

**G411/2022 : APPOINTMENT OF A CONTRACTOR FOR RENOVATION WORK AT THE GOLDFIELDS CENTRE - KIRSTENBOSCH
BOTANICAL GARDEN - QUESTIONS**

<u>Question no</u>	<u>PAGE no</u>	<u>QUESTION</u>	<u>RESPONSE</u>
<u>1</u>	Schedule 6 Item 602,02,02	Item 602,02,02 does not come in a 80mm thick, only in a 50mm. please advise if we can price for a 50mm and what the colour should be.	The item should have read 50mm thick and colour to be grey.
<u>2</u>	Schedule 2 Item 207,02,04,09	Ceasarstone Titan is discontinued.	It has come to our attention that Ceasarstone sent out an email in Jan 2022 of all the quartz tops that have been discontinued. Titan is one of them. Oyster, which is still available and similar to Titan and is acceptable.
<u>3</u>	Schedule 5 Item 501,02,01	Should PV panel size and dimensions be exactly as specified, or can we quote on a bigger panel?	The panels should be able to fit the dimensions of the carport: Refer Dwg 0534-03_A, however, the panels should still provide 365W/panel equivalent or better (ie still deliver 77kWh/d from the 44m2 roof area).
<u>4</u>	Schedule 5 Item 501,03	Can we quote on a single hybrid inverter of around 20 kW or should it specifically be 3 x 6.3 kW inverters?	3 x 6.3 kW inverters are preferred as it would allow for continued supply even if we have breakdown on 1 inverter.
<u>5</u>	Schedule 7	Can you please send us the requirement details for this project? (Spec)	Please see attached the Specification. The details of the Project is to supply and install new fire detection system. Items measured in BOQ is detailed and can be priced.
<u>6</u>	Schedule 7	We also need the SANS10139 Fire Category requirements (L1,L2,L4 etc)	It is a Category L1 Category L1: systems installed throughout all areas of the building. The objective of a Category L1 system is to offer the earliest possible warning of fire, so as to achieve the longest available time for escape;
<u>7</u>	Schedule 7	Lastly must we do the design for this fire system or has a consultant done a design?	It will be required of the specialist fire detection contractor to submit design shop drawings for approval.

TECHNICAL SPECIFICATION

IG AUTOMATIC FIRE DETECTION SYSTEMS

CONTENTS

IG 01	SCOPE
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IG 01 SCOPE

IG 01.01 This standard specification covers the repair and maintenance of the complete fire detection installation including the following (this list is not intended to be complete):

- ☐ Fire alarm panels and remote indicators.
- ☐ Battery chargers and batteries.
- ☐ Links to the fire brigade.
- ☐ All wiring, cables and antennas connected to the fire detection system.
- ☐ Detectors, break glass units and other initiating devices.
- ☐ Alarms, flashing beacons, warning lights and other notification devices.
- ☐ Gas control units, evacuation lights, sirens and associated devices.
- ☐ Door closers and hold open magnets controlled by the fire detection system. Door sequencers on these doors also forms part of the fire detection system.
- ☐ Door locks monitored by the fire detection system.
- ☐ Relays and other interface equipment.
- ☐ Wiring to interfaces such as telephone connections, modems, dialling units, optic fibre converters, etc.
- ☐ Warning signs, labels, blocked plans, drawings and manuals.

IG 01.02 The following does not form part of the scope of this technical standard:

- ☐ Fire and smoke dampers and their release mechanisms.
- ☐ Associated equipment forming part of another system e.g.
 - Fire relays in an air-conditioning control panel.
 - Detonators installed on gas cylinders.
 - Gas release solenoids forming part of the gas cylinders.
- ☐ SCADA, computers and other monitoring systems.
- ☐ Monitoring equipment at the fire brigade.
- ☐ Gas or other extinguishing systems.
- ☐ Modems, line drivers, optic fibre converters, etc. that forms part of a link to a remote panel or a monitoring station such as the fire brigade.

IG 01.03 A summary inventory of the existing systems is given in PIG – Particular Specification for the Fire Detection System.

IG 02 STANDARD SPECIFICATIONS

IG 02.01 SABS standards and codes

The latest revisions of the following SABS standards and codes shall apply:

- *SABS 10139: The prevention, automatic detection, and extinguishing of fire in buildings.*
- *SABS 10142: The wiring of premises.*
- *SABS EN 54: Components of automatic fire detection systems.*

IG 02.02 Department of Public Works Specifications

The following standard specifications of the Department of Public Works, and the standards referred to in these standard specifications shall apply:

- *Standard Specification for an Automatic Fire Alarm Installation, reference FPO/82/5E as revised.*

IG 02.03 Occupational Health and Safety Act

The Contractor shall be required to comply with the Occupational Health and Safety Act 85 of 1993, Construction Regulations 2014 and related regulations. Non-compliance with these regulations, in any way whatsoever, will be adequate reason for suspending the Works.

IG 02.04 Manufacturers' specifications, codes of practice and instructions

All the wiring, installation, maintenance, testing and other specifications of the manufacturer of the equipment shall be adhered to.

IG 02.05 Municipal regulations, laws and by-laws

All municipal regulations laws, by-laws and special requirements of the Local Authority shall be adhered to unless otherwise specified.

IG 03 DEFINITIONS

The following definitions shall apply:

Class A wiring: Circuits capable of transmitting an alarm signal during a single open or non-simultaneous single ground fault on a circuit conductor shall be designated as Class A.

Class B wiring: Circuits not capable of transmitting an alarm beyond the location of the fault conditions specified for Class A above shall be designated as Class B.

Addressable system: A system in which signals from each detector and/or call point are individually identified at the control panel.

Conventional system: A system that is not addressable.

Ring system: A wiring system where a return loop with no spurs (T-offs) is used. This normally provides a Class A wiring system if the control panel is so designed.

Isolating device: Devices that isolate a line to line short circuit so that only the section between the isolating devices will be effected. The effective use of an isolating device requires Class A wiring.

IG 04 OPERATING AND MAINTENANCE MANUALS

IG 04.01 PROCUREMENT OF AVAILABLE OPERATING AND MAINTENANCE INFORMATION

At the commencement of the contract, the Contractor shall obtain all available operating and maintenance documentation. Please note that although existing manuals may be available they may not be complete and additional information must be obtained. New manuals shall be compiled even if existing manuals exist.

The Contractor shall be responsible for the compilation of a complete set of drawings, inventory list and operating and maintenance manuals. This shall be done in accordance with the Additional Specification SB - Operating and Maintenance manuals.

The Contractor shall allow for the required tools and equipment to establish the correct information.

All information shall be recorded and reproduced in electronic format as well as supplying the Engineer with three sets of hard copies.

IG 04.02 INFORMATION REQUIRED IN MANUALS

Over and above what is specified in the Additional Specification - SB Operating and Maintenance manuals, the Operating and Maintenance Manual to be compiled shall be structured and shall at least include the following for each fire alarm panel. *Please adapt and add as required.*

Master manuals and manuals for each fire panel shall be prepared containing extracts from the master manuals.

IG 04.02.01 A complete listing of all the configuration and programming information of the control panel. Enough information must be supplied so that the control panel can be reconfigured by a person not knowledgeable of the site.

IG 04.02.02 Complete drawings showing the positions of all the devices connected to the system and schematic connection diagrams.

IG 04.02.03 Complete design information containing at least:

- Sizes of batteries and battery chargers. The quiescent and alarm current of the system must be included.
- Sizes of sirens and strobes.
- Types of detectors and other devices and their specifications.

IG 04.02.04 A full description of the system providing information similar to that shown in the table below.

SYSTEM DESCRIPTION	
Name of system	
Device	Manufacturer / type / description
Control panel	ZP2 Fire Panel Large Cabinet - 2 loop compelpre with 1XZP2-ZI-40,1 X ZP2-LB & 2 x BS131N or similar approved
Battery charger	Ziton or similar approved
Detectors	Annalogue Thermal (Ionization) Sensor ZP720-3 complete with base Polar White or similar approved
Detectors	Multisensor(optical and heat) detector including the surface base,Colour Polar White or similar approved
Detectors	Annalogue Adressiable Optical Smoke detector ZP730-2 & surface mounted detector base ZP7-SB1-P Polar White or similar approved
Break glass units	Ziton ZP785-3 or similar approved
Sounders/Strobes	Ziton ZP755B-2 or similar approved
Link to the fire brigade	GRPS (Cell Phone) Modem Link to local Fire Department.
Links to other systems	None

IG 04.02.05 A complete list of all the devices of the system providing at least the information indicated in the table below.

