURN VALVES (WAFER)

- 1. Make :
- 2. Approved by :

3.14 TANK INFILL VALVES

- 1. Make :
- 2. Approved by :

3.15 GLYCERINE FILLED PRESSURE GAUGES

1. Make :
2. Approved by :

3.16 FLOW TEST ARRANGEMENT (TANK INFIL)

1. Make :
2. Approved by :

3.17 FLOW TEST ARRANGEMENT (PUMP TEST)

1. Make :
2. Approved by :

3.18 FLEXIBLE CONNECTIONS (PUMP DELIVERY)

1. Make :
2. Approved by :

3.19 KLAMBON OR SIMILAR CONNECTIONS

1. Make :
2. Approved by :

3.20 MALLEABLE PIPE FITTINGS

1. Make :
2. Approved by :

3.21 STEEL SECTIONAL SPRINKLER TANKS (CIRCULAR) – TO MATCH EXISTING

1. Supplier / Make & Model :
2. Country of origin :
3. Approvals :
4. Effective capacity :

3.22 STEEL SECTIONAL HYDRANT TANKS

1. Supplier / Make & Model :
2. Country of origin :
3. Approvals :
4. Effective capacity :

3.23 HYDRANT DIESEL PUMP

1. Engine make & model & Supplier :
2. Engine output (kW) :
3. Pump make & model No. :
4. Pump duty (l/min) :
5. Pump head (kPa) :
6. Pump rating churn pressure :
7. Is pump curve included? :
8. Country of origin :
9. NPSH Calculation Included? :

3.24 HYDRANT ELECTRICAL PUMP

1. Engine make & model & Supplier :
2. Engine output (kW) :
3. Pump make & model No. :
4. Pump duty (l/min) :
5. Pump head (kPa) :
6. Pump rating churn pressure :
7. Is pump curve included? :
8. Country of origin :
9. NPSH Calculation Included? :

3.25 ELECTRICAL JOCKEY FIRE WATER PUMP

1. Motor make & model No :
2. Motor output (kW) :
3. Pump make & model No. :
4. Pump duty (l/min)- min. 60 l/min :
5. Pump head (kPa) :
6. Pump rating churn pressure :
7. Is pump curve included? :
8. Country of origin :

3.26 4.5 & 9KG DCP STORED PRESSURE TYPE FIRE EXTINGUISHER

1. Make :
2. Country of Origin :
3. Approved by :

4. SCHEDULE OF RATES

Please supply rates (including labour, commissioning, etc.) for the supply and installation of the following:

The rates under this sub-section will be used for calculating the value of additional work, unless there is specialised work which requires substantially more materials, in which case subsequent pricing will be applied which needs to be approved prior to commencing of any works. The rates of this section should include for all aspects of the installation including, but not limited to, material, manufacturing, project engineering, supports, painting, commissioning, site management, labour etc. – price is for a completed and commissioned work. All prices to be to same standard as stipulated within the applicable section of this document.

4.1 NEW AND REPOSITIONED SPRINKLERS

Description	Rate
Re-positioning of sprinkler point – Exposed	
Re-positioning of sprinkler point – Ceiling	
New sprinkler point (complete) – Exposed	
New sprinkler point (complete) – Ceiling	
Replacing of sprinkler head due to painting for instance	
Plug of sprinkler head	
Difference in cost between piped droppers to ceiling sprinklers and flexible connection to ceiling sprinklers	
Servicing of Installation control valve (Complete)	
Cleaning, priming, and painting of existing delivery / suction pipework (per meter) (above 100mm diameter)	
Cleaning, priming, and painting of existing pipework (per meter) (below 100mm diameter)	

4.2 PIPING, AND OFFSETS

Size (mm Ø)	Per Running Meter including all fittings, “Klambons”, supports, painting etc.	Price per Offset (complete with all fittings, supports etc.)
25		
32		
40		
50		
65		
80		
100		
150		

200		
250		

4.3 SPRINKLERS AND ROSETTES

Description	Rate
Brass Sprinklers (fast response)	
Brass Sprinklers (standard response)	
Coloured Sprinklers (white / black / chrome) (fast response)	
Coloured Sprinklers (white / black / chrome) (standard response)	
Coloured Sprinklers (Special to RAL Code) (fast response)	
Coloured Sprinklers (Special to RAL Code) (standard response)	
Dry pendant Sprinkler	
Semi-Recessed Sprinkler	
Concealed Sprinkler	
Rosette	
Water Shield	
Sprinkler Guard	
Flexible arm hose	

4.4 INSTALLATION CONTROL VALVES

Description (complete with all ancillary equipment such as valves, flow switches etc.)	Rate
Installation control valve – complete (100 mm Ø)	
Installation control valve – complete (150 mm Ø)	

4.5 MISCELLANEOUS

Description	Rate
25mm Terminal test arrangement – complete with sight glass and Galvanized piping after valve	

