APPENDIX 3-G

INITIAL O&M SERVICES PLAN

(See attached.)

O&M Plan

22nd June 2017

Great Hall Project LLC

ferrovial

SAUNDERS
Building Confidence

JLC | MJE-Loop Capital Partners LLC

Disclaimer

This document is delivered pursuant to the Predevelopment Agreement, dated as of September 5, 2016 (as amended, supplemented and/or otherwise modified, the "PDA"), between the City and County of Denver (the "Owner") and Denver Great Hall LLC (the "Developer") and as part of a Submittal under the PDA. It summarises our views and considerations as Developer, which are based on the information provided by the Owner and/or Denver International Airport ("DEN") and other information publicly available.

The information and analysis contained in the document are preliminary and subject to review, discussion and modification in mutual cooperation with the Owner. It is therefore subject to further discussion, review and, to the extent required, updates and amendments during the analysis of the Project regulated in the PDA and the negotiations in respect of finalizing the Development Agreement ("DA") contemplated thereby to be entered into between the Owner and the Developer.

Therefore, it is an analysis subject to review which is based on the available information and shall be understood as excluding any promise, representation or warranty (expressed or implied) to any person as to the accuracy or completeness of the information or of any type of projection, forecast, or prospective or risk analysis included in it, for which any liability is excluded.

Any errors, misstatements or omissions shall be discussed with the Developer for review, discussion, development and amendment in future revised versions.

The information contained is confidential and should be treated as such. It should not be made public and can only be shared with third parties in accordance with the terms agreed in the PDA or the DA, as applicable.

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ANNEX

ACRONYM LIST

ABHS	Automatic Baggage Handling System
ACRP	Airport Cooperative Research Program
ANSI	American National Standard Institute
AOA	Airport Operating Area
API	Airport Performance Indicator
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
BOCA	Building Officials and Code Administration International, Inc.
CAA	Clean Air Act
CBP	Custom and Border Protection
CCR	Colorado Conveyance Regulation
CFR	Code of Federal Regulations
CMMS	Computer Management Maintenance System
CSR	Colorado Revised Statutes
DAP	Damage Assessment Procedure
DEN	Denver International Airport
DRMC	Denver Revised Municipal Code
EMC	Emergency Management Coordinator
EMP	Environmental Management Plan
EMR	Environmental Management Representative
EPA	Environmental Protection Agency
F&B	Food & Beverage
FAA	Federal Aviation Administration
FOIA	Freedom of Information Act
GCSI	Global Cleaning Service Indicator
GHP	Great Hall Project
HR	Human Resources
HSE	Health Safety and Environmental
HVAC	Heating Ventilation and Air Conditioning
IAP	Integrated Activity Plan
IAQ	Indoor Air Quality
ICBO	International Conference of Building Officials
ICC	International Code Council
IECC	International Energy Conservation Code

IFC	International Fire Code
IMC	International Mechanical Code
IPC	International Plumbing Code
KPI	Key Performance Indicator
MBE	Minority Owned Business
MI	Maintenance Indicator
MSDS	Material Safety Data Sheet
MTBF	Mean Time Between Failure
MTI	Maintenance Top Indicator
MTTR	Mean Time To Repair
NFPA	National Fire Protection Association
NOTAM	Notice to Airmen
O&M	Operation & Maintenance
OSHA	Occupational Safety and Health Administration
PM	Preventive Maintenance
PPMP	Planned Preventive Maintenance Plan
PPE	Personal Protection Equipment
PTAC	Packaged Terminal Air Conditioners
PTHP	Packaged Terminal Heat Pumps
QA	Quality Assurance
QC	Quality Control
RAV	Replacement Asset Value
SBA	Small Business
SBCCI	Southern Building Code Congress International
SCEI	Specific Cleaning Evaluated Indicator
SCQI	Specific Cleaning Quality Indicator
SDB	Small Disadvantaged Business
SLA	Service Level Agreement
SMACNA	Sheet Metal and Air Conditioning National Contractor's Association
SOP	Standard Operating Procedure
STOP	Service Task Order Program
TSA	Transport Security Administration
VOC	Volatile Organic Compounds
WBE	Woman Owned Business
WO	Work Order

1 Introduction[1]

1.1 Purpose of the O&M Plan

This Operation and Maintenance Plan (*O&M Plan*) has been developed in order to provide best management practices within the O&M Limits (*facility*) of the Denver International Airport (*DEN*) and its main objective is the following:

"Developer shall prepare and submit to the Owner for review and approval an Operations and Maintenance Services Plan (or "O&M Services Plan") that clearly identifies the approach, methods, systems, procedures, organization and staffing, contracting practices, schedule, project controls, inspections and reporting procedures and frequencies necessary for Developer to perform the O&M Services and ensure that the Project continuously meet or exceed the requirements the Technical Requirements and the Development Agreement, including the Performance Standards."

The O&M Plan covers the following phases of the project:

- The updating of the O&M Service Plan due to any possible change, within the O&M limits, during the construction phases.
- The transition phase in order to take over and implement all Owner O&M Services, within the O&M limits, and prepare for the operation phase.
- The operation phase during the whole concession period starting on every Functional Area Readiness Date and on Project Substantial Completion Dates within the O&M limits.
- The Handback phase upon termination Date or in the event of any earlier termination of the Development Agreement.

The O&M plan gathers all required information in order to perform the O&M services as required in the Technical Requirements and Development agreement and must be used by all persons, entities and/or stakeholders involved or related with the operation and maintenance of the facility, within the O&M limits.

1.2 Revisions and Update of O&M Plan

In order to maintain the quality and accuracy of the O&M Service plan and to ensure the required quality of operation and maintenance performance, the Developer shall periodically review, throughout the service life of the facility, any change in the facility that affects the Operation and Maintenance thereof. Consequently, the Developer shall update as needed the O&M plan as well as all appendixes, referenced documents, drawings, schedules, etc. after any change in the system, space, parameters, assets, etc. within the Developer's scope of responsibilities.

The Developer shall ensure that the latest version of the O&M Service plan is available in the Electronic Document Management System for all persons and/or entities that have the authorization to access the O&M plan and its documents as defined and required by the Document and Data Management Plan (DDMP) and the Technical Requirements.

[1] The O&M Plan will be reviewed and adapted to be consistent with the provisions finally presented in the Development Agreement that is being negotiated during the PDA Phase

Revisions to the O&M documentation must be undertaken within a time frame of 30 days after any of the following events has taken place within the O&M limits:

- **Fit-Out**. Building spaces usually are delivered through separate, but interdependent, delivery processes:
    - Building delivery.
    - Partial building delivery.
    - One or more fit-out deliveries.
- **Renovations, Renewal work.** Any renovation or renewal work project, however small, after the Functional Area Readiness Date that involves adding, removing, or modifying a building system or changing the design intent and/or operation of the spaces in the O&M Limits shall be fully recorded in the O&M documentation. The corresponding effects to the Elements, in scope within the O&M Limits, shall be reviewed to ensure the change can be accommodated without detriment to operation or to occupant comfort in other areas**.**
- **Changes to Operating Procedures**. The initial O&M plan is based on the Technical Requirements and Development Agreement of the Great Hall Project. As building parameters change during the building's service life, the documentation shall be updated accordingly. Changes in the documentation shall be in accordance with Part III of the TRs, the Development Agreement, and Good Industry Practice and may not be made without justification.
- **Retesting, Rebalancing, Recommissioning**. Is often carried out due to renovations, Patrons complaints or changes, or equipment replacement. Records of these activities shall be included in this O&M Service Plan with associated dates as well as in the Document Control Repository (asset management). A review of their impact on overall building performance, within the O&M limits, shall be conducted in some instances.
- **Other Changes**. These changes are related to changes after the Developer has started its responsibility after the reconstruction of the Great Hall Project. Changes as to building systems within the O&M limits (such as lighting, and HVAC retrofits), changes to heating/cooling loads and envelope changes shall be documented with dates. The O&M documentation updates due to changes to building systems or loads shall be carried out at the time of the change. Such information provides the history of the equipment that is necessary for management of the O&M procedures and shall also be archived in the Document Control Repository.

After the Functional Area Readiness Date, any reconstruction, rehabilitation, restoration, renewal, replacement or any other kind of changes, within the O&M Limits, shall be integrated into the O&M documentation. The commissioning of these reconstruction, rehabilitation, restoration, renewal or replacement shall be done as part of the project and the reports shall be added to the O&M plan.

1.3 Project Requirements

With the exceptions of the Work listed in Section III.4.1 and Section III.4.2 of the Technical Requirements, Developer shall perform the O&M Services on all assets installed, built, re-built, or repurposed by Developer within the O&M Limits and, within the O&M Limits, take all necessary actions to:

i. Ensure the safe, clean, functional, and reliable delivery of the O&M Services, and in particular the Work in the Concession Space;

ii. Ensure and verify the quality of the O&M Services in compliance with these Technical Requirements;

iii. Ensure the safety of the Users, the general public, and staff from the Owner and the Owner Contractors, the airlines, the FAA and the TSA, and Developer and Developer-Related Entities within those areas which are the responsibility of Developer in accordance with these Technical Requirements;

iv. Minimize the risk of damages to, disturbance of, or destruction of property of the Owner, the airlines, the FAA, the TSA, and third party property;

v. Partner, cooperate and collaborate with the Owner and collaborate as may be required, with due regards to efficient passenger flow, processing and way finding;

vi. Coordinate and collaborate with the Owner for all O&M Services respecting the Building Systems and Utilities;

vii. Coordinate and collaborate with the Owner in the event Irregular Operations, including re-routing of passengers across the A bridge should the Concourse Train System become disabled; for the avoidance of doubt, Core Airport Operations within the O&M Limits is the responsibility of the Owner and Developer will provide reasonable assistance in respect of the same during the occurrence of any Airport Irregular Operations.

viii. Provide a consistent level of User experience within the Core O&M Limits in accordance with the Performance Standards defined in Table III.5 of the Development Agreement;

ix. Provide for continuous access to and proper functioning of public amenities within the O&M Limits in accordance with these Technical Requirements;

x. Minimize inconvenience and risk of delay and disturbance to Core Airport Operations, the operations of the Owner, the airlines, the FAA, and the TSA;

xi. Optimize the use of the Project assets for efficiency, flexibility, and to maximize the useful life of the Project assets;

xii. Meet the Performance Standards and comply with the acceptance criteria that measure the condition, performance, and specified life of the respective Elements; and

xiii. Monitor, measure and report Developer performance in fulfilling its responsibilities and obligations set forth in this Part III of these Technical Requirements.

This will be achieved through our approach that will ensure the implementation of a number of preventive and proactive actions that will help avoiding incidences with the Airport's users in general.

1.3.1 The approach

Inconveniences and risk of delay to Users, the general public, the Owner and Owner Contractors, the airlines, the FAA and the TSA within the O&M limits and that are due to the proceedings of the O&M must be minimized. For that the whole O&M staff must be familiar with the approach, options and actions that have been designed to achieve this objective and avoid these kinds of incidents.

The approach is conceived through a number of protocols that are described in the following.

- **Consciousness and recognition;** The first step is to be conscious of the risks of causing these incidents and recognize them, as early as possible in time, in order to be able to take actions that will remedy or minimize the risk by means of appropriate and predetermined procedures. For that reason, these incidents will be included in the risk management plan of the O&M team. The risk management plan will analyse and evaluate the risks and involve all members with required and adequate knowledge to

develop determined actions plans for any of the detected risks. The risk management plan will be available for all staff members. This measure must be updated continuously and kept up to date and it is the O&M manager's liability to monitor this.

- **Adapting maintenance schedule**; the maintenance manager will adapt the planned maintenance activities and assure to plan actions on a schedule that will minimize interference and/or avoid the detected risks of incidents. It is not an objective for the staff to be invisible, in the O&M limits, for the Patrons, airlines staff, etc., when executing their duties, but the less contact they have, the less opportunities there will be for causing incidents. It is reasonable to be aware that most of the planned maintenance tasks must be undertaken in the agreed shifts without eliminating any shift as this could be prejudicial for the general performance of the O&M liabilities. Nevertheless, and depending on the existing risk, maintenance tasks could be rescheduled if the maintenance manager considers it appropriate to take that decision when he/she believes a realistic possibility exist that an incident may occur. The O&M manager shall take into consideration that if the rescheduling is containing equipment that has the potential of impaction DEN Operations, the rescheduling shall be coordinated/shared with DEN on a regular basis. Changes to schedule shall be broadcast in a formal manner, through the formal channels.

  Of course, there are tasks, which due to their duration for completion, cannot be rescheduled easily. For those cases, other actions (describe in the following points) have been designed.

- **Training;** The O&M management has set-up training sessions to provide staff, of each discipline (i.e. electrical, mechanical, plumbing, cleaning, etc.), with specific information of the Airport's activities, all type of persons that make use of the spaces in the O&M limits, airline companies, concessioners, etc. in order to increase awareness of possible negative effects as a result of the execution of O&M obligations. The information submitted in these sessions will be accompanied by requisites of the Developer and the Owner providing by this mean insight in the relations between the requirements, the real use within the O&M limits, and the Operation & Maintenance tasks with the purpose to train staff in understanding the relations and their influences of the performances in the O&M limits.

  The training session's objectives can be summarized as follows:

  - O&M staff to understand the Developer's contractual obligations as included in the Development Agreement
  - O&M staff to achieve appropriate knowledge regarding Developer and Airport's activities, its processes, its bottlenecks, the Patrons, the Airlines, FAA and TSA
  - O&M staff to understand how the O&M tasks can have influence in Developer's contractual obligations as included in the Development Agreement.

  This preventive action of the Developer's approach is considered important as it is a first step in bonding people with the project goals.

- **Briefing;** The O&M staff's supervisors will brief their team insistently in their day to day commitments with the objective to highlight possible risks of interference in the Developer and Airport's activities and agree the required precautions that must be taken in the daily execution of planned tasks.

  It is the supervisors liability to be aware of every planned task and the possibilities of influencing the Airport's activity and to transmit his/her knowledge to his team, monitor them in accomplishing their task without the creation of incidents, assist them in continuous improvement in this area, and

send the message that this policy is strict and must be applied in every single task within the O&M limits.

This briefing will reinforce the awareness training. The briefing could also be seen as a continuous training and will minimize incidents in the O&M limits.

- **Equipment Data Sheets;** The Equipment Data Sheets, which are used by the maintenance staff for their scheduled and non-scheduled maintenance tasks, do include a section ("Accessibility") that indicates the visual and functional interference level with the Airport activities in order to inform the staff member of the risk and be able to take the required precaution measurements.

- **Deferred actions;** the maintenance manager and or O&M supervisors will defer any planned activity if a realistic risk of interfering in the Developer or Airport's activities exists. This does not mean that the planned tasks automatically will be scheduled for another day or week; the postponing of a task could be questions of hours if the situation requires such a decision. Nevertheless the final call shall always be of the Owner.

1.4 O&M Limit Description

The O&M Limits are as defined in the Contract Documents.
The Core O&M Limits are graphically represented in Appendix A of this O&M Plan.

2 Management and Staffing Plan

2.1 Introduction

All elements, within the O&M limits, serve a variety of purposes. These elements and the O&M Services, must guarantee an environment complaint with the required performance as describe in section 2.1 of this O&M Service plan and as described in Section I.10.2 Management & Staffing Plan of the Technical Environment.

Once the elements and the O&M Services are in operation within the O&M limits, they require continue attention to ensure that they operate correctly and economically and that the area is available for use when required according described in the Technical Requirements and the Development agreement.

Developer is responsible for all maintenance that needs to take place to be compliant with the Technical Requirements and the Development agreement. Developer must ensure that maintenance is carried out

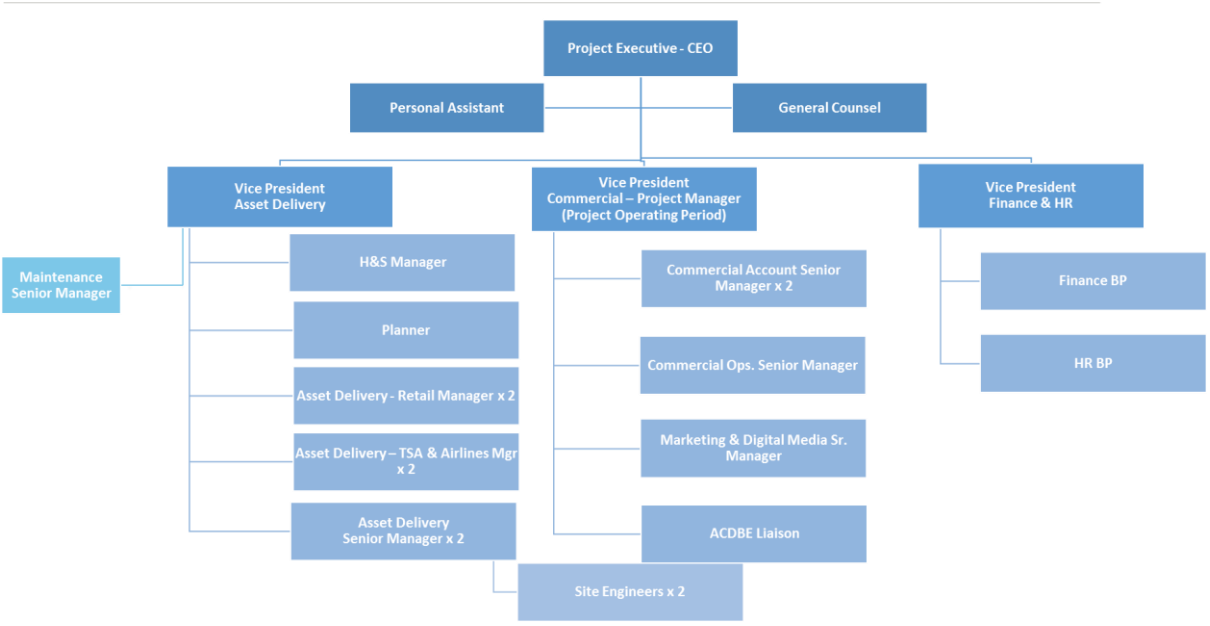
The technical content includes determining what Elements is to be maintained (as describe in O&M limits – see section 2.2 O&M limits description), how and when; identifying problems and diagnosing causes; monitoring effects; preparing and analysing records and technical information; initiating procedures to cope with situations before they arise; and ensuring that the chosen techniques are achieving the required results.

The control element is aimed at providing the required technical service at minimum expense, and can involve management and staffing of labour, spares and equipment to match the workload; locating where work is required; organising transport, setting priorities; and coordination actions. It can extend to setting budgets, monitoring expenditure, identifying high maintenance cost plan and collecting information to form a basis for decision making.

Effective maintenance management minimises the costs associated with the non-availability of an engineering service. It shall be recognised that in addition to enabling the engineering services to be available when required, maintenance is vital to ensure that the services retain their value as asset within the O&M limits of the airport.

2.2 Operations and maintenance phase

Figure 1 Operations and Maintenance Phase Organizational Chart[2]



2.3 Director level roles and responsibilities

The Executive Director of the Developer is the primary formal point of contact for the Owner's. The responsibilities of the main roles during O&M Phase are outlined below:

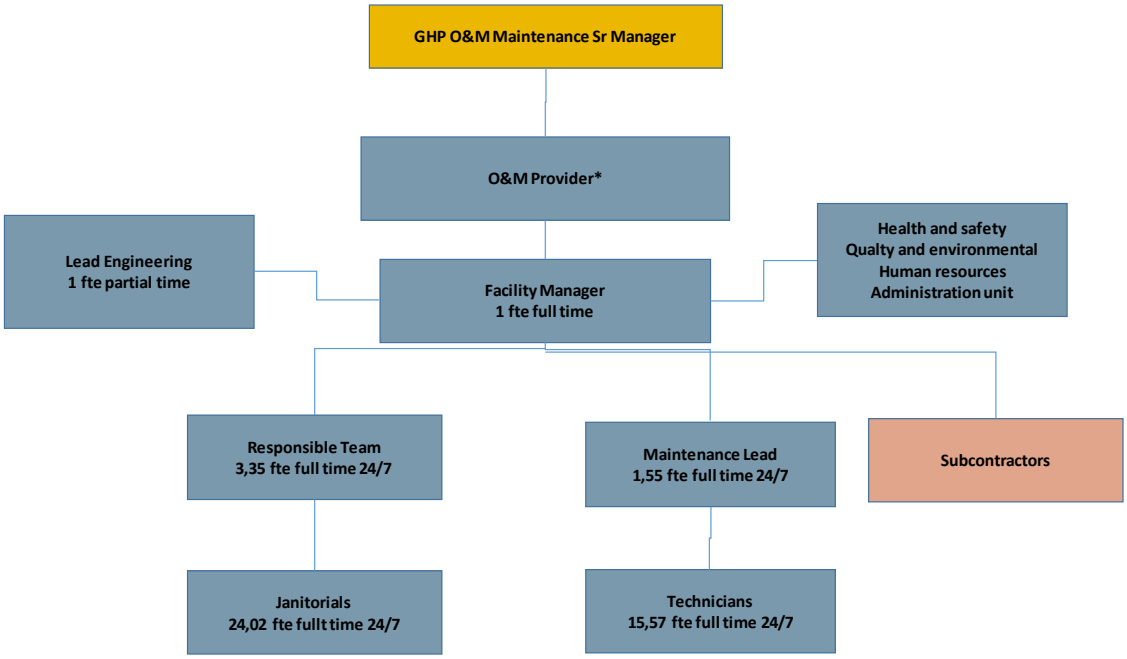
Table 1 Role responsibilities

Role	Phase	Responsibility
CEO – Project Executive	All	Leader of the GHP team; coordinates all work streams with ultimate responsibility for the final project delivery and performance; main interface with Owner. He/she hold decision-making authority for GHP and has the responsibility for all decisions contemplated by the DA.
Maintenance Senior Manager	D&C and O&M	Responsible for leading the delivery of the O&M requirements. Will be the primary point of contact for O&M interfaces between GHP and DEN. Will work under the VP Asset Delivery during D&C to ensure that any changes made during this phase do not prejudice the ability to service and maintain it to the performance specifications and the O&M responsibilities outlined in the DA. He/she will be delegated decision-making authority by the CEO. He/she will report to the GHP CEO fortnightly on their respective work areas.
O&M Provider	O&M	Deliver services in compliance with Technical Requirements and Development Agreement.