LIST OF DEVICES	
	Goldfields Building
Fire Panel: ZP2	1
Call-Point Break Glass	8
Optical Smoke Sensor	40
Thermal (Ionization) Sensor	2
Multisensor(optical and heat	4
Optical Smoke Sensor Fire Alarm Siren combination with Strobe light	6
Door closers and hold open magnets	

IG 04.02.06 A complete list of inputs and output to the system excluding the devices indicated in the list of devices above providing at least the information indicated in the table below. Examples of other inputs and outputs are:

- Activate fire doors when alarm occurs.

IG 05 DETAIL OF REPAIR WORK

There is no fire detection system at the Goldfields Education Centre. A new Fire Detection will be supplied, installed and commissioned under the contract.

IG 06 MAINTENANCE

The maintenance functions starts from day one of the contract even if the corrective maintenance has not been completed and shall consist of preventative and breakdown maintenance with the purpose of keeping the complete installation in fully working condition as specified in the additional specifications.

IG 06.01 The preventative maintenance shall be done according to the specifications of the manufacturer of the equipment and shall at least include the following:

- Testing of all the functions of the fire detection system in a period of 12 months.
- Testing, cleaning and servicing parts of the system every 3 months to ensure that the fire detection system functions correctly.

IG 06.02 Table 1 indicates recommended testing frequencies. (T for test and I for inspect)

No.	Part of the system	Quarterly	Annually
1	Alarm notification devices		Test
2	Batteries	Load voltage test	Discharge test
	Battery charger	Charger test	Charger test
3	Control equipment	Clean	Test all functions
4	Initiating devices	Activate and clean 25% of devices	Activate all devices
5	Interface equipment		Activate all devices
6	Labels, drawings & manuals	Update as required	
7	Supervisory signals (e.g. fire brigade)	Test	
8	Wiring		Check all terminations for bad connections.

IG 06.03 A brief description of some of the tests are given below but the specifications of the manufacturer shall also be followed.

Test	Description
Battery load voltage test for sealed lead acid batteries.	Apply a load of 0.1C with the battery charger disconnected. The battery voltage should be higher than 24.5V after 30 seconds.
Battery discharge test for sealed lead acid batteries.	Apply a load of 0.2C or the full alarm load (whichever is higher) with the battery charger disconnected. The battery voltage should be higher than 23V after 30 minutes or as recommended by the battery manufacturer.
Battery charger test	The charging voltage shall be between 27.0V and 27.6V with the batteries in a charged state. The ripple voltage should be less than 30mV.

IG 07 **RECORD KEEPING AND LABELLING**

IG 07.01 **LABELS**

All equipment shall have a unique number inscribed on a label and fixed to the equipment. These numbers shall correspond with that on the drawings and in the manuals.

IG 07.02 **DESIGN INFORMATION**

IG 07.02.01 The following information shall be indicated on a label:

- The battery type and size. (next to the batteries)
- The quiescent load and alarm load in amps of the system. (next to the batteries)
- The sizes of all the fuses. (next to the fuses)
- The dates that the batteries were installed. (on the batteries)
- The number of each detector, break glass unit, interface, relay or other activation or initiating devices. (on or next to the unit)

IG 07.03 **RECORD KEEPING**

A record shall be kept of each inspection and test in a book next to the fire panel. The record book shall state at least the following:

- The date and name of the person and company.
- Comments on the tests or inspections.
- The voltages measured for the battery tests.

The date on which batteries were installed shall be clearly marked on the batteries and also indicated in the record book.

IG 07.04 **INFORMATION CABINET**

A neat, high quality cabinet or holder with a lock shall be provided next to the fire panel.

- IG 07.04.01** This cabinet shall have the following characteristics:
- It shall be wall mounted next to the fire panel.
 - It shall have a lock that opens with a general type of key such as the fire panel key or a square key.
 - It shall be large enough to hold the information indicated below but at least 350mm x 250mm x 50mm deep.
- IG 07.04.02** The information cabinet shall contain all the system specific information contained in the master manuals but at least:
- Basic operating instructions.
 - The complete design information.
 - The record book.
 - A full description of the system with drawings.
 - Configuration and programming information.

IG 07.04 **BLOCKED PLAN**

A framed drawing shall be fixed to the wall next to the fire panel and kept up to date with changed information on the fire detection system. The drawing shall contain at least the following:

- The building name as shown outside the building otherwise as known by the users of the building. The panel number shall also be shown.
- All the initiating devices and their numbers and types shall be shown.
- A symbol list of all the symbols used on the drawing.
- The positions and numbers of all the battery chargers and gas cylinders shall be shown.
- Detection and gas zones must be indicated.
- The drawing shall be at least A3 size but large enough to contain all the required information. The drawing shall be mounted behind glass with a hard wood frame.

IG 08 **DAMAGE CAUSED BY VOLTAGE SURGES**

All damage caused by lightning or power surges must be fixed under this contract. No such claims will be considered.

Please note that the Komatipoort area is very prone to lightning and voltage surges must therefore be expected.

The contractor is advised to install surge protection equipment on the systems and to regularly check the surge protection equipment for proper operation. Contact a specialised lightning specialist to assist with the design of the surge protection.

IG 09 **TEST EQUIPMENT**

The contractor shall ensure that the following equipment is available on site for the engineer's use.

- A digital multimeter.
- Smoke and heat detector testers suitable to reach heights of 6 meter.
- Testers to test batteries.
- Test equipment to test flame detectors, beam detectors, etc, if applicable.

IG 10 EQUIPMENT AND COMPONENTS REMOVED

All equipment and components of the fire detection systems that the contractor removes during a replacement action shall, where still usable be retained by the contractor and shall be used as spare parts to maintain other systems.

IG 11 MEASUREMENT AND PAYMENT

The measurement of items does not imply that those items form part of the scope of the work. Work shall be done according to the drawings, specifications and the instructions of the engineer.

IG.01 DEVICES & EQUIPMENT Number

Devices are measured per item and include the removal of an existing device (if applicable) and the supplying, installation and testing of the replacement device. The price includes all wire connections, lugs, labels, mountings and updating of the manuals and drawings. The patching and touching up of paint, woodwork, plaster, etc. shall be included in the price.

IG.02 WIRINGmetre

All wiring shall include the supply, installation into conduit, wiring channel or any other medium and the testing thereof. Prices shall include wastage, off cuts, labels, etc. to make the installation complete. The measurement is the length installed.

IG.03 CONDUITS AND CONDUIT ACCESSORIES

See AB.

IG.04 TESTING Number

The testing of fire panels, detectors and other devices or systems shall include all the test equipment, obtaining testing procedures, changes to make the test possible, recommissioning of the device or system, test reports, etc. to make the test complete and acceptable to the engineer.

All tests shall be done according to the manufacturer's specifications, standard specifications and the requirements of the engineer.

Test shall also include the calibration, cleaning of the unit and sending the unit to the supplier if the tests cannot be locally carried out.

IG.05 LABELSNumber

Prices shall include the supply and installation of the labels. Printed drafts of the labels shall be submitted to the engineer for approval before manufacture.

IG.05.01 Large labels Number

Labels for large equipment such as fire panels and battery charges shall be reverse engraved labels fixed to the equipment with screws. The labels shall be at least 20mm x 60mm.

IG.05.02 Small labels Number

Small labels shall be applied to smaller devices such as detectors and draw boxes. Labels for detectors and addressable devices shall be as supplied by the manufacturer of the device. Other small labels shall be of the laminated plastic type with a letter size of at least 4mm. The mounting surface shall first be cleaned with alcohol before fixing the label.

PARTICULAR SPECIFICATION

PJC CONVENTIONAL FIRE FIGHTING EQUIPMENT

CONTENTS

PJC 01	SCOPE
PJC 02	GENERAL DESCRIPTION OF INSTALLATION
PJC 03	TECHNICAL DETAILS OF EXISTING INSTALLATION
PJC 04	DETAILS OF REPAIR AND SERVICE WORK
PJC 05	MEASUREMENT AND PAYMENT

PJC 01 SCOPE

- (a) This specification covers the particulars of the corrective and maintenance work to the conventional fire fighting equipment installation at the various sites. This Particular Specification shall be read in conjunction with Technical Specification JC: Conventional Fire Fighting Equipment, and all additional and technical specifications compiled as part of this document, in particular the following Additional Specifications:

SA: General Maintenance
SB: Operating and Maintenance Manuals
SC: General Decommissioning, Testing and Commissioning Procedures
SD: General Training

The intended repair work to this installation will restore the existing installation to a safe, efficiently functional system that complies with all statutory regulations and applicable standards, in the process repairing all defects and shortfalls.

