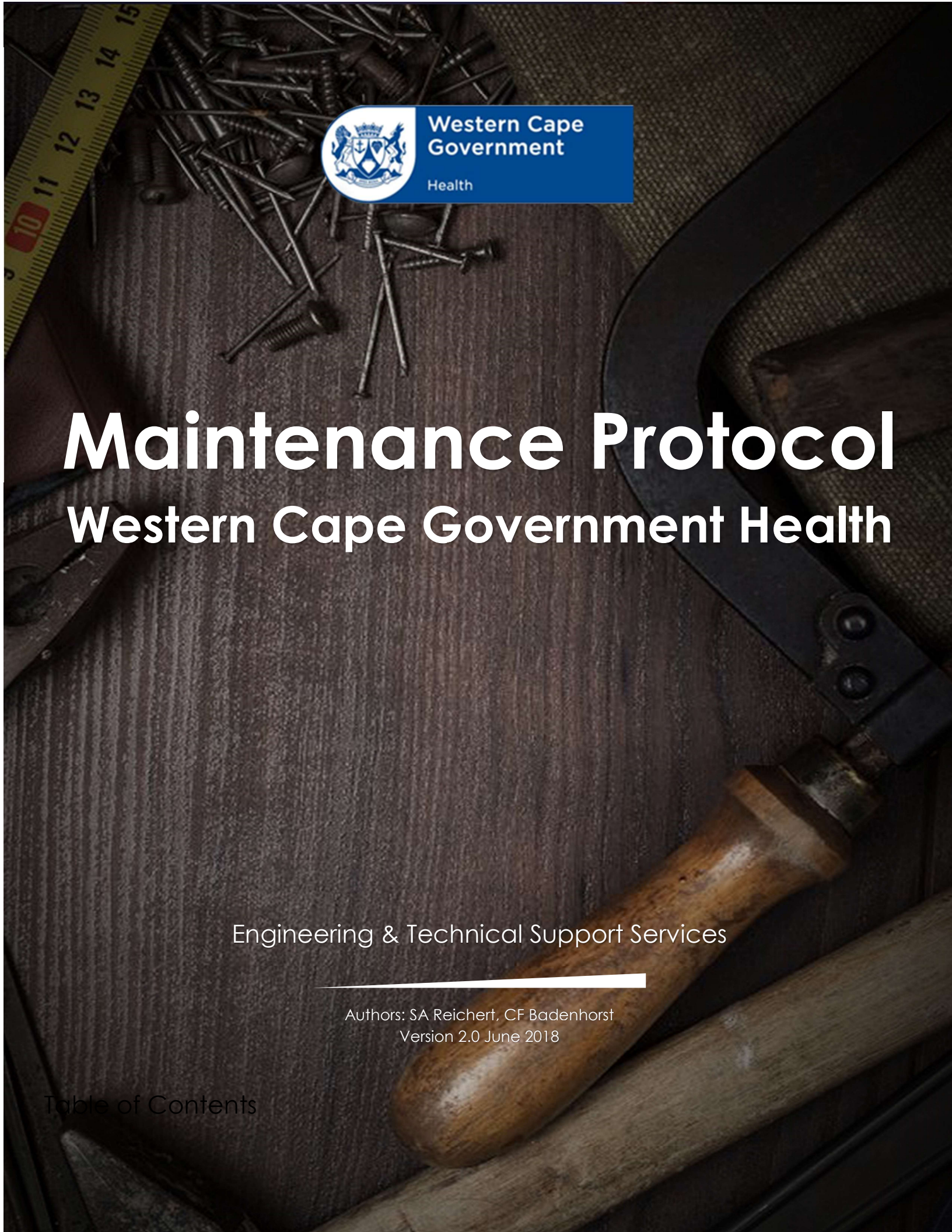

Maintenance Protocol
Western Cape Government Health

Engineering & Technical Support Services

Authors: SA Reichert, CF Badenhorst
Version 2.0 June 2018

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1. Introduction

This document provides a brief overview of processes to be followed by relevant role-players when implementing Day-to-day, Routine, Emergency and Scheduled Maintenance at all WCGH facilities.

The document also provides and overview of maintenance in WCGH in an attempt to clarify roles and simplify communication between facilities and the relevant maintenance departments.

1.1. Maintenance Definition

The term "maintenance" is defined in numerous ways in the infrastructure sector. However, in WCGH the only definition that applies is as follows:

The combination of all technical and associated administrative actions during an item's service life with the aim of retaining it in a state in which it can perform its required functions.

1.2. Construction Definition

The term "construction" or "construction related" is defined in numerous ways in the infrastructure sector but as defined by the CIDB it is :

the provision of a combination of goods and services arranged for the development, extension, installation, repair, maintenance, renewal, removal, renovation, alteration, dismantling or demolition of a fixed asset including building and engineering infrastructure.

1.3. CIDB Classes of Construction Works

In addition to the broad definition of what is considered to be construction work, the CIDB also provides a table of construction classes. The classes most applicable to maintenance activities are listed below for reference.

Definition	Basic Works Types	Examples
Electrical Engineering Works – Building (EB Class)		
Construction Works that are primarily concerned with the installation, extension, modification or repair of electrical installations in or on any premises used for the transmission of electricity from a point of control to a point of consumption, including any article forming part of such an installation	All electrical equipment forming an integral and permanent part of buildings and/or structures, including any wiring, cable jointing and laying and electrical overhead line construction.	• Electrical installations in buildings. • Electrical reticulations within a plot of land (erf) or building site. • Standby plant and uninterrupted power supply. • Verification and certification of electrical installations on premises.
Electrical Engineering Works – Infrastructure (EP Class)		
Construction Works that are primarily concerned with development, extension, installation, removal, renovation, alteration or dismantling of engineering infrastructure: (a) relating to the generation, transmission and distribution of electricity; or (b) Which cannot be classified as EB.	Electrical power generation, transmission, control and distribution equipment and systems	• Power generation. • Street and area lighting. • Substations and protection systems. • Township reticulations. • Transmission lines.
General Building Works (GB Class)		
Construction Works that: a) are primarily concerned with the development, extension, installation, renewal, renovation, alteration, or dismantling of a permanent shelter for its occupants or contents; or b) cannot be categorised in terms of the definitions provided for civil engineering works other other classes.	Building and ancillary works other than those categorised as: Civil engineering works; Electrical engineering works; Mechanical engineering works; Specialist works.	• Buildings for domestic, industrial, institutional or commercial ccupancies. • Car ports. • Stores. • Walls.
Mechanical Engineering Works (ME Class)		
Construction Works that are primarily concerned with the development, extension, installation, removal, alteration, renewal of engineering infrastructure for gas transmission and distribution, solid waste disposal, heating, ventilation and cooling, chemical works, metallurgical works, manufacturing, food processing and materials handling	Machine systems including those relating to the environment of building interiors • Gas transmission and distribution systems • Pipelines • Materials handling, lifting machinery, heating, ventilation and cooling, pumps • Continuous process systems, chemical works, metallurgical works, manufacturing, food processing such as that in concentrator machinery and apparatus, oil and gas wells, smelters…	• Air-conditioning and mechanical ventilation • Boiler installations and steam distribution • Central heating • Centralised hot water generation • Compressed air, gas and vacuum installations • Conveyor and materials handling installations • Dust and sawdust extraction • Kitchen equipment • Laundry equipment • Refrigeration and cold rooms • Waste handling systems (including compactors)

Additionally, there are specialist works which are separately defined in the CIDB:

Class	Description	Class	Description
SB	The extension, installation, repair, maintenance or renewal, or removal of asphalt.	**SI**	The development, extension, installation, repair, maintenance, renewal, removal, renovation, alteration or dismantling of lifts, escalators, travellators and hoisting machinery.
SE	Demolition of buildings and engineering infrastructure and blasting.	**SK**	The development, installation, removal, or dismantling, as relevant, of piles and other specialised foundations for buildings and structures
SF	The development, extension, installation, renewal, removal, renovation, alteration or dismantling of fire prevention and protection infrastructure (drencher and sprinkler systems and fire installation).	**SL**	The development, extension, installation, renewal, removal, renovation, alteration or dismantling of structural steelwork and scaffolding
SG	The development, extension, installation, renewal, removal, renovation, alteration or dismantling of glazing, curtain walls and shop fronts.	**SM**	Timber buildings and structures.
SH	The development, extension, installation, maintenance, renewal, removal, alteration or dismantling, as relevant, of landscaping, irrigation and horticultural works.	**SN**	The extension, installation, repair, maintenance, renewal, removal, renovation or alteration, as relevant, of the waterproofing of basements, roofs and walls using specialist systems
SO	The development, extension, installation, renewal, removal, alteration, or dismantling or demolition of water installations and soil and waste water drainage associated with buildings (wet services and plumbing)	**SQ**	The development, extension, installation, repairs, dismantling of precast walls, installation of wire perimeter fencing, diamond perimeter fencing, palisade steel fencing with posts and stay at intervals.

All construction work in excess of R 30 000 must be advertised using the applicable CIDB grading. Any bids above R 200 000 must be advertised on the CIDB website under the applicable grading.

2. Categories of Maintenance

Different procedures are prescribed for each maintenance type, and are outlined in section 4 of the protocol.

In addition, it is important to note that, in order to differentiate between the different skills levels required to carry out maintenance, WCGH has, through its proposed Maintenance Blueprint (Hub & Spoke Model), defined three different categories of maintenance as follows:

2.1. Category 1 – Handyman or Assistant to Artisan

Day-to-day, routine and emergency maintenance services that require basic technical skills to be provided on a full time basis at Health Facilities. The tasks can be performed by a trained Handyman under the direct or distant supervision of an Artisan. **None of the services listed as Category 1 will be outsourced, unless specifically required**.

Generally, the types of tasks associated with Category 1 maintenance are:

Electrical Reticulation
Cleaning without being exposed to wires or switchgear, visual inspections, check if equipment is functional, replace bulbs.

Mechanical Equipment
Cleaning of plant rooms, filters and equipment, visual and audial inspections, check functioning of equipment, rust prevention, safety of equipment, check for leaks and general inspections.

Buildings and Infrastructure
Cleaning and painting, visual inspections, check function of fittings and features, rust prevention, check for leaks and other small repairs not requiring official training like replacing door handles, tightening of screws etc.

2.2. Category 2 – Formally Trained

Day-to-day, routine and emergency maintenance that require higher level technical skills. It requires higher levels of skills (formally trained), experience and frequently making use of specialised equipment. **Can be carried out through in-house personnel or outsourced service providers.**

Generally, the types of tasks associated with Category 2 maintenance are:

Electrical Reticulation
Checking of live installations with test equipment, replacing of switchgear, wiring cables, fittings and equipment and servicing of electrical equipment.

Mechanical Equipment
Service and repair of equipment, installation of new equipment, fault finding, filter, belt and consumable replacement, replacement of faulty parts and spares and enforcing H&S at facilities.

Buildings and Infrastructure
Repair larger cracks, implementation of wet works, repair of roads and fences, repairs to wet services, repairs to roads and fences, minor repairs and patching of floors, ceilings and other fixtures.

Medical Gas and LPG
Service and repair of medical gas and LP gas installations by SAQCC registered technicians.

Generators
Weekly checks and monthly full load test, checking of fuel and oil levels and supervision contractors performing annual services and repairs.

2.3. Category 3 – Qualified Artisan or Professional

Day-to-day, routine/preventative and emergency maintenance that requires Professional Engineers, Engineering Technicians and Artisan expertise and specialised equipment. **Can be carried out through in-house personnel or outsourced service providers.**

Generally, the types of tasks associated with Category 2 maintenance are:

Electrical Reticulation and Mechanical Equipment

Feasibility studies, design, specify and inspect new installations, extensions or modifications to existing systems and upgrading of existing installations, energy management and associated upgrades, compiling standards and technical memoranda, liaison with departmental representatives for ad-hoc & preventative maintenance projects and management of all contractual and quality issues with suppliers and contractors.

Buildings and Infrastructure

The preparation of specifications for work of a construction nature, management of outsourced work related to construction, oversee any changes to buildings where the form or function should change, liaison with departmental representatives when work is implemented and management of all contractual and quality issues with suppliers and contractors.

Medical Gas and LPG

The procurement and maintenance of plant and equipment for the provision of medical gas. Service and repair of medical gas and LP gas installations by SAQCC registered technicians

2.4. Classification Additional Information

Annexure 4 to this document provides an extensive list of maintenance tasks and associated Categories – this list can be referenced if one is uncertain as to the Maintenance Categories that should be associated with specific maintenance tasks.

Finally, it should be emphasized that there are numerous maintenance tasks that are the responsibility of the specific facility and that need to be carried out on a regular and ongoing basis – tasks such as the cleaning of windows, gardening, etc. These tasks are, however, not considered to be infrastructure maintenance, but nonetheless, must be carried out, because, ultimately, neglect could lead to infrastructural problems.

As per CIDB: Best Practice Guideline #A6, Applying the Registers to Construction Procurement, 2006, construction projects exceeding R200 000 in the public sector, have to be registered on the CIDB Register of Projects. The Directorate: Engineering and Technical Support is responsible for registering such projects. This register however, is only applied to construction works contracts having a value in excess of R30 000 including VAT.

3. Types of Maintenance

Within WCGH, only four types of maintenance are defined and used namely Emergency, Day-to-Day, Routine and Scheduled maintenance. It is however important to note however that not all Day-to-Day and Emergency maintenance is performed exclusively by Engineering and Technical Support. For the sake of clarifying the roles and responsibilities and to simplify this document, a fifth sub-type is defined in this document as Workshop based Day to Day / Emergency maintenance.

As a rule of thumb, the above categories of maintenance is associated to each type of maintenance.

It is important to note that the above types could range from Category 1 to Category 3 Maintenance Services, depending on the complexity of the work; similarly, depending on the scale of the work, in some instances, Category 1 Maintenance work could also be outsourced.

For instance, workshops that have a SAQCC registered gas technician could perform category 1 to 3 maintenance to the medical gas system. In contrast, a facility with no local support could require outsourced Day to Day maintenance of certain category 1 types of work like painting of a high area that requires scaffolding.

Different procedures and guidelines are prescribed for each maintenance type, and are outlined below.

3.1. Facility Based Maintenance

Facility based maintenance generally falls under the definition of day-to-day maintenance with the differentiation that it is typically funded by the facility requesting the work, performed by the facility itself or referred to the regional maintenance hubs.

Definition of Day to Day Maintenance:

> *Maintenance that takes place on an ad hoc basis including minor repairs, modifications or replacements.*

Examples of Workshop Maintenance work includes:

- Maintenance and upkeep of walls, ceiling, roof and the building envelope.
- Fault finding and repair of fixtures, fittings, equipment or furniture.
- Identifying and repairing leaks, blockages, drip or other plumbing problems.
- Cleaning, fault finding, repairing or replacing electrical equipment and reticulation.
- Inspection, maintenance and repairs to mechanical systems and equipment.
- Service and maintenance of medical or LPG gas systems.
- Testing and checking of standby systems (generators, UPS and water backup systems)

The above examples could range from Category 1 to Category 3 Maintenance Services and could be performed in-house by the facility, by the regional hubs or as outsources maintenance project funded by the facility.

Facility based maintenance can be broken up into three distinct scenarios:

3.1.1. Local Workshop Maintenance

Day-to-day Maintenance work implemented by the facility hub and/or by facility maintenance staff where technical expertise and funding is available at facility level without requiring external technical or financial assistance to complete the work.

The procedures and processes of the applicable facility hub should be followed. Typically these works are below the R30 000 threshold or are not construction related.

3.1.2. Mobile Workshop / Regional Hub Maintenance

Should it not be possible for Day-to-day Maintenance work to be carried out by the hospital workshop / facility - either because of a lack of funds or lack of capacity - assistance can be provided by the Mobile Workshop Hubs.

Currently there are 3 activated maintenance Hubs namely:

- Central Hub (Formerly Bellville Mobile Workshop)
- Metro East Hub (Formerly Lentegeur Workshop)
- Metro West Hub (Formerly Zwaanswyk Mobile Workshop)

Facilities that fall within the Metro sub-districts can refer to the maintenance portal at www.doheng.co.za to locate their designated maintenance hub.

Facilities that fall within the Rural districts currently submit requests to the Central maintenance hub.

This assistance from the mobile workshops is generally provided in the form of mobile teams that will provide the materials and perform the work on behalf of the facility. Assistance could also be offered in the form of the supply of spares or equipment or in the form of technical assistance to the facility. The maintenance hubs typically do not provide category 1 maintenance services as this should be undertaken by the facility hub.

If the Mobile Workshop is to carry out the work, the process to be followed is:


The work is initiated through a request as sent from the respective facility to the applicable hub.