Figure 2 Operations and Maintenance Operator example structure[3]

[2] Organization shown under these charts might be subject to change in the future

[3] Organization shown under these charts might be subject to change in the future



2.4 Developer's facilities list

The following list shows the facilities details that shall be used by the Developer during the operating period:

Facility's Name	Full Address		Facility type
Airport Office	Denver International Airport 8500 Peña Boulevard Denver, CO 80249, USA L6 – office XXX		Office
Contact Person	Telephone 1	Cell phone	Email address
Insert name contact person	*Insert Telephone contact person*	*Insert cell contact person*	*Insert email contact person*
Comments Facility			
Insert comments			

Facility's Name	Full Address		Facility type
Developer Storage	Denver International Airport 8500 Peña Boulevard Denver, CO 80249, USA L4 – space XXX		Storage
Contact Person	Telephone 1	Cell phone	Email address
Insert name contact person	*Insert Telephone contact person*	*Insert cell contact person*	*Insert email contact person*
Comments Facility			
Insert comments			

Facility's Name	Full Address		Facility type
Developer Maintenance Shop	Insert address off-site maintenance workshop Denver, CO 80249, USA		Maintenance
Contact Person	Telephone 1	Cell phone	Email address
Insert name contact person	*Insert Telephone contact person*	*Insert cell contact person*	*Insert email contact person*
Comments Facility			
Insert comments			

3 Risk Management Plan

Risk assessment and management are important as the Developer is exposed to a complex range of risks in relation with the requirements and commitments as described in the Technical Requirements and Developer Agreement.

Some risks will be obvious or known but their potential impact may be underestimated, others may be undetected through lack of awareness. For the organization to survive, exposing and controlling risks will be essential and required. Risk assessment is part of risk management and enables risk identification and clarification, it also helps with the preparation of contingency plans for when an emergency situation arises.

The O&M Services within the O&M Limits relies to a large extent on the building services engineering installations (Elements) The risks associated with these Elements and O&M Services and described in this section, must be assessed and managed at all stages, from concept to dismantling and disposal.

The Risk Management Plan shall be developed as required in Section I.10.3 of the Technical Requirements.

3.1 Developer's Risk Management Approach

Order of precedence shall prevail according to the Development Agreement and over this Section of the O&M Plan.

Developer's performance is essential to ensure that the airport's operational equipment and premises within the O&M Limits, continues to function effectively. Elements, within the O&M Limits. are integral to successful airport operations. When these Elements are not repaired or maintained properly, other airport operations are stressed and overused, causing an unwanted and costly domino effect on the rest of the airport operations. As a consequence, the primary risk associated with repair and maintenance is the impact to operations and damages associates with the subject Element being out of operation for any length of time.

The Developer's main approach to prevent any potential risk is by means of a number of preventive risk identifications and the corresponding actions that will minimize or avoid any occurrences or incidents. These preventive risk identifications are:

- **Standard of Care/Faulty Work**
  Quality and routing maintenance can prevent accidents and a shutdown of activity. When repair is needed, quality and prompt repair can similarly prevent future maintenance or repair issues or prolong the need for such maintenance or repair. All of these elements protect the airport from unnecessary liabilities and costs. It is therefore important to perform any Developer's actions as required in Technical Requirements and Developers Agreement in order to mitigate these risks. Examples of risk mitigation (of standard of care/faulty work issues) within the O&M Services plan:
  - competent training
  - professional recruitment
  - quality management plan
  - Health and Safety Plan
  - Etc.
- **Liability and Damages**

  The Technical Requirements and Development Agreement provide the obligations for the recovery of all "consequential" damages, when possible. Consequential damages that arise from an unnecessarily

extended period of downtime for the equipment (non-compliance with required performance standards) will almost always be the largest damage that arises from repair or maintenance.

Examples of risk mitigation (of liability and damages issues) within the O&M Service Plan:

- Insurance requirements as required in appendix 18 of Development Agreement
- Payment deductions as described in Appendix 10 of Development Agreement
- Etc.

- **Indemnity**
  As Airport are frequently sued by parties injured or damaged as a result of improperly maintained equipment, a broad indemnity provision is critical to limit risk and shift it to the appropriate parties, and if allowed by state law, also to require a duty to defend.

- **Concession's Occupancy Liability and Indemnity**
  Regardless of the type of tenant or user agreement for the Concessionaires, these shall remain liable for occurrences related to its occupancy or any negligence by the Concessionaires (employees, contractors, agents, licensees, tec.). The Concessionaires shall remain liable for any loss including all costs for investigation and defense of any litigation that may be incurred by the Developer or Owner to the extent that such loss:
  - Resulted from or arose out of the construction, use, occupancy or maintenance of the premises, the Concessionaires operations thereon, or the acts or omissions of the Concessionaires, resulting in damage to or destruction of any property or injury or death to any person;
  - Arose out of any breach of the Concession Agreement; or
  - Was imposed or assessed against the airport arising out of any act or omission on the part of the Concessionaire or any other person acting by, through, or for the Concessionaire.

- **Remedies for Default**
  For a monetary default, the Developer reserves all rights available to it pursuant to state law, which usually include the options or terminating the Concession/lease and retaking possession, and recovering unpaid rent as it become due, without terminating the concession/lease. The Developer has also an express reservation of Developer's rights to pursue litigations for damages of not only the rent and additional rent, but also costs incurred in retaking, restoring and reletting the premises, including attorney's fees and costs.
  Examples of Remedies for Default risks within the O&M Limits:
  - Non-waiver clauses in concession agreement
  - Developer shall be mindful of state and Concessionaire statutes or ordinances, and even bankruptcy, which may prescribe or limit a Developer's rights or remedies in a given circumstance.

- **Hazardous Materials**

  Concessionaires engaged in activities that uses hazardous or environmentally regulated substances shall be required to provide explicit, separate environmental indemnities to the Developer (and Owner). These provisions shall include an formal system for auditing environmental conditions during the tem and a method for determining the condition upon expiration or termination of the concession term. The Developer shall address procedures for monitoring and/or remediation and the impact on possession and use during the term of the concession. The concession agreement shall permit the

Developer to recover the cost of any remediation as additional rent. This may require the necessity for the concessionaire to maintain business interruption insurance coverage.

- **Concession Insurance and Bonds**
  Each Concession Agreement shall require particular types of insurance and bonds based on the proposed use, rights, and obligations under the agreement.
  The insurances that may be required in the Concession Agreement are the following:
  - General Liability Insurance
  - Workers' Compensation or similar insurance
  - Construction-Related Coverage
  - Pollution Insurance coverage
  - Other special insurances related with their activities

  The Bonds or other security-backing performance of their obligations are required for the Concessionaires. The following bonds may be required:
  - Contract Bonds
  - Build out and Construction-Related Bonds
  - Letter of Credit

- **Concession Agreements**
  The primary risk associated with vendor/purchasing agreement is ensuring the acquisition of goods and services necessary for the safe and efficient operation of the O&M Limits. The resulting agreements are often standardized and are entered into with a low bidder.
  Examples of Concession Agreement risks:
  - Performance
  - Federal Security Violations
  - Personal Injury
  - Property Damage

- **Developer's Software/IT systems**
  Software systems are critical to O&M operations. Software that does not conform to be desired specifications, and thus fails to perform to the required performance standards can significantly hinder the Developers' obligations.
  In addition, the software may reside on serves hosted remotely and accessed through internet. Although this may reduce the Developer's hardware costs, it creates the additional risk that the server hosting services may lose power, go out of business, suffer a cyber attack, suffer a fire or any other calamity. As a result, the Developer need redundant software systems and/or alternative operational procedures to allow for continued operations, despite access disruption to cloud-based systems.
  Examples of Developer's Software/IT System risks:
  - System Downtime
  - Software Security
  - Performance
  - Obsolescence

3.2 Risk Assessment

Risk assessment and management are important as any organization is exposed to a complex range of risks. Some will be obvious or known but their potential impact may be underestimated, others may be undetected through lack of awareness. For the organization to survive, exposing and controlling risks will be essential and

required. Risk assessment is part of risk management and enables risk identification and clarification, it also helps with the preparation of contingency plans for when an emergency situation arises.

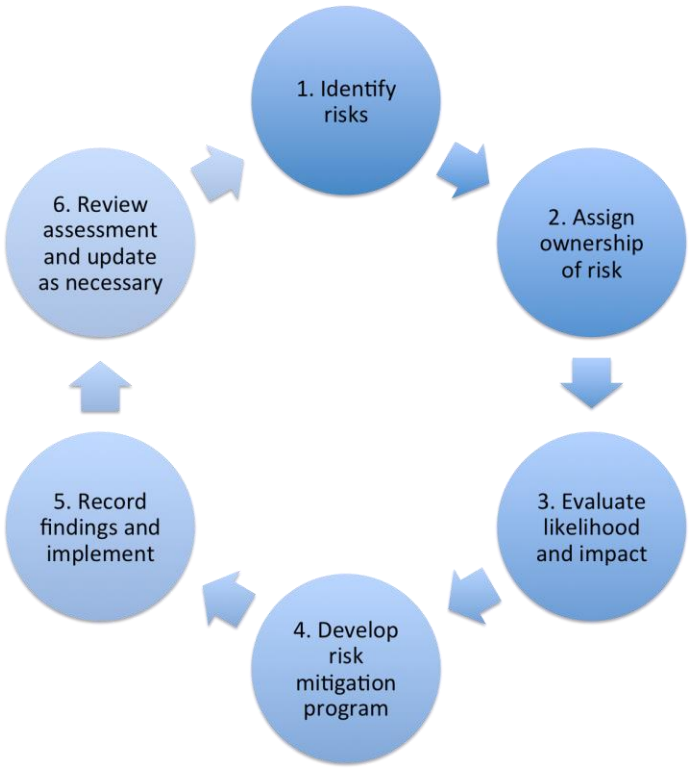
The built environment relies to a large extent on the building services engineering installations. The risks associated with these installations and described in this section, must be assessed and managed at all stages, from concept to dismantling and disposal. In this section ensures the risks that are acceptable within the parameters of the requirements of the Owner, statutory obligations and good practice.

The Risk Management Plan's objectives are to:

- Systematize the process by which we respond to circumstances that could significantly delay or halt the O&M services by minimizing differences between O&M plans and objectives, determining risks and costs of proposed changes and identifying alternatives that satisfy DEN's goals;
- Increase transparency regarding challenges to O&M plans and objectives by preparing internal and external information that is reliable, timely and relevant;
- Capture O&M opportunities and aid the identification, and ability to take advantage of positive events quickly and efficiently; and
- Satisfy legal and regulatory requirements and meet the needs and expectations of other stakeholders by supporting efforts to ensure compliance with legal and regulatory requirements, identifying risks of non-compliance and identifying and managing challenges of particular importance to stakeholders.

3.2.1 Assessing the risks

The risks associated shall be identified at the appropriate stage in the project life, the implications assessed, and the method of addressing each risk determined. The process must be iterative throughout the life of the service delivery, learning from experience whether the risk assumptions were correct and modifying the procedures as necessary, as shown in the following figure:



The Assessment process

Therefore, the Developer shall maintain written records of every step of the process, preferably identifying those undertaking the assessment and those responsible for the subsequent management.

A.- Business risks

Business risks are related to the function carried out by the organization and will influence the design of the building services from initial concept to final detail.

As an example (and not in scope of O&M), in air traffic control the overall reliability required may be higher than 99.9% and the mean time between failures (MTBF) for the building services will therefor need to be of the same order as the equipment providing the air traffic control service. The risk to life may be the highest priorities, but all risks will include some measure of financial risk, either direct or consequential.

B.- Operation and maintenance risks

The management of operational risk is significantly important across the facility. Increasing regulatory requirements, protection of business reputation and concerns about profitability in a competitive environment drives organizations to develop systems and internal controls for identifying, understanding and managing operational risk.

In order to demonstrate appropriate management and control, operational risks must first be identified. Once identified action can be taken to mitigate the risk and/or implement appropriate management control procedures and processes, to reduce the risk to an acceptable level.

C.- Disposal risks

A time will come with any installation when it needs to be disposed or replaced. The plant should not represent a higher risk at this time than when it is in use.

Removing equipment from occupied areas presents its own special risks, especially if operational status is to be maintained. Works needs to be carefully planned and coordinated to contain risks. At such times other risks (i.e. from fire and flooding) are increased and additional precautions and adequate contingency plans should be in place.

D.- Dependency modelling

In order to implement appropriate management and control, operational risks shall been identified. Once identified, actions shall been developed to mitigate risk as well as appropriate management control procedures and processes, to reduce the risk to an acceptable level. The assessment is done through dependency modelling to identify problem areas and system weakness which have the potential to disrupt business operations. This process maps the dependencies within the organization and provide a visual tool to aid the prioritization of resources to address key problems.

The following model shows the identified risks:

Business risks

- External to facility
  - Electricity supply
  - Fuel for mechanical services
  - Flood
  - Fire
  - Snow
  - Security breach
- Internal to facility:
  - Electricity supply
  - Fuel for mechanical services
  - Flood
  - Fire
  - Snow
  - Security breach

Performance risks

- System Failure
- Partial system failure
- Environmental condition not satisfactory
- Water quality
- Occupant/user health
- Security

Procurement and delivery risks

- Quality of brief
- Contract terms
- Materials availability
- Materials quality
- On-going support for specified equipment

Design and installation risks

- Health and safety
- Budget constraints
- Legislation
- Testing and commissioning

Operation and Maintenance risks

- Scope of service provided
- Training
- Organization and staffing
- Skills and competencies
- Performance measurement
- Critical risk awareness
- Emergency response provision
- Relationship with client
- Disposal risks
- Health and safety
- Environmental implications
- Access
- Availability of installation information

Disposal

- Health and safety
- Environment

Legislation

- Access
- Original installation information

E.- System resilience

Critical business facilities are reliant upon services availability and system resilience. The impact to the airport's business through the loss of a critical building or facility must be a concern, and loss of the engineering services is the most likely and immediate cause. Whereas the engineering system may only appear to be critical to the facility in which they are housed, failure of these systems may have far reaching business implications if any of the airport's business processes are affected as a consequence. It is therefore necessary that an overall view of the airport's business activities and reliance on supporting engineering is considered, in order that support system interdependency and resilience can be fully understood. The resilience of these support systems must be adequate to satisfy the full business needs.

It is of fundamental importance that the critical plan and systems supporting the airport's business operations, including systems and communication equipment, be identified and the role it plays in supporting the business operation established.

3.2.2 Site Safety Rules

A. Developer's approach

The Developer's approach is to be complaint with all health and safety legislation which is relevant to protecting the public form construction work and maintenance activities. Following the legislation the next statements describe the Developer's approach to pedestrian protection within the O&M limits during O&M projects and maintenance activities:

- It is the Developer's duty to take reasonably practicable steps to ensure the health and safety of people who are not in the Developer's employment, such as Patrons, airlines employees, etc.
- The Developer's employees have also the duty to co-operate with the Developer on health and safety matters and not to do anything which put others at risk
- Health and Safety is taken into account and managed throughout all stages of a O&M project and/or maintenance activities, from its conception, design and planning through to site work
- Anyone engaged in the O&M projects and/or maintenance activities is competent and has made adequate provision for health and safety. This shall include measures to protect the public where necessary. For notifiable O&M projects (lasting longer that 30 days or involving 500 persons days of work) a CDM (Construction, Design, Management) coordinator shall be appointed to assist the Developer with the project
- The Developer shall provide O&M project specific health and safety information at the pre-construction/pre-maintenance stage. This information shall include, among other things, arrangements for planning and managing the work, including health and safety goals for the O&M project and arrangements for the security of the site and site hoarding requirements
- The Developer shall assess, in particular, the risks to the health and safety of employees and others who may be affected by the activities. This is for the purpose of identifying the necessary preventative and protective measures.
- Regarding the control of substances hazardous to health, the Developer is aware and committed with the duties related to the use of these substance There is a wide range of substances which can give a risk to people's health. Many of these duties extend not only to employees but to any other person, whether at work or not, who may be affected by the work carried out, including members of the public (patrons, airlines employees, airport users, etc.)

No maintenance or renovation project shall be performed within the O&M limits unless the pedestrian are protected.

Each application for any kind of O&M project as well as any maintenance activity shall be reviewed to determine if pedestrian protection is required for carrying out the scheduled project and/or activities. When protection is required, the following paragraphs, in this section, set out a number of guidelines and precautions that the Developer will take into consideration.

B. Pedestrian Considerations

A wide range of pedestrians might be affected by maintenance activities and/or O&M projects within the O&M limits, including the young, elderly, and people with disabilities such as hearing, visual, or mobility. These pedestrian need a clearly delineated and usable travel path.

The applied standards by the Developer are:

- The various provision of O&M projects and maintenance activities for pedestrian and worker safety set forth in the O&M manual shall be applied by knowledgeable persons after appropriate evaluation and professional judgement
- Advance notification of closures shall be provided by the O&M management
- If the O&M projects and/or maintenance activities affects the movement of pedestrian, adequate pedestrian access (and/or walkways) shall be provided. If the zone of the O&M projects and/or maintenance activities affects an accessible and detectable pedestrian facility, the accessibility and detectability shall be maintained along the alternate pedestrian route.

C. Accessibility Considerations

The extent of pedestrian needs should be determined through engineering judgement or by the Developer' staff for each situation of an O&M project and/or maintenance activity. Adequate provisions should be made for pedestrians with disabilities.

For this, the applied standards by the Developer are:

- When existing pedestrian facilities are disrupted, closed, or relocated, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility. For pedestrian with visual disabilities, a barrier that is detectable by a person with a visual disability traveling with the aid of a long cane shall be placed across the full width of the closed path.

Maintaining a detectable, channelized pedestrian route is much more useful to pedestrians who have visual disabilities that closing a path and providing audible directions to an alternate route involving additional crossings and returns to original routes.

Because printed signs and surface delineation are not usable by pedestrian with visual disabilities, blocked routes, alternate routes, and sign and signal information should be communicated to pedestrian with visual disabilities by providing audible information devices, accessible pedestrian signals, and barriers and channelizing devices that are detectable to pedestrians traveling with the aid of a long cane or who have low vision.

D. Site perimeter and other boundaries

This part of this section is to describe how the Developer shall plan, provide and maintain suitable perimeters and barriers at locations within the O&M limits where it is necessary to separate and protect the public and others form the work.

<u>Planning</u>

For most O&M project and maintenance activities areas the perimeter is a geographical area within which construction of maintenance work will be carried out. Determining this perimeter is an important aspect of managing the Airport's public space. Three issues need to be considered:

- Planning what form the perimeter will take.
- Providing the perimeter.
- Maintaining what has been provided

If the O&M project or maintenance task will be subcontracted, identifying the issues at pre-tender stage allows specific terms to be included in the project as it is important that the contractors take them into account when tendering.

Risk assessment shall decide how the perimeters will be defined, what type will be needed to protect the public and where it should be placed. Factors to consider will include:

- The nature and type of O&M project within the O&M limits.
- How the public flow is around that specific area.
- Whether the work area may attract children.
- Area characteristics.

When planning for the delivery of materials there are many positive precautions that shall be taken to ensure people outside the area are protected including:

- Plan delivery to make sure they do not coincide with airport peak hours and its corresponding pedestrian traffic or consider whether the deliveries should be scheduled at times outside of these peak hours.
- Provide specific measures for safer movement of goods on and to the work area.

For higher risk activities, such as cranes, fork-lift trucks or similar, it may be necessary to temporarily extend the existing site perimeter while the work with these equipment is carried out. Alternative pedestrian routs may be required.

The precautions taken to secure the site perimeter shall reflect the level of risk.

During the planning of the O&M project and/or maintenance activities certain issues may be identified and it may be necessary to consider appropriate closure and start the required closure requests with the Owner as early as possible.

O&M projects and maintenance activities can present a risk outside the work site/area perimeter. These risks might include materials falling from access platforms, materials stored temporarily off site, the operation of cranes and other lifting equipment either on or off site. This can change as the project/maintenance work progresses. The process of risk assessment shall have identified these areas as well as any necessary control measures.

The Developer shall pay attention to ensure that equipment and parts of equipment such as elbows of cranes, loaders, etc. do not swing into the path of airport vehicles or pedestrians.

Provision

Fences are effective work site/area barrier for most indoor projects/maintenance activities. These perimeter fences can be constructed from a range of materials, including metal mesh. If a fence is to be used then it should be difficult to climb. Using a close mesh which prevents children getting their hands and feet through should mean that no one can gain handholds or footholds. Sectional fencing should be locked together and not easily separated without using a tool from the inside of the site/area. The Developer shall also keep gaps underneath the fence or gate as small as possible to stop anyone gaining access under the fence, making sure children cannot get access through gaps under temporary fencing. Where the feet of sectional fencing points into pedestrian areas, they shall be highlighted to avoid tripping hazards.

In case of O&M project that last for several days and more, securable gates at access points shall be provided. These gates shall form part of the fence and be of the same size. Controlling access through gates is very

important and the secured gate shall be ensured. In some projects or maintenance activities, it may also be necessary to close the gate while work is in progress. However, this must not hamper the ability to escape in an emergency. The gate shall be kept locked when the site/area is not occupied.