PJC 02 GENERAL DESCRIPTION OF INSTALLATION

(a) GOLDFIELDS EDUCATION CENTRE

The existing fire extinguishers and fire hose reels at Goldfields Education centre will be serviced and defective equipment will be replaced. Rusted and damaged fire equipment boxes will be replaced with stainless steel boxes.

PJC 03 TECHNICAL DETAILS OF EXISTING INSTALLATION

The equipment that is listed in the table below will be maintained as part of the Repair and Maintenance Contract. Newly installed fire fighting equipment shall also form part of the Contractors maintenance responsibilities.

PJC 04 DETAILS OF REPAIR AND SERVICE WORK

The following work shall form part of the intended repair work to the fire fighting equipment. This work shall be done in accordance with the relevant regulations, codes, specifications and Technical Specification JC: Conventional Fire Fighting Equipment.

The description of the repair work as set out below shall be read in conjunction with the Schedule of Quantities and Technical Specifications.

PJC 04.01 GENERAL DESCRIPTION OF REPAIR WORK

PJC 04.01.01 The Contractor shall, at the start of the Contract, have the items, systems, equipment and installations listed below inspected by qualified personnel. This inspection shall include the establishing of any defects, leaks, conditions, damages, shortfalls, repairs required, details of existing equipment, suitability of equipment for the purpose it serves, etc. The Contractor shall report to the Engineer in writing on all the above and the following items. No repair work shall commence prior to approval by the Engineer.

- (a) Correlation of all fire fighting equipment;
- (b) Last service record;
- (c) Inventory list of all equipment;
- (d) Compliance with present governing regulations;
- (e) Accessibility to equipment;
- (f) Dynamic water pressure under flow conditions of equipment;
- (g) As-built information.

PJC 04.01.02 The general scope of work at the time of going on tender is defined as follows:

- (a) Replacing of irreparably damaged, missing and unsuitable fire fighting equipment;
- (b) Servicing and overhauling of all fire hose reels and fire hydrants;
- (c) Servicing and recharging of all fire extinguishers;
- (d) Replacing of missing and damaged fire extinguisher brackets;
- (e) Replacing damaged fire hose reel cabinets;
- (f) Supply and installation of additional fire hose reels, hydrants and extinguishers where necessary, in accordance with the requirements of SABS 0400;
- (g) Servicing and overhauling of fire booster and pump connections;
- (h) Compilation of fire plan for each of the service buildings;
- (i) Compilation of inventory list with all relevant details and an identification system to all equipment.

PJC 04.02 REPAIR WORK TO FIRE FIGHTING EQUIPMENT

The repair work to this installation shall include, but not be limited to at least the following items. Any items, components or installations not detailed in this specification but found to be defective or inoperative during the inspection and report phase, shall be repaired or replaced as instructed by the Engineer.

PJC 04.02.01 Goldfields Education Centre

- (a) Service existing fire extinguishers
- (b) Replace broken and rusted fire extinguisher cabinets
- (c) Replace broken and rusted fire hose reel cabinets
- (d) Replace defective fire extinguishers
- (e) Compile fire plans for operational buildings
- (f) Add additional fire fighting equipment according to SANS 0400
- (g) Fire fighting training

PJC 05 MEASUREMENT AND PAYMENT

All new building work and corrective work to existing structures and buildings resulting from repairs to the conventional fire fighting equipment as scheduled, shall be done in accordance with the Specifications for the structural and building section included elsewhere in this Tender Document. The costs of such building and repair works shall be deemed to be included in the tendered rates for the applicable items scheduled in this section.

- PJC.01** **INSPECTION AND REPORT ON EXISTING INSTALLATIONS** Unit: item
- The tendered sum shall include full compensation for the inspection and written report on all items, systems, components, equipment and installations, including the establishment of any defects, leaks conditions, damages, shortfalls, structural soundness, repairs required, details of existing equipment and suitability of the equipment for the purpose it serves.
- PJC.02** **AS-BUILT INFORMATION AND OPERATING AND MAINTENANCE MANUALS** Unit: sum
- The tendered sum shall include full compensation for the compilation and submission of seven complete sets of inventory lists and operating and maintenance manuals in accordance with Additional Specification SB: Operating and Maintenance Manuals.
- The tendered sum shall also include full compensation for all equipment necessary to establish the exact position and level of underground services, as well as the recording of all information on electronic drawing format.
- PJC.03** **ISOLATION, STRIPPING, DISMANTLING AND REMOVAL OF EXISTING FIRE FIGHTING EQUIPMENT** Unit: number
- The tendered rates shall include full compensation for the isolation, stripping, dismantling and removal of irreparable damaged, broken or unsuitable fire hydrants, fire hose reels and fire extinguishers, including all valves, cabinets, mounting brackets, streamers, etc, as well as removal off site and/or storage of all removed items mentioned above.
- PJC.04** **SUPPLY AND INSTALLATION OF FIRE HYDRANTS** Unit: set
- The tendered rate shall include full compensation for the supply, delivery, positioning, installation, testing, commissioning and hand-over of fire hydrants, including all necessary pipework, cabinets, cupboards, valves, brackets, fittings, bends and the reinstating of existing surfaces such as walls, floors, ceilings, etc.
- The tendered rate shall also include full compensation for the supply, delivery and positioning and fixing of all fire signage as required by regulation.
- The tendered rate shall also include full compensation for the labelling with identifying tags and recording of details of all equipment.
- PJC.05** **SUPPLY AND INSTALLATION OF FIRE HOSE REELS** Unit: number
- The tendered rate shall include full compensation for the supply, delivery, positioning, installation, testing, commissioning and hand-over of fire hose reels, including all necessary pipework, cabinets, cupboards, valves, brackets, fittings, bends and the reinstating of existing surfaces such as walls, floors, ceilings, etc.
- The tendered rate shall also include full compensation for the supply, delivery and positioning and fixing of all fire signage as required by regulation.
- The tendered rate shall also include full compensation for the labelling with identifying tags and recording of details of all equipment.
- PJC.06** **SUPPLY AND INSTALLATION OF FIRE EXTINGUISHERS** Unit: number
- The tendered rate shall include full compensation for the supply, delivery, positioning, installation and hand-over of the fire extinguishers, including all necessary brackets, backboards, etc.

The tendered rates shall also include full compensation for the supply, delivery, positioning and fixing of all fire signage as required by regulation.

The tendered rate shall also include full compensation for the labelling with identifying tags and recording of details of all equipment.

PJC.07

SERVICING, CLEANING AND REPAIR OF FIRE

HYDRANTS..... Unit: number

The tendered rate shall include full compensation for the repair or replacement of damaged, broken, leaking or corroded pipework and fittings, main hydrant seals, quick coupling catches, shaft ends for right-angle hand wheel type hydrants, streamers, hose nozzles, valve steam seals, fire cupboard doors and locks, damaged, missing or shortfall fire signage, etc.

The tendered rate shall also include full compensation for the labelling with identifying tags and recording of details of all equipment.

PJC.08

SERVICING, CLEANING AND REPAIR OF FIRE HOSE

REELS..... Unit: number

The tendered rate shall include full compensation for the repair or replacement of damaged hose drums, mountings and shut-off valves, replacement of damaged or missing 30 m hoses, hose nozzles, shut-off valve wheel handles, hose drum seals where leaks occur, gland packing and gaskets of shut-off valves, repainting of deteriorated paintwork, replacement of fire cupboard doors and locks, damaged, missing or shortfall fire signage, etc.

The tendered rate shall also include full compensation for the labelling with identifying tags and recording of details of all equipment.

PJC.09

SERVICING, CLEANING, RECHARGING AND REPAIR OF

FIRE EXTINGUISHERS..... Unit: number

The tendered rate shall include full compensation for the repair or replacement of all damaged, faulty or missing discharge hoses and nozzles, pressure gauges, operating instructions, the recharging of discharge cylinder to required capacity for DCP, water and foam extinguishers, and the recharging of CO₂ extinguisher to capacity, repair, resealing of CO₂ discharge mechanism, checking, servicing and repairing of activation mechanisms, replacement of water and foam extinguishers that have corroded cylinders, replacement of DCP, water or foam content of extinguishers, the replacement of fire cupboard and cabinet doors and locks, damaged, missing or shortfall fire signage, brackets and backboards, etc.