The repair request is captured onto the maintenance management system, generating a job card.


Job cards are then distributed to the respective and appropriate workshops streams for execution.


The responsible Chief Artisan assigns staff to undertake the work.


Technical staff report to the facility to perform the work.


The jobcard is signed-off by the facility manager and closed on the system.

The workshops do not provide outsourced maintenance services and due to limited maintenance budgets at these facilities, can generally assist in works where the spares costs does not exceed R50 000.00.

Repairs or maintenance above this threshold must be referred to Day-to-Day maintenance at Engineering and Technical support for funding approval.

3.2. Day-to-Day Maintenance

The Day-to-Day maintenance fund generally conforms to the definition of day-to-day maintenance with the differentiation that it is funded exclusively from Program 8, is planned on a yearly basis instead of on an ad-hoc basis and is implemented by Engineering and Technical Support Services.

Definition of Day-to-Day Maintenance:

Maintenance that takes place on an ad hoc basis including minor repairs, modifications or replacements.

It is important to note that the same rules apply to facility funded day-to-day maintenance as would apply to Day-to-Day maintenance funded by Engineering and Technical Support.

Day to Day maintenance cannot be used for:

New Buildings or Prefabs

Additions to Existing Buildings

Major New Infrastructure

Preventative Maintenance

If a project is allocated funding under day-to-day professional projects, there are certain conditions and prescripts that need to be considered and adhered to:

- The project to which funding is allocated must be completed and claimed back (where applicable) in the financial year for which it was approved. Most funded projects are now implemented by Engineering in-house so only in exceptional cases will a facility be allowed to procure and claim back the expenditure.

- Where a facility is given permission to claim back an expenditure, the funding must be claimed back no more than 30 days after the final payment has been made.

Due to limitations in delegations, regulations and compliance requirements, the following thresholds apply:

If the work is construction related with a **cost below R30 000**, procurement and funding must be done by the facility (16A). Only in exception cases are projects below R30 000 funded by Directorate : Engineering and Technical Support.

If the work is construction related with a cost **between R30 000 and R200 000**, procurement must be done with technical assistance from Engineering and Technical Support or via an approved Regional Hub.

If the work is construction related with a cost **between R200 000 and R1m**, procurement must be done by Engineering and Technical Support.

If the work is construction related with a cost **greater than R1m** or where the work (any value) would constitute major changes to the form and function of a building, the Directorate: Infrastructure Planning must be contacted to consider options for implementation (Refer to Annexure 2 for contact details).

If the bid is for **delivery of spares only** (no installations or services) or for work which is not classified as infrastructure construction work, procurement must be done by the facility (up to R200k) or the district office (up to R500k).

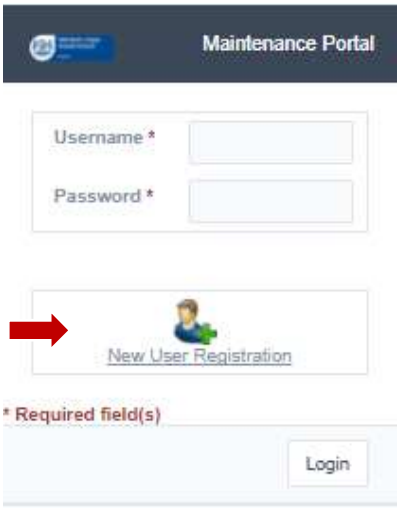
Please note: Most projects do require supervision and management of the day-to-day contract at a facility level to supplement site visits by the project managers. Where facilities have the capacity to assist with the implementation of monitoring of contract, assistance in this regard would be required.

3.2.1. Project Submission Process

1. The submission portal is activated on the www.doheng.co.za website at the end of October each year.
2. Facility representatives register themselves onto the system and start submitting their requests for day-to-day maintenance on the maintenance portal.
3. Project submissions close on the first working day of December each year.
4. Engineering compiles the lists and sends it to the districts for prioritization by mid-December.
5. The management of each district, in partnership with the chief directorates, then prioritizes the lists and removes projects it does not deem to be a priority or which can be attended to utilizing another method.
6. A compiled list is then sent to the DD Engineering and Technical services by mid-January and provisionally added to the list as the projects that will be undertaken in the coming financial year.
7. Once budget approval is finalized in January, each district's list is shortened according to the available budget provisioned and the priority of the works to be undertaken.
8. Any last amendments and changes are made to the list after consultation.
9. The list is finalized and implemented on 01 April yearly.

3.2.2. Maintenance Portal Registration

Any person with a @westerncape.gov.za e-mail address can register themselves onto the maintenance portal. To do this log onto www.doheng.co.za/D2D where you will be presented with a login screen as shown here.



Then click the New User Registration button

This will open up the new user registration window which will present a form with some basic information you will need to submit. When providing your name, please keep in-mind that this needs to match your name, as it appears on Outlook, and that this information will be used to identify you for all submissions.

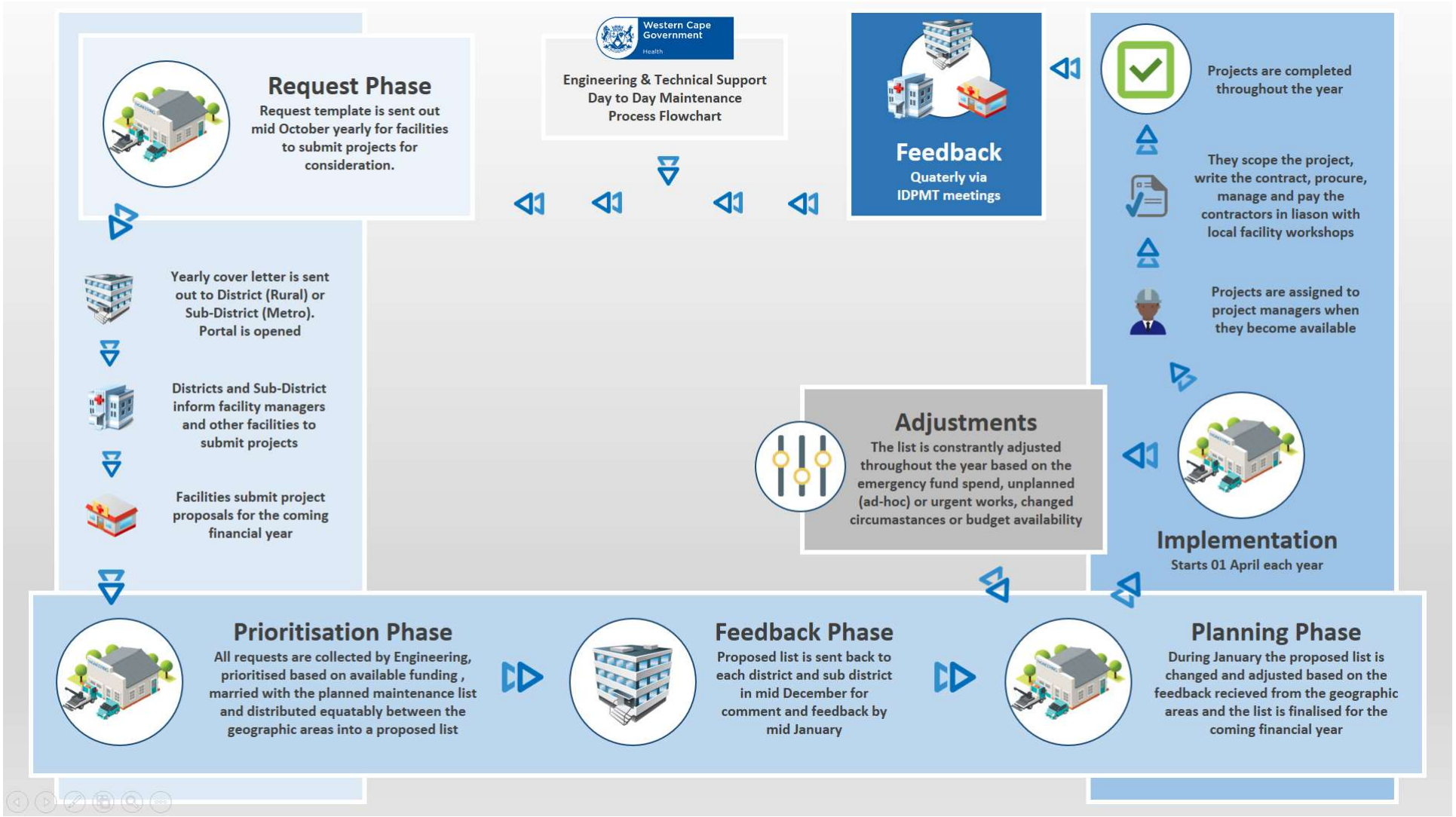
Submit your registration and you will then be directed back to the login page. Please insert your username and password and write it down somewhere safe for future reference.

When logged in, you can view all the distinct options and to submit your request please use the dropdown menu at the top labelled : Day to Day Submission and then select either submit, edit or view depending on what you need to do.

There is also a selection of live submission statistics available under the same menu.

Please contact Stephan Reichert if you require any assistance in this regard.

3.2.3. Project Submission Flowchart



3.3. Emergency Maintenance

Definition of Emergency Maintenance:

Repairs which are unforeseen and require urgent attention due to the presence of, or the imminent risk of, an extreme or emergency situation arising.

Emergencies are classified as such when they contain one or more of the following risk factors:

- Human injury or death
- Human suffering or deprivation of human rights
- Serious damage to property of financial loss
- Livestock or animal injury, suffering or death
- Serious environmental damage or degradation
- Interruption of essential services

All emergency work is measured against this definition before being considered for approval.
Some examples of emergency maintenance work may include among others:

Burst water main
Financial loss due to cost of wasted water and interruption of essential services.

Medical gas leaks
Financial loss due to cost of wasted gas and interruption of essential services.

Blocked sewerage lines
Interruption of essential services and deprivation of human rights.

Extended Service Failures
Interruptions due to extended power, water of other service failures.

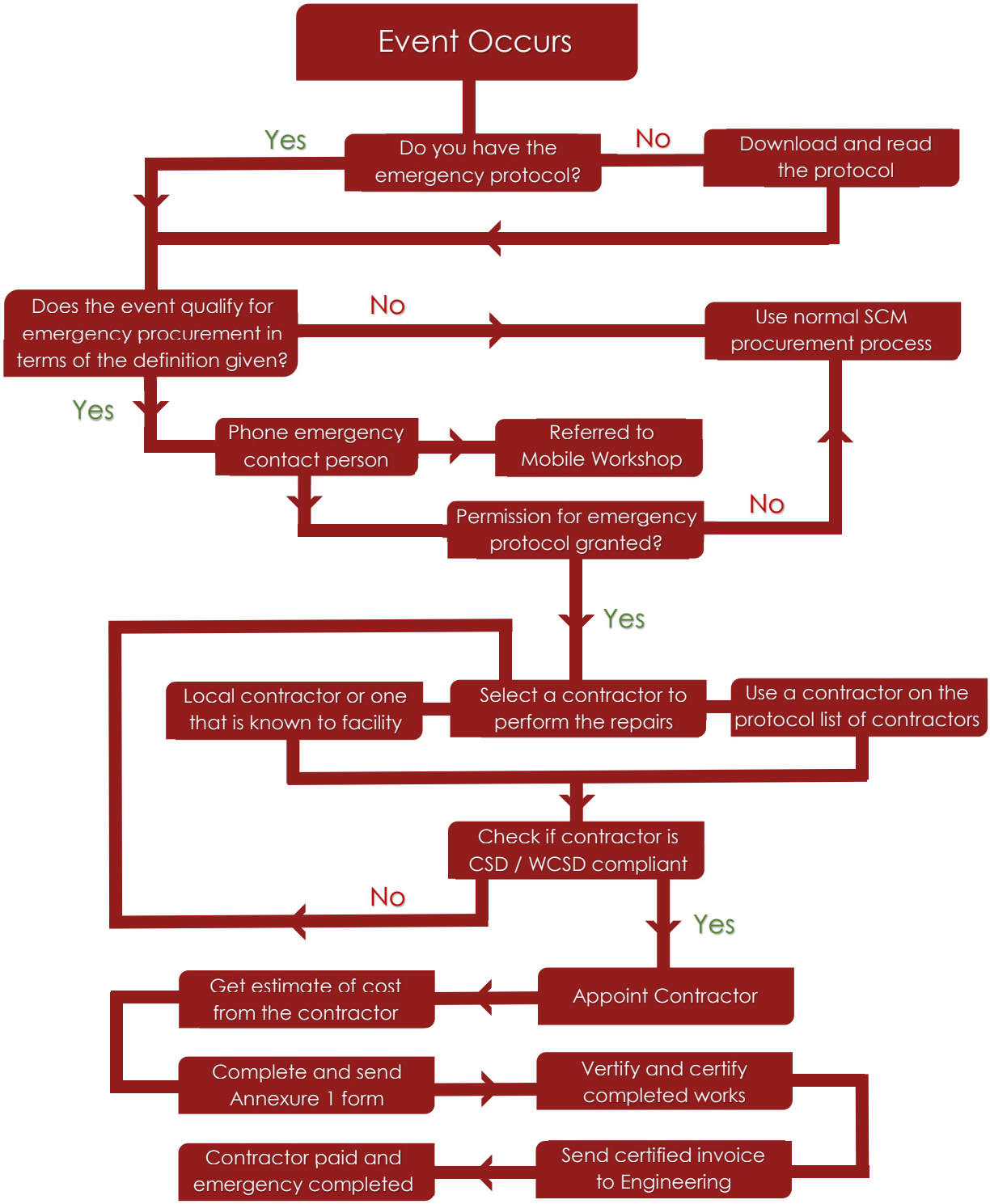
Storm damage to buildings
Where such damage may cause additional damage to the building or impacts the operation of the facility.

Damage though criminal activity
Where the damage still poses a security risk to the facility or the damage caused prevents essential services from being rendered.

Note: In accordance with the Western Cape Provincial Treasury Instructions: Chapter 16B – Clause 3.2 (c): "An institution may, in the case of emergency maintenance where immediate repairs are essential, proceed with effecting of repairs or measures to arrest further damage of losses provided that…Such repairs and measures can be effected within 48 hours." Authorization must be granted from a delegated official before such repairs are undertaken.

3.3.1. Emergency Flowchart

The flowchart provided, in conjunction with the written explanation on the next page, should be followed during an emergency event to ensure that all the required steps are taken and to ensure a compliant transaction.



3.3.2. Emergency Procedure Detailed Instructions

Event for potential Emergency Maintenance occurs.

The responsible person must contact the Directorate: Engineering and Technical Support (see Annexure 2 for contact persons who are available 24 hours) before any work is conducted.

The Directorate: Engineering & Technical Support emergency contact person identifies if the work is to be carried out as an Emergency according to the definition.

The Directorate: Engineering & Technical Support person will advise on whether the work is to be carried out in-house or outsourced.

If the work can be carried out **in-house**, the Directorate: Engineering & Technical Support person will advise on the appropriate personnel to be contacted.

If the work is to be carried out by an **outsourced contractor**, the facility may select any appropriate contractor known to the facility or which is located in close geographical proximity to the facility. The facility may also rotate contractors on the emergency contractor list (updated from time-to-time) or alternatively the facility may request that the emergency contact person advise on appropriate contractors known to Engineering and Technical Support Services.

In all cases, once the emergency work has been authorized by the Directorate: Engineering & Technical Support, this must be followed as soon as possible, by a written "Request for Emergency Maintenance" (Annexure 1). Details should include stating the cause and consequences of the emergency and how the incident relates to the definition of an emergency.

Institutions / responsible persons must check that the contractor is actively registered on the Western Cape Supplier Database (WCSD) and Central Supplier's Database (CSD) and relevant documentation must also be checked for validity. If the emergency occurs after hours and cannot be checked, the responsible persons / institutions must also inform the contractor that if their registration status is not compliant, they will be working on risk until it can be made compliant.

Institutions / responsible persons checks that the contractor completes the work as approved and certifies the contractor's invoice against the work done. The certified invoice is sent to Engineering for processing of payment to the contractor.

3.3.3. Forms of Emergency Assistance

Once emergency assistance is requested by a facility, the delegated emergency contact person will determine the most suitable method of performing the required works. The following options are available to conduct emergency maintenance:

Option 1

Engineering supplies or procures the spares and parts, work done by facility.

Option 2

Engineering supplies or procures the spares and mobile workshop performs the work.

Option 3

Work is outsourced to contractors who may supply labor and spares or just labor.

3.3.4. Outsourced Maintenance Conditions

Engineering and Technical support requests that facilities maintain a consistent communication to contractors performing outsourced maintenance works regarding some general rules applicable to all emergency works. These general rules are:

Contractors are bound to fair and market related pricing. Where Engineering believes the department is being overcharged for emergency maintenance work, we reserve the right to evaluate the pricing against obtained fair market pricing and insist on market pricing at time of invoicing.