Site storage compounds should, whenever possible, be adequate to accommodate all the plant, equipment and materials out of working hours. Strict control over the amount and timing of deliveries will keep storage to a minimum outside the compound area. Sometimes the compound may be in a different area, but still will need the same level of protection, signing, etc. The Developer shall avoid storing materials in a way which allows the fence to be climbed more easily. Some materials can pose a significant fire risk and separate, properly constructed, secure compound may be needed for these materials.

Path deviations

The Developer recognizes that pedestrians are reluctant to retrace their steps or to add distance or out-out-the-way travel to a destination. Therefore the following guidance is applied by the Developer:

- Pedestrians should not be led into conflicts with airport vehicles, equipment and operations.
- Pedestrians should not be led into conflicts with vehicles moving through and around the work or activity site.
- Pedestrians should be provided with a convenient and accessible path that replicates as nearly as practical the most desirable characteristics of the existing walkways or footpaths.

The pedestrian routes should not be severed and/or moved for non-project or non-maintenance activities such as parking for vehicles and equipment needed for the project or maintenance activity.

Consideration should be made to separate pedestrian movements from worksite activity. Unless an acceptable route, that does not involve crossing the terminal, can be provided, pedestrian should be appropriately directed with advance signing that encourages them to cross to the other side of the Terminal.

To accommodate the needs of pedestrian, including those with disabilities, the following considerations should be addressed when temporary pedestrian walkway in the project or maintenance zone are designed or modified:

- Provision for continuity of accessible paths for pedestrians should be incorporated into the project plan or maintenance schedule.
- The geometry and alignment of the facility should meet the applicable requirements of the “Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADDAAG).
- Pedestrian control devices and other construction or maintenance materials and features should not intrude into the usable width of the temporary pathway or other pedestrian facility.
- Blocked routes, alternate paths, signs and visual information should be communicated to pedestrians with visual disabilities by providing devices such as audible information devices, accessible pedestrian signals, or barriers and channelizing devices that are detectable by pedestrians that walk with the aid of a long cane or who have low vision.

- When channelization is used to delineate a pedestrian pathway, a continuous detectable edging should be provided throughout the length of the facility such that pedestrians using a long cane can follow it.

Project or maintenance closing off

Whenever it is feasible, the Developer shall close off the worksite (O&M project and/or maintenance activity) from pedestrian intrusion rather than channelizing pedestrian traffic along the site. For this, the following guidance is applied by the Developer:

- Fencing should not create sight distance restrictions for airport users. Fences should not be constructed of materials that would be hazardous if impacted by trolleys or airport vehicles.
- Movement by work vehicles and equipment across designated pedestrian paths should be minimized and, when necessary, should be controlled by staff of the Developer in order to inform and protect pedestrians. Stopping of work vehicles or equipment, along the side of pedestrian paths should be avoided, since it encourages movement of workers/maintenance staff, equipment, and materials across the pedestrian path.
- Access to the work space by workers/maintenance staff across pedestrian walkways should be minimized.

Canopied walkways

A canopied walkway may be used to protect pedestrian from falling debris, and to provide a covered passage for pedestrian. For this, the following guidance is applied by the Developer:

- Covered walkways should be sturdily constructed and adequately lighted if required
- If a temporary barrier is used to shield pedestrians, it should be designed to accommodate the airport's closure conditions.

Maintenance

Site/area perimeters may need to change as the O&M project/maintenance activities progresses. The Developer shall plan how to ensure the perimeters remain current and effective. Control measures may include nominating and individual to manage the perimeter and check it is adequately maintained. If the area/site is changed, the signs shall be altered accordingly.

E. Specific hazards, risks and their control

Risk assessment will identify whether precautions over and above those taken to protect workers shall be taken to protect others. Following some common hazards are outlined and the precautions needed to control the risk of pedestrians. It is not an exhaustive list.

Scaffolding and other access equipment

The erection, dismantling and use of scaffolding and other access equipment, like mobile elevators, present various risks because pedestrians can be struck by:

- Components which are being moved across public area within the O&M limits during erection or dismantling.
- Components which fall during erection or dismantling.
- Stored materials or debris which fall off or through gaps in the working platform.

- Scaffolding and other equipment which collapses because it is not properly designed, erected or secured.
- Plant or equipment which collapses as a result of instability or following impacts.
- Moving parts of mobile access equipment erected in an area to which the pedestrians have access.

Where access equipment is not adequately fenced off pedestrians, they may also:

- Walk into or otherwise make contact with access equipment.
- Gain access on to the equipment and the fall of or through the working platform or ladder.
- Use the equipment to gain access to other elevated areas and subsequently fall from there.
- Use debris chutes as slides.

These last three issues are often a particular problem with children.

Precautions

As mentioned in section 10.7 Closures, the Developer shall be collaborating closely with the Owner in closures and follow the agreed protocols for obtaining the corresponding approvals. Regardless of the closure protocols, the Developer shall take certain precautions which are:

- Exclude pedestrian from the work area whenever possible.
- Fence off area and provide alternative routes which are clearly signposted.
- Erect, modify and dismantle equipment when there will be fewer pedestrians in the area and always use warning notices.
- Fans, tunnels and sheeting are a useful means of protection. Make sure the scaffold is designed to take the extra loading.
- Protective measures shall be put in place at an early stage during erection and shall be removed as late as possible during dismantling.
- Lighting may be necessary in tunnels.
- No materials or components shall be dropped or thrown during erection or dismantling.
- Make sure the working platforms are constructed to prevent materials falling through it;
- Bolts on couplings shall be face away from the pedestrian or shall be wrapped.
- Consider enclosing the base of the scaffolding to prevent climbing.
- Out of hours, remove ladders from the scaffold. Secure them in a compound or in storage containers.
- Consider using alternatives to scaffolding such as mobile elevating work platforms, cradles and mast climbers. These can reduce the likelihood of pedestrian gaining access to heights providing the equipment is properly isolated when not in use.
- Debris chutes should be protected either by providing lids or covers, etc.

F. Openings

Pedestrian can be injured if they fall:

- Into floor holes, manholes or other holes in the floor.
- Over open edges such as stairwells or open floor edges.
- On to pointed metal or timber objects such as projecting reinforcement bars.

The risk of injury of pedestrians shall be reduced in a number of ways:

- Provide guard rails and toe boards or similar where it is possible to fall.
- Barriers shall be placed at least 1 m away from the edge of the excavation.
- Securely fixed marked covers may also be used.
- Openings, shafts, etc. shall be protected from approaching pedestrians.
- Make sure that any precautions do not obscure the view of pedestrians and airport vehicles drivers. Use vision panels in solid barriers or keep their height to a level that pedestrians can see over.

G. Slip, trips and falls within O&M limits

Slips, trips and falls are a frequent source of injury of pedestrians. Inadequate protection of holes, uneven surfaces, poor reinstatement, trailing leads and cables, spillage of oils, etc. are just some of the causes. Poor storage of materials and equipment and other obstructions in public areas, including inadequate control of waste materials, are other common causes.

The risks shall be reduced in the following ways:

- Segregate or control access to the work area by physical barriers or warning signs. If tape is used ensure it does not become a tripping hazard itself.
- Work during non-peak hours of the airport when the pedestrians are less likely to be in the area.
- Provide clear signs and proper protection at obstructions.
- Use temporary flooring material, e.g. plywood or steel plates, to cover uneven floors or holes.
- Avoid trailing cables (especially on stairways). Cover or fix any which need to cross pedestrian areas.
- Provide lighting if needed.
- Remove waste and rubbish as it arises.
- Reinstate surface properly and as soon as work is complete.
- Clear all spillages and obstructions from pedestrians routes as soon as possible and always before the pedestrians are allowed access to the area again.

H. Plan machinery and equipment

The authorised and unauthorised use of equipment presents a range of hazards. Almost any piece of plant is dangerous in the wrong hands and some plants can be started easily without the proper keys or tools.

The risks shall be reduced in the following ways:

- All plant shall be immobilised out of hours.
- Keys and starting handles shall be removed and tried to store them in a compound or similar secure area.
- Cab covers also make vehicles more difficult to enter.
- If used inside the O&M limits, place excavator buckets, lift-truck forks, etc. on the ground at the end of the day.
- If used inside the O&M limits, the fork-lift trucks shall not be driven along pedestrians paths with the forks raised too much. The driver shall have a clear view.
- Avoid lifting across pedestrians areas if possible.
- Properly support and choc bowers to prevent accidental displacement.
- Check that all equipment operatives are competent.
- Remove cartridge guns and cartridges from site, or lock them up at the end of the day. Clear up all used and misfired cartridges at least daily.

I. Hazardous substance

Pedestrians may be affected by poor storage, transportation, use or disposal of hazardous substances. Other substances cause ill-health effects when they are inhaled, swallowed or come into contact with the skin or eyes. Flammable liquids and gases can cause fires or even explosions. Some substances and materials, such as foams, give off toxic fumes when burned.

The precautions taken to protect workers from these substances will often reduce the risk to everyone else and in particular the pedestrians:

- Use less hazardous materials if possible, e.g. water rather than solvent-based paints.
- Change the way work is done, e.g. use water suppression or local exhaust ventilation where dusts are created.
- Apply solvent-based paints or adhesives by brush rather than spraying.
- Exclude everyone not directly involved in the work from the vicinity – this can be particularly necessary during woodworm and damp-proof chemical treatments.
- Plan and control the amounts ordered and delivered.
- Limit the amount of flammable or hazardous substances handled or used on site at one time.
- Only decant hazardous materials into suitable, properly marked containers; collect and dispose of empty containers.
- Store all hazardous substances in suitable containers or in secure compounds when not in use.

J. Storing and staking materials

The storage of materials presents several hazards:

- Materials may fall from storage areas, scaffolds or other working platforms.
- Part-opened pallets and badly stored bricks can topple.
- Certain materials which are stored upright can topple over.
- People can fall from the top of storage areas, stacks, etc. They may also be used as a means of climbing on to other positions of danger.
- The pedestrians may be struck by materials and plant or exposed to hazardous substances.
- During the transfer of materials between off-site storage areas and the site.

<u>Precautions</u>

The risks associated with the storage of materials shall be reduced in several ways:

- All materials shall be stored within the site perimeter, preferably in secure compounds or away from the perimeter fencing when needed. The area should be will lit to discourage unauthorised entry.
- Pallets shall be stored on the floors no more than three high. Special consideration is taken when packaging is broken as the contents of pallets become less stable once the packaging is broken.
- Materials such as plywood shall be stored horizontally and secured.
- Vertical stacks of materials and materials stacked against walls, etc. shall be propped and secured to prevent them toppling.
- Loose materials stored on platforms or other similar areas cannot fall accidentally. Toe boards and brick guards shall be in place. Materials shall not be stacked above the height of the brick guards.
- The height of all material stacks shall be limited.

- Prevent items such as scaffolding tubes from falling or toppling over. If it is impracticable to store them other than vertically, even for a short period, then steps will be taken to ensure they do not topple over.
- Avoid storing materials off site where possible. If it is unavoidable, position storage areas away from busy pedestrians routes, and keep distances between stores and the site as short as possible. Warning signs shall be posted.

K. Electricity and other energy sources

Energy sources on site present a range of hazards:

- Contact with electrical supplies or arcing can cause shock, burns and even death.
- Bottled gases can cause fire or explosions if they are not stored safely or in they are tampered with.
- Fuel and gas oil can also ignite causing burns.

Precautions

These risks shall be reduced at the planning stages and while work is being carried out in the following way:

- Use a suitable protected supply, cordless tools or reduced voltage equipment, e.g. 110 V centre tapped. For other purposes, such as lighting, it may be possible to use even lower voltages.
- Place lights out of reach and away from other parts of the electrical system which may expose pedestrians to danger.
- Make sure gas cylinders and appliances are fitted with valves which require special tools to turn on the supply.
- Isolate gas cylinders when not in use and lock them in a secure cage out of hours;
- Secure cylinders to prevent toppling.
- Avoid lighting wires. Some substances give off toxic fumes when burned.

L. Dust, noise and vibration

Dust, noise and vibration do not usually pose a health risk to pedestrians if their exposure is likely to be low and of a short duration. Dust, noise and vibration are a common source of complaints.

Precautions

The controls adopted to protect the workforce will often reduce the risk of the nuisance to others;

- Use noise suppression on equipment.
- Adopt different work methods, e.g. when cutting paving slabs consider the use of guillotines rather than disc cutters.
- Use stacks of materials or existing features as temporary noise barriers;
- Use low-dust products.
- Use water suppression or exhaust ventilation.
- Carry out the work off site.
- Work at times when the pedestrians are less likely to be in the area.
- Provide solid barriers adjacent to pedestrians areas.

M. Falling objects

Falling objects can cause serious injuries to pedestrians.

Precautions

Priority shall be given to stopping materials falling in the first place. First, the Developer shall focus in stopping materials falling, then it shall pay its attention to stop pedestrians being struck by any materials which do fall:

- Always plan how materials will be raised and lowered.
- Materials shall not be thrown into an uncontrolled area and use chutes for debris, if required.
- Provide an enclosed hoist platform and carefully position gin wheels, etc. If possible, working above public area shall be avoided.
- Ensure there are safe systems of work when dismantling equipment, e.g. striking formwork or dismantling scaffold to prevent components and timbers falling into pedestrians areas.
- Provide debris netting to trap small pieces of ejected material.
- Material storage shall be kept to a minimum.
- Protected walkways may be needed in some circumstances, e.g. demolition sites where materials could fall into pedestrian areas.
- Where it is no possible to eliminate the risk of materials falling or being ejected, the area shall be fenced off or at least demarcated. Only authorised people shall enter an even their access shall be controlled to avoid times when there is a risk of them being struck.
- Areas of risk shall be identified and put up warning signs.

N. Delivery and other site vehicles

Delivery and other moving site vehicles create several hazards:

- Pedestrians may be struck by vehicles entering or leaving the site.
- People falling form vehicles on to pedestrians.
- Site and delivery vehicles may obstruct pedestrians walkways or paths.
- Unsecured loads or those moved during transit may fall off, striking pedestrians.
- Unauthorised use of vehicles which are not switched off or locked when the driver is not in the cab.
- Vehicles may take contaminated material off site on their wheels.

Precautions

It is important to consider access and approaches to the site during the planning stage. The risk to pedestrians can be reduced in several ways:

- Segregate pedestrians and vehicles wherever possible.
- Divert site traffic away from pedestrian areas.
- Make sure there are adequate measures to prevent people falling from vehicles.
- Control stock to make sure to have the right materials at the right time.
- Wherever possible, provide adequate space on site for offloading vehicles.
- Allow sufficient clearance around mobile loading arms.
- Choose delivery times which avoid busy pedestrian traffic.
- Use a banksman to direct pedestrian and to assist with loading and unloading.
- Give delivery companies advance notice of loading/unloading arrangements, etc.
- Make sure loads are properly secured.
- Provide wheel washers and make sure drivers use them before entering the O&M limits.
- Secure vehicles and plant when not in sue. If possible, leave them in a secure area overnight and immobilise them.

O. Vulnerable groups

Vulnerable groups such as elderly, children and people with disabilities may need special attention. Work and maintenance in the O&M limits within the airport premises requires careful thought and planning.

The disabled

The disabled are especially at risk where O&M projects and maintenance activities affects pedestrian routes, e.g. cabling installations or scaffold erection inside the pedestrian areas. It is therefore important to identify whether your work will affect a route or path within the O&M limits which is used by people including those with disabilities. Therefore, certain procedures shall be followed and precautions shall be taken.

Children

The death or injury of a child is particularly tragic and a lot of effort must go into keeping them out of the work area and away from danger. Children do not have the ability to perceive danger in the same way as adults do.

Some children are drawn to constructions projects or maintenance activities areas as exciting places to play. The Developer shall do everything in order to keep them out of that area and away from danger.

The following specific steps are particularly relevant to child safety:

- Secure sites adequately when finishing work (for the day or for breaks).
- Barrier of or cover floor holes and pits.
- Isolate and immobilise vehicles and plant and if possible lock them in a compound.
- Store building/construction/maintenance material so that they cannot topple or roll over.
- Remove access ladders.
- Lock away hazardous substances.

The Developer shall make subcontractors, delivery drivers and others aware of all restrictions regarding children before they arrive on the O&M project or maintenance area. This is particularly important as the airport premises are considered a safe place to let children walk a run on their own. Suitable steps shall be taken to ensure that everyone observes the rules regarding children.

3.2.3 Personal Protective Equipment (PPE)

Personal protective equipment, commonly referred to as "PPE", is equipment worn to minimize exposure to hazards that cause serious workplace injuries and illnesses. These injuries and illnesses may result from contact with chemical, radiological, physical, electrical, mechanical, or other workplace hazards. Personal protective equipment may include items such as gloves, safety glasses and shoes, earplugs or muffs, hard hats, respirators, or coveralls, vests and full body suits.

The Developer's approach in its hierarchy of controls, personal protective equipment is considered the least satisfactory method in preventing of work-related injury or illness and is only to be used when other measures are not feasible or cannot be implemented immediately. PPE shall be used, to supplement or augment other means of hazard control, to further minimize the risk of injury.

The following types of personal protective equipment can be used by the Developer:

- Respiratory protection (disposable, cartridge, air line, half or full face).
- Eye protection (spectacles/goggles, shields, visors).
- Hearing protection (ear muffs and plugs).
- Hand protection (gloves and barrier creams).
- Foot protection (shoes/boots).
- Head protection (helmets, caps, hoods, hats).
- Working from heights (harness and fall arrest devices).
- Skin protection (hats, sunburn cream, long sleeved clothes).
- Other personal protective equipment. This may include PPE for specific tasks such disposable clothing for working with chemicals, welding, painting, etc.

The Development management is aware of its responsibilities for equipment and shall ensure that:

- The needs for PPE are assessed by a person who is competent to judge whether other methods of risk control can offer better protection of safety and health than the provision of PPE.
- Professional advice is obtained, where necessary, to identify the most suitable types of PPE for the tasks to be carried out.
- Training is provided to supervisors and employees to enable them to ensure the proper selection, fit, use, cleaning and maintenance of PPE.
- Supervision and enforcement of the PPE policy is undertaken.
- Evaluation of the effectiveness of the PPE program is carried out on a regular basis.
- Suitable PPE is provided for visitors who may be exposed to hazards in the workplace. Equipment shall be properly cleaned before re-issue.
- All equipment complies with current relevant U.S.A. Standards and should be stamped or labelled with a corresponding compliance marking. Existing PPE shall be re-assessed regularly to ensure compliance.

3.2.4 Hazardous substances

All hazardous substances of materials, components, cleaning, etc. are listed in their corresponding file (Equipment Data Sheet, Standard Operating Procedures and/or Manufacturer's Manual); see annex B – O&M Equipment Manuals.

3.2.5 Safe Work Method Statements

The Developer shall create SWMS (safe work method statements) sheets for all activities that require the corresponding attention as part of the Developer's Workplace Safety Management Plan. See annex G – SWMS template.

4 Quality management Plan

4.1 Background

4.1.1 Introduction

The Maintenance Manager and O&M supervisor has the primary responsibility for quality assurance/ quality control (QA/QA). They monitor required inspections and submit monthly QA/QC and exceptions reports to management. Developer's CMMS generate reports of the data entered and highlight occurrences where either work or inspections were completed late. The Developer reviews daily the performance and weekly dashboards to identify problems and address unresolved issues before they become system failures, unmet Performance Standards or facility emergencies. The O&M supervisor verifies the inspection performed, whether the work performed met Performance Standards and what remediation actions, if any, were taken for any substandard contract performance.

The combination of setting specific expectations (for maintenance activities, inspections and follow-up) in contracts, job description and/or other documents with the final level of inspection will ensure that all required maintenance activities are completed as scheduled and conform with the Performance Standards.

For cost management, the Developer will develop annual budgets and track monthly expenditures for operations, maintenance and renewal work. Contingencies will provide for unexpected repairs and additional work identified during inspection. Forecast using actual and projected expenditures will produce trends and provide early identification and resolution of potential budget concerns.

Quality Management shall be complaint with section 8 "Quality Management Plan" of the Project Management Plan and with section I.10.8 of the Technical Requirements.

4.1.2 Quality Management Plan Objective

The Developer's overall commitment to quality in work practice and service delivery is defined through the processes defined in various sections of this O&M plan. Through these sections, together with the Developer Agreement, the O&M plan is aligned with goals and strategic direction of the Developer. The O&M plan defines the Developer's commitment:

- By demonstrating its ability to consistently provide quality service that meets the Owner's and applicable regulatory requirements.
- By addressing customer satisfaction through effective application of the system, including processes for continual improvement and the prevention of nonconformity.
- Through employee empowerment, especially for innovative action to improve the Developer's performance.
- Through orderly change management that will maintain a high level of service in technologically complex and fast pace environments, both to accommodate technological change and for continual improvement of the skills and capability.

The O&M plan provides an overview of the quality policies and key requirements for the Developer. It is the source of reference for all matters dealing with quality. It is an open document, that means it is available for inspection and review, including for regulatory agencies.

O&M management shall ensure that quality objectives, including those needed to meet requirements for services, as describe in the O&M plan, are established at relevant functions and levels within the organization. The quality objectives shall be measurable and consistent with the quality policy.

Appropriate levels and type of monitoring and measurement or Developer's responsibilities are determined and documented in relevant policies and procedures in this O&M plan.

The Quality Management Objectives are:

- To be complaint with the Developers Agreement.
- To maintain an effective Quality Assurance System.
- To achieve and maintain a level of quality which enhances the Developer's reputation with the Owner and its clients (Patrons, airlines, airlines employees, providers, etc.).
- To ensure compliance with relevant statutory and safety requirements.
- To endeavour, at all times, to maximize customer satisfaction with the services provided by the Developer.