The tendered rate shall also include full compensation for the labelling with identifying tags and recording of details of all equipment.

PJC.10

COMPILATION OF FIRE PLAN FOR EACH OF THE

SERVICE BUILDINGS..... Unit: number

Provision of a "Fire Plan". The Contractor shall provide a Fire Plan (Emergency Evacuation Plan) indicating positions, and keeping up to date any changes of the equipment position, status and operation.

The unit of measurement shall be for each service building for which the fire plans were developed, printed and laminated. The tendered rate shall include full compensation for all drawings, printing, duplicating and laminating.

- PJC.11** **FIRE FIGHTING TRAINING**..... Unit: number
- The tendered rate shall include the number of training sessions conducted for a maximum of 20 attendees including all training material, transport and training aids required.
- The end user shall be trained, by the supplier of the fire fighting equipment, to operate the individual fire fighting equipment. Fire Fighting training shall be done by a national accredited training institute (Fire Protection Association of South Africa).
- PJC.12** **SERVICING, CLEANING AND REPAIR OF FIRE BOOSTER PUMP ROOM**..... Unit: number
- The tendered rate shall include full compensation for the execution of a full engine service as per the manufacturer's recommendations including air, fuel and oil filters, oil, replacement of wiring, V-belts and hoses as needed and other consumables required including the steam cleaning of the assembly.
- The tendered rate shall also include full service of all the listed equipment in PJC.03 that includes the pumping equipment and motor control centre and replacing the batteries in the motor control centre.
- PJC.13** **SUPPLY AND INSTALLATION OF FIRE EQUIPMENT SIGNAGE** Unit: number
- The tendered rate shall include full compensation for the supply, delivery, positioning, installation and hand-over of the fire signage as required by regulation, including all necessary brackets, frames, etc. as described in the schedule of quantities.
- PJC.14** **LABELLING OF ALL CONVENTIONAL FIRE FIGHTING EQUIPMENT WITH IDENTIFYING TAGS AND RECORDING OF DETAILS** Unit: number
- The tendered rate shall include full compensation for the supply, delivery, positioning, and installation of identifying tags which must be in a printed or engraved format on each type of fire fighting equipment and bracket or holder.
- The tendered rate shall also include full compensation for the supply, delivery, positioning, installation of labels on existing cabinets, cupboards, valves, brackets,
- PJC.15** **SUPPLY OF DIESEL FUEL**..... Unit: Litre
- The unit of measurement shall be the quantity of diesel fuel supplied, delivered and transferred into day/bulk tanks upon instruction from the Engineer.
- The tendered rate shall include full compensation for the supply, transport and transfer of diesel fuel.
- PJC.16** **REPLACE STARTER BATTERY**Unit: number
- The unit of measurement shall be the number of diesel starter batteries replaced.
- The tendered rate shall include full compensation for the removal of the existing battery, the installation and reconnection of a new "Deltec Heavy-Duty Freedom"-type battery and final test of start up volt drop.

PJC.17 SERVICE UPS ELECTRONIC AND BATTERY CABINET.....Unit: number

The unit of measurement shall be the number of UPS systems opened and serviced in accordance with manufacturer's instructions

The tendered rate shall include full compensation for the opening, cleaning , visual inspection of cable terminations, ventilating fans, battery links and the recording of earthing resistance.

The tendered rate shall further include full compensation for the testing of all control cards and replacement of any defective control cards.

PJC.18 REPLACE UPS BATTERIESUnit: number

The unit of measurement shall be the number of batteries replaced.

The tendered rate shall include full compensation for the disconnection and safe disposal of old batteries and supply, installation and connection of new sealed UPS batteries.

PJC.19 SUPPLY AND INSTALL UPS UNITUnit: number

The unit of measurement shall be the number of UPS units as specified supplied and installed.

The tendered rate shall include full compensation for the disconnection of the old UPS unit and supply, installation and connection of new UPS unit including testing and commissioning.

ADDITIONAL SPECIFICATION

SB **OPERATING AND MAINTENANCE MANUALS FOR MECHANICAL AND ELECTRICAL EQUIPMENT/ INSTALLATIONS AND SITE LAYOUT PLAN(S)**

CONTENTS

SB 01	SCOPE
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SB 03	FORMAT OF OPERATING AND MAINTENANCE MANUALS
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SB 06	MEASUREMENT AND PAYMENT

SB 01 **SCOPE**

The Contractor shall be responsible for the acquiring and compilation of complete sets of Operating and Maintenance Manuals for all Mechanical and Electrical equipment and installations. A separate Operating and Maintenance Manual shall be supplied for each installation where required and as defined in the Additional Specification SA: General Maintenance. Existing Operation and Maintenance Manuals shall be revised and updated. Existing manuals that are still serviceable shall be scrutinised and certified correct and appropriate.

The contractor will furthermore be responsible for compiling and updating site layout plan(s).

SB 02 **PROCEDURE FOR SUBMISSION OF MANUALS**

SB 02.01 **SUBMISSION OF DRAFT MANUALS**

A draft copy of each Operating and Maintenance Manual shall be submitted to the Engineer prior to safety inspection of the installation. Approval of the draft Operating and Maintenance Manuals shall be a prerequisite for commencement of the safety inspection in terms of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993)

Where an installation has an existing Operating and Maintenance Manual, the Contractor shall check whether its contents are still applicable and accurate. When drawing up his own Operating and Maintenance Manual for the installation, the Contractor shall incorporate therein all such existing applicable data. The existing Operating and Maintenance Manual shall then be disposed of provided written permission to do so have been obtained from the Engineer.

The manuals will be reviewed and checked by the Engineer and returned to the Contractor with comments, where necessary. The Contractor shall make the necessary changes and amendments to the manuals to incorporate the Engineer's comments.

SB 02.02**DEVELOPMENT OF FINAL MANUALS**

A final draft copy of each Operating and Maintenance Manual shall be submitted to the Engineer at least one week prior to commencement of Day 1 tests on commissioning. This set of manuals will not be accepted without the Contractor's verification of the information contained in the manuals and the professional language editing thereof. The Engineer shall return the manuals to the Contractor, who shall make the final corrections. The Engineer will, however, not be responsible for the quality control on manuals. Approval of final Operating and Maintenance Manuals shall be a prerequisite for issuing of a Certificate of Practical Completion for repair of the installation.

After the Engineer has approved the final Operating and Maintenance Manuals, the Contractor shall provide the Engineer with seven (7) sets of the manuals. Approval of the final Operating and Maintenance Manuals shall be a prerequisite for issuing of a Certificate of Completion.

SB 03**FORMAT OF OPERATING AND MAINTENANCE MANUALS**

- (a) Manuals shall be bound in hardcover lever-arch files with plastic coatings. The files shall be clearly labelled on the front cover, as well as on the back band, with the following information:
 - (i) The title "Operating and Maintenance Manuals"
 - (ii) Name of the installation (as defined in Additional Specification SA: General Maintenance)
 - (iii) Name of the contract and contract number
 - (iv) The Contractor's name, address and contact telephone number and fax (logo optional)
 - (v) Month and year in which the manuals are finally handed over to the Employer
 - (vi) Name of the User Client.
- (b) Pamphlets and bound leaflets/booklets from suppliers or manufacturers shall be placed in plastic pockets.
- (c) Drawings and diagrams larger than A3 shall be folded and placed in plastic pockets to be easily removed or stored.
- (d) The sections of the manuals specified below shall be clearly partitioned.
- (e) Cross-referencing between drawings/diagrams and text shall be in a clear and consequent format.
- (f) The Operating and Maintenance Manuals shall be supplied in English.

SB 04 **CONTENTS OF OPERATING AND MAINTENANCE MANUALS**

SB 04.01 **TABLE OF CONTENTS**

The table of contents shall appear on the second page and shall consist of the headings of the various sections in the manual and the relevant page numbers.

The table of contents shall essentially contain at least the following:

1. Introduction
 - 1.1 Scope of the manual
 - 1.2 General arrangement of the manual
 - 1.3 Description of installation
 - 1.4 Specifications
2. List of drawings and diagrams
3. Parts and components
4. Operating procedures
5. Maintenance
 - 5.1 Purpose of maintenance
 - 5.2 Preventative maintenance
 - 5.3 Trouble-shooting
6. Breakdown maintenance and repair
7. List of Appendices.

SB 04.02 **INTRODUCTION**

The introduction shall contain at least the following:

SB 04.02.01 **Scope of the manual**

A summary shall explain the scope of the contents.