Engineering only pays to a maximum markup of 15% on materials, spares and subcontracted services obtained by the emergency contractor. The contractor is required to supply original invoices for all materials, spares or subcontracted works. Markup shall be applied on the ex-VAT portion of the supplier's invoice if the contractor and his supplier is VAT registered.

The contractor is required to report to site daily on a sign-in sheet kept by the facility for emergency maintenance works during which the repair spans over multiple days. Any claims for labor or travel costs must be accompanied by the signed time-sheets.

Where the facility selects a contractor known to the facility, it is vital to inform the contractor of these conditions prior to work being undertaken to ensure all parties are aware and understand the terms of the emergency maintenance appointment.

3.4. Routine Maintenance

Routine Maintenance that is planned and managed by the Directorate: Engineering and Technical Support is funded out of Programme 8 (Routine Maintenance budget). Due to the conditional grant conditions, Routine maintenance is limited to newly completed facilities (i.e. facilities completed since 2007) or facilities where major refurbishment projects were recently completed.

Funding is authorized by the Chief Director: Infrastructure and Technical Management and carried out by contractors procured, appointed and managed by the Directorate: Engineering and Technical Support, office of the Chief Engineer.

Definition of Routine Maintenance:

Regular on-going maintenance that is necessary to keep infrastructure operating and to prevent premature failure, including repairs.

3.4.1. Routine Maintenance Procedure

- A project manager is assigned to the project and the office of the Chief Engineer compiles the bid and contract documentation. Engineering and Technical Support handles all procurement.
- Directorate: Engineering and Technical Support compiles the recommendation and issues the order or appointment to the contractor.
- Directorate: Engineering is responsible for contract management such as issuing site hand-over certificate, evaluating and approving invoices.
- The workshop staff are to supervise contractors e.g. inspection of works, signing-off of works orders, generate job cards, verification of work done etc.
- In accordance with the contract, the contractor may proceed with remedial work up to a value of R1000, at contracted rates, while performing inspections and services.
- Contractor should provide quotations for any work above R 1,000 (at billed rates) for approval by Directorate: Engineering before embarking on any remedial work.
- The project manager will validate the invoice and process payment via the Directorate: Engineering and Technical Support.

3.4.2. Routine Maintenance Project Requests

Facilities that are covered by Routine maintenance can also request additional maintenance work like for instance painting of the facility. Requests are handled as part of the yearly day to day maintenance project initiation phase.

If a facility, which qualifies, requests day-to-day maintenance, the project will be referred to the routine maintenance schedule for inclusion into the following financial year's budget and planning.

If the requests cannot be accommodated by Routine maintenance it will fall back to the Day to Day maintenance list.

3.5. Scheduled Maintenance

The scheduled maintenance program is managed by Directorate : Infrastructure planning and projects are planned on an annual basis.

Definition of Routine Maintenance:

Maintenance projects flowing out of condition assessments of life cycle planning and which are included in a list in the User Asset Management Plan (U-AMP).

Generally scheduled maintenance is intended to be used for projects which exceed R1m or which involve major maintenance work to a large section of a facility.

3.5.1. Scheduled Maintenance Procedure

The programme of projects is managed by the Directorate: Infrastructure Programme Delivery as the Programme Manager, while each project is managed by WCGTPW as WCGH's Implementing Agent. All projects are carried out in compliance with the Standard for a Construction Procurement System (as published by Provincial Treasury).

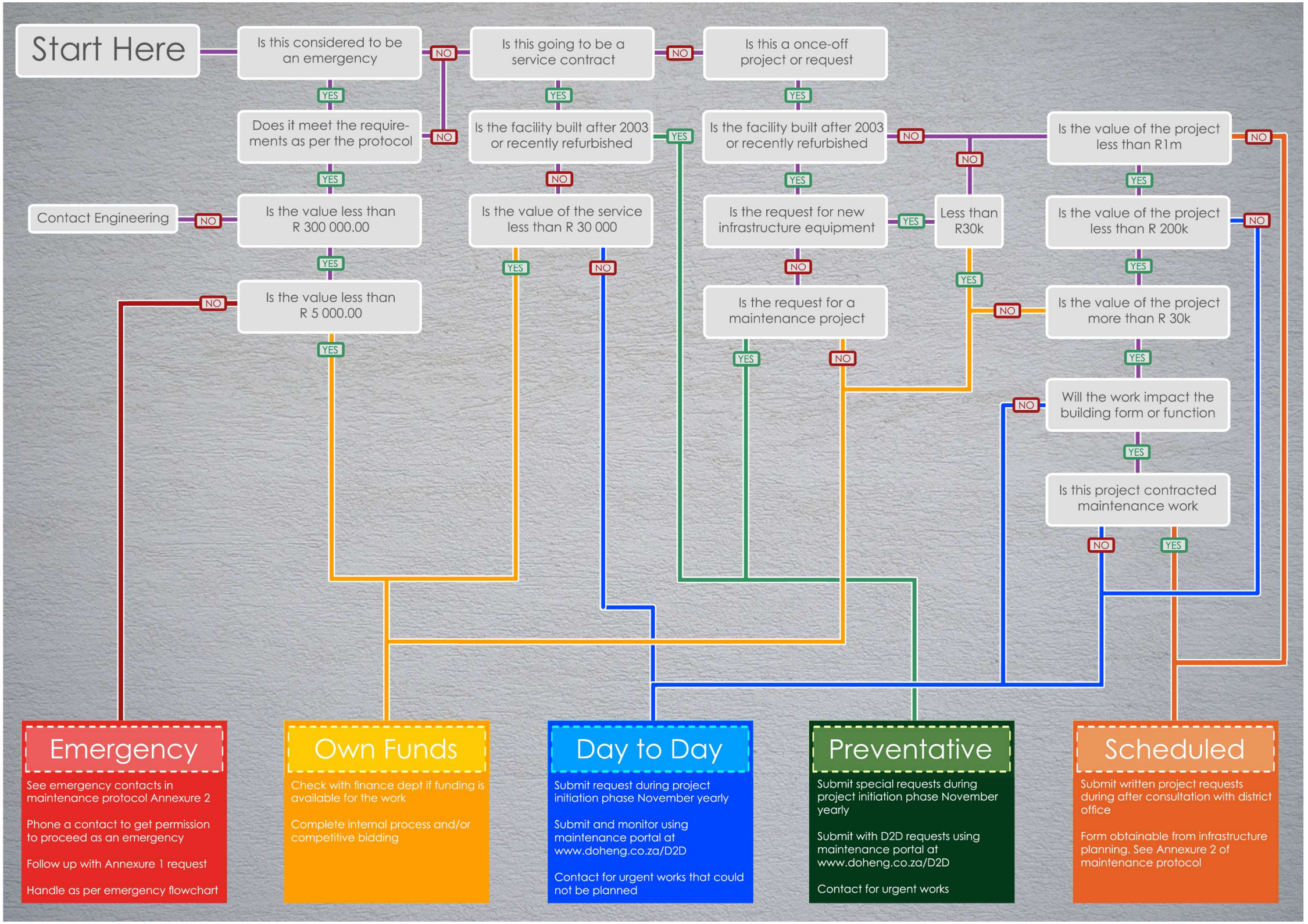
General Procedure :

- Western Cape Government: Transport & Public Works (WCGTPW) conducts Facility Condition Assessments of all WCGH facilities - this assists with the preparation of a prioritized Scheduled Maintenance project list.
- Consultation regarding this list takes place at the monthly Inter-Departmental Project Management Team (IDPMT) meetings.
- The list is compiled for a three year cycle (MTEF Period).

WCGTPW reports on project progress (both physical and financial) to the Directorate: Infrastructure Programme Delivery at the monthly Maintenance Project Review Meeting.

As Implementing Agent, WCGTPW is also responsible for procurement of Scheduled Maintenance projects. Currently, the majority of projects are being implemented under a Framework Agreement (FA) entered into between WCGTPW and various contractors and Professional Service Providers. Many projects are at this stage also being implemented by TUSK who is acting as an implementing agent for WCGTPW. WCGTPW as the implementing agent certifies all invoices and WCGH processes payments.

3.6. Maintenance Cheat Sheet



Directorate : Engineering and Technical Support

Cornel Badenhorst
Cell : 076 817 6156

Hein Grebe
Cell : 071 353 7226

Stephan Reichert
Cell : 071 353 7226

Annexure 1 – Request for Emergency Maintenance

(Electronic Version)

Date of Emergency	2000/01/01		**Facility :**	Click or tap here to enter text.
Time of Emergency	00:00		**Approved By :**	Click or tap here to enter text.
Authorised at Engineering by : (Select one)			**Designation :**	Click or tap here to enter text.
Cornel Badenhorst		☐	**Telephone :**	Click or tap here to enter text.
Hein Grebe		☐	**E-mail :**	Click or tap here to enter text.
Stephan Reichert		☐	**Fax :**	Click or tap here to enter text.

Motivation for request:

Click or tap here to enter text.

Action taken by facility:

Click or tap here to enter text.

Name of Contractor	Click or tap here to enter text.	**Tel :**	Click or tap here to enter text.

Declaration by facility :

I, Click or tap here to enter text. ,hereby declare that I have read and understand the definition of an emergency and declare that the event described above is a bona fide emergency. I declare that the information provided to Engineering is, to my knowledge, truthful and comprehensive. I understand and accept liability for any denied, fruitless or irregular payments, which may occur because of the misrepresentation of the facts on this form. I understand and have communicated to the contractor that a maximum 15% mark-up is acceptable and that costs and rates must be proven by the contractor in the form of an original supplier invoice at the time of billing.

_____

Signature

For Engineering Office Use :

Approved | Not Approved
Name :
Date :
Signature :

Comments :

_____

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_____

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Captured on Docs
Name :
Date :
REFERENCE NUMBER

Western Cape Government
Health

Directorate : Engineering and Technical Support

Cornel Badenhorst
Cell : 076 817 6156

Hein Grebe
Cell : 071 353 7226

Stephan Reichert
Cell : 071 353 7226

Annexure 1 - Request for Emergency Maintenance

(Print Version)

Date of Emergency		**Facility :**	
Time of Emergency		**Approved By :**	
Authorised at Engineering by : (Select one)		**Designation :**	
Cornel Badenhorst	☐	**Telephone :**	
Hein Grebe	☐	**E-mail :**	
Stephan Reichert	☐	**Fax :**	

Motivation for request:

Action taken by facility:

Name of Contractor		**Tel :**	

Declaration by facility :

I, _____, hereby declare that I have read and understand the definition of an emergency and declare that the event described above is a bona fide emergency. I declare that the information provided to Engineering is, to my knowledge, truthful and comprehensive. I understand and accept liability for any denied, fruitless or irregular payments, which may occur because of the misrepresentation of the facts on this form. I understand and have communicated to the contractor that a maximum 15% mark-up is acceptable and that costs and rates must be proven by the contractor in the form of an original supplier invoice at the time of billing.

_____
Signature

For Engineering Office Use :

Approved | Not Approved
Name :
Date :
Signature :

Comments :

_____
_____
_____
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Captured on Docs
Name :
Date :
REFERENCE NUMBER

Annexure 2 – Contact List

A. Emergency Maintenance Contact List

In cases of Emergency Maintenance contact the **Directorate: Engineering and Technical Support** personnel in the order as listed below:

	Designation:	Name:	Contact Number:
1.	Chief Engineer: Professional Support Services	Mr. Cornel Badenhorst	076 817 6156 | 021 918 1890
2.	Engineer: Professional Support Services	Mr. Hein Grebe	071 353 7226 | 021 918 1889
3.	Deputy Director: Engineering & Technical Support	Mr. Stephan Reichert	073 942 1786 | 021 918 1569

B. Mobile Workshops Contact List

	Facility	Name:	Contact Number:
1.	Provincial Workshop (Bellville Mobile Workshop)	Mr. Granville Willams	082 737 7074 | 021 830 3772
2.	Metro West (Zwaanswyk Mobile Workshop)	Mr. Brian Lesch	083 538 7260 | 021 715 5921
3.	Metro East (Lentegeur Mobile Workshop)	Mr. Ockert Buys	084 200 1290 | 021 370 1119

C. Day to Day, Routine and Emergency SCM and Process

	Role	Section	Name:	Contact Nr:
1.	Emergency Documentation	Admin Support	Me. Lucille Welgemoed	021 830 3786
2.	Routine IPS and SCM	SCM	Me. Bilquees Rodriques	021 830 3763
3.	Day to Day IPS	SCM	Me. Lorna Madaka	021 918 1567
4.	Day to Day IPS	SCM	Me. Wilma Schrikker	021 918 1661
5.	BAS Payments	SCM	Me. Maria Terblanche	021 918 1502
6.	BAS Payments & Claimbacks	SCM	Me. Danielle Martin	021 830 3769

D. Directorate: Infrastructure Planning Contact Details

Directorate: Infrastructure Planning (Chief Directorate: Facility and Infrastructure Management)	
Director: Milne Van Leeuwen	Chief Architect: Duncan Rendall
Email: Milne.VanLeeuwen@westerncape.gov.za	Email: Duncan.Rendall@westerncape.gov.za
Tel.: 021 483 5084	Tel.: 021 483 6769

Annexure 3 – Maintenance Work Categories

A Priority

Work necessary to:

- Correct or prevent a dangerous situation.
- Prevent a potentially unsafe situation.
- Repair or replace an essential installation has broken down.
- Repair or replace an essential installation that is about to break down.
- Comply with the Occupational Health and Safety Act.

B Priority

Work necessary to:

- Prevent costly deterioration / damage to a structure or installation.
- Prevent serious financial loss from continuing to operate inefficient machinery.
- Prevent a building from becoming a health risk.

C Priority

Work necessary to:

- Maintain buildings and structures in an acceptable condition.
- Maintain an environment conducive to good patient care.
- Maintain a pleasant working environment.
- Maintain the appearance of buildings and structures (image of the Department).

D Priority

Work than can be:

- Delayed until the next financial year.
- Deferred until funding becomes available.

Annexure 4 – Maintenance tasks listed per category

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
BUILDINGS				
Prepare maintenance and repair specifications				X
Attend to structural faults and major cracks	Recommend and specify corrective measures			X
Investigate major or re-occurring failures of pavements, sewer systems, storm water systems (civil works)	Recommend and specify corrective measures			X
Surface depression or irregularities (greater than 20 mm over a 3 m straight edge)	Remove paving (or surfacing) over affected area, remove and replace sub base with 3% cement to correct level, replace paving or new premix surface	X		
Treat all paved areas with environmentally friendly Herbicide. Herbicide should not affect any other organisms due to storm water wash-down	Spray all paved areas and curb with herbicide.	X		
Standing surface water	Squeegee or broom water off and initiate maintenance as for surface depression above	X		
Cracks or potholes forming in tarred surfaces	Fill cracks with crack filler or perform pothole repair	X	X	
Silt or sand on surface	Sweep affected area and removing silt and sand	X		
Road marking lines and letters visible	Clean road marking or repaint with road marking paint when worn	X	X	
Loose curbs or signs of movement (joint grout missing), or cracked/ chipped	Remove affected curbs, repair bedding and replace curbs.	X	X	
Missing curbs	Replace curbs	X	X	
STORM WATER SERVICES				
Curb and channels clean of sand, litter and refuse	Remove sand, litter and refuse. Remove from site	X		
Clean out catch pits	Remove sand, litter and refuse. Remove from site	X		
Pipes clean of sand and silt	Remove sand and silt by high pressure jetting			
Clean all grids	Remove refuse and litter. Remove from site	X		
Pipes clean of refuse	Remove refuse and litter. Remove from site		X	
Covers and frames are in place	Replace missing covers and frames, move into place or repair	X	X	
FENCING SERVICES (INCLUDES PERIMETER FENCES AND GATES)				
Investigate reoccurring breakdowns and provide advice				X
Compile and manage service contracts				X
Check for broken areas	Repair or log maintenance request	X	X	
One (1) meter cleared	Clear when required	X		