4.1.3 Quality Policy

O&M management shall ensure that the quality policy

a) Is appropriate to the purpose of the organization.
b) Includes a commitment to comply with requirements and continually improve the effectiveness of the quality management system.
c) Provides a framework for establishing and reviewing quality objectives.
d) Is communicated and understood within the Developer's organization.
e) Is reviewed for continuing suitability.
f) Is to work safely and accurate in the performance of our activities and tasks, thereby ensuring the safety and comfort of the airport users in general within the Developer's scope of responsibility.

The quality policy and quality objectives are relevant to the Developer's organizational goals and the expectations and requirement of the Owner. These concepts shall be communicated to all employees within the scope of the QMS.

4.2 Quality Management

The adoption of the quality management system is a strategic decision for the Developer that will help to improve overall performance and provide a sound basis for sustainable development initiatives. The potential benefits of implementing a quality management system is based on international standards and are:

- The ability to consistently provide services that meet customer and applicable statutory and regulatory requirements.
- Facilitating opportunities to enhance customer satisfaction.
- Addressing risks and opportunities associated with its context and objectives.
- The ability to demonstrate conformity to specified quality management system requirements.

The quality management system approach incorporates the Plan-Do-Check-Act (PDCA) cycle and risk-based thinking. This approach enables the Developer to plan processes and interactions. The PDCA cycle enables the

Developer to ensure that its processes are adequately resourced and managed, and those opportunities for improvement are determined and acted on.

Risk-based thinking enables the Developer to determine the factors that could cause its processes and its quality management system to deviate from the planned result, to put in place preventive controls to minimize negative effects and to make maximum use of opportunities as they arise.

Consistently meeting requirements and addressing future needs and expectations poses a challenge for the Developer in an increasingly dynamic and complex environment.

4.2.1 Quality management principles

The Developer's quality management system is based on the quality management principles described in ISO 9000. The description include a statement of each principles, a rationale of why the principle is important for the Developer and some benefits associated with the principle.

The quality management principles are:

- Customer focus.
- Leadership.
- Engagement of people.
- Process approach.
- Improvement.
- Evidence-based decision making.
- Relationship management.

A. Customer focus

Statement

The primary focus of the Developer's quality management is to meet customer requirement and to strive to exceed customer expectations.

Rationale

Sustained success is achieved when an attracts and retains the confidence of the Owner and other stakeholders. Every aspect of interaction with the Owner provides an opportunity to create more value for the Owner. Understanding current and future needs of the Owner and other stakeholders contributes to sustained success of the Developer.

Actions that can be undertaken to achieve customer focus

- Recognize direct and indirect customer as those who receive value from the Developer's service performance.
- Understand the Owner's current and future needs and expectations.
- Link the Developer's objective to customer needs and expectation.
- Communicate customer needs and expectations throughout the Developer's organization.
- Plan, design, develop, produce, deliver and support services to meet the Owner's needs and expectations.
- Measure and monitor the Owner's satisfaction and take appropriate actions.
- Determine and take actions on interested parties' needs and expectations that can affect the Owner's satisfaction.

- Actively manage relationship with the Owner to achieve sustained success.

B. Leadership

Statement

Leaders at all level establish unity of purpose and direction and create conditions in which people are engaged in achieving the Developer's quality objectives.

Rationale

Creation of unity of purpose and direction and engagement of people enables the Developer to align its strategies, policies, processes and resources to achieve its objectives.

Actions that can be undertaken to achieve leadership

- Communicate the Developer's mission, vision, strategy, policies and processes throughout the Developer's organization.
- Create and sustain shared values, fairness and ethical models for behaviour of all levels of the organization.
- Establish a culture of trust and integrity.
- Encourage an organization-wide commitment to quality.
- Ensure that leaders at all levels are positive examples to people in the organization.
- Provide people with the required resources, training and authority to act with accountability.
- Inspire, encourage and recognize people's contribution.

C. Engagement of people

Statement

Competent, empowered and engaged people at all levels throughout the organization are essential to enhance its capability to create and deliver value.

Rationale

To manage the Developer's organization effectively and efficiently, it is important to involve all people at all levels and to respect them as individuals. Recognition, empowerment and enhancement of competence facilitate the engagement of people in achieving the Developer's quality objectives.

Actions that can be undertaken to achieve engagement of people

- Communicate with people to promote understanding of the importance of their individual contribution.
- Promote collaboration throughout the organization.
- Facilitate open discussion and sharing of knowledge and experience.
- Empower people to determine constraints to performance and to take initiatives without fear.
- Recognize and acknowledge people's contribution, learning and improvement.
- Enable self-evaluation of performance against personal objectives.
- Conduct surveys to assess people's satisfaction, communicate the results and take appropriate actions.

D. Process approach

Statement

Consistent and predictable results are achieved more effectively and efficiently when activities are understood and managed as interrelated processes the function as a coherent system.

Rationale

The quality management system consists of interrelated processes. Understanding how results are produced by this system enables an organization to optimize the system and its performance.

Actions that can be undertaken to achieve process approach

- Define objectives of the system and processes necessary to achieve them.
- Establish authority, responsibility and accountability for managing processes.
- Understand the Developer's capabilities and determine resource constraints prior to actions.
- Determine process interdependencies and analyse the effect of modifications to individual processes on the system as a whole.
- Manage processes and their interrelations as a system to achieve the Developer's quality objectives effectively and efficiently.
- Ensure the necessary information is available to operate and improve the processes and to monitor, analyse and evaluate the performance to the overall system.
- Manage risks that can affect outputs of the processes and overall outcomes of the quality management system.

E. Improvement

Statement

The Developer's organizations has an on-going focus on improvement.

Rationale

Improvement is essential for the Developer to maintain levels of performance, to react to changes in its internal and external conditions and to create new opportunities.

Actions that can be undertaken to achieve improvement

- Promote establishment of improvement objectives and tall levels of the Developer's organization.
- Educate and train people at all levels on how to apply basic tools and methodologies to achieve improvement objectives.
- Ensure people are competent to successfully promote and complete improvement projects.
- Develop and deploy processes to implement improvement project throughout the Developer's organization.
- Track, review and audit the planning, implementation, completion and results of improvement projects.
- Integrate improvement consideration into the development of new or modified goods, services and processes.
- Recognize and acknowledge improvement.

F. Evidence-based decision making

Statement

Decision based on the analysis and evaluation of data and information are more likely to produce desired results.

Rationale

Decision making can be a complex process, and it always involves some uncertainty. It often involves multiple types and sources of inputs, as well as their interpretation, which can be subjective. It is important to understand cause-and-effect relationships and potential unintended consequences. Facts, evidence and data analysis lead to greater objectivity and confidence in decision making.

Actions that shall be undertaken to achieve evidence-based decision making

- Determine, measure and monitor maintenance indicators to demonstrate the Developer's performance.
- Make all data needed available to the relevant people.
- Ensure that data and information are sufficiently accurate, reliable and secure.
- Analyse and evaluate data and information using suitable methods.
- Ensure people are competent to analyse and evaluate data as needed.
- Make decisions and take actions based on evidence, balanced with experience and intuition.

G. Relationship management

Statement

For sustained success, the Developer manages its relationship with interested parties, such as providers, the Owner and Owner's providers, Patrons, airline employees, etc.

Rationale

Interested parties influence the performance of the Developer. Sustained success is more likely to be achieved when the Developer manages relationships with all of its interested parties to optimize their impact on its performance. Relationship management with these interested parties is of particular importance.

Actions that can be undertaken to achieve relationship management

- Determine relevant interested parties (such as the Owner, the Owner's providers, Patrons, airlines employees, etc.).
- Determine and prioritize interested party relationships that need to be managed.
- Establish relationships that balance short-term gains with long-term considerations.
- Pool and share information, expertise and resources with relevant interested parties.
- Measure performance and provide performance feedback to interested parties, as appropriate, to enhance improvement initiatives.
- Establish collaborative development and improvement activities with interested parties.
- Encourage and recognize improvements and achievements by suppliers and partners.

4.2.2 Quality Management Structure and responsibility

O&M management shall ensure that responsibilities and authorities are defined and communicated within the organization.

Management representative

O&M management shall appoint a member of the organization's management who irrespective of other responsibilities, shall have responsibility and authority that includes:

a) Ensuring that processes needed for the quality management system are established, implemented and maintained.
b) Reporting to top management on the performance of the quality management system and any need for improvement.
c) Ensuring the promotion of awareness of customer requirements throughout the organization.

The O&M management also acts as the liaison between the Developer's organization and other third parties on matters concerning the Developer's Quality Management System.

See section 2. Management and staffing plan for the Quality Management assignment.

Management review

O&M management shall review the Developer's quality management system annually, to ensure its continuing suitability, adequacy and effectiveness. This review shall include assessing opportunities for improvement and the need for changes to the quality management system, including the quality policy and quality objectives.

Review input

The input to management review shall include information on:

a) Results of audits.
b) Customer feedback.
c) Process performance and service conformity.
d) Status of preventive and corrective actions.
e) Follow-up actions from previous management system.
f) Recommendations for improvement.

Review output

The output from the management review shall include any decisions and actions related to:

a) Improvement of the effectiveness of the quality management system and its processes.
b) Improvement of product related to the Owner's requirement.
c) Resource needs.

The results of management reviews shall be recorded.

4.2.3 Project Team

O&M management shall determine and provide, in a timely manner, the resources needed:

- To implement, maintain and improve the effective operations of the QMS processes.
- To enhance customer satisfaction by meeting requirements.

Personnel who are assigned responsibilities directly or indirectly affecting conformity to service requirements are determined to be qualified and competent based on education, training, observed skills, and experience.

The Developer shall identify training needs and provide training of all personnel performing activities affecting quality. A training plan shall be prepared and scheduled annually with periodic updates. Training shall be provided either on or off the job, internally or externally, as appropriate. The on-going effectiveness of training shall be periodically assessed by observation, proficiency testing or other appropriate means.

4.2.4 Control of documents

Records established to provide evidence of conformity to requirements and of the effective operation of the quality management system shall be controlled.

The Developer shall establish a documented procedure to define the controls needed for the identification storage, protection retrieval, retention and disposition of records,

Records shall remain legible, readily identifiable and retrievable.

4.2.5 Project Records

The Developer shall record every single task and/or activity performed to comply with the Developer's Agreement. These records will be stored and maintained in digital format, and are subject to "back-up" at regular intervals, with the "back-up" information being stored in a protected location to ensure security form loss/damage of active data.

All records shall be retained as defined in the requirements.

4.2.6 Communication

Operating and maintenance information

The engineering plant and services installed within the O&M limits of the Airport are of increasing technical complexity. If the requirements of the building user are to be satisfied, detailed, comprehensive and well-presented information must be available to those responsible for operation and maintenance covering the exact plant installed, the design operating parameters and maintenance instructions. The preparation and presentation of a well-prepared operation and maintenance manual should be an essential part of the building services contract.

A proper prepared manual can be expected to produce cost benefits to offset the initial outlay on its preparation such as:

- Providing the basis for correct and efficient plant operation.
- Providing and information base for effective maintenance.
- Providing a comprehensive reference source.
- Providing a reference for the standards used during design and installation.
- Ensuring the most economic use of energy.
- Helping to create and develop safety awareness.
- Providing a basis for staff training.
- Providing a basis for maintenance training.
- Providing a reference point for emergency procedures.

The importance of O&M manual

The requirement for the health and safety file confirm the need for high-quality operation and maintenance manuals and record drawing. Further recognition of the importance of this information being made available is the requirement that the Owner shall be provided with sufficient information about the fixed building services

within the O&M limits and their maintenance requirements so that the building can be operated in such a manner as to use no more fuel and power that is reasonable in the circumstances. The way of showing compliance will be the *O&M limits log book*. The O&M limits log book will draw or refer to information available as part of other documentation required for seamless communication between the Developer and the Owner.

Health and safety file

The health and safety file is a record of information for all stakeholders, which focuses on health and safety. The information it contains will alert those who are responsible for the installation of the key health and safety risks that will need to be dealt with during subsequent maintenance, repair and construction work. The amount of detail needed in the health and safety file and the time and effort required to prepare it should be in proportion to the scale and complexity of the installation. The Developer is responsible for ensuring that the health and safety file is prepared. Putting together the health and safety file is a task that will be a continual process throughout the design and installation stages, When the Owner's requirements for health and safety file are identified, including how the information is to be stored and recorded, the Developer shall ensure that all those contributing to the health and safety file (e.g. designers, manufacturers, installation contractors, etc.) are aware of:

- What information is to be collected.
- How the information is to be collected and stored.

The Developer shall require health and safety details in pre-tender stages in renovation, retrofit projects or similar regarding how and when the information for health and safety file is to be prepared and passed on. Throughout the installation stage, those who carry out design work will need to ensure, as far as reasonable practicable, that information about any feature which involves significant risks to health and safety during the lifetime of the installation are passed to either the Developer or to the principal contractor. The Contractors have the duty to pass information for the health and safety file to the principal contractor, who in turn has to pass it to the Developer. This information will include "as-built" and "as-installed" drawings as well as operation and maintenance manuals. At the end of every project the Developer will make this information available for the Owner in the standard formats and by means of the established communication protocols.

Information contained in the file needs to include that which assists persons carrying out construction or installation work within the O&M limits at any time after completion of the current project and may include:

- Record or "as-built" drawings and plans used and produced throughout the construction/project process along with the design criteria.
- General details of the construction/project methods and materials used.
- Details of the installation's equipment and maintenance facilities.
- Maintenance procedures and requirements for the installation.
- Manuals produced by specialist contractors and suppliers which outline operating and maintenance procedures and schedules for plan and equipment installed as part of the installation.
- Details on the location and nature of utilities and services, including emergency and fire-fighting systems.

Content

The O&M manual on the Building log book provides detailed guidance on the content and quality of operation and maintenance manuals and will generally satisfy the requirements of the Owner. The presentation of information within the manual does not need to follow a rigid format but shall cover the range of all required

topics. For communication purposes and information sharing, the Operation and Maintenance plan shall contain a content list and a comprehensive index with the following information:

- How to use the manual.
- Contractual and legal duties.
- Overall purpose (including design parameters).
- System description, including control concept.
- Equipment schedules and reference numbers.
- Spares policy and recommended spare lists.
- Commissioning records data.
- Operation instruction.
- Maintenance instructions.
- Modification information.
- Disposal instructions.
- Record drawing schedules (including the location of the drawing).
- Emergency information.
- Manufacturer's literature relevant to the installation (including directory of names and addresses).

Manufacturer's literature

Manufacturer's literature is often unavailable or not sufficiently explicit. It shall be made a condition that explicit and specific operation and maintenance instructions for the item of equipment be supplied. This will avoid the issuing of basic and general literature covering ranges and types of equipment other than that supplied. It shall also be a condition that date-stamped and certified "as-built" drawing are provided, together with recommended spares lists and disposal instructions. The manufacturer's literature and certified "as-built" drawings will be both available in electronic format.

Computer based information systems

The use of computer technology enables most, if not all, of an operation and maintenance manual to be presented in electronic format.

Updating

There will be always a need to update documents if the engineering equipment, within the O&M limits, is to be operated and maintained, to take account of developments in knowledge and technology. It is the duty of the Developer to update documents during life of the installation and it shall also take into account knowledge gained through operational experience.

It is therefore the duty of every O&M staff member to collaborate in the provision of such information, instructions, training and supervision as is necessary to ensure, so far as is reasonable practicable, the health and safety at work and a continuous improved operation and maintenance.

In order to ensure the updating of the O&M manual and all related documentation, the Developer shall make sure:

- That updating will be responsibility of the installation contractor making particular alterations.
- That updating will be responsibility of an appropriate specialist as alternative,

That all staff member are supervised in their updating tasks and responsibilities.

5 Document and Data Management Plan (DDMP)

Document and Data Management Plan shall be complaint with section I.10.9 “Document and Data Management Plan” of the Technical Requirements.

To be further developed.

6 Communication and Coordination Plan

Communication and Coordination between Owner and Developer shall be in accordance with Section I.10.10 “Communications and Coordination Plan between the Owner and Developer” of the Technical Requirements.

This section sets out the procedures for communication of information from GHP to DEN and vice versa. It discusses the overall processes and plans for coordinating activities between these two entities. It sets out the procedures for scheduling, coordinating and conducting meetings with DEN.

The aim of the meetings is to achieve the optimum balance of decision-making meetings versus allowing time to get the work done. Where possible, requirements for additional decisions will be fed into the existing meeting rhythm unless the subject requires its own session.

The process for all notices, correspondence and other communications in relation to compliance with the contract documents is as set out in section 27.10 of the Development Agreement and therefore not covered here.

6.1 Conducting Meetings

In planning the meeting the chair will:

- Establish the meeting objectives;
- Prepare the meeting agenda;
- Determine timing and physical arrangements;
- Identify and invite participants; and
- Write minutes of the meeting

If an invitee of the meeting is unable to attend they should send their apologies as soon as possible to the meeting chair or inform the Chair who they have nominated to attend on their behalf. The meeting invitees can be altered or increased if agreed by the meeting chair.

It is the Chair’s responsibility that the meeting be conducted in as relaxed and informal a manner as possible and that the meetings begin and end the meeting on time. If discussion on an agenda items is taking longer than expected and required further attention the chair will action that a subgroup be arranged to discuss that item further in isolation and report back.

If several invitees are unable to attend the chair will inform the group that the meeting has been cancelled and where applicable will endeavour to reschedule another date during that week.

If a cancelled meeting prevents a key decision being made, where feasible, the decision should be made over email with all the members of the meeting cc’d in.

Meeting Agenda

A meeting agenda will be circulated two days in advance of the meeting by the chair. If background data is available for any of the topics to be discussed it will be distributed with the agenda as early as possible.

Meeting Minutes

Draft meeting minutes will be circulated by email from the chair to the meeting invitees within 3 days of the meeting date. The chair will specify in the email circulating the draft minutes the cut off time for comments. Unless otherwise agreed, comments on meeting minutes should be given to the chair no later than two days

after they are issued. The meeting minutes will be verified as final at the following meeting. The working groups could opt to circulate actions lists as opposed to formal minutes if this is deemed more practical.

6.2 Request for Information

Informal request will be made to and from DEN and GHP via email.

A formal request for information (RFI) should be originated through Aconex system. Any user can send a request to the responsible party from within the system. When raising a RFI the system will automatically label and number the request to ensure continuity across all requests.

If the Development Agreement specifies a standard response time for supply of the information this can be inputted into the system. The responsibility party will respond as soon as possible or will enter a response by date to alert the user when a response is expected.

Aconex will provide a complete audit trail for submitting/ tracking/ logging & responding to all RFI's.

7 Affected Third Party Plan

Affected Third Party Plan shall be in accordance with Section I.10.11 “Affected Third Party Plan” of the Technical Requirements.

To be further developed.

8 Public Information and Communication Plan

8.1 Introduction

This section outlines the communication protocols between GHP and the Owner on communicating with the general public and the media regarding the construction activity of the project. Emergency communications will be covered in the Emergency Management and Disaster Recovery Plan (EMDRP) to be prepared prior to construction start.

8.2 Communication Planning

We expect that the Owner will designate a Public Information Officer (PIO) for this project whom will be part of the Owner project team structure.

Prior to the start of the construction phase GHP's Marketing and Digital Media Senior Manager alongside our Construction Manager will meet with DEN's Program administration, operations and construction manager and the PIO to discuss the key events in the project lifecycle when information may need to be provided by the Owner to the public and the level and format (e.g. website updates, social media update, billboards) of each communication.

GHP's Marketing and Digital Media Senior Manager or a delegated representative and DEN's PIO should continue to meet regularly, at least in advance of each phase throughout the construction activity to discuss, update and agree on the ongoing communications plan.

8.3 Owner communicating with the general public

In so far as is possible, communications between the Owner and the general public with regards to the Great Hall project should be reviewed by GHP's Marketing and Digital Media Senior Manager or another delegated person.

8.4 GHP communicating with the general public

GHP will require to independently communicate with the general public about the project on various matters, for example to recruit staff, to contract suppliers and meet transparency requirements for contracting e.g. advertisements and notices and report construction innovations.

8.5 Owner responding to communications from the general public

If the Owner receives communications from the general public (for example an enquiry or complaint letter regarding the construction work), it should be converted into an electronic format and forwarded by email as soon as possible to GHP's Marketing and Digital Media Senior Manager to review and prepare a response. GHP will liaise as necessary with DEN's PIO in doing so. The Owner will then issue the response.

If the response required is complex and therefore there will be a delay in GHP preparing a reply or if the answer is unknown, GHP will provide a suitable holding response for the PIO to issue until a full response can be provided.

8.6 GHP responding to communications from the general public

If GHP receive a communication from the general public directly or second hand from a person other than the PIO (for example an enquiry or complaint letter regarding the construction work), GHP will review and prepare a response. GHP will liaise as appropriate with the PIO in doing so.

8.7 Owner communicating with the media

Should the Owner have a media request, press release or other requested responses these should be sent to GHP's Marketing and Digital Media Senior Manager for review and approval.

8.8 GHP communicating with the media

GHP will send any media request in relation to the project, press release or other requested responses to the Owner's designated Public Information Officer (PIO) for review and comment.

8.9 Communication contact details

To communicate with GHP, the public or media should contact the PIO at media@flydenver.com or by calling 303-342-2250 during business hours or after hours at (303) 342-2288. This will then be forwarded by the PIO to GHP's Marketing and Digital Media Senior Manager (or another delegated person) for a response.