SB 04.02.02 **General arrangement of the manual**

A brief description shall explain the way in which the manual is arranged.

SB 04.02.03 **Description of installation**

This section shall give a functional description of the complete installation covered by the manual, including all systems and/or functional units deemed to form part thereof, as defined in Additional Specification SA: General Maintenance.

SB 04.02.04 **Specifications**

A summary shall be given of the specifications applicable to the particular part of the Contract.

SB 04.03 **DRAWINGS AND DIAGRAMS****SB 04.03.01** **Mechanical flow diagrams (MFDs) and single line diagrams**

Mechanical flow diagrams (for mechanical systems) or single line diagrams (for electrical systems) of the system and/or functional unit shall be included in the Operating and Maintenance Manuals for easy reference by the operators of the installation. Diagrams shall be drawn not only for parts of an installation that have been repaired, but also for the complete installation, including all the components.

SB 04.04 **PARTS AND COMPONENTS****SB 04.04.01** **Equipment data sheets**

A data sheet shall be drawn up for each piece of equipment and/or machine forming part of the installation and shall contain the following information:

- (a) Equipment tag number
- (b) Equipment description
- (c) Model/make/manufacture
- (d) Supplier/Reconditioning details
- (e) Ordering details
- (f) Details of fixed components
- (g) Details of lubrication
- (h) Maintenance references (refer to supplier/reconditioning technical manual).

SB 04.04.02 **Technical equipment manuals**

For each piece of equipment and/or machine forming part of the installation the following information shall be included in this section of the Operating and Maintenance Manuals:

- (a) the supplier or reconditioning manual and/or standards of operating and maintenance instructions;
- (b) illustrated parts breakdown and/or group assembly drawings as agreed with the Engineer;
- (c) parts lists and data sheets, including all characteristic curves for machines indicating operation point, efficiency, power consumption, etc;
- (d) calibration charts, and
- (e) test certificates for hydraulic pressure tests, flame-proof grading, materials, non-destructive examinations, coating and lining details, etc.

Each detailed description shall be accompanied by a set of engineering drawings. From the drawings the functionality of each part or component used, as well as the special characteristics associated with the part or component shall be very clear.

SB 04.04.03 **Parts and components list**

A detailed description shall specify all the parts and components used for the duration of the Contract. This description shall include new parts and components, as well as existing parts and components that have either been reconditioned or used as specified in the Contract.

The description shall state at least the part or component number, part or component name, the size of the part or component, an explanatory description, the quantity used, the material of which the part or component is made, the coating (if any), date of purchase, as well as any relevant remarks as to the application thereof.

Details of the manufacturer of the part or component shall also be listed. This shall at least state the name, address, telephone number, fax number and name of a contact person.

The supplier of the part or component shall also be stated and shall include at least the name, address, telephone number, fax number, name of a contact person and an alternative supplier (if available).

SB 04.04.04 **Drawings**

Drawings shall contain a descriptive heading, an explanatory key and relevant comments. Drawings shall be done on a computer-aided design package approved by the Engineer.

A compound drawing for all subassemblies shall clearly indicate how and where the various parts fit in the subassembly. The compound drawing shall be linked to the equipment data sheets and parts and components list and shall clearly specify the parts or components used, their model numbers, their sizes and the quantities used. The compound drawings shall also be accompanied by a short description explaining the workings of the subassembly, as well as the assembly of the parts or components to complete the subassembly.

SB 04.05 **OPERATING PROCEDURES**

The operating instructions shall be a step by step description of the manual start-up and shut-down procedure for every piece of equipment and/or process reconditioned, repaired or supplied with references to the MFDs. For automatic operation the operators shall be referred to the automatic control manual (if applicable).

The functioning of the installation shall be clearly described, using a flow diagram depicting the interrelationships among the various subassemblies. The subassemblies shall be described by descriptive drawings.

Each mechanical or process flow diagram shall contain at least a heading, relevant comments and a key.

Every subassembly shall also have its own flow diagram explaining the operation of the subassembly, as well as the application of each part and component. The application of the subassembly shall also be very clear. The flow diagram shall consist of at least a heading, relevant comments and an explanatory key.

A detailed description shall be given of all operational systems forming part of the installation, explaining the operation and functioning of the system and the

number of operations personnel required for performing the operation successfully.

The preparations, which are required before the system can be operational, shall be clearly stated and explained.

The operation tasks shall be clearly explained with reference to dangerous situations that might occur. Hazardous operations shall be explained in great detail and cover all the applicable safety precautions.

SB 04.06 **MAINTENANCE**

SB 04.06.01 **Purpose of maintenance**

The maintenance process shall be explained and the main responsibilities described.

SB 04.06.02 **Preventative maintenance**

A preventative maintenance and lubrication schedule shall be included in this section. This schedule shall be in table format and shall include a summary of all the maintenance actions required for each different system and/or functional unit covered by this manual, in order to give a single summary of all routine preventative maintenance actions required for the complete installation.

The schedule shall indicate daily, weekly, fortnightly, monthly and yearly maintenance actions. A lubrication schedule summary shall also be included under this section.

The frequency of routine preventative maintenance actions shall be indicated very clearly.

The Contractor shall provide the maintenance requirements as prescribed by the manufacturer. The type of maintenance shall be clearly indicated. The description of the maintenance to be performed shall include at least the part name, location of the part in either the assembly or subassembly, the model number, the quantity of the particular part or component to be maintained, the type of maintenance, and notes on the maintenance procedure.

A brief description shall accompany the maintenance schedule, indicating special tools to be used, maintenance and test equipment required for the test procedures. Any special tools necessary for maintenance shall be specified in terms of name, model, size, manufacturer, supplier (name, telephone number, fax number, contact person), coating (if any) and notes on the use of the equipment.

Remarks on the system readiness checks of each subassembly shall be explained in detail. Routine inspection and maintenance processes shall be described. It shall be very clear what needs to be done, how to perform the necessary task and any dangers that are present.

SB 04.06.03 **Trouble-shooting**

An explanation shall be given to assist the maintenance personnel in analysing and resolving malfunctions that might occur. Various scenarios with possible causes and rectification procedures shall be explained.

The scenarios shall be accompanied by drawings indicating the position of the part that is faulty. Each of these drawings shall have a heading, comments and an explanatory key.

SB 04.07 **BREAKDOWN MAINTENANCE AND REPAIR**

The Contractor shall describe the complete procedure to be followed in the event of a breakdown. It shall be very clear what the operating personnel should look for, how to eliminate any dangers due to the breakdown (eg electricity must be shut off in the event of problems with the wiring) and who should be contacted. The Contractor shall supply the names and telephone numbers of at least two contact persons who may be contacted in the event of a breakdown.

The Contractor shall refer to Additional Specification SA: General Maintenance, to determine the reaction time for the repair to the breakdown.

Repair instructions shall provide the maintenance personnel with detailed instructions for the removal and/or replacement of any item requiring replacement due to malfunctioning. Contact numbers shall also be given to assist maintenance personnel, should a breakdown occur.

The Contractor shall specify the actions expected of maintenance personnel in the event of a breakdown.

The Contractor shall also specify the testing procedures to be followed before the system can be put into operation again. Every procedure shall be described clearly and all the potential dangers pointed out, as well as the precautions that have to be taken.

The testing procedures shall be accompanied by drawings illustrating the process to be performed. Every drawing shall have a heading, comments and an explanatory key.

SB 05 **SCOPE OF SITE LAYOUT PLAN**

This specification provides minimum requirements for the preparation of a Site Layout Plan and is based on the specifications of the Department of Public Works.

SB.05.01 **SPECIFICATIONS**

The Specification is based on the following specifications:

1. Civil Engineering Manual PW347/2012, Annexure A1
2. Specification of Materials and Methods to be Used PW371
3. Additional Specification SB: Operating and Maintenance Manuals.

Compile and supply a complete Site Layout Plan:

(a) Detail Ground Survey

All services must be shown on a complete Site Layout Plan as required by the Engineer, including roads, fences, paving, transmission and telephone lines, etc. For sewerage reticulation and storm water drainage systems the pipe sizes, as well as invert heights must be provided. An effort must be made to trace the routes of these services.

(b) Survey of Buildings

The “footprint” of all the buildings and structures must be surveyed.

(c) General

All survey data shall be captured in electronic format.

SB.05.02

TITLE BLOCK

The standard drawing sheet layout and title block of the Department of Public Works must be used.