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
Check and clear areas around transformers and electrical switch gear and water meters and valves of vegetation	Clear when required	X		
Check operation of gates	Repair or log maintenance request	X	X	
Check gate motors, rack and pinion/opening device. Light beams and magnetic loops	Repair or log maintenance request		X	
Clean gate runners/tracks, lubricate bearings and rollers (including security gates inside building)	Clean gate runners, lubricate bearings and rollers (including security gates inside building	X	X	
Check all locks, slides and lubricate all hinges on swing gates (including all security gates inside building)	Check all locks, slides and lubricate all hinges on swing gates (including all security gates inside building)	X		
Check electric fence for functionality, continuity, condition of conductors and isolators and compliance with Occupational Health and Safety Act & Regulations	Repair or log maintenance request			X
EXTERIOR FACILITY BUILDINGS ASSETS SERVICES				
Compile Specifications for replacement, repair and maintenance of building Envelope				X
Roofing / Waterproofing on flat roofs, Check all laps Check turn ups. Paint with bituminous aluminum paint every 3 years If protected by stone every ten years. (turn-ups every 3 years)	Clean, repair, paint or log maintenance request	X	X	
Clean all flat roofs from debris, remove any weeds and clean full boars			X	
Roofing / Waterproofing on flat roofs	Repair or log maintenance request		X	
Check exterior walls for graffiti and condition of paint	If pealing or vandalized, sand surface, dust (wash and wait to dry, smooth all inconsistencies and re paint to match existing	X	X	
Clean all ledges	Sweep, remove debris			
Clean and inspect all external stairs, steel stairways, catwalks and safety rails.	Sweep, remove debris, repair and re-paint or apply cold galvanizing to repair.	X	X	
WINDOWS AND DOORS				

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
Check for broken windows panes and mechanisms	Repair or log maintenance request	X		
Clean slides and mechanisms	Wipe with damp cloth, lubricate to Original manufacturer's specification	X		
Check all window rubbers	Re-instate or replace if necessary	X		
Check and clean friction stays	Wipe with mild detergent cloth	X		
Clean frame including water outlets and drain holes	Brush, vacuum, rinse	X		
Check exterior doors for wear and tear, door locks and hinges	Repair or log maintenance request	X	X	
Inspect frame for chips, and signs of corrosion	Clean, sand and repaint to OM specification.	X	X	
Check all wooden doors and windows for wear and tear, swelling etc.	Plane to fit. Reseal with marine type wood sealer	X	X	
Inspect all coatings on doors and windows	Sand down, ensure that surface is dust free and re-seal/ paint to match original.	X	X	
Inspect for putty deterioration	Scrape out the putty and treat any corrosion by sanding back and priming with a zinc-rich primer, metal primer and finish coat. Leave the new putty for two weeks before painting. Ensure the paint covers 2mm of the window to create a seal.	X	X	
Check security doors locks and hinges	Lubricate locks with graphite, Lubricate hinges. Repair or log maintenance request	X	X	
Inspect building signage and signage lighting	Replace to match existing	X	X	
Check condition of facias	Sand down, ensure that surface is dust free and re-seal/ paint to match original*			
Check painting on facias, gutters and downpipes	Sand down, ensure that surface is dust free and re-seal / paint to match original*	X	X	
INTERIOR FACILITY BUILDINGS ASSETS				
Compile Specifications for replacement, repair and maintenance of building Envelope				X
Check flooring Check vinyl for cracks, bubbling, delamination and disintegration of self-leveling screed Tiles chipped, cracked or loose	Repair or log maintenance request	X		
Check wall finishes: Clean or re-paint Tiles chipped, cracked or loose	Repair or log maintenance request	X	X	
Check Bumper rails (secured, condition of surface finish, stainless steel protectors)	Repair or log maintenance request	X	X	
Check ceilings. Dirt marks	Clean dirt marks with mild detergent. Repair or log maintenance request	X		

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
Signs of leakage (water marks) replace and trace origin Check for sagging any signs of ceiling not being secured. Check that all cornices are secured				
Check internal doors, locks and hinges	Lubricate as per exterior. Repair or log maintenance request	X	X	
Check door and doorframe protection	Repair or log maintenance request	X	X	
Check build in furniture, cupboards, etc.	Fix hinges, locks and slides. Repair or log maintenance request	X		
Check room blinds, curtains rails and curtains	Repair or log maintenance request	X		
Check bed curtain rails and curtains	Repair or log maintenance request	X		
Inspect Paper towel dispensers, towel rails, toilet role dispensers and mirrors for: Cracks, mechanical damage, are thy properly secured.	Repair, tighten fasteners. Log maintenance request if replacement is needed.	X	X	
PLUMBING				
Design and size water and sewer reticulation system.	Compile Specifications for replacement, repair and maintenance of building Envelope			X
Investigate reoccurring breakdowns, reticulation problems and advise				X
Address failures and non-compliance with suppliers and contractors				X
Compile Specifications for replacement, repair and maintenance of sewer systems and pumps				X
Interpretation of water analyses and recommend/implement corrective actions				X
Check level of tanks	Record levels	X		
Check pumps and pressures	Check operation and record pressures. Repair if required	X	X	
Log water meter reading	Record water reading in checklist	X		
Log pressure gauge reading	Record reading in checklist	X		
Check for leaks	Repair leak or log maintenance request	X	X	
Clean out strainers	Shutoff water supply and clean out dirt and re-instate		X	
All float valves in working order	Repair or log maintenance request	X	X	
Main shutoff valve Check operation Does valve shut off completely	Lubricate spindle Repair/replace if required	X	X	

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
Replace tap washers		X		
All stained equipment cleaned	Clean with cloth and decalcifying liquid	X		
Fire hydrants, connections clean and gaskets in place	Clean fit gasket if necessary. Full service by others	X		
Water chemical and biological analyzed and results submitted	Take water sample in clean bottle, seal and mark and send to lab for testing log report	X		
Water tanks cleaned and in working order	Drain tanks, clean, rinse and fill		X	
Repairs to pipes and fittings and paint equipment	Repair leaks or Repair		X	
DRAINAGE				
Design and size water and sewer reticulation system.	Compile Specifications for replacement, repair and maintenance of building Envelope			X
Investigate reoccurring breakdowns, reticulation problems and advise				X
Address failures and non-compliance with suppliers and contractors				X
Check for blockages	Open with plunger drain rods	X	X	
Clean grease traps	Clean traps with degreasing liquid	X	X	
Check that manhole covers and frames are in place	Replace missing covers or fixed moved covers	X		
Check manhole benching	Fix with epoxy	X	X	
Check rodding eye covers	Replace missing or broken cleaning eye covers	X		
SANITARY WARE				
WC seats and covers in place and not broken	Replace broken seats, tightens lose seats	X	X	
Cistern flushing mechanism working	Repair	X	X	
Inspect wash hand basins for damage, chips and cracks	If damaged replace	X	X	
Check taps for leaks or insufficient flow	Replace washers or mixer cartage Clean and descale when flow obstructed.	X	X	
Check drains for blockages and not leaking	Open with plunger. Tighten fitting or repair	X	X	
Showers heads on and working	Clean and descale when flow obstructed. Repair, replace	X		
Taps not leaking	Replace washers on leaking taps	X		
Check internal water reticulation for leaks	Thread tape, replace gasket/rubber, tighten fitting	X	X	
Inspect lagging on hot water reticulation system	Secure loose lagging. Install Thermaflex where lagging on bare pipes	X	X	
Check shutoff valves	Repair	X	X	
Check all drains for blockages and leaks	Unblock, report repair and cause	X	X	
Flush master functional and adequate pressure	Repair, replace		X	
RAIN WATER DRAINAGE				

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
Compile maintenance and repair specifications & Manage contract				X
Investigate major or re-occurring failures of sewer systems, storm water systems (civil works	Recommend and specify corrective measures			X
Design, compile and specify new or replacement systems + manage project				X
Address failures and non-compliance with suppliers and contractors				X
Gutter brackets in place, gutters aligned and cleaned	Repair, replace	X	X	
Down pipes in place and secured	Repair, replace	X	X	
Gratings in place	Repair, replace	X	X	
Flat and concrete roofs clean, remove debris, DON'T CLEAN WITH HIGH PRESSURE HOSE	Repair, replace	X		
Paint all "torch on" water proofing with bituminous paint to manufacturer's recommendations see monthly inspection	Repair, replace		X	
ELECTRICAL PLANT AND EQUIPMENT				
SUBSTATIONS: HT- SWITCHGEAR				
HT- Switchgear – perform as per supplies requirements	Check oil levels, top up if necessary		X	X
	Check for leaks, if gasket nip bolts, if stripping is required then follow repair procedure		X	X
	Check earthing		X	
	Check operation: • Interlocks • Spring Charge • Relays' Operation • Fuses		X	
	Lubricate moving parts (note that parts NOT to be lubricated as per suppliers maintenance instructions)		X	
	Measure wear on interrupters		X	
	Record number of operations		X	
	Inspect for mechanical damage, cracks and signs of overheating.		X	
	Perform high voltage test across interrupter			X
	Replace existing Switch gear (investigate, design specify, manage project)			X
	Specification for servicing			X
	Interpret test results			X
Power Transformer and Mini-Subs	Record load		X	
	Record LV Voltage (advise on tap changes if required)		X	
	Check CT's ratio and functioning		X	

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	Record meter readings		X	
	Check oil levels, top up if necessary		X	
	Check all meters and metering devices e.g. Ammeters, Volt		X	
	Measurement of neutral unbalanced current which shall not exceed 2% of the full load rated current of the transformer		X	
	Check for leaks, if gasket nip bolts. Cork-nitrile is the preferred gasket material alternatively Cork-Neoprene may be used.		X	
	Check exterior for corrosion, coating deterioration, peeling paint. Clean affected area with wire brush treat with rust converter and paint to manufacturers specification	X		
	Clean and vacuum cabinets		X	
	Oil hinges and locks with moisture displacing penetrating oil	X		
	Check earthing visually		X	
	Earthing resistance check (5 ohms max)		X	
	Check/torque cable and bus bar connections		X	
	Check the porcelain for any cracks, broken parts or dirt. Check for the oil level and for any Oil leakage.		X	
	Check silica-gel, replace when required. Check for clogging due to dust		X	
	Inspect safety devices:			X
	• Buchholz relay operation			X
	• Sudden pressure relief device			X
	• Pressure surge relay (where installed)			X
	• Relay interlocks		X	
	Thermometer and alarm. Thermometer to be removed and accuracy checked every 3 years.			X
	Infra-red scan of transformer and connections (report)		X	
	Perform a dissolved gas analysis (D.G.A.) (report) inclusive of insulation test			
	Clean and inspect bushing and isolators		X	
	Remove and examine oil level indicator gauge if fitted		X	
	Double test installation, alternatively Megger and check power factor on transformer.			X
	Insulation resistance test from LV to earth, HT to earth and HV to LV			X
	Replace existing Switch gear (investigate, design specify, manage project)			X
	Check efficiency and specify and manage remedial action eg power factor correction.			X
	Compile Specification for servicing			X
	Interpret test results			X
Switch gear related to transformer and Mini-Sub: Isolators	Clean and vacuum the switch and its compartment.		X	
	Inspect for any physical damage, tracking, broken insulators, etc...		X	
	Check tightness of all electrical connections		X	
	Check that mechanical operation of switch is in good condition		X	
Switch gear related to transformer and Mini-Sub: Circuit Breakers	An initial check of the breaker should be made in the TEST position prior to withdrawing it from to enclosure Clean and vacuum the switch and its compartment.		X	
	Inspect breaker for signs of tracking and general mechanical condition.		X	

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	Inspect contacts for burning and pitting and clean and burnish, if necessary.		X	
	Manually close and check contact pressure, alignment and sequence.			X
	Inspect wiring connections for tightness.		X	
	Lubricate latch switches and mechanism as necessary.		X	
	Measure contact resistance in micro-ohms.			X
	Perform an insulation resistance test.			X
	Infra-red inspection of installation			X
ELECTRICAL RETICULATION SYSTEM				
Maintenance schedule for general Electrical Installations: Distribution Boards	Investigate reoccurring faults and recommend remedial actions			X
	Investigate and recommend remedial actions on more complex matters e.g. Harmonics, phase balancing, power factor correction			X
	Evaluate capacities of existing and advise			X
	Vacuum Board	X	X	
	Are all circuit breakers labeled	X		
	Are all cover plates in place and all screws in place	X		
	Is circuit diagrammed in place and up to date		X	
	Check wires for discoloration/overheating. Tighten loose connections		X	
	Test function of all safety devices.		X	
	Inspection of all breaker, overloads, contactors, relays for signs of tracking and general mechanical condition		X	
	Test Earth leakage and measure trip current		X	
	Check Earthing		X	
	Earth loop impedance test		X	
	Infra-red inspection of installation		X	
Maintenance Schedule for general Electrical Installations: General: Inspect and Report	Set standards (standard specifications and technical memoranda)			X
	Evaluate equipment, fittings and technologies			X
	Energy management of system			X
	Are socket outlets functional	X	X	
	Validated that only medical equipment are plugged into emergency power supply sockets	X		
	Are all switches and isolators functional	X	X	
	Light fittings and Lamps inspect and replace when required	X	X	
	Site and security lighting	X	X	
Maintenance Schedule for general Electrical Installations: General: Fix and Replace Faulty	Faulty socket outlets	X	X	
	Faulty switches and isolators	X	X	
	Light fittings and Lamps (with lamp with same color rendering and Lux)		X	
Maintenance Schedule for general Electrical Installations: Emergency Lighting	Inspect for structural defects and deposits.	X	X	
	Clean off corrosion deposits and apply silicone grease to terminals	X		
	Push test button and observe light operation. (See manufacturer's instructions.) Replace faulty lamp. (Clean diffusers on inside when replacing lamps)	X		
	Check vent holes.	X		
	Clean exterior with dry cloth.	X		
	Disconnect power to check operation. The battery should maintain the light output for 1.5 hours.	X		

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	Record battery cell voltage. Replace cells below manufacturer's recommended low level. (Replacement batteries to be Nickle Cadmium batteries)	X		
UNINTERRUPTED POWER SUPPLIES				
UPS Maintenance	Investigate reoccurring faults and recommend remedial actions			X
	Determine capacities of new and replacement units			X
	Evaluate new technologies			X
	Set norms and standards for maintenance			X
	Interpret test results and make recommendation			X
	Check all lamps on mimic bus and alarm status indicators.	X		
	Compile Specification for servicing			X
	Check input, output, and bypass voltages and currents and all other system status readings terminals.		X	
	Check capacity (connected load versus capacity) during normal operation		X	
	Check cooling fans for operation and noise		X	
	Check display for alarms and rectify		X	
	Perform visual checks and operational tests of all UPS equipment and associated switchgear.		X	
	Complete a functional checkout and test of the UPS diagnostic systems.		X	
	Check environment, temperature, dust, moisture, room vents, etc.	X	X	
	Clean and tighten all power connections at the input and output terminals, at all circuit breakers, and at the terminal posts and fuses on the rectifier and inverter legs		X	
	Check all power cabling for abrasions and burn spots	X	X	
	Visually check components for signs of overheating, swelling, leaking, etc. Visually check printed circuit board alignments		X	
	Replace air filters at regular intervals. Site conditions will determine how often the filters should be replaced.		X	
	Check and calibrate each system, to include switchgear and circuit breakers, meters, and alarm levels for frequency, voltage, current, transfer, trip, alarm,		X	
	Perform system and component functional tests on all UPS equipment to insure proper functioning within supplier's specified parameters.		X	
	Run all UPS system diagnostics, and correct all diagnosed problems.		X	
	Replace control batteries at least every 2 years. If the control batteries have been used without inverter or bypass AC power, they may need replacement sooner.		X	
	Open all doors, drawers, and covers. Perform a thorough inspection of all cabinets for foreign objects. Perform a thorough dusting and vacuuming of all cabinet interiors. Use only rubber or plastic vacuum attachments to clean drawers and cabinets. Except for vacuuming, never attempt to clean the UPS subassemblies. Accumulated dust or grime should only be cleaned by the manufacturer's service representative.		X	
	In service test the UPS system to ensure that the system is completely functional. *This shall be carried out with full*		X	