8.10 Information to assist project communications

To assist the Owner with communications they may wish to do on the project, GHP will provide the information required for the Owner to do website updates, twitter feeds or billboard advertisements. The Owner will be responsible for implementing and publishing the communication on its own communication channels. If communication channels used are GHP's (e.g. supplier's websites etc.) then GHP will be responsible for implementing and publishing the communications.

GHP will provide DEN's PIO with:

- Advance notice of major commencement of a phase of works;
- Advance notice of completion/ opening of new facilities;
- Information on expected delays or disruption that may occur to airport users during construction works and the mitigations in place;
- Details of the proposed benefits of the project; and
- Good news stories and awards.

GHP is also responsible for providing:

- Preconstruction photographs;
- Periodic construction photographs;
- Final Completion construction photographs;
- Preconstruction video recordings;
- Periodic construction video recordings; and
- Web-based construction photographic documentation.

8.11 Communications Plan Review

At the proposed monthly meeting between GHP's Marketing and Digital Media Senior Manager and the PIO we will review what communications will be necessary the following month by the Owner and GHP, review

the success or otherwise of communications in the previous month and address any outstanding responses to the general public or media.

9 Health, safety Management Plan

9.1 Background

The health and safety Management Plan is based on the premise that elimination of hazards is much preferable to minimizing the effects.

The progressive introduction of regulations in this area has led to increasing awareness by management of factors affecting the health, safety and welfare of the workforce, clients, visitors, etc. As well as the requirement to consider health and safety in operational procedures, a healthy environment must be provided in the O&M Limits. Prominent in this consideration is air quality. Management shall bear in mind not only contaminants that may be created by the airport activities in general but also pollutants from the ambient environment that may be drawn into the O&M Limits by mechanical or natural ventilation.

HSE Management Plan Context

9.1.1 Indoor quality

Indoor quality within the O&M Limits is influenced by external and internal factors. The ability to maintain satisfactory air quality depends on identifying the factors that affect air quality in a particular application, controlling or eliminating detrimental factors and promoting beneficial ones.

External factors include:

1. Building geography.
2. Neigh boring land use, industrial or commercial.

Internal factors include:

1. Occupant related effects.
2. Effects of furnishing equipment and building materials.

External factors

Ambient air pollution is generally caused by energy provisions for industry and by transport and its control in overall terms is, therefore, usually responsibility of central or local government. External pollutants may be diluted by locating fresh air intakes away from pollutant sources. This normally involves siting ventilation air intakes at roof level, away from chimney flues, soil vents, standing water and cooling towers. Air ventilation intakes at ground level should be avoided wherever possible.

Where a ventilation air intake is unavoidably close to pollution sources, control measures must be implemented to remove or reduce contaminants to acceptable levels.

Internal factors

The major sources of contaminants in the O&M limits are the Patrons, furniture and equipment. All may affect actual or perceived air quality. Patrons generate odours, skin flakes, bacteria and other bio-

effluents. Furnishings release solvent vapours including volatile organic compound, such as formaldehyde, as does equipment such as the boarding pass printers.

Ventilation with terminal re-circulatory facilities may act as a secondary contaminant sources as internally generated dust and microbes will, unless removed by regular filter replacement and cleaning, accumulate and be ejected back into the O&M limits.

Air quality monitoring

External contaminants may be assessed through visual inspection of fresh air intakes and their proximity to pollution sources. Local pollution data must be obtained from local authority monitoring stations. Specific contaminant sources such as generators flues, car parking facilities and cooling towers shall be monitored to determine any effects on the quality of ventilation air intake.

Petroleum or other fossil fuel-derived combustion products are the most common cause of deteriorating external air quality. Any fraction of vehicle or generator fumes must be sampled by and air quality consultant to determine whether infringement of World Health Organization (WHO) guideline has occurred.

Where dilution to undetectable levels is not possible because of the siting of fresh air intakes or the need to maintain minimum fresh air supply rates, gas phase or absorption filtration shall be applied to remove noxious fumes Carbon monoxide cannot be removed by activated carbon filters, but most other harmful gases can.

Indoor contaminants cannot be exhaustively monitored without incurring excessive costs due to the low concentrations encountered and the large number of contributory substances. Therefore, surrogate contaminants shall be monitored because of their association with other potentially harmful contaminants to arrive at an indication of relative air quality.

The typical contaminants assessed are:

1. Respired carbon dioxide
2. Airborne particles
3. Noxious gases
4. Microorganisms

9.1.2 Sources of Indoor Air Pollutants:

The relative importance of any single source depends on how much of a given pollutant it emits, how hazardous those emissions are, occupant proximity to the emission source, and the ability of the ventilation system (i.e. general or local) to remove the contaminant. In some cases factors such as the age and maintenance history of the source are significant.

Sources of indoor air pollution may include:

5. **Building Site or Location**: The location of a building can have implications for indoor pollutants. Highways or busy thoroughfares may be sources of particulates and other pollutants in nearby buildings. Buildings sited on land where there was prior industrial use or where there is a high water table may result in leaching of water or chemical pollutants into the building.
6. **Building Design**: Design and construction flaws may contribute to indoor air pollution. Poor foundations, roofs, facades, and window and door openings may allow pollutant or water intrusion. Outside air intakes placed near sources where pollutants are drawn back into the building (e.g., idling vehicles, products of combustion, waste containers, etc.) or where building exhaust reenters into the

building can be a constant source of pollutants. Buildings with multiple tenants may need an evaluation to ensure emissions from one tenant do not adversely affect another tenant.

7. **Building Systems Design and Maintenance**: When the HVAC system is not functioning properly for any reason, the building is often placed under negative pressure. In such cases, there may be infiltration of outdoor pollutants such as particulates, vehicle exhaust, humid air, parking garage contaminants, etc. Also, when spaces are redesigned or renovated, the HVAC system may not be updated to accommodate the changes. For example, one floor of a building that housed computer services may be renovated for offices. The HVAC system would need to be modified for office employee occupancy (i.e., modifying temperature, relative humidity, and air flow).
8. **Renovation Activities**: When painting and other renovations are being conducted, dust or other by-products of the construction materials are sources of pollutants that may circulate through building. Isolation by barriers and increased ventilation to dilute and remove the contaminants are recommended.
9. **Local Exhaust Ventilation**: Kitchens, shops, parking garages, toilet rooms, trash rooms, locker rooms, copy rooms and other specialized areas may be a source of pollutants when they lack adequate local exhaust ventilation.
10. **Building Materials**: Disturbing thermal insulation or sprayed-on acoustical material, or the presence of wet or damp structural surfaces (e.g., walls, ceilings) or non-structural surfaces (e.g., carpets, shades), may contribute to indoor air pollution.
11. **Building Furnishings**: Cabinetry or furniture made of certain pressed-wood products may release pollutants into the indoor air.
12. **Building Maintenance**: Workers in areas in which pesticides, cleaning products, or personal-care products are being applied may be exposed to pollutants. Allowing cleaned carpets to dry without active ventilation may promote microbial growth.
13. **Occupant Activities**: Building occupants may be the source of indoor air pollutants; such pollutants include perfumes or colognes.

9.1.3 Categories of Indoor Air Pollutants:

Although there are numerous indoor air pollutants that can be spread through a building, they typically fall into three basic categories: biological, chemical, and particle.

1. **Biological:** Excessive concentrations of bacteria, viruses, fungi, dust mites, animal dander, and pollen may result from inadequate maintenance and housekeeping, water spills, inadequate humidity control, condensation, or water intrusion through leaks in the building envelope or flooding.

1. **Chemical:** Sources of chemical pollutants (gases and vapors) include emissions from products used in the building (e.g., office equipment; furniture, Wall and floor coverings; pesticides; and cleaning and consumer products), accidental spills of chemicals, products used during construction activities such as adhesives and paints, and gases such as carbon monoxide, formaldehyde, and nitrogen dioxide, which are products of combustion.

1. **Particle (Non-biological):** Particles are solid or liquid, non-biological, substances that are light enough to be suspended in the air. Dust, dirt, or other substances may be drawn into the

building from outside. Particles can also be produced by activities that occur in buildings such as construction, sanding wood or drywall, printing, copying, and operating equipment.

1. Source management

Source management includes removal, substitution, and enclosure of sources. It is the most effective control method when it can be applied practically.

For example, the U.S. Consumer Product Safety Commission recommends installing carpets that are low-volatile organic compound (VOC) emitters, and encourages consumers to ask retailers or installers about the carpet industry's voluntary "green label" program for new carpets. According to the carpet industry, the green and white logo displayed on carpet samples informs the consumer that the specific manufacturer's product has been tested by an independent laboratory and has met the criteria for very low emissions. The label, however, is not a guarantee that the carpet will not cause health problems.

2. Engineering controls

a. **Local exhaust:** Local exhaust, such as a canopy hood, is very effective in removing point sources of pollutants before they can be dispersed into the building's indoor air.

b. **General dilution ventilation:** General dilution ventilation systems, when properly designed, operated, and maintained, will control normal amounts of air pollutants. A well designed and functioning HVAC system controls temperature and relative humidity levels to provide thermal comfort, distributes adequate amounts of outdoor air to meet the ventilation needs of building occupants, and also dilutes and removes odors and other contaminants. Testing and rebalancing of HVAC systems are essential when partitions are moved in buildings.

For certain situations, such as painting and carpet cleaning, temporarily increasing ventilation can help dilute the concentration of vapors in the air.

c. **Air cleaning:** Air cleaning primarily involves the removal of particles from the air as the air passes through the HVAC equipment. Most HVAC system filtration is provided to keep dirt off of coil surfaces to promote heat transfer efficiency.

Most smudging observed around air supply diffusers in a ceiling result from entrainment (trapping) of dirt particles in the space that accumulate there because of poor housekeeping.

3. Administrative controls

a. **Work Schedule:** Through scheduling, managers can significantly reduce the amount of pollutant exposure in their buildings. For instance:

1. Eliminate or reduce the amount of time a worker is exposed to a pollutant (i.e., scheduling maintenance or cleaning work to be accomplished when other building occupants are not present).

2. Reduce the amount of chemicals being used by or near workers (i.e., limit the amount of chemicals being used by the worker during maintenance or cleaning activities).

3. Control the location of chemical use (i.e., perform maintenance work on moveable equipment in a maintenance shop as opposed to the general area, or locate the equipment (e.g., printers, copiers) in a separate room).

b. **Education:** Education of building occupants regarding IAQ is important. If occupants are provided with information about the sources and effects of pollutants under their control, and about the proper operation of the ventilation system, they can alert their employer and/or take action to reduce their personal exposure.

c. **Housekeeping:** Housekeeping practices should include preventing dirt from entering the environment (using, for example, walk-off mat systems), removing dirt once it is in the building, disposing of garbage, storing food properly, and choosing cleaning products and methods that minimize the introduction of pollutants into the building.

9.1.4 Pre-occupancy environmental monitoring

Time constraints often preclude a comprehensive thermal assessment of the building environment at the preoccupancy stage; factors such as normal occupancy conditions, thermal load and weather conditions cannot be readily simulated to obtain the operational performance of a building throughout a complete annual cycle. Instead, commissioning and its resulting data have to be relied on at this stage and, for this reason, adequate time must be allowed for the commissioning process.

It must be assumed that any alterations to the intended use of the O&M limits will have taken due account of the original design capabilities of the structure and its engineering services.

9.1.5 Post-occupancy environmental monitoring

As part of routing maintenance, air temperature and relative humidity will be monitored, through either a building management system or manual measurement. However, this does not take into consideration the effects of air movement, radiant heat sources and personal preferences.

The two primary means of determining whether satisfactory comfort is maintained are physical monitoring and personal evaluation by trained maintenance personnel, independent consultants and building occupants. Where comfort control has been brought into question, experience, observations and communication with occupants to establish their views are all that is necessary to carry out a preliminary assessment.

9.1.6 Air distribution systems

Air handling units must operate in accordance with the corresponding regulations, pursuant to the provision of a suitable volume of fresh and purified air. This requires that the highest appropriate standards of filtration must be applied and that on-going maintenance will be based on reasonably practicable planned preventive measures, including hygiene.

Air handling units must be routinely inspected to ensure deteriorating components, such as spent filters, are replaced as necessary and that other conditions likely to affect air quality – for example, water pooling within condensate drain trays or carry-over water on duct surfaces – are prevented or controlled. Minimum standards of cleanliness must be applied based on visual inspection and scheduled maintenance periods. Such routine inspections will be facilitated if the items to be inspected are located in easily accessible areas.

As standard of cleanliness are partly subjective, some components must be cleaned as a matter of routine. These components include air intake equipment prior to filtration, post-filter chambers, condensate trays, cooling coils during the coiling period and humidification equipment during the heating period.

Filter condition provides the most convenient indicator of other condition-related maintenance requirements, and full cleaning of all air handling units components shall be undertaken at least once a year to maintain

these to optimum hygienic condition. Unexpected contamination shall be investigated to establish its source and whether it constitutes a risk to Patrons.

Risk assessments has been prepared for each air handling unit to identify specific maintenance requirements and to plan the adequate air filtration, as determined by minimum filter standards and air source evaluation.

The effectiveness of on-going maintenance shall be periodically assessed and validated independently to confirm that satisfactory standards are being achieved. Annual inspection of air handling units shall also be undertaken, although representative units must be examined more frequently and their condition taken as indicative of similar system.

9.1.7 Air distribution ductwork

New ductwork needs to be stored and installed in accordance with current standards of good practice, particularly to ensure the prevention of contamination. Independent inspections shall be undertaken during installation and at the final inspection for deficiencies and defects, at the time of installation, adequate access shall be provided to facilitate inspection of sensors and fire curtains, and to monitor cleanliness.

The handover of clean ductwork and high standards of on-going maintenance shall limit subsequent contamination of duct surfaces. Air handling equipment shall be assessed at least once a year to provide an accurate indication of cleanliness. Representative areas of ductwork may then be examined. For an airport environment this will typically be on a five-year basis. Other ductwork systems, e.g. such as kitchen extract where a fire risk applies, a more frequent examination is required.

The cleanliness of supply ductwork systems is more serious than that of extract duct systems because of its more direct association with Patrons; nevertheless, extract duct systems shall be kept under review especially where air recirculation is operated.

Distribution ductwork system with an unknown or questionable maintenance history may be affected by more significant contamination. More importantly, ducts or plenums may be of an age where the materials contain asbestos and are now deteriorating. The passage of supply air across damaged or unsealed asbestos tiles presents an unacceptable hazard.

Other distribution network contaminants with no specific hazardous components shall be assessed as to their likelihood of affecting air quality and the health and wellbeing of Patrons of the conditioned space. Typical contaminants comprise a mix of organic and inorganic debris including vehicle-derived combustion products, vegetation, silica dust and re-circulated dust such as skin flakes, paper and textile fibres. The effect of this contaminant mix is unknown although likely to contribute to at least superficial infection; it shall, therefore, be prevented from accumulating to any significant degree.

9.1.8 Modification of existing elements within the O&M limits

An assessment of the renovation shall be undertaken to determine the effect on Patrons and maintenance staff. The headings below area indicative of the areas that shall be addressed.

9.1.9 Noise nuisance

Can normal airport activities continue without interruption? If not, what precaution is necessary? The following must be considered:

- Out of hours working.
- Acoustic barriers.

- Relocation of airport staff for the duration of the work.
- Ear defenders for maintenance staff.

Noise levels must be monitored during the works and record sound pressure levels to confirm that preconstruction assumptions were correct. If noise level exceed the control limits, review precautions and modify as necessary.

Account also needs to be taken of the noise that mechanical plant can make as part of an assessment in selecting the plant for a building. Noise is also a health and safety in design issue. There is no point in having clean air and unbearable noise.

9.1.10 Airborne contaminants

Which of the following contaminants are likely to be released into the air?

1. Particulates.
2. Fibres.
3. Gases and vapours.
4. Microbes.

Actions will be undertaken to minimize these contaminants in the operative areas during the work and the precautions must be reviewed and modify as necessary.

9.1.11 Personal protective equipment

The Developer shall assess the type of equipment necessary to prevent nuisance or adverse health effects. Building modifications are likely to generate dust which may constitute a nuisance to maintenance staff and Patrons in the locality of the works; additionally, some of the dust released may contain recognised hazardous materials (e.g. glass fibre of asbestos). Any activity generating dust will require the protection of maintenance staff, Patrons and equipment, including ventilation systems.

Dust, in itself may cause irritation while associated microorganisms may be released in high concentrations, particularly during the renovation of old structures. Vapour migration from construction materials may occur during the works and for some time after the work is completed Adhesives used in construction will have been assessed as safe for use although most will specify the need for ventilation to control concentrations and dilute odours. Precautions shall be taken to protect construction workers and Patrons form inhalation, ingestion and skin contact with potentially hazardous materials. Protective measures can include ori-nasal masks, gloves and dilution by supply air ventilation or local exhaust ventilation.

Enclosures should be erected around work area, or at access routes, to contain contaminants. Coveralls, eye and respiratory protection shall be provided as necessary or anyone working within the enclosure. Gloves shall be supplied to prevent skin irritation, particularly for eczema sufferers.

The contaminant levels shall be monitored within and local to the enclosure to confirm effective control. It control levels are exceeded, precaution means must be modified.

9.1.12 Ventilation

Ventilation system offer a means of controlling contaminants, including collection and removal. Measures shall be taken to ensure that adequate fresh and purified air is provided to dilute generated contaminants, Re-circulating systems shall be isolated within the work zone to prevent distribution of contaminants to other building areas. Extract diffusers shall be taped shut and terminal re-circulatory systems isolated unless

required for ventilation and comfort control. Terminal equipment shall be examined before starting the works and after completions to assess the need for filter replacement and unit cleaning.

Where extract ventilation has been isolated, local exhaust ventilation may be required to prevent pressurisation of the work area. Exhaust ventilation will also help consequent contaminant dilution. Contaminants should not be exhausted into the atmosphere without an assessment of the discharge point to confirm that it is safe to do so.

Treatment (filtration) of the exhaust may be necessary depending on property boundaries, the discharge point and height, and the prevailing wind direction.

9.1.13 Safety assessments

For the majority of refurbishments and modifications, familiarity with the hazards through day-to-day experience shall be sufficient to identify the effect of work on the building environment and occupants and to recommend the appropriate control measures and precautions. Monitoring the effectiveness of precautionary measures may require the assistance of a competent person, such as an occupational hygienist or air quality consultant to provide independent assurance that the health, safety and welfare of occupants is protected. It is important that his/her recommendations be acted upon.

9.1.14 Notification and record keeping

Notification of construction work shall be made in writing to O&M Manager that will inform the City. Records of the safety assessments, together with noise and air quality analysis results, shall be kept within an on-site building log identifying assumptions made and precautions implemented.

9.1.15 Recommended assessment schedules

Air quality monitoring

Initial assessment are recommended at handover, prior to occupation/use, to confirm that satisfactory standards of air quality have been achieved and that system ventilation operation is unlikely to be detrimental to the health of occupants.

On-going assessments are carried out under normal occupancy conditions and shall be carried out within one year of handover to confirm that satisfactory air distribution system hygiene standards are being maintained.

Routing monitoring shall be carried out on the basis of initial assessments. It is recommended that air quality indicators are routinely reviewed to assess seasonal variations, confirm the validity of initial assessments and demonstrate a commitment to the maintenance of satisfactory conditions of the area within the O&M limits. Reviews of air quality shall be carried out quarterly together with assessments of the air distributions system and thermal comfort.

Air distribution system

Initial assessment are recommended during installation works to confirm that ductworks and equipment is delivered to site in a satisfactory condition of cleanliness and that storage arrangements minimise the entry of dust and contaminants. Installation proposals shall be reviewed to confirm that adequate access has been allowed to facilitate maintenance and inspection. An intermediate inspection may be carried out at first fit and a final inspection as part of defect and deficiency inspections.

On-going assessments are recommended on an annual basis to validate the efficacy of planned preventive maintenance. The actual frequency of assessment shall be a three-monthly inspection while ensuring that each unit is inspected annually.

9.2 HSE Management Plan Objective

The HSE Management Plan objectives are annually updated to meet the Technical Requirements, Development agreement; and all related current regulations. The objectives are the overall goals and provide the Developer and the Owner with the means to evaluate the program. The annual updating shall be based on the risk profile, legislative changes, corporate requirements, annual health and safety review, analysis of health and safety events and investigations, and others.

HSE Objectives:

- Health & Safety Job descriptions to be included in management documentation.
- Electrical testing of portable equipment.
- Maintaining HSE training records.
- Be complaint with the requirements of safety and health legislation.
- Implement safety and health guidance in the organisation.

9.3 Management Responsibilities

The HSE management responsibilities is to ensure effective implementation, organizations and develop capabilities and support mechanisms necessary to achieve the HSE policy, objectives and targets. To motivate and empower all staff to work safely and to protect their long-term health, not simply to avoid accidents. Ensure arrangements in order to:

- Underpin by effective staff involvement and participation through appropriate consultation, the use of the representation system.
- Sustain by effective communication and the promotion of competence, which allows all employees and their representatives to make a responsible and informed contribution to the safety and health effort.

9.4 Training

For training approach and policy see section 12.0 Training.

9.5 Incident and Injury Management

For further details see section 10.1 Emergency and Incident Reporting where the incident and injury management is part of the approach and policies.

9.6 Work Health and Safety Management

9.6.1 Work Health and Safety Policy

The policy goals are:

- To show the commitment of Developer’s management and workers to health and safety.
- To aim to remove or reduce the risks to the health, safety and welfare of all workers, contractors and visitors, and anyone else who may be affected by Developer’s operations.
- To aim to ensure all work activities are done safely.

9.6.2 Work Health and Safety Responsibilities

Management is responsible for providing and maintaining:

- A safe working environment.
- Safe systems of work.
- Plant and substances in safe condition.
- Facilities for the welfare of all workers.
- Any information, instruction, training and supervision needed to make sure that all workers are safe from injury and risks to their health.