Complete all the relevant fields in the title block with reference to the name of the Port of Entry in the appropriate block. The words SITE LAYOUT PLAN should form part of the drawing title.

SB.05.02.01

Drawing Number

The drawing number should consist of a four-part identifier:

- Port of entry designator: WCS 045305
- Group: 1
- Drawing number: Numbering will start at 1
- Revision number: Will start at 01

Typical example: WCS 045305/1/1 Rev 01

SB.05.02.02

Overlay Sheets/Layering Scheme (if required)

The overlay sheet designator identifies the type of drawing (example: overlay for water reticulation) and can be added to the drawing number:

- C: Existing structures, facilities, roads, paving, fencing, etc
- CR: Storm water drainage system
- CE: Electrical power and equipment
- CF: Fire fighting equipment
- CS: Sewer network
- CT: Telephone lines
- CW: Water reticulation system

Typical example for the numbering of an overlay sheet:
WCS 045305/1/**CW**/1 Rev 01

SB.05.03 DRAFTING CONVENTIONS

The Site Layout Plan should be created following engineering conventions and standards in order to represent a clear drawing simplifying the huge amount of visual information.

SB.05.03.01 Paper Prints

Preference is given to size A1 plans, but for reporting size A3 will be used and the information should still be legible in this format.

SB.05.03.02 Scale

The Site Layout Plan must be drawn according to scale and the following scales can be used:

- 1:200 or
- 1:500 or
- 1:1000

SB.05.03.03 Plan Orientation

The Port of Entry should be rotated on the plan so that the north point arrow are pointing in the direction of either the upper left or upper right quadrants of the plan. The north point arrow to be placed in the top right hand corner of the drawing space.

SB.05.03.04 Contours

Contours do not form part of the Site Layout Plan.

SB.05.03.05 Line Weight

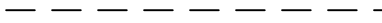
Line weight/width is extremely important and features such as the services should be drawn with lines that are more prominent. The following line weights (mm) can be used:

- | | |
|---------|---------|
| 1. 0.10 | 5. 0.35 |
| 2. 0.15 | 6. 0.50 |
| 3. 0.25 | 7. 0.70 |
| 4. 0.30 | 8. 1.00 |

SB.05.03.06 Line Type/Style

The following typical standard line types that can be used:

TYPICAL LINE TYPES

LINE DESCRIPTION	LINE APPEARANCE
1. Centre Line	
2. Solid/Continuous line	
3. Short broken line	
4. Long broken line	
5. Break line	
6. Hatch lines 45°	

SB.05.03.07 Hatching

Hatching are angled line patterns to indicate the position of permanent structures. The spacing between lines should be consistent at 45° to the structure. Park Homes must be shown on the plan, but without hatching.

SB.05.03.08 Surfaced Areas

Surfaced roads should be indicated by two solid lines as well as paved areas.

Two long broken lines should be used to indicate gravel roads.

SB.05.03.09 Non Standard Line Types

The following lines could be used for the various services, but must be identified in the Legend as a non-standard line type:

LEGEND

		<u>Colour Code</u>	<u>Line Weight (mm)</u>
	Water pipe line	Cyan	0.50
	Sewer pipe line	Black	0.50
	Electrical overhead line	Magenta	0.50
	Electrical cable	Magenta	0.50
	Telephone line	Green	0.50
	Gas pipe line	Brown	0.50
	Fence line	Black	0.30
	Surfaced Road	Black	0.30
	Gravel Road	Black	0.30
	Railway Line	Black	0.25

SB.05.03.10 Lettering and Font Styles

Use the standard font style and font size for engineering drawings and do not use stylized fonts.

Create all text in upper case letters, except for certain unit designations such as km, m, mm, kVA, etc.

SB.05.03.11 Site Layout Plan

When the Port of Entry is too large for one sheet, divide the plan into logical sections. Add a key layout in the title block showing how the various sheets should be joined together to obtain a layout of the entire site. This key layout should form part of each sheet.

SB.05.03.12 Facilities

The name of the facility should be written adjacent to the facility. If the space is limited, a reference number of the facility, which refers to a description of the facility, is inserted in a table format in or close to the title block as a legend.

SB.05.03.13 Fences and gates

Show the position of the security fence and all other fences as well as gates. Include the height of all fences.

SB.05.03.14 **Destinations**

The destination to the nearest town with a pointing arrow should appear on all incoming and outgoing roads.

SB.05.04 **SERVICES**

The position of the services is extremely important and should be indicated by lines that are more prominent/thicker. The description of the line types for the various services must be given in the Legend. See DIR04.09.

The following services, where applicable, must be shown on the Site Layout Plan for future reference:

SB.05.04.01 **Water Reticulation System**

Show the position of the water reticulation system and include the following:

- Pipe lines, pipe sizes, type of pipes, valves, meters, boreholes and tanks (include capacities). Show the direction of flow.

SB.05.04.02 **Sewerage Network**

Show the layout of the sewerage network and include the following:

- Pipe lines, pipe sizes, type of pipes, manholes, rodding eyes, septic tanks (include capacities), french drains (include volumes). Show the invert levels of all manholes as well as the position and level of the bench mark.

SB.05.04.03 **Electrical Power**

Indicate the position of electrical power lines, cables, substations, kiosks, flood lights along the perimeter as well as street lights and area lighting.

Air-conditioning units should be numbered and listed in table format including the type and size.

Give the source(s) of electrical power.

SB.05.04.04 **Telephone Lines**

Show the position of overhead telephone lines.

SB.05.04.05 **Storm water System**

Show the layout of the storm water system, culverts and sizes as well as inlet and outlet structures. Give the invert levels of all structures as well as the position and level of the bench mark.

SB.05.04.06 **Fire Fighting Equipment**

Include the pump installation, tank and capacity, fire hydrants, valves, meters, fire extinguishers and fire hose reels.

Fire extinguishers should be numbered and listed in table format including the type and size.

SB.05.05 **ELECTRONIC FORMAT**

A complete set of electronic files shall be placed on CD(s) in a Data Exchange Format (DXF) or DWG format.

Affix a stick-on label to the CD with the following information:

- Department of Public Works and logo
- Name of Port of Entry
- WCS number
- Description: SITE LAYOUT PLAN
- Drawing number(s)
- Date issued
- Electronic format: DXF or DWG

SB.05.06 **SUBMISSION**

The Consultant must submit A1 and A3 paper prints as well as a CD(s) of the Site Layout Plan(s) to the Project Manager before the Final Approval Certificate is signed.

The site layout plan(s) to be submit for approval within 12 months from the start of the contract. If not, a breakdown will be registered with related payment reduction.

The CD(s) must include the entire overlays/layering scheme and a compound drawing which includes all the services and information on one Site Layout Plan in DXF/DWG format.

During the Repair and Maintenance phase, the Project Manager will forward a request from time-to-time to the Consultants to prepare an A3 print(s) of the Site Layout Plan, which will be submitted as part of a report to Department of Public Works.

SB 06 **MEASUREMENT AND PAYMENT****SB 06.01** **Compile and supply a complete set of Operating and Maintenance Manuals**Unit : sum

The unit of measurement shall be a sum for each complete set (seven copies) of Operating and Maintenance Manuals. Operating and Maintenance Manuals for different installations shall be measured separately in the Schedule of Quantities.

The tendered sum shall include full compensation for all technical research, gathering of information, compilation of manufacturer's instructions, compilation of drawings and diagrams, and for writing of all the descriptions, instructions and functional procedures, as well as language editing, in order to provide a clear and correct set of Operating and Maintenance Manuals.

The tendered sum shall also include full compensation for all expenses such as paper, copy work, binding and printing necessary for the completion of the manuals.

The tendered sum shall also include full compensation for the compilation of draft sets of operating and maintenance manuals in accordance with the specification, and for incorporation of all comments and corrective requirements.

SB 06.02 **Compile and supply a complete site layout plan**.....Unit : sum

The unit of measurement shall be a sum for the complete set (three A1-size copies for each plan) and electronic format of the site layout plan(s).

The tendered sum shall include full compensation for all expenses such as paper, copy work and printing required for the completion of the site layout plan.

The site layout plan(s) to be submit for approval within 12 months from the start of the contract. If not, a breakdown will be registered with related payment reduction.