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	knowledge and written approval of the Hospital Representative.			
UPS Battery Maintenance	Validate that cells/batteries are alternated.		X	
	Implement current capacity test - Do not over test. Frequent testing will shorten the service life. Within the 2 Years of installation and every 5 years thereafter.		X	
	Check and record the overall float voltage at the battery terminals (not at the rectifier charger)		X	
	Measure the pilot cells' voltages		X	
	Make a visual cell and rack check as to general appearance, cleanliness, cracks in cells, electrolyte leakage, or evidence of corrosion.	X		
	Check Pilot cell/batteries electrolyte levels and add water	X	X	
	Check Pilot cell/batteries electrolyte levels and add water	X	X	
	Check and record specific gravity of flooded Pilot lead-acid cells/batteries adjust if required		X	
	Clean terminals and coat with corrosion protective coating	X	X	
	Check ALL electrolyte levels and add water	X	X	
	Check and record specific gravity of ALL flooded lead-acid cells/batteries adjust if required		X	
	Check ALL cells/batteries' voltage		X	
	Check rectifier		X	
	Check rectifier charger output current and voltage		X	
	Check ambient temperature and condition of ventilating equipment	X	X	
	Check for evidence of voltage leaks to ground		X	
	Check total battery voltage		X	
	Provide an equalizing charge if cells are unbalanced		X	
Earthing and Lighting Protection.	Visual inspection, verify that all elements (straps, conductors, terminations, fasteners etc.) are in place.	X	X	
	Resistance check of facility grounds (25 ohm max for single electrode system)		X	
	Check continuity of Q-bars in theatre to ground		X	
	Effectiveness of grounding system by voltage and impedance measurements		X	
	Review the lightning protection system on each facility at least annually or after repair actions have been completed.		X	
MECHANICAL PLANT AND EQUIPMENT				
Compressors	Drive motor bearings to be lubricated.		X	
	Drive motor brushes and slip rings to be checked (where applicable). Slip rings to be blown out to remove carbon dust.	X	X	
	V-belts to be checked for correct tension and alignment, and replaced if necessary, and drive pulleys to be tightened, if necessary (where applicable)		X	
	Flexible drive coupling alignment to be checked and rectified, if necessary.		X	
	Oil level to be checked and topped up, if necessary.	X	X	
	Sight glasses to be checked for correct liquid charge and moisture in system. Refrigerant to be added to system, if necessary, after locating and rectifying leaks	X	X	
	Refrigerant circuits to be checked for leaks and repaired if necessary	X	X	
	Unloading mechanism to be checked for correct operation	X	X	

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	Crankcase heater operation to be checked.	X	X	
	Refrigerant system suction, discharge and oil pressures, to be checked and recorded while compressors are operating	X	X	
	High and low pressure cut-out and oil pressure switch operation and set points to be checked and reset, if necessary (Refer manufacturer's manual for correct settings)		X	
	Check and tighten all terminals in terminal box (quarterly) if necessary		X	
	Examine for unusual knock, noises and vibrations and report thereon	X	X	
	Check shaft seal for oil leaks and monitor.	X	X	
	Check anti-vibration mounts (where applicable)	X	X	
	Observe bearing temperatures		X	
	Oil viscosity and cleanliness to be checked and recorded and changed only when the system lost gas or water entered the system.		X	
	Carry our examinations, test and complete records as required in accordance with Manufacturers Specification		X	
Pumps	Check if pump is operating satisfactorily	X	X	
	Check for leakages and rectify as required	X	X	
	Record operating pressures & compare with as design & commissioning data	X	X	
	Measure and record motor temperature & report increase in temperature	X	X	
	Listen for and note any abnormal noise, such as rubbing, cavitation and loose solids	X	X	
	Measure and record motor amperage. Compare with nameplate rating		X	
	Inspect drain pipe of drip tray and clean if necessary	X	X	
	Bearings to be lubricated check pump bearings for oil level and adjust, as necessary		X	
	Gland packing to be checked for excessive leakage and adjust, as necessary	X	X	
	Mechanical seal type pumps to be checked for leaks on shaft & report for action	X	X	
	Flexible drive coupling alignment rubbers to be checked and rectified, if necessary	X	X	
	Holding down bolts to be checked and corrosion removed and painted, if necessary	X	X	
	Water valves on open condenser water circuits to be fully opened and closed, to prevent lime scale formation from inhibiting valve action	X	X	
	Clean strainer		X	
	All ferrous metal components to be examined, corrosion, algae and lime scale to be removed and repainted to prevent further corrosion	X	X	
Motors	Review manufacturer's instructions on installation of a new motor		X	
	Check ventilation ports for soil accumulation, clean if necessary	X	X	
	Clean exterior of motor surfaces	X	X	
	Lubricate bearings when required. Report any noise & vibrations	X	X	

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	Check motor windings for accumulation of dirt & dust. Blow out with air if required.		X	
	Check hold down bolts and grounding straps for tightness.	X	X	
Cooling Towers	Equipment to be electrically isolated, and lock circuits for annual service		X	
	Sump to be isolated, drained, cleaned and refilled every 6 months		X	
	Ball valve to be checked for correct operation and water level	X	X	
	Suction strainers to be cleaned		X	
	Spray nozzles to be cleaned and set correctly - replace any if required			X
	Tower casing to be washed down	X		
	Casing, pipe work, water level of sumps to be examined for water leaks and report for action	X	X	
	Evidence of corrosion to be rectified with rust converter and NS4 & top layer	X	X	
	Check fan inlet screens	X	X	
	Check fan blades and remove dirt accumulation		X	
	Wash down and remove algae and lime scale formations on the top of the eliminator support frame including air intake screens	X	X	
	V- belts to be checked for correct tension and alignment and replaced, if necessary		X	
	Check condition of drive couplings and pulleys		X	
	Bearings to be checked for noise and vibrations. Report for action	X	X	
	Check lubrication and operation of air volume control damper	X	X	
	Circulating and spray header pumps to be checked for leaks and undue noise & reported for action	X	X	
	Circulating pump (closed circuit coolers) to be checked for water flow, noise or vibration & reported for action	X	X	
	Check pipe work for corrosion or leaks, report for action	X	X	
	Check control and isolating valves		X	
	Dosing equipment to be checked by water treatment specialist.			X
	Check all fan guards – clean and re coat as required	X	X	
	Check gas tubes for scale build-up. Remove scale chemically / manually	X	X	
	Check fan and pump motor mountings & report any abnormalities for action		X	
Evaporative Coolers	Sump to be isolated, drained, cleaned, flushed and refilled		X	
	Ball valve to be checked for correct operation and water level	X	X	
	Suction strainers to be cleaned		X	
	Spray nozzles to be cleaned and set correctly		X	
	Casing to be examined for water leaks and evidence of corrosion which is to be rectified with bitumen based alkaline paint	X	X	
	Casing to be examined for water leaks and repaired, if necessary (Fiberglass type)	X	X	
	Wash down and remove algae and lime scale formations	X	X	
	Check lubrication and operation of air volume control dampers		X	

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	Check evaporative cooler for undue noise, vibration and leaks	X	X	
	Check piping for leaks and repair, if necessary	X	X	
	Check circulating and spray header pumps	X	X	
	Check controls		X	
	All ferrous metal components to be examined, corrosion removed and repainted to prevent further corrosion, internally and externally with bitumen based alkaline paint, including eliminators	X	X	
	Strainer material to be replaced, if necessary		X	
	Clean & disinfect strainer and unit	X	X	
	Check water quality to be at least a chlorination of 5 ppm of free residual chlorine and ph between 7 & 8		X	
	Empty unit & thoroughly clean the internal surfaces with detergent & pressurized water. Proceed with exhaustive rinse, empty again and fill with water		X	
	Valve stems to be lubricated		X	
Chilled Water Handling Units	Schedule shutdowns with operating personnel, as needed		X	
	Inspect flexible connections and ductwork for damage and leaks	X	X	
	Test secureness of guards, doors and panels		X	
	Inspect all structural elements for corrosion and damage & report for action	X	X	
	Inspect for vibrations and unusual noises & report for action	X	X	
	Inspect all major stop valves and report condition		X	
	Check fan blades for dust build-up and clean if necessary		X	
	Check fan blades and moving parts for excessive wear		X	
	Check bearing collar set screws on fan shaft to make sure they are tight		X	
	Check dampers for dirt accumulations. Check felt, repair or replace as required		X	
	Check damper motors and linkage for proper operation. Adjust linkage on vanes if out of alignment		X	
	Lubricate mechanical connections of dampers-sparingly		X	
	Clean coils by blowing out with air & washing		X	
	Check coils for leaking & report for action		X	
	Use fin comb to straighten coil fins	X	X	
	Flush and clean condensate pans and drains	X	X	
	Check belts for wear, adjust tension or alignment, and replace belts when necessary. Multi-belt drives should be replaced with matched sets		X	
	Check flexible couplings for alignment and wear		X	
	Check freeze-stat for proper operation.		X	
	Vacuum interior of unit.	X	X	
	Check canvass collars for leaks & & report for action	X	X	
	Check all filters & clean/replace		X	
	Check drains & report for action	X	X	
	Check operation of controls and valves		X	
	Check pressure gauges and thermometers & report for action	X	X	
	Check operation of all pressure switches for fire stats – electrical interlocks		X	
Electric Duct Heaters	Inspect for damage to elements		X	
	Inspect isolators for damage or cracks		X	
	Remove dust and debris where accessible from elements.	X	X	
	Verify operation of control & overheat stat		X	

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	Check operation		X	
Fire Dampers	Release fire damper manually. Check operation and reset		X	
	Clean all damper linkages		X	
Air Outlets and Dampers	Clean all surfaces, including ceilings adjacent to air terminals inclusive of the actual terminal	X	X	
	Check air flow and adjust settings if required, especially in isolation rooms, theatres, ICU			X
Chilled Water Fan Coil Units	Remove and wash R/A ceiling grille filters (replace where necessary)	X	X	
	Examine fan impeller(s) and motor if accessible		X	
	Check for undue noises & report for action	X	X	
	Check operation of thermostat, fan speed selector and heater elements		X	
	Check operation of chilled water control valve		X	
	Check for water leaks	X	X	
	Check for air leaks on flexible ductwork (where applicable)	X	X	
	Check drain pan and unblock if necessary	X	X	
	Check condition of finned coil and pressure clean as required		X	
	Check condition of all ferrous metal components. De-rust and repaint to prevent further corrosion, as required	X	X	
	Check condition of chilled water pipe insulation at unit and reinstate as required	X	X	
	Check condition of condensate trays. Remove corrosion and scale. Treat with rust converter & NS4	X	X	
Induction Units	Clean and wash permanent filters	X	X	
	Replace disposable filters when necessary		X	
	Drain and clean condensate pan	X	X	
	Clean coils by vacuuming or washing	X	X	
	Use fin comb to straighten coil fins when necessary	X	X	
	Clean interior unit surfaces to remove dirt	X	X	
Package Air Conditioning Units – Water Cooled	Isolate and remove all inspection panels, and clean inside of units and rectify any damaged insulation	X	X	
	Air filters - Check pressure drop and report	X	X	
	Washable filters to be removed, cleaned, dried and replaced	X	X	
	Disposable media type to be fitted with new media, if necessary		X	
	Air filter frames to be checked for air by-pass and rectified, if necessary		X	
	Evaporator coils to be cleaned and washed		X	
	V-belts to be checked for correct tension and alignment, report for action		X	
	Drive pulleys on fans and motors to be tightened if necessary		X	
	Check bearings for vibrations & noise and report for action	X	X	
	Fresh air and return air damper settings and operation to be checked and adjusted, if necessary		X	
	Switchboards and electrical control panels to be cleaned inside		X	
	Check indicating lights & report for action	X	X	
	Circuit breakers and fuses to be checked and investigate reasons for any blown fuses or circuit		X	X
	Rectify faults and replace blown fuses and faulty circuit breakers		X	X

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	Starters, Contactors and Relays to be checked to ensure moving bridges slide freely and that all contact points are clean		X	
	Investigate and rectify cause of excessive burning of contacts		X	X
	Time switch settings to be checked and reset to start and stop plant at correct time, if necessary		X	X
	Control thermostats operation to be checked and recalibrate, if necessary		X	
	Safety controls to be checked and operation of controls to be tested, i.e. air flow switch, air pressure switch, smoke detectors, heater safety stats		X	
	Compressor oil level to be checked and report for action if oil level low	X	X	
	Sight glasses to be checked for correct liquid charge and moisture. Report for action	X	X	
	Compressors unloading mechanism to be checked, if applicable		X	
	Compressor crankcase heater operation to be checked		X	
	Refrigerant system suction, discharge and oil pressures to be checked and recorded while compressors are operating		X	
	High and low pressures cut out and oil pressure switch operation and set points to be checked and reset if necessary (Refer manufacturer's manual for correct settings)		X	
	Lubricate damper linkages, check operation and record damper operating parameters (where applicable)		X	
	All ferrous metal components to be examined, corrosion treated removed and repainted to prevent further corrosion	X	X	
	Evaporator coils to be cleaned with high-pressure air	X	X	
	Condenser coils to be blown out from inside out with high pressure air	X	X	
	Control and safety devices to be checked		X	
	Panel joint seals to be checked		X	
	Operation of entire plant to be checked and recorded		X	
Package Air Conditioning Units – Air Cooled.	Isolate and remove all inspection panels, and clean inside of units and rectify any damaged insulation		X	
	Air filters - Check & clean or replace		X	
	Washable type to be removed, cleaned, dried, replaced & recorded	X	X	
	Disposable media type to be fitted with new media, if necessary & recorded		X	
	Air filter frames to be checked for air by-pass and rectified, if necessary & noted		X	X
	Evaporator coils to be cleaned and washed	X	X	
	Condenser coils to be cleaned and washed	X	X	
	V-belts to be checked for correct tension and alignment and & report for action		X	
	Axial flow fans to be checked for correct operation and undue noise & report for action	X	X	
	Drive pulleys on fans and motors to be tightened if necessary		X	
	Check bearings for vibrations and noise & report for action	X	X	

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	Fresh air and return air damper settings and operation to be checked and adjusted, if necessary		X	X
	Switchboards and electrical control panels to be cleaned inside		X	
	Check and tighten terminals and replace indicating light globes where necessary		X	
	Circuit breakers and fuses to be checked and investigate reasons for any blown fuses or circuit		X	X
	Rectify faults and replace blown fuses and faulty circuit breakers		X	
	Starters, Contactors and Relays to be checked to ensure moving bridges slide freely and that all contact points are clean		X	
	Investigate and rectify cause of excessive burning of contacts		X	X
	Time switch settings to be checked and reset to start and stop plant at correct time, if necessary		X	
	Condensate drip pans to be cleaned, check water flow and remove any blockages from drain piping	X	X	
	Flexible connections to be checked for air leaks & report for action	X	X	
	Heater batteries to be tested and faulty elements to be replaced		X	
	Control thermostats operation to be checked and recalibrate, if necessary		X	
	Safety controls to be checked and operation of controls to be tested, i.e. air flow switch, air pressure switch, smoke detectors, heater safety stats		X	
	Compressor oil level to be checked and topped up, if necessary		X	
	Sight glasses to be checked for correct liquid charge and moisture in system & report for action	X	X	
	Compressors unloading mechanism to be checked, if applicable		X	
	Compressor crankcase heater operation to be checked		X	
	Refrigerant system suction, discharge and oil pressures to be checked and recorded while compressors are operating		X	
	High and low pressures cut out and oil pressure switch operation and set points to be checked and reset if necessary (Refer manufacturer's manual for correct settings)		X	
	Inspection panels to be checked and all fastening devices secured		X	
	Lubricate damper linkages, check operation and record damper operating parameters (where applicable)		X	
	All ferrous metal components to be examined, corrosion treated removed and repainted to prevent further corrosion	X	X	
	Evaporator coils to be cleaned with high-pressure air.	X	X	
	Condenser coils to be cleaned with high-pressure air	X	X	
	Control and safety devices to be checked		X	
	Operation of entire plant to be checked and recorded		X	
Air Handling Plant – Ventilation Only.	Isolate and remove all inspection panels, and clean inside of units and replace any damaged insulation		X	
	Check air filters & report	X	X	

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	Washable type to be removed, cleaned, dried and replaced. Record	X	X	
	Disposable media type to be fitted with new media, if necessary. Record		X	
	Air filter frames to be checked for air by-pass and rectified, if necessary. Record		X	
	Axial flow fans to be checked for correct operation and undue noise & report for action	X	X	
	V-belts to be checked for correct tension and alignment & report for action		X	
	Drive pulleys on fans and motors to be tightened if necessary		X	
	Bearings to be lubricated, if necessary. Check for noise & vibration & & report for action		X	
	Fresh air and return air damper settings and operation to be checked and adjusted, if necessary			X
	Switchboards and electrical control panels to be cleaned, checked and tighten terminals and replace indicating light globes where necessary		X	
	Circuit breakers and fuses to be checked and investigate reasons for any blown fuses or circuit breakers in OFF position.		X	X
	Rectify faults and replace blown fuses and faulty circuit breakers.		X	
	Starters, Contactors and Relays to be checked to ensure moving bridges slide freely and that all contact points are clean.		X	
	Investigate and rectify cause of excessive burning of contacts		X	X
	Time switch settings to be checked and reset to start and stop plant at correct time, if necessary		X	
	Flexible connections to be checked and air leaks & report for action	X	X	
	Heater batteries to be tested and faulty elements to be replaced		X	
	Control thermostats operation to be checked		X	
	Safety controls to be checked and operation of controls to be tested, i.e. air flow switch, air pressure switch, smoke detectors, heater safety stats		X	
	All ferrous metal components to be examined, corrosion treated and required to prevent further corrosion	X	X	
	Operation of entire plant to be checked and recorded		X	
Split Units	Check filters, clean when required	X	X	
	Check cooling and heating operation	X	X	
	Check heat pump reversing valves for correct operation		X	
	Check fans and fan motor operation	X	X	
	Check condensate drains for obstruction	X	X	
	Test thermostat and controls operation		X	
	Generally clean equipment externally	X		
	Replace batteries of remote control	X	X	
	Air pressure clean evaporator coil (where access allows)	X	X	
	Air pressure clean condenser coil if necessary	X	X	
	Clean condensate pans and drains	X	X	
	All ferrous metal components to be examined including, corrosion removed treated and repainted with Techtyl or	X	X	