Workers are responsible for:

- Ensuring their own personal health and safety, and that of others in the workplace.
- Complying with any reasonable directions (such as safe work procedures, wearing personal protective equipment) given by management for health and safety.

We expect contractors have similar policies and responsibilities to the Developer.

9.6.3 Work Health and Safety Reporting

All reporting issues are part of the sections 13.11 – O&M monthly report and annual report.

9.7 Subcontractor WHS Management

All issues related to subcontracting are included in section 14 – Contracting practices.

10 Environmental Management Plan

10.1 Emergency and Incident Reporting

When responding to an Emergency or Airport Irregular Operations, Developer shall comply with the Airport Rules and Regulations and notify the Owner immediately of any Shutdowns not associated with a previously approved Planned Maintenance, in accordance with the Shutdown Policies and Procedures. As part of the O&M Services Plan, Developer shall develop procedures for interfacing and coordinating with the Owner.

During an Emergency or Airport Irregular Operations, Developer will immediately act to ensure that Work is stopped if required and that the O&M Limits are free of Developer personnel, in accordance with the incident response, safety and security procedures, and protocols of the O&M Services Plan and the Emergency Management and Disaster Recovery Plan.

Developer shall provide the Owner a detailed damage report after the occurrence of an Emergency or Airport Irregular Operations. This report shall include an individual analysis of the site or sites affected by the events within the O&M Limits.

As per Technical Requirements, Section III.4.11.1, every O&M Monthly Report shall include a report of all Emergencies and impacts on the Elements within the O&M Limits and O&M Services, including:

- a time based report of all actions and activities performed by Developer
- description of impact of such events on Developer's O&M Services or statement of no impact
    - (including damage assessment logs).

10.1.1 Purpose of emergency and incident reporting policy

The Developer has two policies that deal with emergency and incident reporting. These are:

- To ensure expert response to all emergencies and incidents within the O&M limits and complaint with Airport rules and Regulations and with section III.4.6 "Emergency and Irregular Operations" of the Technical Requirements.
- To manage the risks in order to provide guidance on risk thinking and business continuity management by integrating risk identification, risk management and consistent reporting into everyday operations.

10.1.2 Policy

According Denver's Airport Rules and Regulation the following numbers could be- important for the Developer:

- Airport Communication Center: 303-342-4200
- Emergencies: 303-342-4200
- Transportation Security Administration: 1-866-289-9673

The Developer shall call immediately the Emergency phone number to report any incident threatening life or property.

Following notification of an emergency the Developer shall report to the Owner as required in section III.4.6 "Emergency and Irregular Operations" of the Technical Requirements:

Developer shall provide the Owner a detailed damage report after the occurrence of an Emergency or Airport Irregular Operations. This report shall include an individual analysis of the site or sites affected by the events within the O&M Limits.

Prompt incident notification enables:

- Staff to provide security related support and advice to the airport (O&M limits) and referral to relevant support and assistance provided across the Owner's providers and the Developer.
- Quick resolution of emergencies while minimising the risk to personal safety.
- Quick implementation of preventative measures in the case of criminal activity.
- Quick notification to relevant providers, airline companies, concessionaires, and other stakeholders.

10.1.3 Response to Specific Emergencies and Critical Incidents

Independent to the notification via telephone of any emergency, and as part of the O&M Services Plan, the Developer's procedures for interfacing and coordinating with the Owner. are available in annex G Developer's emergency procedures.

10.1.4 Damage Assessment

Introduction

The purpose of this Damage Assessment Procedure (DAP) is to prescribe the procedures in conducting a comprehensive damage assessment survey. A complete and accurate damage assessment survey is one of the most essential functions of a comprehensive emergency management program of the Owner related with the Denver International Airport. It is the intent of the Developer to provide in this section a standardized resource which can be utilized by the damage assessment teams and also as a refresher for those seasoned individuals.

Abstract of the Damage Assessment Procedure

When a disaster of any magnitude has caused any damage to the airport within the O&M limits, the damage assessment process shall be initiated immediately by the Developer under the direction of the Owner's emergency management coordinator. As the EMC will be occupied in the response to the emergency, the Developer appointed member shall be pre-designated and trained to coordinate the initial damage reporting and damage assessment process.

The process of initial damage reporting begins by evaluating the O&M limits of the airport and documenting the number of damages found and categorizing them according to the type, severity and location of damage sustained. This documentation is in the form of a document titled the Developer Survey Form. Photographs shall be taken and kept on file of those areas that are damaged. Once the information is compiled, the initial damage report is sent to the Owner (EMC).

The need for the initial damage report is not only to identify if a disaster declaration is needed, but also to identify any unmet needs, the impact the disaster has on the airport, and to identify existing resource that need to be allocated.

The initial damage assessment process will also identify the impact the disaster has on the airports O&M limits in order to evaluate the projects needed for the recovery process for every single damage.

10.1.5 Damage Assessment categories & Classification

Before completing the first portion of the damage assessment process, the Developer Survey Form, it is critical to use the standard reporting categories. Having a precursory knowledge of this information will make the task of completing the information easier and more accurate for any person appointed for this role by the Developer.

Damage Assessment Categories

In order to accurately assess the severity of the damage sustained, the following damage assessment categories have been adopted by the Developer and shall be used to summarize the extent of the damage.

Category	Description/examples
Affected	- Ingress/Egress to spaces/areas may be hampered - The entrance spaces have been spotted due to heavy rains - The spaces/areas are usable without repairs - Only a few light fixtures are not functioning
Damaged	- spaces/areas are usable, however repairs may be required - Critical components of the facility are inoperable
Destroyed	- Spaces within the O&M limits are no longer there - The O&M limits is structurally unsafe - All major structural systems are damaged and no longer operable - Structure has partially collapsed
Inaccessible	- Unable to access a space/area within the O&M limit
Major	- Large portion of roof is missing - Structure cannot be used until repairs are made
Minor	- Airport's O&M limits is damaged, but usable - Numerous broken windows - Minor structural damage

10.1.6 Sequence of events for the damage Assessment Process

Preliminary Notification

The damage assessment process shall be initiated routinely whenever an incident occurs in the Airport within the O&M limits that causes damage. In the event of widespread whether or a significant incident impacts numerous areas, the Developer shall take a proactive approach to the damage assessment process and begin collecting information while the weather or incident is still impacting the O&M limits.

All actions taken regarding these issues shall be in accordance with the Emergency Management and disaster Recovery Plan as required in Section I.10.15 of the Technical Requirements.

Developer's Survey Form

The damage assessment process shall be started immediately after the response phase of the incident has concluded, or if possible during this phase as it will provide an appraisal of the effectiveness of the response actions taking place.

The Developer's Survey Form has been designed to allow the damage assessment team or appropriate individual the capability to rapidly summarize the impact of the disaster. This form is designed to document the number of assets and areas that have been impact by the incident, along with the severity and location of the

damage. Estimates of dollar amount of damage shall not be reported in this form; simply the number of assets and areas impacted by the incident.

The Developer's Survey Form shall be completed and delivered to the Owner no later than 48 hours after the passing of the event.

Declaration of Disaster Emergency

Depending on the nature of the incident, it may be necessary for the Owner to declare a disaster emergency. By having the elected officials declare a state of emergency, or more common known as a disaster declaration, it enables local governments to bypass purchasing requirements, hire temporary workers and bypass other requirements.

Emergency Protective Measures / Debris Removal

In addition to documenting the damage sustained by the Airport's O&M limits, it is also important that a thorough account is kept of emergency protective and debris removal measures by the Owner. During incidents where a presidential disaster has occurred, reimbursement may be available to the Owner and/or emergency service agencies who committed their resources to assist in emergency operations related to the incident or to clean-up from the incident. Some examples of emergency protective measures include the following:

- Barricades placed to limit access.
- Fire department personnel who evacuated airport users.
- Fire department personnel who rescued victim from areas within the O&M limits.

When documenting emergency protective measures, it is critical to provide a description of the tasks, including the location, the number of personnel who performed the task, the number of hours that the service was performed, and any equipment used.

Debris removal activities involve those where the airport's O&M limits has been affected by the incident and the Developer has taken actions to remove debris from the airport's O&M limits to restore it to pre-disaster conditions.

If any emergency protective or debris removal measures have taken place, it is critical that the Developer who will complete the damage assessment procedure communicate with other disciplines, the Owner, and Owner's providers and obtain the necessary information and include this with the report.

Damage Assessment Report

After the Developer Survey Form has been completed and returned to the Owner, the next step in the Initial Damage Report process is the completion of the Airport's O&M Damage Assessment Report. After the report has been completed, it will be submitted to the Owner.

See Annex I for Developer's Damage Survey Form

11 Shutdown Plan

Shutdown Plan shall be in accordance with Section I.10.17 “Shutdown Plan” of the Technical Requirements.

This section includes the implementation and the guidelines of the Shutdown Plan that describes the procedures that will be followed by Developer to notify and receive approval from the Owner and, as applicable, public utilities, for any Shutdown.

11.1 Introduction

The maintenance closure procedures will be used when equipment and/or assets are shut down or areas/spaces are closed for extended periods of time because of maintenance, cleaning or renewal/construction activities during operation period. The scheduling process for equipment/asset or space/area closure involves contact with the City and incorporation of pre-established program needs into the schedule and in accordance with I.10.10 Communication and Coordination Plan of the Technical Requirements.

11.1.1 Maintenance Shutdown Planning

O&M management shall coordinate the different planned preventive maintenance, cleaning, O&M renewal/construction or Warranty Work activities in a monthly timeframe that requires equipment/asset shutdown or area/space closure in order to unify all activities in that particular equipment/asset or area/space and avoid repetitive closure of the same equipment/asset or area/space.

As required in sections I.10.10, I.10.11 and III.4.5 of the Technical Requirements, the schedule of Planned Maintenance, and any changes thereof, shall be developed in cooperation with the Owner or third parties impacted by such proposed Shutdowns to minimize the impact on passenger flow, the Owner’s operations, airline operations, and TSA operations.

In every monthly report as describe in section 13.11.1 O&M Monthly Reports, the Developer shall include all planned shutdowns and closures for the next period and comment any incidences or comments of previous reporting period.

11.1.2 Renewal Shutdown Planning

As described in Section 17.2 of this document, the Developer shall submit to the Owner for review and comment as Submittal Type 1 a Renewal Work Schedule as part of the Renewal Work Plan. The Renewal Work Schedule shall be planned and developed in cooperation with the Owner and other Government Entities or third parties impacted by such proposed Shutdowns to minimize the impact and avoid the scheduling conflicts.

The Renewal Work Schedule shall include explanation, anticipated start and end dates and duration of each planned Renewal Work, and anticipated start and end dates and duration of Shutdowns along with a description of proposed Shutdowns and mitigating measures to avoid any Unavailability Event or negative impact on traffic.

General closure requirements

Work duration is the major factor in determining the type of closure procedure used in the O&M limits of the airport. The duration of a work is defined relative to the length of time a work operation occupies a spot location.

The Developer's approach defines three different types of closures:

- Long-Term stationary activities.
- Intermediate-term activities.
- Short-term stationary activities.

Long-Term stationary activities

Long-Term stationary activities can be defined as all those maintenance, O&M renewal/construction, Warranty Work and/or cleaning activities that take more than 24 hours (1 day) and require a closure of a system/equipment and/or area/space.

Since long-term operations extend into night-time and the lighting can be different as during daylight hours, the closure devices must be illumined devices or additional and/or special lighting shall be used to make the closure visible.

Intermediate-Term stationary activities

Intermediate-Term stationary activities can be defined as all those maintenance, O&M renewal/construction, Warranty Work and/or cleaning activities that take more than 8 hours and require a closure of a system/equipment and/or area/space.

If intermediate-term operations can extend into night-time and the lighting can be different as during daylight hours, the closure devices must be illumined devices or additional and/or special lighting shall be used to make the closure visible if the closure in during night hours.

Short-Term stationary activities

Intermediate-Term stationary activities can be defined as all those maintenance, O&M renewal/construction, Warranty Work and/or cleaning activities that take less than 1 hour and require a closure of a system/equipment and/or area/space.

If short-term operations does take place during night-time and the lighting can be different as during daylight hours, the closure devices must be illumined devices or additional and/or special lighting shall be used to make the closure visible if the closure in during night hours.

11.1.3 Effective and safe Closures

When a closure request has been approved by the City and/or a closure is required due to a corrective maintenance action to mitigate an incident with high priority level, the Developer shall make sure that the closure and its signs are visible for Patrons, airport employees, airport visitors and other providers.

Depending of the category or type of the closure, the developer, at its sole discretion, shall install an information board for the airport's users and employees, informing of the closure, the reason of the closure, the activities that will be performed and the expected opening date with an apologize statement related to any possible inconvenience caused by the closure. The information board shall also display contact information details like a phone number, help-desk webpage and/or email in order to allow the users to contact with the Developer for any reason.

The Developer, for long-term and intermediate-term activities that requires closure, shall ensure that all closure measures remain intact and visible to all airport users by a continuous monitoring of the closure and its devices.

11.2 Policies and Procedures

The purpose of this section is to record the policies and procedures required to Shutdown equipment and properties at Denver International Airport and in particular the O&M Limits. It is aligned with all other parties active in the Denver International Airport and creates a common framework. This will allow all Divisions to work together with the same understanding of the way the process works.

11.2.1 Service Owner

The Shutdown Service Owner the Deputy Manager of Airport Infrastructure Management. The Service Owner will be accountable for the service, service requirements, and will represent the service to customers.

11.2.2 Process Manager

The Process Manager will be the MCC Supervisors group. The Process Manager works with the Service Owner to plan and coordinate activities, prioritize, and make improvements. The Process Owner also monitors and reports on process performance to ensure services run smoothly.

11.3 Scope

The scope of this section touches all O&M services within the O&M Limits and includes any employee of the Developer or Developer related entities. Any O&M staff member could be tasked with requesting that equipment, a service, or a property be shutdown. The scope of this section does not include the reasons for a shutdown or any of the work performed during the shutdown. Instead, this section only governs the process of requesting a shutdown as well as tracking and recording the request.

Important: As the Developer might not have access to the online request tool, it will request the Shutdown in means by the established communication procedures with the Owner as described in section 6 - Communication and Coordination. This means that the Owner´s approval/rejection process will take longer due the inclusion of an additional step in this procedure.

11.3.1 Submitting Shutdown Request

- All other Shutdowns must be submitted at least seven (5) business days prior to the shutdown start date. The Denver International Airport' policies is five (5) business days.
- All Shutdown Requests must be submitted using the online form (https://intranet.flydenver.com/sites/shutdown) Maintenance Control uses this as the database of record and therefore all shutdown requests must be processed there.
- The Shutdown cannot proceed unless all approver groups have approved the request. If any of the groups rejects the request, the Owner shall communicate this to the Developer and the Developer may not proceed with the Shutdown.

11.3.2 Approving Shutdown Request

- Each approver group shall respond to the initial request with approved or rejected within 72 hours of submission. It is the responsibility of each member of the approving groups to ensure their group responds. The Owner will have and additional time frame of 24 hours for communicating the response to the Developer.
- All approval group members must be aware of their out of office schedules. It is the responsibility of the approval groups to make sure that each temporary approver is capable of approving shutdowns and fully understands the process.

- The membership list for all approval groups is stored on the Shutdown SharePoint site, which is not accessible by the Developer:
- https://intranet.flydenver.com/shared/shutdown
- It is the responsibility of each approval group to ensure this is the most current list. Any changes to this list should be sent to the MCC Supervisors email group.
- Every approver group shall have at least two members to ensure response times are met and backups are in place.

11.3.3 Emergency Shutdowns

If a Shutdown is determined to be an emergency due to pending health issues or the risk of additional damage, this process may be bypassed. If the Shutdown is an emergency, proceed with the shutdown without the approvals but coordinated with the Owner. However, the shutdown must still be entered as request after the fact. The system will not allow you to enter a historical date, so enter the current date and time and explain in the conditions field or comments section that this was an emergency shutdown that has already taken place to the Owner who will record the request with all its details. To avoid confusion, the request should be submitted as soon as possible after the actual shutdown. This means is shall be communicated to the Owner as soon as possible after the actual emergency shutdown.

11.4 Compliance/Auditing

Failure to comply with the policies described within this document will result in Shutdown Requests being rejected. Users failing to comply with this Policy may be subject to disciplinary actions. At the direction of Airport Legal Services, audits may be conducted to ensure compliance with this Policy. Additional steps to ensure compliance may also be taken.

11.5 Shutdown Request Form

The Shutdown Request form manages the submission and approval of requests to shut down facilities at Denver International Airport. As the Developer can not access the Shutdown Request Form online and must communicate to the Owner a Shutdown Request, a specific Developer's Shutdown Request Form is used that will facilitate the Owner in processing the request and avoid misunderstanding and unnecessary delays in the approval/rejection process.

The following details are required:

<table>
<tr><th>Field Title</th><th colspan="2">Details to be inserted</th></tr>
<tr><td>Request ID</td><td colspan="2">TBD as the ID is created automatically by the online form. An internal request ID may be defined in collaboration with the Owner</td></tr>
<tr><td>Request Submitted by</td><td colspan="2">Last name, first name, company</td></tr>
<tr><td>Status</td><td colspan="2">Draft</td></tr>
<tr><td>Request name</td><td colspan="2">Use a descriptive name. This name shall be shown in the subject of the notification emails once inserted in DEN’s Shutdown Notification Request Application. Don’t make the name to long, but attempt to succinctly describe the shutdown.</td></tr>
<tr><td>Shutdown Request Types (all that apply)</td><td colspan="2">Select as many types as required by the shutdown. At least one type must be selected:
<table>
<tr><td>Lightning syst.</td><td>HVAC – cool</td><td>HVAC – heat</td></tr>
<tr><td>HVAC – vent</td><td>Kitchen vent</td><td>Plumbing – water</td></tr>
<tr><td>Plumb- Fixt.</td><td></td><td></td></tr>
</table></td></tr>
<tr><td>DEN Dept. Supervisor / Project Manager</td><td colspan="2">Leave field blank – To be inserted by receptor of Developer’s request form</td></tr>
<tr><td>DEN Contact Person</td><td colspan="2">Leave field blank – To be inserted by receptor of Developer’s request form</td></tr>
<tr><td>Additional Contact</td><td colspan="2">Leave field blank – To be inserted by receptor of Developer’s request form</td></tr>
<tr><td>Contact Radio Channel (N/A of no radios)</td><td colspan="2">Insert Radio Channel if applicable</td></tr>
<tr><td>Contact Radio Call Sign</td><td colspan="2">Insert Radio Call Sign if applicable</td></tr>
<tr><td>Contact Cell Number</td><td colspan="2">Insert Cell Number</td></tr>
<tr><td>Requester Name</td><td colspan="2">Insert Requester Name</td></tr>
<tr><td>Requester Company</td><td colspan="2">Insert Requester Company name</td></tr>
<tr><td>Requester Contact</td><td colspan="2">Insert Requester Contact</td></tr>
<tr><td>Requester Office Number</td><td colspan="2">Insert Requester Office Number</td></tr>
<tr><td>Requester Cell Number</td><td colspan="2">Insert Requester Cell Number</td></tr>
<tr><td>Requester Home Number</td><td colspan="2">Insert Requester Home Number</td></tr>
<tr><td>Shutdown Date and Time</td><td>Insert Shutdown Date MM/DD/YYYY</td><td>Insert Shutdown Time HH/MM AM/PM</td></tr>
<tr><td>Shutdown Completion Date and time</td><td>Insert Shutdown Completion Date MM/DD/YYYY</td><td>Insert Shutdown Completion Time HH/MM AM/PM</td></tr>
</table>

Shutdown Purpose	Insert a full explanation of what the purpose of the shutdown will be
Shutdown Specific Locations	Describe as detailed as possible about where the Shutdown Locations will be
Shutdown Equipment Affected	Insert Equipment Affected by Shutdown, even if they are not directly shutdown
Vendors Affected	Insert Vendors Affected by Shutdown. If no Vendor is affected, insert "N/A"
Shutdown Request Files	Insert names of shutdown Request Files and where these files can be found, downloaded, etc.
Attachments	As the DEN's Shutdown Notification Request Application only accepts one file. If you need to add multiple attachments, consider zipping them into a single file.
Comments	Add comments, although this is not required.

The Owner, after receiving the Developer's Shutdown Request Form using the communication protocols described in section 6 of this O&M Services Plan, will insert the request into DEN's Shutdown Notification Request Application.

The Request may be returned requesting additional information:

11.5.1 Satisfying Conditions

If the request is approved with a condition, the submitter will be informed by the Owner and the submitter must confirm that the condition has been ***Satisfied*** or ***Acknowledged***. Confirming that the condition has been satisfied asserts that the condition has been met and no longer exists. Confirming that the condition is Acknowledged means that the submitter is aware of the condition and will address it at the time of the shutdown.

11.5.2 Changing a Shutdown Request

If the submitter needs to edit the request, the Owner must be informed and a changed Developer's Shutdown Request Form must be send to the Owner with the required fields changed. Only the following field are allowed to change:

- Contact Names;
- Contact Number;
- Vendors Affected;
- Equipment Affected; and
- Comments

If the submitter need to change the Shutdown Date or Time, Shutdown Type, or Shutdown Location the original request must be cancelled. This must be done notifying the Owner through the agreed channels of the Communication protocols (see section 6 of this document). Changes of this nature change the Shutdown ad require new approvals. Once the request has been cancelled a new Shutdown Request can be submitted.

12 Training Plan

12.1 Training

Developer shall develop and implement a Training Plan, which shall set out processes and related procedures to maintain all O&M personnel trained in order to perform their duties in a safety manner. The Training Plan shall conform to Good Industry Practice and in accordance with section I.10.20 of Technical Requirements.