ADDITIONAL SPECIFICATION**SC GENERAL DECOMMISSIONING, TESTING AND COMMISSIONING PROCEDURES****CONTENTS**

SC 01	SCOPE
SC 02	PHASED REPAIRS AND UPGRADING OF THE INSTALLATION
SC 03	DETAILED COMMISSIONING PROGRAMME
SC 04	COMMISSIONING COMMUNICATION CHANNELS
SC 05	COMMISSIONING RISK CONTROL AND PENALTIES
SC 06	DELAYS OF SCHEDULED SHUTDOWNS
SC 07	MATERIAL AND EQUIPMENT PROCUREMENT AND PROTECTION
SC 08	TESTING OF EQUIPMENT PRIOR TO RECOMMISSIONING
SC 09	TESTING OF MATERIAL AND EQUIPMENT SPECIFICATIONS AND WORKMANSHIP
SC 10	DECOMMISSIONING
SC 11	RECOMMISSIONING, COMMISSIONING AND COMPLETION OF INSTALLATIONS
SC 13	MEASUREMENT AND PAYMENT

SC 01 SCOPE

This specification encompasses all aspects of the repairs of systems and services that form part of an installation, including the factory and on-site testing, decommissioning, installation and commissioning of all equipment, instrumentation and materials reconditioned, supplied and installed as part of an installation as defined in The Scope of Work.

The specified procedures are the minimum requirements to be supplemented by various technical and particular specifications in this document. These requirements shall apply to all commissioning work scheduled as part of the installations, as well as recommissioning work that is part of the routine preventive and corrective maintenance.

SC 01.01 Occupational Health and Safety Act

The Contractor shall be required to comply with the Occupational Health and Safety Act 85 of 1993, Construction Regulations 2014 and related regulations. Non-compliance with these regulations, in any way whatsoever, will be adequate reason for suspending the Works.

SC 02 PHASED REPAIRS AND UPGRADING OF THE INSTALLATION

When an installation consists of parallel systems or components, the complete installation and all its components shall be repaired without taking the complete installation out of commission at any time, unless otherwise specified in the Technical Specifications.

In order to schedule the repairs of an installation, all work shall be done in phases as specified in the Technical Specifications and illustrated in detail on the Drawings. Repairs of each part shall terminate with the successful recommissioning of that part. Each part of an installation shall be decommissioned and recommissioned in the sequence specified in the Technical Specifications and on the Drawings.

The Contractor shall install all the necessary temporary specials, spool pieces, supporting frames, brackets, electrical cables and any other temporary equipment and materials to provide a functional link between each repaired and upgraded part of the installation and the parts that has not yet been repaired and upgraded during recommissioning.

Electrical and instrumentation Contractors and subcontractors shall ensure that the system remains operational as specified, using either existing or newly installed instruments, cables and controls.

Payment is based on the successful recommissioning of a specific part of the installation.

SC 03

DETAILED COMMISSIONING PLAN

No work of any kind on any part of the existing installation shall take place prior to the Engineer's approval of a detailed commissioning plan. This plan shall be submitted in addition to the general programme for planning and monitoring contract progress, at least two weeks prior to any programmed shutdown. The Contractor submits the detailed commissioning plan for approval by both the Engineer and the User Client. Commissioning plans shall take all process requirements into account. The detailed commissioning plan shall indicate all actions necessary for:

- (1) Decommissioning
- (2) Recommissioning of parts of the installation
- (3) Commissioning of the installation.

All work deemed necessary for practical completion of the installation shall be indicated on the commissioning plan.

The plan includes a detailed programme which shall indicate the milestones to be achieved before shutdown and decommissioning as activities of zero duration, all of which shall be prerequisites linked to the "start" of decommissioning or shutdown.

The following specific actions shall be included in the detailed programme, clearly indicating the time allowed for:

- (a) Communication, including the time for confirmation of the official shutdown.
- (b) Draining parts of the installation to sumps, where available, or to other storage facilities provided by the Contractor;
- (c) Installation of temporary spools blanked flanges, electrical cables, temporary equipment and materials or other means of isolation where necessary;
- (d) Partial decommissioning and removal of existing material and equipment to perform work, including protection of pipework against hot work, cutting into pipework, loosening bolts, flanges, electrical and communication cable termination and all other work necessary for recommissioning;
- (e) Installation of temporary functional links between any two parts of the installation;
- (f) Each individual field weld, connections and terminations subject to the Engineer's approval;
- (g) Non-destructive testing of materials, for manufacturing/construction quality and for producing test results;
- (h) Installation of all instruments and their connection to SCADA systems;

SC.3

- (i) Detailed tests to confirm the performance of specific equipment, including calibration of all instruments;
- (j) Installation and connection of all power and communication cables;
- (k) De-aeration of all pipe sections;
- (l) Communication between the Contractor, the Engineer, the Employer and the User Client;
- (m) Start-up of the complete system, indicating start-up procedures.

Inspection of the prefabricated installation, testing of all equipment and materials prior to final commissioning, pressure testing and non-destructive testing shall be clearly scheduled in the project progress programme.

The detailed commissioning plan clearly indicates the responsible technical staff, with their relevant qualifications and trade skills against each of the tasks on the programme.

The detailed commissioning plan also indicates the methodology for testing, calibration and certifying functional compliance for each component forming part of the installation.

Day 30 tests and instruction/training sessions with the User Client shall be scheduled in the project progress programme.

The Contractor shall submit commissioning checks sheets to the Engineer at least three weeks before the commissioning period commences, for all the equipment supplied, reconditioned and installed by the Contractor. The Contractor shall complete the commissioning sheets during the commissioning period and all items listed shall be entered.

Programmes for the Day 1 tests, Day 30 tests and instruction/training sessions with the User Client's operators and maintenance team shall be prepared by the Contractor and submitted to the Engineer at least two weeks before the commissioning period commences.

SC 04

COMMISSIONING COMMUNICATION CHANNELS

The Contractor shall communicate with the User Client's operating and maintenance managers via the Engineer to finalise start-up after decommissioning in accordance with the specified procedures.

The following key parties shall be involved before and during shutdown and decommissioning of any part of the system:

Contractor:	Site Agent
Engineer:	Engineer Representative
Employer:	Representative of Area Manager
User Client:	Operating and Maintenance Manager.

SC 05

COMMISSIONING RISK CONTROL AND PENALTIES

- (a) The safety instructions stipulated by the Occupational Health and Safety Act 85 1993 (Act 85 of 1993) shall be adhered to at all times.
- (b) The Contractor shall not be allowed to work on any part of the installation without obtaining a commissioning check permit on the day of shutdown.

- (c) Payment reductions for exceeding the maximum permissible down-time during shutdown and commissioning shall apply as stipulated in the General Conditions of Contract and the Contract Data.

SC 06**DELAYS OF SCHEDULED SHUTDOWNS**

Specific dates on which an installation shall be shut down for decommissioning shall be finalised during coordination meetings of all the parties involved, including the Engineer, the Employer, the User Client and the Contractor.

Although a date for each shutdown will be scheduled at the coordination meetings, the actual date of the shutdown shall be determined by the process requirements and user demands, allowing for a window of seven (7) calendar days from the date of the planned shutdown.

Prospective bidders shall make allowances in their bid rates for the shutdown to occur at any time during this seven-day period. No additional payment shall be due if the shutdown occurs within this seven-day period.

If the Contractor fails to commence with the shutdown and decommissioning of the installation within the scheduled period, all additional costs arising from the shutdown at a later stage shall be for the Contractor's account.

SC 07**MATERIAL AND EQUIPMENT PROCUREMENT AND PROTECTION**

It is the responsibility of the Contractor to ensure the functionality of all units of new equipment prior to decommissioning, before installation of any specific part of the system. If the equipment, whether free-issued or not, does not conform to the functionality specifications during pre-installation testing, the Contractor shall notify the Engineer in writing without delay.

SC 08**TESTING OF EQUIPMENT PRIOR TO RECOMMISSIONING**

The equipment shall be tested for functionality after pre-installation of equipment in parts of the installation.

- (a) The Contractor shall inform the Engineer well in advance of his intention to perform the first tests and start-up of equipment in order to allow a representative of the Engineer to witness the tests. The extent of all pre-commissioning tests and checks shall be agreed with the Engineer prior to commencement, as scheduled in the Detailed Commissioning Plan.
- (b) The Contractor shall first conduct his own tests of all the equipment and individual components forming part of an installation. When he is satisfied that the equipment complies with the specifications, he shall notify the Engineer that he is ready for the official pre-commissioning tests on completion. The Contractor shall not conduct an official test without the Engineer's presence or approval. All equipment shall conform to the specified requirements.
- (c) Before starting up any part of the installation or filling the tanks or pipes sumps, the Contractor shall clean out the tanks, pipes, fittings, equipment or structures and, if necessary, make arrangements with other Contractors to remove their building rubble from the structures, check that all safety devices and alarms have

been set and activated, all nuts have been tightened correctly, that all the equipment is complete and ready for start-up, that the plant has been installed correctly, and that copies of the operating manuals have been handed to the Engineer.