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	similar to prevent further corrosion (coastal applications only)			
	Put into operation and check all functions		X	
	Check brackets for rust, remove any rust & paint with rust converter and anti-rust coatings. Check that brackets are properly fixed unto wall & outside unit unto brackets	X	X	
Window / Wall / Console Units	Check filters & clean where necessary	X	X	
	Check cooling and heating operation of unit	X	X	
	Check fans and fan motor operation	X	X	
	Check condensate drains for obstructions	X	X	
	Generally clean equipment externally	X	X	
	Operate unit and check all functions.		X	
	Remove unit to on site wash bay or cleaning area.	X	X	
	Air pressure clean evaporator coil	X	X	
	Air pressure clean condenser coil	X	X	
	All ferrous metal components to be examined, corrosion removed treated and repainted with Techtyl or similar to prevent further corrosion (coastal application only)	X	X	
	Put into operation and check all functions	X	X	
Fans - Centrifugal	Bearings to be lubricated on drive motor and fan, if necessary		X	
	V-belts to be checked for correct tension and alignment, & report for action		X	
	Drive pulleys on both fan and motor to be checked and tightened if necessary		X	
	Flexible connections to be checked for air leaks & & report for action	X	X	
	Casing and holding down bolts to be checked for corrosion & report for action	X	X	
	Check for undue noise and vibration & report for action	X	X	
	Check wear on fan blades		X	
	Check security of fan wheels on shaft		X	
	Clean air inlet screen	X	X	
	Clean blades of dirt accumulation		X	
	Belt guards to be checked and tightened if necessary		X	
	Check anti-vibration mounts and & report for action	X	X	
	All ferrous metal components to be examined, corrosion removed treated and repainted to prevent further corrosion	X	X	
	Bearings to be greased, where necessary. Check for vibrations and noise & report for action		X	
	Check motor starter and run-up speeds		X	
	Check bearing bolts		X	
	Check drive shaft alignment and condition		X	
Fans - Axial	Impeller hubs to be checked for tightness and tighten if necessary		X	
	Flexible connections to be checked for & report for action	X	X	
	Casing and holding down bolts to be checked for corrosion and security	X	X	
	Check for undue noise and vibration & report for action	X	X	
	Check wear on fan blades		X	
	Check security of fan belt on shaft and tighten if required		X	
	Clean air inlet screen (where applicable)	X	X	
	Clean blades of dirt accumulation		X	
	Check inlet control dampers for operation and oil if necessary (where applicable)		X	

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	All ferrous metal components to be examined, corrosion removed and repainted to prevent further corrosion	X	X	
	Check motor support bolts on pedestal		X	
Ceiling, Wall or Window Fans – Less than 500 WATT	Switch off fan and/or remove plug. Remove cover and clean with damp cloth		X	
	Clean blades & blow out dust		X	
	Spray bearings with Q20. Remove excessive oil spray to prevent dust build up		X	
	Replace cover & check operation		X	
Exhaust Canopy	Clean exterior of hood		X	
	Check/ condition of ducting, connections & filters		X	
	Inspect and clean light fittings in canopy		X	
	Clean drainage system. Ensure fire damper is open & in operation		X	
	Check all electrical connections		X	
Fridge and Freezer Units – Domestic / Cabinet: Condensing Unit	Check operation of unit	X	X	
	Check condenser fan motor bearings for noise & report for action		X	
	Check safety cut outs & record for quarterly report		X	
	Inspect and clean condenser coil	X	X	
Fridge and Freezer Units – Domestic / Cabinet: Blower Coil	Check operation of unit	X	X	
	Check for fan vibrations and noise & report for action		X	
	Check for restriction at coil inlet and clean		X	
	Clean condensate tray	X	X	
	Record box temperature & report for action		X	
	Inspect door seal, strike and latch		X	
	Ensure expansion bulb is secure		X	
Cold Rooms: Condensing Unit	Check operation of unit & clean	X	X	
	Check system gas charge		X	
	Check operating pressures and record		X	
	Check condenser fan motor bearings for noise & report for action		X	
	Check and tighten terminal connections		X	
	Check safety cut outs and record		X	
	Inspect and clean condenser coil		X	
Cold Rooms: Blower Coil	Check operation of unit	X	X	
	Check for fan vibrations & report for action	X	X	
	Check for restriction at coil inlet and clean		X	
	Clean condensate tray		X	
	Record box temperature		X	
	Inspect door seal, strike and latch		X	
	Ensure expansion bulb is secure		X	
Freezer Rooms :Condensing Unit	Check operation of unit & report for action	X	X	
	Check system gas charge		X	
	Check operating pressures and record		X	
	Check condenser fan motor bearings for noise & vibrations & report for action		X	
	Check and tighten terminal connections		X	
	Check safety cut outs and record		X	
	Inspect and clean condenser coil		X	
Freezer Rooms: Blower Coil	Check operation of unit	X	X	
	Check for fan vibrations & report for action	X	X	
	Check for restriction at coil inlet and clean		X	
	Clean condensate tray		X	
	Record box temperature		X	

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	Inspect door seal, strike and latch		X	
	Ensure expansion bulb is secure		X	
Refrigeration piping and controls	Check refrigerant charge.		X	
	Check condition of all refrigerant pipe work saddles. Check refrigerant pipe work for chafing		X	
	Check suction line insulation and report if replacement is necessary		X	
	Check condition of vibration eliminators		X	
	Check operation of oil separator sump heater		X	
	Test temperature drop across the refrigerant drier		X	
	Check operation of solenoid, thermostatic expansion valves and electric expansion device		X	
	Check ¼ " and 3/8 " copper tube, especially control lines for copper hardening		X	
	Check & replace moisture indicators when necessary		X	
Plate Heat Exchangers	Check for leaks on pipe connections and rectify if necessary		X	
	Check and clean in-line water filter / strainer		X	
	Check operation of shut off valves		X	
	Measure between end plate and record		X	
	Mark all heat exchanger plates individually		X	
	Strip plate heat exchanger to manufacturer's recommendations		X	
	Clean out plates of any dirt or scale		X	
	Reassemble to manufacturers recommendations		X	
	Verify measurements between endplates and torque the nuts accordingly		X	
	Check rubber bush linings for splits, cracks or deterioration (where fitted)		X	
	Check port rings for collapsed seals, splits or hardening (where X fitted)		X	
	Record water pressure in and water pressure out – to see whether unit is busy blocking up. Clean when necessary		X	
Calorifiers	Manually check operation of safety valve. Check for corrosion		X	
	Check all connections - electric and water. Tighten as necessary. (Make sure power is disconnected to electric heaters)		X	
	Check operation and setting of aqua stat. Check hot water temperature with dial thermometer, and set aqua stat at minimum value.		X	
	Clean element contacts, and check for proper closing under load by electrical technician.		X	
	Open drain & let sludge out until water runs clean. To be done when water is cold, i.e. after morning bulk use. User to be informed in advance	X	X	
	Drain tank completely & wash & rinse to remove sediment. Wire brush inside of tank. Check for corrosion & note & take photos. Repaint as per PGWC standard paint spec for calorifiers or paint spec obtained from Engineer. To be done every second year or as requested by Engineer.		X	
Water Storage Tanks	Manually check operation of shut off valves. Check for corrosion		X	
	Check operation of ball valves, level control and alarm		X	
	Check connections for leaks	X	X	

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	Drain tank completely & wash & rinse to remove sediment until water is clean. Wire brush rusted parts inside of tank. Check for corrosion & note & take photos. Flushing of tank to be done every year. Inform user in advance		X	
	Treat with rust converter and repaint as per PGWC standard paint spec for metal or galvanised water tanks or paint spec obtained from Engineer. To be done every second year or as requested by Engineer		X	
Electrical Geysers	Manually check operation of all shut off valves.		X	
	Check connections for leaks. Check all plumbing connections are secure.		X	
	Check all electrical connections		X	
	Check operation of thermostat		X	
	Check that the safety valve is piped to the outside.		X	
	Check operation of the safety valve		X	
	Check for continuous overflow and verify		X	
	Check that drain pan is clean, no cracks in it, drain pipe to the outside is open and works properly		X	
	Test voltage on terminals to check power to terminals		X	
	Check operation of thermostat. Check that water is within 10 degrees of the thermostat setting on the thermostat		X	
	Check anode and replace if required		X	
	Check electrical water heater element for scale build up and clean. Flush tank if there is presence of sediment		X	
Solar Water Heaters	Manually check operation of all shut off valves.		X	
	Check connections for leaks. Check that all plumbing connections are secure		X	
	Check all electrical connections and operation of circulating pump/s. Check that pump is running normally on controller order		X	
	Check operation of inlet ball valve in case of low pressure solar water heater		X	
	Check that structure is rust free and properly fixed to roof		X	
	Check operation of the safety valve		X	
	Check for continuous overflow and verify		X	
	Check that pressure relief valve open and close properly		X	
	Test voltage on terminals to check power to terminals when there is electrical backup elements		X	
	Check that automatic air vent are venting & not leaking water		X	
	Drain tank once a year and check for leaks and cracks. Flush tank if there is presence of sediment build up. Check anode and replace if required		X	
	Check electrical water heater element for scale build up and clean		X	
	Check that motorized valves open and close correctly		X	
	Check that no construction, vegetation or other objects are shading the collector or evacuated tubes	X	X	
	Look for cracks in collector glazing & seals. Look for leaks and cracks in case of evacuated tubes	X	X	
	Periodically clean collector or tubes from dust, especially during winter months	X	X	
	Look for insulation degradation		X	
Steam Generators	Clean strainer		X	
	Check and clean steam manifold		X	
	Check for leakage on steam hoses, replace if necessary		X	

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	Check operation of control valve		X	
	Check trap and clean as required		X	
	Check and clean out steam cylinders, replace if necessary		X	
	Check fresh water supply		X	
	Check steam nozzles and unblock if necessary		X	
	Break downs			X
	Pressure Testing			X
Pipework - Chilled Water / Condenser Water / Hot Water	Inspect and clean suction line strainers.		X	
	Check operation of non-return valves.		X	
	Check operation of pressure relief valves, air vents.		X	
	Check supports and tighten as necessary.		X	
	Inspect hanger system and adjust if required		X	
	Check all valves and stop cocks for operation - lubricate stems if necessary.		X	
	Check regulating valves (if necessary).		X	
	Check all valve stem glands - rectify any leaks if required.		X	
	Check anchor points (if necessary).		X	
	Check main condensate drains and full bore outlets.		X	
	Check bolts and nuts and tighten as necessary.		X	
	Check all bolts and nuts for corrosion and replace where necessary.		X	
	Check for condensation & pipe insulation (where applicable) and repair as necessary.		X	
	Inspect piping for leaks and repair as necessary.		X	
	Check cleanliness of water in systems. Dirty strainers could adversely affect water flows, flow recorders and chiller pressure differential switches		X	
Water Quality Specifications	Undertake quarterly water (qualified technician) to check that the water quality of all the chilled water systems conform to the minimum requirements		X	
Water Treatment: Chemical and Non Chemical	Panels to be cleaned internally		X	
	Terminals to be checked and tightened		X	
	Indicating lights to be checked & report for action		X	
	Do chemical analysis of water condition & set dosing pumps accordingly		X	
	Verify that sufficient chemicals are on hand. Supply user and main contractor with a monthly report		X	
	Check Starters, Contactors and Relays to ensure moving bridges slide freely and that all contact points are clean. Investigate and rectify cause of excessive burning of contacts		X	
Speed Drives	Check air flow and ventilation fan operation		X	
	Check heat sink fins for dust pick up - clean if necessary		X	
	Check motor power against unit power		X	
	Check control wiring for heat build up		X	
	Check motor and motor cable for heat build up		X	
	Check for loose connections inside cabinet		X	
	Check cabinet filters		X	
Controls – Pneumatic	Pneumatic controls systems compressor air intake oil level and motor bearings to be checked and rectified, if necessary		X	
	Clean and replace intake and discharge Air filters		X	
	Air compressor safety controls to be checked and operation of controls to be tested		X	
	Adjust belt tension as required		X	

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	Control thermostats operation to be checked and calibrated if necessary		X	
	Check operation of Air dryer and related controls		X	
	Check pressure reducing valve, pressure relief valve and pressure switch		X	
	Drain filter bowl and replace filter as required		X	
	Operate and check operation of plant		X	
	Check actuator mountings and lubrication		X	
	Check all air connections for tightness		X	
	Check all electrical connections for tightness		X	
	Check operation of control valves		X	
	Check response of actuators and primary elements		X	
	Clean and check operation of all Air terminal boxes		X	
	Motorised damper, linkages and motor to be checked and operation observed and reset, if necessary by specialist contractor			
	Operation of entire plant to be checked and recorded by specialist contractor			X
	Controllers, actuators and primary elements to be checked and calibrated as required			X
Controls – Electronic	Control thermostats operation to be checked and calibrated, if necessary			X
	Temperature sensors to be checked and re-calibrated, if necessary			X
	Clean all temperature sensing bulbs of dust and re-mount, if necessary			X
	Check operation of control valves			X
	Check full operation of controller sequence, stop/start, timers etc.			X
	Check operation of humidistat control, if applicable			X
	Check condition of back-up battery on controllers, where applicable			X
	Check all electrical connections for tightness			X
	Check response of actuators and re-calibrate, if necessary			X
Electrical Control and Switchboards & Wiring	Inspect switchboards for cleanliness, correct operation & check pilot lights & report for action		X	
	Check meter readings if applicable		X	
	Check for any burnt wiring and or hot connections		X	
	Inspect all electrical meters		X	
	Inspect indicator lights and replace if faulty		X	
	Inspect operation of time clocks and check settings		X	
	Inspect on/off switches for all equipment		X	
	Clean switchboard interior – vacuum thoroughly		X	
	Inspect relays, circuit breakers, contactors and overloads & tighten electrical connections		X	
	Inspect all fuses and fuse holders		X	
	Inspect all contactors and relays. Burnt contactors to be reported for action		X	
	Test time delay relays. Record results of all tests		X	
	Check all waterproof covers and & report for action		X	
	Check operation of switchboard exhaust fan where fitted		X	
	Check for rust spots on panels, clean & repaint as required		X	
	Check overload settings		X	
	Check that all circuit breakers are labeled & report for action		X	

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	Check that all cover plates and screws are in place		X	
	Check that circuit diagrams is in place and up to date		X	
	Test earth leakage and measure trip current		X	
	Check plug circuits for correct polarity and for earthing problems. Replace damaged switch-plugs		X	
	Test all over/under voltage or phase failure/phase rotation protection monitor relays for proper operation		X	
	Check all voltmeters, voltmeter switches and ammeters for correct operation and log all maximum demand currents before resetting ammeters		X	
	Log all motor running hour meters		X	
	Check all instrumentation fuses and all control circuit supply fuses		X	
	Check all board doors and covers for proper closing & report for action		X	
General Mechanical Maintenance Tasks	Attended to any complaints reported		X	
	Replace all inspection panels and covers and refix all screws, bolts and nuts, and replace, if necessary		X	
	Clean plant room on a weekly basis. Check whether lights work Check all external windows and louvers are intact Check all filters are in place Check if filters are dirty Report anything that is not normal, like leaks, abnormal noise to supervisor or foreman	X	X	
	Lock switch panels and plant rooms		X	
	Check Zone Room temperature, wet bulb and dry bulb, for Theatres, Pharmacy, ICU and others as requested, simultaneously checking plant operating parameters		X	
	Record all Tenant complaints by means of a "Tenant Report Schedule" and obtain the relevant tenant's signature		X	
AUTOCLAVE				
Autoclave Mechanical Components	Open all control valves, check seats and replace kits		X	
	Open all non-return valves and replace seats		X	
	Check all safety valves for correct operation, adjust or replace if necessary		X	
	Check all reducing valves for accuracy and adjust or replace if necessary		X	
	Check and clean all strainers, water filters		X	
	Clean all steam traps and seats, replace steam trap kits		X	
	Examine all unions, probes, connections and fittings for leaks and tightness, repair where necessary		X	
	Examine water tank and condensers for corrosion, replace if necessary		X	
	Check water tank and float valve		X	
	Check door and lubricate all moving parts (i.e.: hinges, chains, bearings)		X	
	Check condition of all V-belts and pulleys, adjust or replace where necessary		X	
	Check for leaks on circulating pumps		X	
	Visually inspect autoclave chamber for cracks		X	
	Replace the bacterial filter		X	
	Check all limit switches – adjust where necessary		X	