12.1.1 Management

The organisation of training cannot be left to chance; lack of consistency of purpose will result in failure. The Developer shall begin by identifying the most important operational requirements (or problems during the term) to highlight training needs. Management shall then plan and initiate the training, which may be from in-house resources or by a specialist training provider. The selection of an outside specialist may require a small-scale trial to assess the suitability, effectiveness and cost. Once a satisfactory source or method has been identified, the training shall be implemented. There is then an on-going role in evaluating the effectiveness of the training. The cycle is one of learning and on-going improvement. What forms of training do and do not work for the Developer will be learnt systematically through this iterative process.

Within the Developer's scope exists the requirement for professionals that are able to demonstrate and prove competence. It is particularly important, for the Developer, that those involved in operations or processes that is inherently hazardous are competent to perform the required tasks safely. The maintenance function is also responsible for the provision and management of internal comfort conditions for the patrons, airlines employees, airport users, etc. and the critical engineering support services which allow the airport to function.

The Developer is aware of its responsibility to do all that is reasonable and practicable to ensure that correct and appropriate training is provided to ensure that employees are competent to undertake their roles.

12.1.2 Developer's training policy statement

The Developer charged with the responsibility for operating and maintaining the assets within the scope and O&M limits need to identify a policy that provides a clear statement of what it is seeking to achieve by way of training and development. The policy statement shall identify the technical, health, safety quality and performance standards relevant to the operation and maintenance functions.

The aim of the policy is:

- Support and develop the business aims of the company's contracts.
- Identify the resources for training.
- Identify the benefits that will result from training.
- Enable managers and staff to contribute towards the achievement of business targets.

Developer's Policy:

A. Purpose and Scope.

The Developer is committed to ensuring that all staff (including O&M provider's staff) and volunteers have access to learning, development and training opportunities which enable them to be suitably knowledgeable and skilled to carry out their role within the organization, and to develop their talents in any ways that fit with the organization's development to meet its strategic objectives.

B. Aims.

The main aim of this policy is to:

- Ensure that employees and volunteers are supported and enabled to meet the changing demands of the organization and its service users so that the organization achieves its strategic objectives.
- Facilitate employee/volunteer development and/or personal development through assisting them to broaden, deepen and thereby further enhance their existing skill base.
- Provide a working environment where continuous learning and development take place that help staff to gain more enjoyment from their roles, increase motivation and enhance staff retention

C. Equal Opportunities.

The Developer is committed to ensuring equality of learning opportunity, hence no employee or volunteer will be excluded from learning on the grounds of gender (including gender reassignment), age, marital status, disability, racial grounds (race, color, nationality – including citizenship - ethnic or national origin), sexual orientation, religion or belief, responsibility for dependant, trade union membership or employment status. Part time and fixed term employees will have equal access to learning and development opportunities appropriate to their post, and volunteers will be given access to relevant training.

D. Responsibility.

Employees

The Developer believes that employee development is most effective when the individual employee takes responsibility for identifying any opportunities for self-development which will enhance work performance through increased skills and knowledge.

Learning needs and opportunities will also be identified through the support, supervision and appraisal process, and through internal assessments to meet business need.

We expect all employees to also take a proactive approach to furthering organizational wide learning and development.

The Executive Director´s PA shall be notified of all learning undertaken for inclusion in a central log. This shall also include top level comments on the quality and cost effectiveness of training from participants, which is made available to all staff when considering booking training.

Line Managers

Line managers are responsible for assisting staff and volunteers to identify learning needs and for ensuring that they review these with staff on a regular basis during support and supervision sessions. The employee's log of learning shall also be discussed at these sessions.

Line managers have a responsibility to monitor and evaluate the effectiveness of learning for employees who have undergone training and development. Line managers shall seek feedback on any training, including quality and cost effectiveness. Line managers shall then ensure that employees implement the skills that they have gained through training and ensure that feedback on training is shared with the organization via the central log of learning.

Executive Director

The co-ordination of the learning and development process is the responsibility of the CEO. They will, therefore, ensure that evaluation of learning activities is undertaken annually by liaising with line managers to ensure that any identified needs are addressed accordingly.

E. Routes to Learning & Development

Options for learning & development may include:

- On the job learning including learning from other members of staff via job shadowing, mentoring, in house skill sharing, staff away days, etc.
- Secondments and placements/visits to other organizations.
- Attending internal or external training days/ workshops.
- An external course of study.
- Web based e learning.
- Self-directed study – such as books, manuals, online information.

The Developer is committed to sharing the learning and lessons gained by staff and volunteers throughout the organization. This will be accomplished in a number of ways:

- Giving time in team meetings to share core lessons from training.
- Networking with partner and same sector organizations and incorporating their literature, reports and research documents into office resource libraries.

F. Key Professional and Skills Based Learning

The organization aims to prioritize learning that focuses on areas which:

- Enable us to fulfill our strategic objectives.
- Pertain to any organizational statutory/contractual obligations.
- Are essential in order to generate and maintain income.
- Enable effective responses and management of legislative changes.
- Ensure staff skills meet business needs.
- Are essential to ensure the quality of service provision.
- Enable employees to meet their responsibilities in completing continuous professional development required by relevant professional bodies.
- Enable management development in relation to those who have managerial/supervisory responsibilities.

G. Core learning

There are specific areas of learning which are essential for all employees and cover a rolling program of needs which have been identified as part of a continuous program of learning and development. Core learning will therefore cover the following areas:

<u>Introduction</u>

All new employees are given a timely program of induction including introduction to all policies for the organization. This is essential part of staff learning and development, and integration into the working environment.

<u>HVAC, Electricity, Plumbing, others</u>

It is important that all employees are given opportunities to enhance their technical skills base. The organization is committed to ensuring that all employees have competent grounding in the use of their HVAX, Electricity, Plumbing, or other trades in the wider context of their professional roles. Initial information and training will be provided on commencement of the role of when any technology related to their specialty changes occur.

H. Recording, Monitoring & Evaluating Learning

The Developer is responsible for ensuring that a central record of employee training is created and maintained, and that all learning and development activities are monitored and evaluated in terms of

suitability, effectiveness and value for money.

Line managers have responsibility for reporting on the effectiveness of any staff development program to their superiors at least once a year.

I. Performance Management

Performance management is an on-going communication process, which involves both the line manager and their employee in:

- Identifying and describing essential job functions and relating them to the strategic and operational objectives of the organization.
- Developing realistic and appropriate performance standards.
- Giving and receiving feedback about performance.
- Participating in constructive performance appraisals.
- Planning learning and development opportunities to sustain improve or build on employee work performance.

Regular meetings/communications between staff and line manager facilitates this process.

J. Appraisals

Annual appraisals are an essential component of Developer's performance management framework and are supported by regular support and supervision sessions between line manager and their employees throughout the course of the year. The appraisal scheme allows for every employee to be formally appraised with their line manager through a structured discussion on work performance over the previous year and which, must also incorporate the employee's learning and development needs for the following year.

It is an opportunity to build on strengths and address areas, which require support, thereby enhancing the potential skill base of the individual employee.

Supervision and Appraisal process:

The Developer has a culture of effective informal mentoring on an on-going basis; this is based around continuous support. The formal aspects to this however are:

- Supervision sessions are held at a min of 3 months intervals between all staff and their line managers on an individual basis.
- A full annual appraisal is then carried out by line managers through discussion with each employee on an annual basis.
- A Personal Development Plan for the year is the created.

12.1.3 Developer's training Plan

All staff and Management will have access to corporate training according to company's training policies and to specific technical training as requested or required in order to be compliant with the technical need for any kind of maintenance of the Elements within the O&M Limits.

Other training available are listed in the following table.

Training module	Assistants
Risk Management Plan	Management & Supervisors
Quality Management Plan	All
Document and Data Management Plan	All
Communications and Coordination Plan	All
Affected third party plan	All
Public Information and Communication plan	All
Health and Safety plan	All
Environmental Management Plan	All
Emergency Management and Disaster Recovery plan	All
Shutdown plan	All

13 Projects Control Plan

13.1 Introduction

This section outlines GHP's plan to control the O&M responsibilities. In particular, the detail on the performance standards , performance measurement and reporting will be monitored and controlled.

Project Control Plan shall be complaint with section 6 "Project Controls Plan" of the Project Management Plan.

13.2 Project Requirements and Operating Standards

This section includes and sets out the Developer's performance requirements for providing the O&M Services. The following areas will be described in this section 13 of this O&M Services plan:

The Performance Requirements is described in section 13.2.2 and covers the provision of services for operation, maintenance and repair of the systems set out in the Technical Requirements and Development Agreement of the Great Hall Project within the O&M limits and the Elements included in the scope (see annex A to E)

The performance standards set out in the Contract Documents shall be audited by the Owner, and the Developer shall establish and implement a self-monitoring and a self-monitoring program (as part of the Developer's Quality System respecting the requirements of Section I.10.8 of the Technical Requirements) as a tool to evaluate the conditions of the Elements within the O&M Limits and the overall effectiveness of Developer's O&M Services in meeting the Performance Standards.

13.2.1 Performance Standard evaluation System

Schedules definition

In the following schedule a number of tables are listed that are used for the evaluation of the maintenance performance standards:

Table title	Description	Application
Performance Standards Schedule of every single service included in the scope and within the O&M limits	This schedule assigns unique code to every single system to be maintained and the performance of the additional services. And describes the coding and the scope of the service.	These schedules are the basis for the execution of every service, as it defines the requisites to achieve as well as it indicates how the performance of the service can be evaluated. In the event of a non-performance of the established in these schedules, the Owner or any person of any company working in the site can create an incident that has to be attended and resolved according to the schedules that are described further on.
STO Criticality Classification	It classify in “Emergency”, “High”, “Medium”, “Other”, “Betterment” the Service Task orders (STO’s) for corrective maintenance actions, establishing for every single priority classification the maximum response and resolution times in normal working hours and outside those working hours.	The goal of this schedule is that the Developer and its Service Providers knows how to classify, respond and resolve every incident.

STO Criticality Classification and Developer Response

PRIORITY	CRITICALITY	MAINTENANCE CLASSIFICATION	IMPACT	DEVELOPER RESPONSE (as part of O&M Services)
1	**Emergency**	Emergency maintenance	• problem is (or has the immediate potential of) adversely impacting fire, life, safety, ingress egress, or operationally critical assets • Continued operation under the current circumstances poses a threat to fire, life, safety, ingress, egress, or operationally critical assets	• 15 minute on-site crew response time, subject to security access requirements • call-in resources if repair will endure longer than 1 hour • work 24 hours per day until completed, unless the Owner determines otherwise • prioritized above other work • routine tasks require no planning • complex tasks require expedited planning • work implementation starts when planning is complete and materials are available for complex tasks • Owner is notified immediately upon Developer first having knowledge of emergency
2	**High**	Corrective maintenance	• Current operating condition place undue burden on the Owner's unit cost or operation • Current operating condition has a high potential to impact safety fire, life, safety, ingress, egress, or operationally critical assets • Asset casualty results in loss of redundant equipment and thus jeopardizes availability of space	• 30 minute on-site crew response time for initial evaluation • call-in crew to make environment safe for work • prioritized in consideration with other high priority work • STO backlog reviewed to determine other items that could be deferred or worked on simultaneously • Owner is notified immediately upon Developer first having knowledge of emergency

PRIORITY	CRITICALITY	MAINTENANCE CLASSIFICATION	IMPACT	DEVELOPER RESPONSE (as part of O&M Services)
3	**Medium**	corrective maintenance or preventive maintenance	• Abnormality or degradation of non-critical, intermittently operated assets that will not result in any impact to unit operations • Problem will worsen progressively if not remediated • Typically preventive maintenance or predictive maintenance in nature	• on-site crew response time is as per the daily work schedule • two-to-three week work schedule is used for planning, preparation, and implementation • completion per due dates • prioritized in consideration with other medium priority work
4	**Other**	Preventive maintenance or predictive maintenance	• problem has no or minimum impact to safety, the environment, or availability	• prioritized in consideration with other work • scheduled when resources are available
5	**Betterment**	Predictive maintenance or service request	• work/modification reduces the overall maintenance required and maximizes asset preservation by systematically replacing components	• prioritized in consideration with other work • includes preliminary planning and estimating • modifications to the Renewal Work Plan requires Owner approval

13.2.2 Performance Requirements

The following schedules shows the Performance Standards as required in the Technical Requirements for every Element category.

Minimum Performance Standards Schedule

ELEMENT CATEGORY, DESCRIPTION, AND MINIMUM PERFORMANCE REQUIREMENT[4][5]				MEASUREMENT	CURE PERIODS, POINTS AND INTERVAL OF RECURRENCE		
Ref	Element Category		Minimum Performance Requirement	Type of Measurement	Cure Period (CP) / Temporary Cure Period (TP) / Fast Cure Period (FP)	Points	Recurrence Period
	BUILDING SYSTEMS AND UTILITY SYSTEMS						
1	Electrical system		Availability of secondary and support equipment of the electrical system: minimum annually 99% / minimum monthly [98%].(Up-time is defined as the time assets operate in accordance with the Construction Documents).	STOP Availability = (Total up time) / (Total operation time – Planned shutdown time)	No cure period	4	Not applicable
			Maintain the circuit schedules, panel schedules, and one line drawings up to date.	STOP/Audit	No Cure Period	3	Not Applicable
			Availability of end distribution electrical assets, such as sockets: minimum annually 97% / minimum monthly 95% (Up-time is defined as the time assets operate in accordance with the Construction Documents)	STOP Availability = (Total up time) / (Total operation time – Planned shutdown time)	No cure period	2	Not Applicable
			For each individual failure of the Electrical system assets rated as Emergency in Table III.4 of the Technical Requirements, the failure should be addressed within the define Cure Period as follows here	STOP	TP: 2 HOURS CP: 8 HOURS FP: 5,5 HOURS	5	24 HOURS
2	Natural gas system		All gas distribution infrastructure and equipment rated as Emergency in Table III.4 of the Technical Requirements is available, except for the planned shutdown time, and those that are designated as available are functioning as per Construction Documents with no leaks in the gas system from the point of use to the Demarcation Point.	STOP	TP (switch off system to make safe): 1 HOUR CP: in line with Table III.4 FP: as CP	5	TP: 1hr CP: No Recurrence Period

[4] For the avoidance of doubt all items within this table exclude Concession Premises

[5] All performance measurements exclude; procurement of long lead items, permitting processes and extraordinary circumstances agreed between Owner and Developer.

ELEMENT CATEGORY, DESCRIPTION, AND MINIMUM PERFORMANCE REQUIREMENT[45]				MEASUREMENT	CURE PERIODS, POINTS AND INTERVAL OF RECURRENCE		
Ref	Element Category		Minimum Performance Requirement	Type of Measurement	Cure Period (CP) / Temporary Cure Period (TP) / Fast Cure Period (FP)	Points	Recurrence Period
3	Plumbing system		Availability of domestic water, sanitation and drainage systems from the point of use to the Demarcation Point: minimum annually 99% / minimum monthly 98% (Up-time defined as assets properly sealed, free of odor associated with non-functioning plumbing and sewage systems, free of blockages and functioning as per the Construction Documents)	STOP Availability = (Total up time) / (Total operation time – Planned shutdown time)	No cure period	4	Not applicable
			For each individual failure of the Plumbing systems assets rated as Emergency in Table III.4 of the Technical Requirements, the failures should be addressed within the define Cure Period as follows here	STOP	TP (system shut off): 1 HOUR CP: 8 HOURS FP: 5,5 HOURS	5	24 HOURS
4	Restrooms		In each restroom, no less than 90% of the sinks, urinals, toilet cubicle doors, stalls and lavatory are available for use and function in accordance with the design at the time of the monthly inspection.	STOP/Inspection	TP: 4 HOURS (where applicable closure constitutes temporary cure) CP: 24 HOURS FP: 16 HOURS Note: no Individual items rated as High in Table III.4 will be out of service for more than 5 days.	3	8 HOURS

ELEMENT CATEGORY, DESCRIPTION, AND MINIMUM PERFORMANCE REQUIREMENT[45]				MEASUREMENT	CURE PERIODS, POINTS AND INTERVAL OF RECURRENCE		
Ref	Element Category		Minimum Performance Requirement	Type of Measurement	Cure Period (CP) / Temporary Cure Period (TP) / Fast Cure Period (FP)	Points	Recurrence Period
5	HVAC serving Concession Space and Public Circulation Space within Level 5 O&M Limits (including exhausts)		Availability of Developer maintained HVAC equipment and support systems: minimum annually 97% / minimum monthly 95% (Up time is defined as assets operating without any obstruction and in accordance with the Construction Documents).	BMS System/ Availability = (Total up time) / (Total operation time – Planned shutdown time)	No cure period	3	Not applicable
			For each individual failure of the HVAC system assets rated as Emergency in Table III.4 of the Technical Requirements, the failures should be addressed within the define Cure Period as follows here	BMS	TP: 2 HOURS FP: 80 MINS.	3	8 HOURS
	FIRE, LIFE, HEALTH, AND SAFETY						
6	Fire hazard		Resolve any hazardous condition per Developer's hazard identification analysis and resolution process or as may be identified in the Contract Documents, by the Owner, the City or the Fire Marshall. No obstruction at/or near fire suppression and detection systems. No obstructions at or near emergency signage or emergency exits shall be allowed.	STOP	TP: 30 MINUTES	5	2 HOURS
7	Fire suppression systems, and detection		All Elements within the Developer's O+M demarcation are in compliance with all applicable Law, regulations, Design Documents, and Construction Documents. All fire extinguishers within the Developer's O+M limits are available, inspected and certified as per NFPA standards)	STOP	TP: 1 HOUR (Stop operation of faulty Equipment)	5	8 HOURS

ELEMENT CATEGORY, DESCRIPTION, AND MINIMUM PERFORMANCE REQUIREMENT[45]				MEASUREMENT	CURE PERIODS, POINTS AND INTERVAL OF RECURRENCE		
Ref	Element Category		Minimum Performance Requirement	Type of Measurement	Cure Period (CP) / Temporary Cure Period (TP) / Fast Cure Period (FP)	Points	Recurrence Period
8	Hazard remediation		Maintain all areas within the O&M Limits free of safety hazards responding within the prescribed response time in Table III.4 of the Technical Requirements. Correct any hazardous or potentially hazardous condition upon detection, whether identified by Developer or upon receipt of a verbal or written notice from the Owner. At the Developers reasonable discretion, in conjunction with DEN Terminal Operations, it shall close the affected portion within the O&M Limits until the hazardous or potentially hazardous condition is corrected.	STOP	AS PER TABLE III.4 FP: as CP	5	Not Applicable
9	Flooring and stairs[6]		Maintain pedestrian circulation and restroom areas free of deterioration, bumps, spalling, chips, excessive cracking, exposed steel, vegetation, holes, misalignments, broken glass and broken mirrors.	STOP	TP: 5 DAYS	2	5 DAYS
	CLEANING AND CUSTODIAL SERVICES						
10	Cleaning, finishes and custodial services		Obtain a monthly average in the scores of the joint audits higher than 3.5	Joint Inspections. A minimum of 15 joint inspections per month between Developer and DEN will be carried out. Additional joint inspections can be requested at the reasonable discretion of the owner. The audit is composed by questions with scores from 1 “low performance” to 5 “high performance” covering the Key aspects of the service. The questionnaire can be modified by mutual agreement in each new version of the O&M Plan.	No Cure Period	2	Not Applicable

[6] No points or instances shall be levied for unforeseen or deliberate damage or items that are already subject to planned maintenance under this category and all surfaces. Significant damage should be subject to an immediate rectification plan.

ELEMENT CATEGORY, DESCRIPTION, AND MINIMUM PERFORMANCE REQUIREMENT[45]				MEASUREMENT	CURE PERIODS, POINTS AND INTERVAL OF RECURRENCE		
Ref	Element Category		Minimum Performance Requirement	Type of Measurement	Cure Period (CP) / Temporary Cure Period (TP) / Fast Cure Period (FP)	Points	Recurrence Period
				Note: Owner can join or not join inspections at their sole discretion			
			For each individual STO related to these services rated as Emergency in Table III.4 of the Technical Requirements, the failure should be addressed within the define Cure Period as follows here	STOP	TP: 2 HOURS	2	8 HOURS
	GENERAL						
11	General		A minimum of 85% of Planned Maintenance work orders is to be completed within the planned month and any outstanding Planned Maintenance completed within the following month	STOP	No Cure Period	3	30 days

13.3 Performance Indicators

The operator must have all knowledge in order to operate each system and Elements to achieve the desired standard of performance. ***Annex B – O&M Equipment Manuals*** *(Equipment Data Sheets, Operating Procedure & Manufacturer's Manuals)* stores detailed data for the operation and maintenance of these systems and Elements..

With the exception of the Work listed in Section III.4.1 and Section III.4.2 of the Technical Requirements, Developer shall perform the O&M Services on all assets installed, built, re-built, or repurposed by Developer within the O&M Limits and meet the Performance Standards and comply with the acceptance criteria that measure the condition, performance, and specified life of the respective Elements; and monitor, measure and report Developer performance in fulfilling its responsibilities and obligations set forth in part III of the Technical Requirements.

13.4 Non-compliance

13.4.1 General

Failure to meet the performance requirements shall constitute a Noncompliance resulting, and will be subject to any applicable Cure Period, in the accrual of Noncompliance Points and associated financial deductions or other implications in accordance with the Contract Documents.

Without otherwise limiting the rights of the Owner to inspect, verify, control, or audit the Work at any time, with or without prior notice, Developer shall report on the performance of the Work and compliance or noncompliance with Technical Requirements. Failure to monitor or report as required in accordance with the Technical Requirements or in the Development Agreement shall constitute a Noncompliance Instance.