50mm Drain arrangement – complete with sight glass and Galvanized piping after valve	
Denso tape (per m)	
Flow switch	
Pressure switch	
Draining & Refilling (per occasion) – additional requests, not for implementation of scope of works	
Painting (per point)	
FM Approved Direct Flow Test Arrangement	
100mm dia. Compound Gauge	

4.6 MANUAL FIRE FIGHTING EQUIPMENT

Description	Rate
4.5kg DCP fire extinguisher	
9kg DCP fire extinguisher	
30m hose reel incl. hose and CP valve	
5kg carbon dioxide fire extinguisher	
Right angle 65mm dia. hydrant outlet	
100mm dia. hydrant head with Storz coupling	
Fire Blanket (1.2 x 1.2)	

4.7 FIRE DETECTION AND ALARM

Description	Unit	Supply	Install
Addressable Detection Control Panel – 4 Loop	Per ea	R	R
Addressable Repeater Control Panel	Per ea	R	R
Emergency Power Supply	Per ea	R	R
SMS Communicator Module	Per ea	R	R
Addressable Optical Smoke Detectors	Per ea	R	R
Detector Bases - Addressable	Per ea	R	R
Addressable Manual Call Point	Per ea	R	R
Klaxon Nexus High Output Sounder with red Strobe	Per ea	R	R
Potential Free Interface Units	Per ea	R	R
Addressable Interface Relay - Inputs	Per ea	R	R
Addressable Interface Relay - Outputs	Per ea	R	R
Fire Retardant Cable – 2 core, 1mm ² dia. PH120	Per m	R	R
Fire Retardant Cable – 2 core, 1.5mm ² dia. PH120	Per m	R	R
P2000 Steel Trunking	Per m	R	R
Steel conduit (incl. Couplings) – 20 mm	Per m	R	R
Steel conduit (incl. Couplings) – 25 mm	Per m	R	R
Steel conduit (incl. Couplings) – 32 mm	Per m	R	R
Surface Box for interface relays	Per ea	R	R

5. SCHEDULE OF CONTRACTOR INFORMATION AND COMPLETED PROJECTS

The tenderer shall complete in this schedule the required information of assessing the ability and capacity of the company to complete the works as specified for this project.

Omission or ambiguity in the data submitted may invalidate this tender.

5.1 MANAGERIAL, PROFESSIONAL AND TECHNICAL STAFF

Please provide full particulars of all managerial, professional and technical staff to be allocated to this project.

a Company Resources

Number of personnel presently employed:

	Local	Total countrywide
Management/admin		
Professional engineers		
Technicians		
Drawing office		
Skilled		
Apprentices		
Semi-skilled		
Unskilled		
Total		

b Project Team

In the event of this contract being awarded to the Contractor, it shall be deemed that the project team members submitted under this heading will be available and will remain in a full time capacity on this project for its duration as long as they are in the employee of the Contractor. Deviation / alterations are to be agreed to with the Engineer

Proposed project team organogram:



Function	Name	Experience (Years)	Qualification
Project engineer/ contracts manager			
Designer responsible for shop drawings (include ASIB registration number)			
SAQCC Detection Designer (include number)			
Planner / Engineering			
Project Draughtsperson			
Hydraulic Calculator			
Site Supervisor/ Inspector			
Quality Controller			
Certified Welder			

d Sub-Contractors

Please state fully any and all outside Contractors you propose utilising for this project (eg. for design work, erection, pump supplier, tank supplier, civil engineer, structural engineer, architect, builder etc.)

5.2 SUB-CONTRACTORS

The mark up on proven costs of material must include all costs involved:

- delivery on site, hoisting, rigging.
- profit, overheads, financing, insurance and guarantee costs
- engineering, management and quality control.

The mark up excludes Value Added Tax only.

The mark up rate is %.

5.3 PROJECTS COMPLETED

Please provide details of recent projects completed, including approximate value, name of client and any other contact particular to the contract. Proof of previous experience in projects of similar scope and substance as this one would be of advantage.

1. Name of project	:	
Value (R)	:	
Name of client	:	
Any other contact	:	
contact person	:	
telephone no.	:	
Completion date	:	
General scope of work	:	
2. Name of project	:	
Value (R)	:	
Name of client	:	
Any other contact	:	
contact person	:	
telephone no.	:	
Completion date	:	
General scope of work	:	
3. Name of project	:	
Value (R)	:	

Name of client	:	
Any other contact	:	
contact person	:	
telephone no.	:	
Completion date	:	
General scope of work	:	

5.4 MAINTENANCE CAPABILITIES

Please provide full details of the resources available to maintain the system as per the specifications.

Description	Normal Working Hours	After Hours	Week-Ends & Public Holidays
No. of Technicians Available on Call			
Minimum Qualification of Technician(s) on Call			
Average Experience of Technician(s) on Call			
Approx. Response Time to This Site (Hrs)			