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
Autoclave Electrical Components	Test pressure and vacuum switches for correct operation, adjust or replace where necessary		X	
	Check temperature controller and temperature probe		X	
	Check and tighten all electrical connections and repair where necessary		X	
	Check and tighten all fixing screws on electrical components		X	
	Check all timers and overload units for correct settings, set where necessary (door motor and pumps)		X	
	Check solenoids for overheating		X	
	Clean electrical box		X	
	Check indicator lights, replace if necessary		X	
	Check and/or replace PLC			X
	Verify that all parts and equipment, which require to be earthed, are properly bonded together and connected to a proper earth			X
Autoclave: Door	Replace chamber door gasket/seal		X	
	Test door locking mechanism – Examine ratchet set, replace diaphragm where applicable		X	
	Examine door bellows, replace where applicable		X	
	Lubricate nose piece and spindle, report to engineer if replacement is required		X	
	Check wearing strip and fingers, report to engineer if replacement is required		X	
	Test clutch on sliding door, adjust or repair where applicable		X	
	Check door catch mechanism, adjust where applicable		X	
	Check door slides and door cylinder where applicable		X	
	Check safety flap for proper operation		X	
	Check door guides, replace if necessary		X	
	Check door motor, gear box and sprockets		X	
	Check door alignment		X	
	Visually check door for cracks		X	
Autoclave: Instruments	Check all pressure and vacuum gauges for correct operation, replace if necessary		X	
	Check all pressure switches and transducers		X	
	Check fittings for blockages		X	
	Check temperature controller/ display/ gauge, repair or replace if necessary		X	
	Check temperature recorder or printer and report if faulty		X	
	Check pen and ink or ribbon and replace if necessary		X	
Steam Generator	Open boiler and replace flange gasket		X	
	Replace bolts - where necessary		X	
	Clean boiler level probes – replace if necessary		X	
	Check elements – replace if necessary		X	
	Check boiler and probe connections - replace burnt wire and connections		X	
	Check safety valve		X	
	Remove and clean out blow down pipes including automatic blow down, repair if necessary		X	
	Visually check boiler for leaks and cracks, report if necessary		X	
	Pressure Test			
Autoclave: Safety	Check that all safety valves are of the correct size and are operating properly		X	
	Ensure pressure test certificate is valid		X	

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	Ensure that circuit breakers and motor overloads are operating		X	
	Clean the plant room and autoclave	X		
	Ensure that the staff are using autoclave properly		X	
Autoclave: Testing	Run an empty cycle		X	
	Check for leaks, repair if necessary		X	
	Do a "test with Bowie Dick" tape or sheet under the supervision of the sister		X	
Access Gates, CCTV and Alarms				
General	Check the site logbook for previous inspections and report all such entries on a service report sheet every quarter			X
	Check if battery backups are provided and run the system from the batteries (disconnect mains supply) for 2 hours to test function bi-annually. Minimum voltage shall not be allowed to fall below10% of EMF Any bulging, leaking or expired batteries are to be replaced Batteries that are visually / voltaically in bad condition are also to be replaced during the next visit to the site			X
	Check all visual, audio and control functions of the control panels are working bi-annually			X
	If requested, use site plans and drawings and inspect the layout of the building to determine any internal changes that would require additional detection, access control or other equipment			X
Access Control	Check system for overall functionality Access control system is to be assessed upon quarterly site inspections and should the system be found to be malfunctioning it is to be reported to the project engineer. The contractor may be asked to provide a price to perform the work to the access control system or to repair / replace the malfunctioning components.			X
	Card / RF sensors to be checked for correct function using a working card/transmitter every quarter. Test shall also be performed with non-programmed or incorrectly programmed device to check that access is denied.			X
	Card / RF Sensors are to be inspected for any signs of tampering as well as physical and electrical damage every quarter.			X
	Check magnetic locks for correct cable run annually. Cables are to be run in an area where it cannot be disconnected or tampered with.			X
	Check that magnetic locks operate normally without unusual sound or electrical performance annually and report any malfunctions.			X
	Check automatic sliding doors and clean rails with a brush of all foreign particles annually. Lubricate all required parts as per manufacturer recommendations and check sensitivity of door closure and any detectors connected to doors.			X
	Check automatic opening doors and clean mechanisms with a brush of all foreign particles annually. Lubricate all required parts as per manufacturer recommendations and check sensitivity of door closure.			X

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	Pin type access devices shall be checked for security every quarter. Default Pins shall not be allowed and all users assigned to such pins shall be required to re-assign the pin.			X
	The pin numbers of ex-employees or employees whom no longer require access to the area or have clearance to the area are to be removed from the system where applicable every quarter. Areas where pin numbers are used communally shall be changed at each quarterly inspection and the codes shall be provided to Heads of Facilities.			X
	Pin devices shall be checked for correct function, correct time and date stamp if applicable and that there are no signs of tampering or damage every quarter. A correct password, incorrect password and a changed password shall be entered to determine if the system is allowing correct pins and denying incorrect pins. This shall be done after the quarterly replacement of pin numbers.			X
	Biometric devices (clock cards, access control and other) shall be checked for cleanliness and the detector shall be cleared of any grease, oil or any other substance that may hamper correct operation every quarter. The general condition of wiring shall be checked. The device shall also be checked any physical damage or signs of tampering.			X
	Biometric device system time shall be confirmed and the device shall be upgraded to the latest available firmware every quarter after consultation as to the advantages and disadvantages of the upgrade with the departmental representative.			X
	All devices that are connected to a single access control computer shall be checked that time across all devices are synchronised to within 30 seconds.			X
Security Gates and Booms	All gates should be checked for signs of corrosion annually. Any corrosion should be painted with rust converter and repainted.			X
	Check that all guide rollers are in good working condition without signs of fatigue or damage quarterly. Report any damages to departmental representative. Add lubrication to pin-threw roller.			X
	Check that all wheels are in good order and roll freely quarterly. Clear any rails or guide ways of obstructions and debris.			X
	Clean all photocells or IR/Laser beam enclosures quarterly.			X
	Check the general state of the gate stoppers, running gears etc. and checks that the gate opens and closes normally annually. Lubricate and perform all other maintenance in accordance with recommended manufacturer procedure.			X
	Boom-gates are to be assessed for overall condition annually. The following components are to be checked : Check motor casing for damage due to traffic incidents, electrical malfunction. Check that the boom arm is in good condition. If plastic, check for brittleing of the plastic. If metal check for denting of boom arm and chipping of the paint.			X
	Check that all bearings are running normally annually and replace if worn bearing is discovered.			X

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	Check for looseness and wobbling on motor pulley or boom pivot and/or crank handle and tighten if required annually.			X
	On boom-arm or motor casing check that all seals are in good condition without showing signs of cracks, water ingress or dryness annually. If in fairly good condition , apply silicone/rubber to seal and replace seal if in bad condition (Cost + % Mark-up Applies)			X
CCTV	The CCTV system is to be inspected quarterly for operation. If an item is not functional, it shall be reported			X
	Visually inspect the CCTV control room for any damage, tampering and malfunctions quarterly. Also check that all monitors are in working order and that all images displayed are clear and visible without interference or distortion.			X
	Check recorded video if applicable for accurate playback of footage without distortion or interference quarterly.			X
	Check that each assigned camera indicated on the system is functioning correctly and that the image being received is clear and legible quarterly.			X
	If applicable, check that audio microphones are working correctly quarterly.			X
	Check that all UPS devices are working normally according to the UPS check bi-annually.			X
	Check that all air conditioning and ventilation fans (including extraction systems and small diameter fans on the server chassis) are in working order and are running without excessive noise or disruption to the system operator bi-annually. Replace small diameter fans (up to 150mm) immediately if failed.			X
	Test all movable cameras for complete mechanical PTZ movement and investigate the mechanical fittings and components if incorrect movement is detected bi-annually.			X
	Report any temporary obstructions to the view are removed including bushes or trees quarterly			X
	Adjust video times to +/- 30 seconds sync over all cameras bi-annually			X
	Test all video transmission equipment ensuring correct operation annually			X
	HIGH LEVEL CAMERAS: Clean the housing, lens, fittings and de-misters of all external cameras. Check for water penetration and check that all cable fittings are secure. Re-adjust focus if necessary. One service per year will be implemented.			X
	OTHER EXTERNAL CAMERAS: Clean the housing, lens, fittings and de-misters of all external cameras. Check for water penetration and check that all cable fittings are secure. Check photocells and Infrared lamps are operational. Re-adjust focus if necessary			X
	INTERNAL CAMERAS: Clean lens and fittings and ensure that the cables are firmly connected. Re-adjust focus if necessary			X
	If a signal error is detected cabling from affected cameras back to control room are to be investigated for signs of damage, theft or tampering.			X
Alarms	Check annually that all devices connected to the panel are functioning by way of a functional test			X

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	If linkup to access control or other system is provided, check annually that linkup works correctly and as expected.			X
	Check annually that panel, detectors, devices and cables are in good working order and without physical damage.			X
General Administration related to Alarms, CCTV and Access Control Gates.	Update the logbook quarterly with details of defects detected and the corrective .measures suggested and note the same on the service report sheet. Also update the logbook with date and details of testing and service.			X
	Check quarterly that all panel times (alarms, access control, CCTV) and dates are correct and adjust if necessary.			X
FIRE EQUIPMENT MAINTENANCE				
General Maintenance	Check quarterly the site logbook for previous inspections and report all such entries on a service report sheet.			X
	Check annually that the fire brigade link-up (If available) is provided and do all tests to ensure that the link is working correctly and is in good condition. The fire brigade is to be informed of the test before it shall be carried out.			X
	Check that the air-conditioning and ventilation system fire components are functional and in good condition (Whole System Annually, ¼ Of System Per Quarter.			X
	Test annually all lifts for correct function and report any deviations from the intended function.			X
	Check quarterly if a lift interface is provided if applicable and test that the interface is functioning correctly.			X
	Check if battery backups are provided and run the system from the batteries (disconnect mains supply) for 2 hours to test function. Minimum voltage shall not be allowed to fall below 21.5V.Any bulging, leaking or expired batteries are to be replaced. Batteries that are visually / voltaically in bad condition are also to be replaced during the next visit to the site. (Whole System Annually, ¼ Of System Per Quarter)			X
	Check bi-annually all visual, audio and control functions of the control panels are working.			X
	Check all break glass units are in working order. (Whole System Annually, ¼ Of System Per Quarter)			X
	If requested, use site plans and drawings and inspect the layout of the building to determine any internal changes that would require additional detection, PA, access or other equipment.			X
	Check that all fire compartment doors and mechanisms actuate upon alarm. (Whole System Annually, ¼ Of System Per Quarter)			X
Fire/Smoke Dampers	Test annually that all electronic fire dampers activate on a fire alarm. This test is to be done in isolated zones and the facility manager shall be informed 2 weeks in advance of the planned tests. All dampers are to be reset after activation. All heat activated / fusible link dampers shall be checked for damage and obstructions which could hamper activation			X
Administration	Check annually the condition of the printer if applicable so that all reports are easily legible and clear of smudges and marks			X

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	Update quarterly the logbook with details of defects detected and the corrective measures suggested and note the same on the service report sheet. Also update the logbook with date and details of testing and service.			X
	Check quarterly that panel time and date is correct and adjust if necessary			X
	Recover quarterly the events buffer for all operational activities and print out or update to service report			X
	Recover quarterly the events buffer for all maintenance alarms, detector thresholds and sensitivities and print out or update to service report			X
	If a fire graphics package is installed , check quarterly the accuracy of bit-map display			X
	If a fire graphics package is installed Check quarterly the Comments / Instructions noted on bit-maps.			X
	If a fire graphics package is installed Check quarterly that GUI and software functions correctly			X
PA System	Visually inspect quarterly the PA/Evacuation control panel for any damage. Also check that all lamps are functional and not indicating any faults. Check that all connections are clean and secure			X
	Inspect all speakers, bells, sirens strobes and illuminated signage is operational. Quote at the end of inspection for the replacement of any equipment. (Whole System Annually, ¼ Of System Per Quarter)			X
	Check annually local rack wiring at fire panel and audio equipment for and loose, faulty or damaged wiring.			X
	Check annually that all audio amplifiers are in working order.			X
	Check bi-annually UPS batteries by doing a 1 hour run before testing voltage. Voltage to be within 5% of normal operating voltage.			X
	Check bi-annually that all ventilation fans are working.			X
	Test annually the public address system by operating the patch panel together with the microphone and verify its functionality by random tests throughout the building. Activate the evacuation signal and check that it is audible throughout the building by doing a zone by zone sweep of the building. Also check that all audio and visual devices in the zone is functional and in good working order.			X
	Independently operate the alert and evacuation signals by patching randomly to different zones on the evacuation panel. (Whole System Annually, ¼ Of System Per Quarter)			X
	If pre-recorded messages are used , annually identify the detail thereof , check the specific operation and note such detail in the service report			X
	Verify bi-annually that the microphone on the PA system is working correctly.			X
Fire Telephone	Annually perform an initial test of the system by lifting a fire telephone off the hook. Verify that the incoming call buzzer sounds and that the appropriate lights are shown on the panel. Silence the call and answer the phone and confirm that the telephone is working normally. Repeat the test with all other fire telephones.			X
	Annually page each telephone from the control panel to verify connection to phone.			X

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	Check annually that the control panel is functioning normally. If possible perform a LED/Lamp test and note any indicators that are not functional. If connected to a UPS check UPS batteries by doing a 1 hour run before testing voltage. Voltage to be within 5% of normal operating voltage.			X
	Check quarterly that all ventilation fans are working if appropriate.			X
Fire System Devices	Manual call-points (break glass units) and door release units are to be tested throughout the contract with each device being tested at least once during the contract. Each point shall be activated and the location of the alarm shall be monitored at the panel to confirm that the system is reacting to the activation and that it is shown where it was activated accurately. After the test, any resettable elements are to be reset and in the case of glass element units, the element shall be replaced and the site left clean of any shards of plastic or laminated glass. (Whole System Annually, ¼ Of System Per Quarter)			X
	Resettable Heat Detectors shall be tested only after it has been cleaned. The contractor shall use a pole mounted heat generator to test the device and the test shall be monitored from the control panel to ensure that the panel does react to the alarm and that the indicated position is correct. (Whole System Annually, ¼ Of System Per Quarter)			X
	Resettable Smoke Detectors shall be tested only after it has been cleaned. The contractor shall use a pole mounted smoke generator to test the device and the test shall be monitored from the control panel to ensure that the panel does react to the alarm and that the indicated position is correct. (Whole System Annually, ¼ Of System Per Quarter)			X
	Non-Resettable Heat Detectors shall not be tested. The device shall be carefully inspected for signs of deterioration of the heat fusing element and the device in general and any detectors that are in poor condition shall be reported to the project engineer for replacement. (Whole System Annually, ¼ Of System Per Quarter)			X
	General or Remote Indicators shall be monitored while the testing on the relevant device is being performed to ensure that the indicator is functional. Any malfunctions to be reported. (Whole System Annually, ¼ Of System Per Quarter)			X
	General Interfaced Items, not conforming to standard items such as lift, ventilation etc. shall be tested using the most appropriate method to simulate alarm condition. For example if a remote interface is connected to the fire panel to warn of freezer malfunction, the sensor in the freezer will be tested with a heat generator to simulate the malfunction condition.(Annually)			X
	Smoke and Fire Rated Doors, if connected directly to the fire system shall be tested during the quarterly testing. The zone will be activated and every fire/smoke door shall be monitored that it is activated and closes normally without obstruction. (Whole System Annually, ¼ Of System Per Quarter)			X
	Sounders, if installed as part of the fire detection system, shall be tested in-place using an exponentially averaging			X