- (d) The Contractor shall start up each section of equipment after ensuring that oil fillings, lubrication, vibration monitoring, cable termination and so on have been correctly completed. He is also responsible for the first refilling of all lubricating oils and for adjusting the plant to operate according to the specifications. Before any equipment is started or energised, the Contractor shall ensure that it is safe in terms of the personnel and equipment on the site to do so. The Contractor's tendered rates and sums shall allow for these costs.

All equipment shall be tested according to the relevant specifications that form part of this document.

No shutdown or decommissioning of any part of the system shall take place unless all the equipment to be installed have been tested by the Contractor and approved by the Engineer.

SC 09 TESTING OF MATERIAL AND EQUIPMENT SPECIFICATIONS AND WORKMANSHIP

All results of the required non-destructive, pre-commissioning functionality and manufacturing testing shall be submitted to the Engineer well in advance of testing the equipment on recommissioning. All such test results shall be submitted before Day 1 commissioning tests.

SC 10 DECOMMISSIONING

The decommissioning period shall commence on the instant of the entire system shutdown. The recommissioning period shall start in parallel with decommissioning.

Shutdown and decommissioning shall not proceed without compliance with all the milestones in the detailed commissioning programme. The list of milestones in this document is not complete but indicates the minimum requirements. Milestones to be achieved prior to shut-down and decommissioning may be added to the programme at the Engineer's discretion.

The Contractor is responsible for the safe decommissioning of all material, equipment, components and instrumentation to avoid damage to parts or components of the installation.

SC 11 RECOMMISSIONING, COMMISSIONING AND COMPLETION OF INSTALLATIONS

SC 11.01 RECOMMISSIONING

Recommissioning means the commissioning of all sections or systems that form part of the installation to meet the required functional specifications for the individual section or system prior to commissioning of the repaired and upgraded installation.

The Contractor is responsible for the recommissioning of all parts of the installation and he shall perform the tasks listed below.

- (a) Prior notice shall be given to and proper arrangements shall be made for recommissioning with the Employer, the Engineer, the User Client and the suppliers of equipment that is affected by recommissioning and testing.
- (b) If plant and equipment supplied by others are to be commissioned, the supplier's specific permission together with all requirements related to commissioning shall be obtained prior to recommissioning without in any way altering the General Conditions of Contract and the Contract Data with reference to the Contractor's liability in terms of defects.
- (c) The new and reconditioned parts of the installation shall be thoroughly inspected by a responsible representative of the Contractor to ensure that manufacture/construction and installation work have been completed according to the specifications.

SC 11.02**COMMISSIONING AND COMPLETION OF REPAIRS AND UPGRADING WORK**

Commissioning means commissioning of the repaired and upgraded installation(s) to perform in perfect working order.

- (a) The commissioning period for each installation:
 - (i) Commences with the Day 1 tests of the complete repaired and upgraded installation;
 - (ii) Includes commissioning of all components, equipment, sections and sub-systems that have been recommissioned prior to the Day 1 tests;
 - (iii) Includes training of the User Client's operating personnel and the maintenance teams;
 - (iv) Terminates with a Day 30 test in compliance with the commissioning report.
- (b) The purpose of the Day 1 tests is to ensure that:
 - (i) The electronic, electrical and mechanical equipment and materials are functional and in perfect working order with respect to each other and the installation as a whole;
 - (ii) The commissioning period, including training, commences on successful completion of the Day 1 tests;
- (c) Complete commissioning of installations as part of the system as a whole shall be undertaken over a trouble-free period up to Day 30. During this period the Contractor shall train the User Client's operators and his maintenance team for operating and maintaining the installation. This training shall allow for all possible operational conditions, including emergency conditions, the correct servicing of every part, the type of oil or grease to be used, and similar tasks. The training shall take place by means of demonstrations, and the operating and maintenance manuals shall be referred to for this purpose.
- (d) Day 30 commissioning tests shall be performed thirty calendar days after the successful completion of the Day 1 tests. The commissioning period of the installation terminates upon the successful completion of the Day 30 commissioning tests:
 - (i) The Contractor shall be entitled to a certificate of Practical Completion for the repairs and upgrading of the installation only upon successful completion of the Day 30 commissioning tests;
 - (ii) The Contractor becomes responsible for maintenance of the installation upon Practical Completion and is entitled to performance-based payments in compliance with Additional Specification SA: General Maintenance, until Project Completion.

- (e) The Contractor shall conduct all the tests required to satisfy the Engineer that the installation is performing according to specification, and shall make allowance for these tests in his bid rates and prices. These tests shall be conducted to certify that the installation, as repaired, upgraded and installed, is in perfect working order in terms of the specified functional requirements. The Contractor shall note that all equipment is to be tested as part of an installation, where appropriate, and will not be passed if all protection devices, interlocking with other equipment, etc, are not fully functional. No completion certificate will be issued for an installation of which the equipment has incomplete commissioning reports. Information that is not available or applicable, or instances where certain tests have not been carried out, are subject to the Engineer's decision.
- (f) Commissioning of a system (which includes the thirty days between the Day 1 and Day 30 tests) includes operating under conditions that adequately prove that all the specifications have been met. All safety devices, standby plant, automatic controls, manual controls and human interventions and all protection devices shall be adequately tested for reliability and correct functioning. The Contractor may be called upon to repeat testing during the maintenance period if the performance of the equipment is suspected to be substandard. Costs related to such tests shall be for the Contractor's account and shall comply with the specified requirements. Copies of updated commissioning reports shall be provided to the Engineer within two days after a test has been performed.
- (g) The Contractor is responsible for providing all labour and materials (including testing equipment) during the commissioning period and shall carry out all the servicing and adjustments to ensure that the installation operates as specified. Valid calibration certificates shall be available for all testing equipment on the site during the commissioning period.
- (h) The Contractor shall provide weekly updates of the detailed commissioning programme and schedule.
- (i) It shall be an express Condition of the Contract that if any equipment fails during the commissioning period, the equipment shall be repaired or replaced by the Contractor, and testing and commissioning shall commence from scratch.

SC 12 MEASUREMENT AND PAYMENT

SC 12.01 DECOMMISSIONING AND REMOVING INSTALLATIONS AS PART OF THE SYSTEM..... Unit: sum

The unit of measurement shall be a sum.

The sum bid shall include full compensation for all actions and labour required for shutdown and decommissioning of the entire installation as specified to enable decommissioning and removal of installations as listed in the Bill of Quantities.

The sum bid shall include full compensation for the decommissioning and removal of the parts and components of an installation as listed individually in the Bill of Quantities, including actions and/or costs resulting from such work, to enable the recommissioning of parts of the repaired and/or upgraded installation.

The sum bid shall include full compensation for final dismantling of decommissioned materials and equipment and the removal of all such items to stores on site, as directed by the Engineer.

SC 12.02 COMMISSIONING AND TESTING OF AN INSTALLATION..... Unit: sum

The unit of measurement shall be a sum.

The sum bid shall include full compensation for commissioning and testing parts of the installation to be operational while still incomplete in relation to the entire repaired and/or upgraded system.

Separate payment items shall be billed for separate installation as part of the system.

SC 12.03 COMMISSIONING AND TESTING OF INSTALLATIONS AS PART OF SYSTEMS AS A WHOLE Unit: sum

The unit of measurement shall be a sum.

The bid sum shall include full compensation for commissioning of the installations specified and listed as part of the system as a whole and for all costs and expenses related to labour, removal, repair, reinstallation and testing of material components and equipment during the commissioning period for each part of the system. The bid sum shall include full compensation for the final commissioning and testing, including Day 1 and Day 30 tests and all work during the 30 day commissioning period of all parts and components of the system to the specified functional condition.

All work, handling of temporary live electrical cables, lock-out and tag out procedures, temporary diversion of flows and all safety requirements shall be included in the bid sum. All actions for on-site testing, sampling, analysis, logging of data and recording of results shall be covered under the costs for commissioning. The contractor shall also be responsible for assisting the client with operation of the system during the commissioning period, all related costs deemed included with the bid sum.

Payment shall be based on successful completion of the Day 30 tests.