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	sound level meter. No sounder may exceed 105dB @ 3M and if devices measure substantially higher , they are to be set if possible to the lowest setting that complies with the required sound level.(Annually)			
	Strobes or Lights will be tested during the regular tests being performed on the fire system and any blown strobes , bulbs or LED arrays to be replaced upon failure. (Whole System Annually, ¼ Of System Per Quarter)			X
	Door Sensors for areas where the fire alarm panel is connected to emergency doors shall be checked that it is secured to the door frame and if not shall be secured to the frame using no more nail and two screws if possible. Cabling shall be checked and secured with hot glue to the door frame (Annually)			X
	Cleaning and Housekeeping is to be done to all components to clear it from dust , debris or obstacles which may hamper operation. Detectors are to be vacuumed out , blown out with clean oil free compressed air and finally wiped clean with a damp cloth. All other items to be visibly free of dust and debris. (Whole System Annually, ¼ Of System Per Quarter)			X
Lifts	Check that lift activates correctly when the fire alarm is raised and report findings (Whole System Annually, ¼ Of System Per Quarter)			X
	Check that lifts go to designated fire floor or ground level and check operation of fireman and/or maintenance mode switch and report findings. (Whole System Annually, ¼ Of System Per Quarter)			X
	Also check that fireman elevators stay operational during the fire alarm and report findings. (Whole System Annually, ¼ Of System Per Quarter)			X
	Operate and check the functioning of the intercom and check that the intercom indicates the correct lift number and location at the control station and report findings (Whole System Annually, ¼ Of System Per Quarter)			X
Related Services	Annually check the general condition of the signage at the building and report his findings. The signage shall be assessed against the ruling regulation that was used when installing the signage in the building or to the time when the building was designed.			X
	Check annually the condition of the access doors, gate booms , automatic gates and automatic doors shall be accessed and report any malfunctioning components so that a proper tender or assessment of repair can be conducted.			X
	Spot check bi-annually the 15 fire hose reels, extinguishers and hydrants to determine state of servicing. Findings to be reported to the Department.			X
Fire Panel Inspection	Check quarterly the panel logbook. Any due repairs shall be done during the service.			X
	Print out quarterly a list of all sensors in error, service, preserve or caution mode.			X
	Print a report of device values for each point on the panel.			X
	Connect quarterly a planner to the panel and print out a complete system configuration report from the panel software. Compare to as-installed and note any discrepancies.			X

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	Check quarterly the common disable LED and investigate the reason for disabled equipment and implement necessary action to return the system to normal condition.			X
	Test quarterly a sensor in each zone. Check that sounders activate and that panel operates appropriately and correctly for the particular sensor. Also check that auxiliary signals work correctly.			X
	Check quarterly that all keys on the panel function correctly			X
	Check quarterly that the printer in working correctly and resupply as necessary			X
	If earth leakage detection is provided , test appropriately on a quarterly basis.			X
	Check quarterly that all terminal screws are tight and cables inside the panel are secure and neat. Check that all printed circuit boards are in good condition and free of dust and securely mounted.			X
	Implement quarterly battery tests or more frequently as described.			X
	Quarterly Check time and Date settings			X
	Quarterly restore the system to normal condition.			X
	Verify annually that input and output mapping is functioning correctly, Activate an input and verify that it is correctly displayed on the panel and that the correct action is performed by the panel.			X
	Check annually that the batteries will not expire before the next service. Any replaced batteries shall be marked with a date it was installed.			X
	Provide annually to the Department all information relating the system including all passwords at the start and end of the contract period. Information shall be provided in a digital format on a removable media (Flash drive or CD/DVD)			X
	Supply annually one hard copy manual to the control room of each separate system to the Department.			X
	Check annually Maestro/Graphical Package computer for dust build-up and correct function to original specification.			X
	If labeling is not correct on the main panel, remove annually current labels and re-do correctly using printed labels inserted into the panel. Also affix company name with contact details onto/into the provided space of the panel.			X
	Check annually logbook holder is present and provide and install a holder if none is currently installed. Holder to be of Perspex or approved material.			X
	Remove annually the panel keys and have an extra 2 copies made which shall be provided to the department..			X
Gas Extinguishing System	Check annually the complete system for mechanical, electrical or physical damage or tampering.			X
	Check annually that the GCU is on and that it is fully functional			X
	Check annually the Auto/Manual switchover and indicate where slave/mimic GCUs are installed.			X
	Check annually that all gas nozzles are clean, free of corrosion, properly aligned and free of any obstructions.			X

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	Where applicable, check gas bi-annually the cylinder pressure on the gauges and note accordingly. Use a liquid level device or weigh the cylinders to ensure correct load. Record results to service sheets. Refill cylinders if more than 10% of charge is lost.			X
	Check annually that the cylinder brackets, piping, pipe hangers and straps are secured and in good working order and free of corrosion or damage.			X
	Clean bi-annually that all equipment of dust, dirt or foreign substances and lubricate any moving parts/linkages that require service.			X
	Operate bi-annually lamp tests on gas control panel.			X
	Disconnect annually the gas system operating controls including discharge plugs and solenoids.			X
	Operate annually the Alarm Initiating device on each circuit and ensure all audible and visual signals operate correctly. Check that GCU operating sequence is correct and that extinguishing initiation operation is functioning on manual and automatic.			X
	Reconnect annually the gas system operating controls including plugs and solenoids and ensure that all equipment is reset and that all components are left in normal standby condition after completion of testing.			X
	Update bi-annually the site log book with date, time and details of testing and service.			X
	Check annually the dates of last Pressure test. If pressure test is required Notify client			X
	Check quarterly the functioning and interlocks on/off solenoid/release valve with cylinders disconnected. (if installed)			X
	Check quarterly the cleanliness of nozzles and clean as necessary			X
	Check quarterly that nozzles are aligned and that discharge is free and unrestricted			X
	Check quarterly seals where needed			X
	Clean up quarterly the work area, ensure area of at least 2m around manifold and cylinders is thoroughly cleaned			X
	Check quarterly that the general lighting at the cylinders and manifolds are functional			X
	Check quarterly that the general condition of the system for safety compliance and good house keeping			X
	Fill in and complete inspection work sheet every quarter.			X
	Fill in and complete Log book every quarter.			X
SPRINKLER SYSTEM				
Pre Run Engine Checks: Lubrication System (Whole System Annually, ¼ Of System Per Quarter)	Check engine oil level, top up if required			X
	Inspect all Gaskets and seals for oil leaks and/or streak marks			X
	Visually inspect oil for contaminants			X
Pre-Run Engine Checks: Fuel System (Whole System Annually, ¼ Of System Per Quarter)	Check for fuel leaks			X
	Record condition of fuel hoses			X
	Record fuel level in tank			X
Pre-Run Engine Checks: Coolant system	Check operation of pre-heating system (heater and thermo siphon), replace heater elements/thermostats if required			X

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
(Whole System Annually, ¼ Of System Per Quarter)	Check condition of radiator hoses (flexibility, leak-free)			X
	Check coolant level, top up if required			X
	Check for coolant leaks			X
	Record Coolant Specific Gravity and adjust if necessary			X
	Visually inspect for and record contaminants if any			X
Pre-Run Engine Checks: General (Whole System Annually, ¼ Of System Per Quarter)	Check V-belt and flat belt condition			X
	Check operation of intake restriction indicator			X
	Check all fasteners			X
	Check that room / enclosure intakes are free from obstructions			X
	Clean Plant room			X
Pre-Run Engine Checks: Batteries (Whole System Annually, ¼ Of System Per Quarter)	Record Battery Voltage before start-up and charge current			X
	Check battery electrolyte level, top up if required			X
	Check battery connections and condition			X
	Record Electrolyte Specific Gravity			X
	Record Voltage during test run			X
	Rock batteries			X
Pre-Run Engine Checks: Exhaust System (Whole System Annually, ¼ Of System Per Quarter)	Inspect exhaust for leaks			X
	Inspect insulation and cladding			X
	Inspect all anchors and mounting brackets			X
Pre-Run Engine Checks: Plant Room (Quarterly)	Check all lights and plugs for proper operation			X
	Clean plant room thoroughly			X
	Inspect Plant room door, hinges and locks			X
	Inspect all pipes and pipe fittings for leaks			X
	Inspect all drains remove blockage if required			X
Pre-Run Engine Checks: Operational Test (Quarterly)	Arrange and schedule test 1 month in advance			X
	Record fuel levels before and after load test			X
	Fail the mains supply to pant room DB and open (valve) NB – only according to prior arranged schedule in the presence of The regional Representative			X
	Check auto start of engine			X
	Check load acceptance			X
	Check operation of all gauges and meters			X
	Record test run data after start-up			X
	Record test run data after 30 minutes			X
	Check for abnormal vibrations			X
	Check airflow through radiator			X
	Check for excessive exhaust smoke			X
	Check for exhaust leaks			X
	Check for operation of fans (radiator)			X
	Restore mains supply			X
	SWITCH CONTROLLER TO "AUTO" POSITION			X
Pre-Run Engine Checks: Electric Motors (Whole System Annually, ¼ Of System Per Quarter)	Check for excessive vibration, noise or temperature			X
	Inspect and tighten fasteners			X
	Inspect all couplings (condition and alignment) between pumps and electric- and diesel motors			X
	Measure full load current and compare with name plate			X
	Measure earth continuity with 500V megger and record results			X
	Clean and tighten terminal connections			X
	Inspect for mechanical damage and corrosion. Clean with wire brush, apply etching primer and topcoat to match existing			X
	Ensure Free and unobstructed ventilation			X

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
Pre-Run Engine Checks: Pumps (Whole System Annually, ¼ Of System Per Quarter)	Record Pump pressure			X
	Record Pump speed			X
	Check if there is a steady drip from glands and adjust			X
	Inspect for mechanical damage and corrosion. Clean with wire brush, apply etching primer and topcoat to match existing			X
	Inspect gland bowl and drip tray drains and clean if required			X
	Top-up oil or grease (where applicable)			X
Pre-Run Engine Checks: Valves (Whole System Annually, ¼ Of System Per Quarter)	Rotate hand-wheel several times to ensure that spindle and gate are free			X
	Grease spindle and adjust gland			X
	Clean strainers			X
	Clean sprinkler control valve and cabinet			X
Pre-Run Engine Checks: Controls (Whole System Annually, ¼ Of System Per Quarter)	Check breaker status correct			X
	Check operation of control panel			X
	Check low oil pressure alarm (if fitted)			X
	Check coolant level alarm (If fitted)			X
	Check charger fail alarm			X
	Reset all alarms			X
	Check if the "Fire Alarm" and "Pump Run" alarms are registered on control panels			X
	Test the Start set points of pumps to ensure that trunk main jockey pump starts is set to start at a higher pressure than the main pressure pumps.			X
	Repeat above test for diesel and electrical main pressure pump			X
	Execute "PUMP FAIL" procedure: Engage engine stop valve and isolate electric pump. Lower system's pressure to start engine. The engine must crank for 15 seconds and dwell for a period for not more than 6 seconds. The above cycle must repeated automatically for 6 seconds. If the engine has not started after the preset time, the crank must stop, the "PUMP FAIL" indicator and alarm must be indicated. Reinstate all switches and Isolators to Normal position			X
	Remove all dust and carbon from panel (vacuum) once lean air or contact cleaner may be used on specific components			X
	Inspect functionality of all indicator lamps, alarms and sirens			X
	Check Phase failure indicators and operation where applicable. Procedure: Isolate DB and remove fuse from motor supply line. Restore power, power lamp should not illuminate and pump should not start. Isolate panel, replace fuse and restore power.			X
	Ensure that Trunk main pressure is as required to allow controls to reset.			X
	Where flow switches are fitted to different sections of the system: Inspect switch operation and inspect related alarm operation.			X
	Repeater Panels: Verify that alarms and signals are also received at repeater panel			X
	Inspect all lamps and switches for correct operation			X

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
Pre-Run Engine Checks: Post Run Checks (Whole System Annually, ¼ Of System Per Quarter)	Check breaker status – correct			X
	Check selector switches – correct (auto)			X
	Record post run data			X
	Record Systems pressure			X
	Record Jockey pump set point and operating pressures			X
	Record electrical Pressure pump set points and operating pressures			X
	Record diesel pressure pump set points and operating pressures			X
	Reset all alarms			X
	Check for fuel leaks			X
	Check for oil leaks			X
	Check for coolant leaks			X
Pre-Run Engine Checks: General (Whole System Annually, ¼ Of System Per Quarter)	After the testing is complete, a visual survey must be conducted to identify any obvious leaks, corroded pipework, loose or damaged pipe-work and/or hangers and sprinkler heads. Any leaks found that do not require shut-down of the system, must be repaired by means of caulking, if possible, including leaks found at the control valves.. Any defaults and leaks should be reported to Department.			X
	Fill in and complete quarterly inspection work sheet			X
	Fill in and complete Log book			X
Booster Pump Connection	Check annually that risers are sign posted.			X
	Check annually non-return valve operations			X
	Check annually that a male blank caps of the appropriate size are secured with chains and are in place			X
	Rotate annually spindle several times to ensure that spindle is free			X
	Grease spindle and adjust gland annually			X
	Record annually the static pressure reading of all hydrants . Should the pressure drop to Low Notify Departmental Officials.			X
	Apply and complete service label annually.			X
Restoration of the System	Annually create or draw off the system the total amount of devices connected to the systems and do a walkthrough inspection to not any glaring defects			X
	With the fire detection panel, annually test and see that all loops and relays are functional and if a graphics package is provided , confirm that it is working correctly.			X
	Annually do a basic test to confirm that all systems or components thereof function normally			X
	Report annually zone by zone the defects noted as well as the device count of the building and provide a quotation to repair the system to full working order.			X
STERILIZING EQUIPMENT				
Mechanical Components	Open all control valves, check seats and replace kits		X	
	Check all steam traps, replace or overhaul		X	
	Check rollers, bearings and motors for noise, alignment and wear	X	X	
	Replace worn bearings, rollers, fan belts		X	
	Check and clean all strainers		X	
	Examine all steam fittings for leaks and tightness, repair where necessary			

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	Check lubricate all moving parts (i.e.: hinges, chains, bearings)		X	
	Check condition of all V-belts and pulleys, adjust or replace where necessary		X	
	Check for leaks on equipment (door gaskets, drains, drums)	X		
	Replace or repair of door gaskets, drains, drums		X	
	Overhaul of equipment			
Electrical Components	Check all limit switches – adjust where necessary		X	
	Check cycles , adjust if necessary (change program)		X	
	Check temperature controller and temperature probe		X	
	Check and tighten all electrical connections and repair where necessary		X	
	Check and tighten all fixing screws on electrical components		X	
	Check all timers and overload units for correct settings, set where necessary		X	
	Check solenoids valves and replace if required		X	
	Check indicator lights, replace if necessary		X	
	Check PLC & controller		X	
	Replace controller/PLC		X	
	Verify that all parts and equipment, which require to be earthed, are properly bonded together and connected to a proper earth		X	
	Replace electrical motor		X	
LAUNDRY EQUIPMENT				
Mechanical Components	Open all control valves, check seats and replace kits		X	
	Check all steam traps, replace or overhaul		X	
	Check rollers, bearings and motors for noise, alignment and wear	X	X	
	Replace worn bearings, rollers, fan belts			
	Check and clean all strainers		X	
	Examine all steam fittings for leaks and tightness, repair where necessary			
	Check lubricate all moving parts (i.e.: hinges, chains, bearings)		X	
	Check condition of all V-belts and pulleys, adjust or replace where necessary		X	
	Check for leaks on equipment (door gaskets, drains, drums)	X		
	Replace or repair of door gaskets, drains, drums		X	
	Overhaul of equipment		X	
	Check and replace repair gearbox		X	
Electrical Components	Check all limit switches – adjust where necessary		X	
	Check cycles , adjust if necessary (change program)		X	
	Check temperature controller and temperature probe		X	
	Check and tighten all electrical connections and repair where necessary		X	
	Check and tighten all fixing screws on electrical components		X	
	Check all timers and overload units for correct settings, set where necessary		X	
	Check solenoids valves and replace if required		X	
	Check indicator lights, replace if necessary		X	
	Check PLC & controller		X	
	Replace controller/PLC		X	

ITEM	MAINTENANCE ACTIONS	CATEGORY		
		1	2	3
	Verify that all parts and equipment, which require to be earthed, are properly bonded together and connected to a proper earth		X	
	Replace electrical motor		X	
BATTERIES				
Lead Acid Batteries Charter Test	Test Annually			X
Lead Acid Batteries Discharge Test	Test Bi-Annually			X
Lead Acid Batteries Load Voltage Test	Test Quarterly			X
Sealed Lead Acid Batteries Charger	Test: Annually			X
Sealed Lead Acid Batteries	Test Bi-Annually			X
Sealed Lead Acid Batteries: Load Voltage	Test Quarterly			X
All Batteries	Annually apply and complete service label			X

Annexure 5 – Approval of Protocol

Western Cape Government Health BETTER TOGETHER.	**MAINTENANCE PROTOCOL** Directorate: Engineering and Technical Support	**DOCUMENT**	MP
		VERSION	2

VERSION	DATE	AUTHOR/S	CHANGES
1	August 2015	SR, YL, KAJ	ORIGINAL
2	June 2018	SAR, CFB	UPDATE

APPROVAL			
DESIGNATION	**NAME**	**SIGNATURE**	**DATE**
Chief Director: Infrastructure & Technical Management	Dr. L Angeletti-du Toit		
Acting Director: Engineering & Technical Support	Mr. CF Badenhorst		