13.4.2 Tracking of non-compliance

The O&M Manager shall be direct responsible for tracking all O&M services related non-compliances. Various methods shall be implemented that consist in a number of actions that are:

- Monitoring and evaluation of all preventive maintenance STO's directly or via the Maintenance supervisors
- Monitoring and evaluation of all corrective maintenance STO's directly or via the Maintenance supervisors
- Establish and deploy a non-regular standard performance requirements evaluation of all services within the scope and O&M Limits
- Establish and deploy a program that checks proactively the progress and correct closure of all incoming complaints, incidences, and similar into the Developer's Help Desk.

The result of these actions will detect any non-compliance in an early stage and shall allow the O&M Manager to program all resources and required actions to remediate the defect.

The result of these actions is the detection of non-compliances in an early stage and the Developer shall create for every non-compliance a STOs that shall be classified as either emergency maintenance, corrective maintenance, preventive maintenance, predictive maintenance, or service requests and clearly indicate the criticality level of the Maintenance Work in accordance with Table III.4 of the Technical Requirements. Developer shall issue STOs for all Maintenance Work, either planned or

unplanned, performed within the O&M Limits in accordance with the appropriate classification and procedures defined in the STOP.

The Developer shall respond to such STOs by investigating, confirming, and curing the Noncompliance within the prescribed Cure Period in the Performance Standards. The STOP shall cover all O&M Services to the extent such work is in response to a Noncompliance.

13.5 Design and Installations drawings

It is important that the building is known by all O&M staff as well as the Developer's contracted parties in order to have a good understanding of the design intent of the building itself and all systems and Elements within the O&M Limits. The Developer shall keep the following table up to date to facilitate the O&M staff a correct insight to the final versions of related drawings[7]

Version	Modified by	Mod. Date	Revised by	Rev. date	Stored in:

Table shall be updated after final design

13.6 Commissioning and testing (Renewal work)

The commissioning and testing functions, in the O&M context, is exclusively related to renovations, retro-fits, asset replacements/substation and projects (O&M projects) during the operating period (after Functional Area Readiness) and within the O&M limits.

The commissioning and testing functions, in the O&M context are understood as:

- Commissioning is the advancement of an installation from static completion to working order according to specified requirements.
- Testing is the measurement and recording of system parameters to assess specification compliance.

Commissioning of the building's O&M limits and their engineering services is very important to their safe and energy efficient operation. This key stage in the O&M projects processes enables the installed systems to be operated according to the design intent.

The main factors influenced by the commissioning of O&M's building services and within the O&M limits are:

- Maintenance of internal design parameters within defined tolerances at all load conditions
- Minimizing energy consumption
- Future maintenance requirements

7 Table to be completed with the relevant documents once the Final Physical Project Plan is approved and to be updated periodically

Commissioning management

The main objective of commissioning management is to manage the overall pre-commissioning and commissioning activities within the O&M limits of the O&M projects, including programming and co-ordination of energizing the installation, to achieve the project completion date.

A number of commissioning parameters needs to be set out by designers of the O&M projects and agreed prior to commencement of any of these O&M project. These changes in the system performance will be recorded by the staff of the Operator's responsible for the commissioning processes, and the O&M log book and other record documentation updated to suit.

Summary of commissioning requirements

The O&M projects shall be inherently commissionable. This is most likely to be achieved if the requirement is in the brief form the outset, and commissioning staff advice is involved early in the design process of any O&M project. The following summarizes the key requirements for successfully commissioned building services after O&M projects within the O&M limits:

- The contractor of the O&M projects and the Developer should allow sufficient time for the complete commissioning process and ensure integration in the overall O&M program.
- A commissioning management team shall be formed early in the design and construction process of O&M projects to advise on buildability and commissionability.
- Maximum use shall be made of off-site pre-commissioning activities for all O&M projects.
- Manufacturers of equipment for O&M projects shall be involved in the commissioning process.
- Thorough commissioning procedures shall be adopted for any O&M project.
- Feedback shall be obtained to confirm the performance of the installed systems of O&M projects and the attainment of required internal environmental conditions.

Commissioning management and commissioning staff responsibilities within the O&M limits

The responsibilities of the commissioning staff can be extensive and various depending on how early the person is appointed and the extent of the renewal work. Management will appoint commissioning staff at early O&M project stages, as the commissioning staff's input at the design stage of O&M projects will make a significant contribution to ensuring the success and timely completion of any O&M project.

If the brief extends to a commissioning management role, the commissioning manager's responsibility is to interface all the activities of the work package so as to produce complete operational systems on time. The commissioning manager shall be appointed to the O&M project/management team as early as possible so that the interfacing can happen in a proactive manner.

The function of the commissioning manager is as a facilitator and catalyst bringing together diverse specialist operation by corporation, consensus and coordination and dealing with any of all the following:

- Electrical services
- Mechanical services
- Control systems
- Specialist equipment (normally commissioned by equipment/system supplier)

Terms of appointment vary, but the scope of works of O&M projects for the commissioning manager shall be:

- Design review.
- Drawing review (including buildability, commissionability and maintainability).
- Planning/programming commissioning.
- Witnessing of works testing.
- Monitoring services installation against the specification and program.
- Coordination of commissioning and maintenance documentation.
- Witnessing the site testing.
- Witnessing of the flushing and cleaning of pipework distribution systems.
- Witnessing the commissioning.
- Coordination of record documentation.
- Organization of client training.

It must be emphasized that all installations within the O&M projects, irrespective of size, will be properly commissioned after any kind of renewal work and the following general principles will apply. The appointed team will also have the understanding of the implications of regulations and a policy and strategy for working to meet the regulations.

Commissioning staff's responsibility may include some of the following activities:

- Design stage
    - Review the commissionability of design.
    - Review the maintainability of design.
    - Review commissioning and testing content of specification.
- Post-design stage:
    - Produce project-specific commissioning and testing methods statements.
    - Prepare an integrated commissioning and testing program.
- On-site duties:
    - Monitor and review installation in line with specified requirements.
    - Coordinate, oversee and witness progressively the testing and commissioning.
    - Monitor commissioning and testing program and report progress.
    - Collate test data.
    - Oversee/coordinate production of operating and maintenance manuals and record drawings.
    - Coordinate client training.
    - Coordinate demonstrations of the safety systems to the local authorities, fire officer, district surveyor and building insurer.

Where the above duties are excluded from the terms of reference of the commissioning engineer, this shall not be a reason to eliminate the excluded duties, and therefore, the excluded duties of the commissioning engineer shall be assigned and/or delegated, together with the appropriate responsibilities, to other suitable qualified members of the O&M team. Important is to highlight, once again, that all commissioning and testing activities are responsibility of the D&C team and only the renewal work commissioning and testing shall be the responsibility of the Developer.

13.7 Commissioning documentation during Operating Period

Comprehensive documentation to support commissioning and testing activities of all O&M projects is of paramount importance. Such records will show that statutory requirements have been bet both mechanically and electrically allowing the O&M limits to be certified as safe for use.

Of much greater importance in the longer term, the commissioning documentation shall provide a record that the commissioned systems operate in accordance with the design intent of the O&M projects during the Operating Period. These records will also be invaluable in ensuring that the performance of the system, within the O&M Limits is kept up to standard. Additionally they provide an essential basis for the logical adjustment of system performance or for the recommissioning of systems following modifications or adaptations of the O&M limits or its services.

The production of O&M manuals, health and safety files and O&M log books in an electronic web-based format is provided to be both time- and cost-effective as it reduces the need for production and/or duplication of hard copies and provides simple cross referencing by hyperlinks. It also makes updating and archiving a simple on-step process.

13.8 Designer's checklist

The following checklist is applicable to all sizes of O&M projects and installations and shall be used to evaluate the design team in its commissioning related activities and responsibilities within the O&M limits (and exclusively of O&M projects):

- Has the appointment of a commissioning specialist been considered?
- Can the systems be commissioned in accordance with the specification and corresponding regulation codes?
- Can the installed O&M services be adequately and safely maintained after handover?
- Have validation checks at manufacturer' works been allowed for on the major plant items?
- Have the patented systems been checked of tested rather than just assumed to be working
- Has sufficient detailed design information been provided, especially in respect of control regimes, including set-points, system flow rates and plant capacities?
- Is the specification definitive in its content of the commissioning responsibilities and acceptance criteria and tolerances?
    - Developing and managing implementation and transition plans and documentation.
    - Ensuring all interfaces are identified, defined, and managed.
    - Ensuring all the quality gates are achieved for the transition.
    - Supporting the preparation, review, and approval of Program/Component Project documentation, including closeout.
    - Identifying and managing implementation and transition-related risks and issues.

Secure resources involves:

- Estimating costs and developing budget.
- Administer the O&M plan.

13.9 Change Procedure

The different Change Procedures (Owner initiated, Developer Initiated, change directives, etc.) are defined in the Development Agreement. For a more detailed definition please refer to section 7.2.2 and article 12 of The Development Agreement and section 4 of the Project Management Plan. If during the course of the Project any specific clarification is required for O&M related changes it will be developed in this section of the O&M Plan.

13.10 Inspection and reporting

13.10.1 Introduction

Controlling operation and maintenance is an on-going activity. It is the process of continually monitoring the maintenance system and its performance against pre-set performance levels, and reporting the performance to those responsible for management of these functions as well as stakeholders that need to have an insight in the performance.

A maintenance audit shall be objective by developing a standard format for the assessment document and describing the content of each item. This shall increase the benefit of the audit to all the parties concerned.

13.10.2 Inspections

Without limitation to the Owner's right to conduct inspections without prior notice, Developer shall be responsible for planning and conducting regular inspections of all Elements within the O&M Limits to verify that Elements function as designed and meet the Performance Standards. Inspections shall be conducted for all Elements at a minimum once per year, or more frequently as may be necessary depending on the nature and conditions of the Element or required by Law.

Developer inspections requirements shall include, at a minimum:

- Comparison of level of service against the Technical Requirements, Performance Standards, manufacturers specifications, O&M Services Plan, O&M Manuals, and best practice;
- Examination of efficiency; and
- Examination that O&M Services have been carried out in accordance with the Contract Documents and the O&M Services Plan and that the anticipated performance has been achieved.

Inspections and outcome of such inspections shall be documented in the Service Task Order Program and as part of the O&M Annual Report.

13.11 Maintenance Reports and logs

The maintenance reports and logs are internal tools of the Developer as part of the Developer's quality management system and define roles and responsibilities and establish procedures and reporting formats, thereby helping to ensure consistent and effective control.

Controlling maintenance shall be done in two levels of audit/inspection:

- A system audit to check the detailed formal procedures that constitute the maintenance regime (e.g. procedures for planned maintenance, procedures for record keeping and managerial procedures) to ensure that they satisfy legal requirements, the Technical Requirements and Development Agreement.
- A performance audit to monitor the performance of the maintenance regime against set performance levels.

Examples of all maintenance reports and logs are to be included in the O&M plan for internal use only. All reporting requirements for system license and inspection shall be documented together with other relevant information such as the date of inspection/renewal and the name and telephone number of the inspection/licensing authority.

The Developer, in order to be complaint with the Contract Documents, shall create, distribute and make available a large number of internal reports to assure a correct functioning of the O&M department. A number of reports that will be created internally are:

- Periodical reports (monthly, semi-annually, annually) for activities tracking and monitoring.
- Maintenance problem solution reports (as for instance in repetitive breakdowns or defaults, or high cost repairs, breakdowns that do require a large solution times, equipment stops requirement for repair work, etc.).
- Continuous enhancements reports.
- Reports related to operation and maintenance activities requested by the Owner.
- Reports of testing.
- Reports of Commissioning.
- Cost reports of spare parts per asset or asset category (use of spare parts, stock of spare parts, default spare parts, etc.).
- Cost projection reports of spare parts.
- Spare Parts Purchase reports (indicating delivery times).
- Checklists of Manufacturer's Equipment.
- etc.

13.11.1 O&M Monthly Report

The O&M Monthly report is the formal performance evaluation tool that serves to communicate with the Owner all information and data related to the performance of the Developer's responsibilities. As the report title already indicates, this report will be presented monthly.

In the O&M Monthly report the Developer will present detailed data concerning service delivery of the previous month that will inform regarding the performance standards of all services within the scope of the Technical Requirements and Development Agreement.

According Section III.4.11.1 O&M Monthly Report of the Technical Requirements:

Upon Developer's commencement of performance of the O&M Services, Developer shall deliver an O&M Monthly Report to the Owner for review and comment no later than the 15th day of each month covering the O&M Services performed the previous month. The format of the O&M Monthly Report shall be submitted to the Owner by Developer as part of the O&M Services Plan Developer shall prepare the monthly reports in electronic format and each report shall contain the following information:

- summary of the Planned Maintenance for the upcoming month;
- summary of the O&M Services performed and completed for the previous calendar month and confirmation that all O&M Services was performed in compliance with the requirements under the Agreement, these Technical Requirements, and the O&M Services Plan;
- summary of the Planned Maintenance previously scheduled for the month but that was not completed for the month, including the reasons for the incompletion of the Planned Maintenance and a revised schedule for such Work;
- summary of the maintenance activities performed for the previous month beyond the Planned Maintenance for that month;
- detailed results of all Planned Maintenance and other Maintenance Work that was performed during the month;
- summary of inspection activities, assessments, testing activities and results, identified Noncompliance Events , and consequential Maintenance Work;
- Utilities usage per Section III.4.3 of these Technical Requirements;
- report all instances of Noncompliance Events and Unavailability Events starting or ending during the month, describing at a minimum: the corresponding name and ID number, applicable Cure Period, the start date and time, entity who identified the event first, whether

the event was the result of an Incident or an Emergency, details regarding the cure of such events including the steps taken and the time it took to cure, the status of the event as of the end of the month, confirmation of cure if applicable, Noncompliance Points and deductions for Unavailability accrued if any associated with each event, and the changes (if any) made to the O&M Services Plan based upon the events;

- summary and support calculation of Noncompliance Points and Unavailability deductions accrued by Developer for the past month and cumulative number of Noncompliance Points and Unavailability deductions assessed during the last rolling 12-month period and 48-month rolling period;
- list with detailed locations and total number of all Shutdowns including details describing the location and duration and explaining as applicable for each Shutdown whether it is an Unavailability Event or a Permitted Shutdown, and detailed assessment of Unavailability deductions;
- report all Emergencies and impacts on the Elements within the O&M Limits and O&M Services, including a time based report of all actions and activities performed by Developer and description of impact of such events on Developer's O&M Services or statement of no impact (including damage assessment logs);
- description of the completed or programmed upcoming Renewal Work and measures to complete such Work;
- materials certification for any materials incorporated into the Work;
- certification that the Work performed meets Developer's acceptance criteria.

13.11.2 O&M Annual Report

The O&M Annual report is the formal annual performance evaluation tool that serves to communicate with the Owner al information and data related to the performance of the Developer's responsibilities during the last calendar year. As the report title already indicates, on an annual basis, Developer shall create a consolidated O&M Annual Report as required in Section III.4.11.2 O&M Annual Report of the Technical Requirements.

The O&M Annual Report shall summarize Developer's O&M Services performed for the year, and confirmation that Developer performed its O&M Services in compliance with the Development Agreement, these Technical Requirements, and the Project Management Plan.

From Substantial Completion date, Developer shall deliver the O&M Annual Report to the Owner no later than 30 days after each Calendar Year for review and comment, starting on January 1st after one year after the first Substantial Completion Date. The O&M Annual Report shall be completed in accordance with the requirements set forth in Part III of Great Hall Project Technical Requirements. Developer's O&M Annual Report shall contain the following information:

- summary of all O&M Monthly Reports from the preceding year;
- summary of Noncompliance Events and Unavailability Events and Noncompliance Points and Unavailability deductions accrued for the preceding year;
- summary of all adjustments to the O&M Monthly Reports from the preceding year (if any);
- summary of the information requested by the Owner (corrected if necessary), by month during the preceding year (if any); and
- Renewal Work Report.

14 Contracting practices

14.1 General

The Contracting Practices describes the required steps of supplier's selection processes:

- Identifying suppliers,
- Soliciting information from suppliers,
- Setting contract terms,
- Negotiating with suppliers, and
- Evaluating suppliers.

First, Developer must identify qualified potential suppliers. Next, Developer must evaluate these suppliers. This process is initiated when the buyer formally solicits information from suppliers. Depending on the information request, suppliers respond by providing "bids" for the contract, specifying an offer on the contract terms, such as price, lead-time, quality, etc. Various contract terms, which relate to the type of contract up for bid. Suppliers' offers often evolve over the course of negotiation with Developer, and negotiation processes. Finally, Developer determines which supplier or suppliers will be awarded a contract and subsequently monitors the supplier during the life of the contract to support future supplier selection iterations.

Identifying potential suppliers.

This section outlines the process of finding viable new suppliers.

Developer may need additional suppliers for service performance or for other reasons like simply to drive competition, reduce supply disruption risks, meet other business objectives such as supplier diversity, etc. In recognition of these reasons, their internal customers may be obliged by company policy to locate a minimum number of viable, potential suppliers for every product or service procured.

Supplier qualification screening process

To avoid serious consequences of supplier's non-performance, the Developer shall take proactive steps to verify supplier's qualifications prior to awarding them a contract. The primary goal of "supplier qualification screening" is to reduce the likelihood of supplier's non-performance, such as late delivery, non-delivery, or delivery of non-conforming (faulty) goods and/or services A secondary goal is simply to ensure that the supplier will be a responsible and responsive partner in the day-to-day business relationship with the Developer.

Supplier qualification screening involves many aspects, which are outlined below.

- Reference checks. Developer may contact previous customers and ask about the supplier's delivery performance, adherence to contract terms, what (if any) problems arose and how they were resolved, etc.
- Financial status checks. Developer may use published supplier financial ratings to determine the supplier's financial status and likely financial viability in the short to medium term.
- Surge capacity availability. The supplier's capacity to increase delivery quantities within short lead times is important as the buyer may be uncertain about their exact quantity needs over the life of the contract. This is particularly true for long-term contracts where demand for the

buyer's product may be heavily tied to unforeseen market events. Surge capacity is available when a supplier has access to second or third shifts, overtime, underutilized facilities, etc.

- Indications of supplier quality. The buyer might require that suppliers have ISO 9000 certification (or similar), indicating that the supplier has policies, procedures, documentation, and training in place to ensure continuous adherence to quality standards. However, in some cases the certification documents can be misleading and/or easily forged. To actually see if an adequate level of quality is achievable, Developer may have to look deeply into the supplier's organization to ensure the supplier is capable and competent to meet the buyer's specifications.

- Ability to meet specifications. To rigorously check the supplier's capabilities Developer might: (i) Request samples of supplier products and test them to ensure conformance to the buyer's requirements. (ii) Visit the supplier's production facility and interview line workers and engineers to ensure that all members of the supplier team understand the critical features of the product in their charge. (iii) Audit the production facilities to ensure that production can and will only proceed in a manner approved by Developer.

Suppliers who have passed the qualification requirements and are eligible for contract award are commonly referred to as "pre-qualified" suppliers. Finally, using a supply base not only reduces Developer's qualification screening costs but also allows for the development of standardized contracts, terms and conditions for pre-qualified suppliers, thereby streamlining administrative processes involved in contracting.

Information requests to suppliers

Once Developer has identified potential suppliers, the next step in supplier selection is to formally request that the suppliers provide information about their goods or services. The request types, each appropriate for a different situation, are described below.

- Request For Information (RFI) shall be issued when Developer seeks to gain market intelligence regarding what alternatives and possibilities are available to meet the Developer's needs. Typically requests to the suppliers are what goods and services they could potentially provide, what differentiates them from other vendors in the marketplace, etc.

- Request For Proposal (RFP) shall be issued when Developer has a sense of the marketplace and has a statement of work which contains a set of "performance" requirements which it needs fulfilled. Upon learning the supplier's proposed pricing, Developer may revise its requirements and/or negotiate exact terms with suppliers. Thus, the process is generally iterative. An RFP is appropriate for procurement of items that are non-standard or highly complex, requiring supplier input and expertise about the best way to meet the requirements set forth in the RFP.

- Request For Quote (RFQ) shall be issued when Developer can develop a statement of work that states the exact specifications of the good or service needed. RFQs shall be used in conjunction with highly structured competitive tendering processes. Typically there is no need for detailed negotiations with suppliers after bid receipt, as lowest price or some other objective criteria shall be used to evaluate bids. Due to their up-front specification requirements, RFQs are appropriate for procurement of items that are standard and well-known in the marketplace.

Contract terms

The supplier selection process culminates in a contract between Developer and one or more suppliers. The information received from suppliers via the requests described, ultimately must be translated into formal contractual terms before contracting can occur. A contract with a supplier specifies what the

supplier should do and how they will be paid by Developer. At the highest possible level, contract terms relate to either monetary transfers (payment terms) or how the contract will be executed (non-payment terms). Contracts can specify any number of payment and non-payment arrangements.

14.2 Contractor's performance

Developer is responsible for achieving performance standards as required under Section III.5 of the Technical Requirement. When subcontracting any service to any third party the end responsibility remains at the Developer and Developer will make sure the contractor is complaint with any of the following, but not limited, requirement of the Technical Requirements and Developers Agreement, as for example:

- Management and Staffing, in accordance with section I.10.2 of the Technical Requirements
- Risk Management Plan in accordance with Section I.10.3 of the Technical Requirements
- Quality Management Plan in accordance with Section I.10.8 of the Technical Requirements
- Document and Data Management Plan in accordance with Section I.10.9 of the Technical Requirements
- Communication and Coordination Plan between Owner and Developer in accordance with Section I.10.10 of the Technical Requirements
- Affected third party Plan in accordance with Section I.10.11 of the Technical Requirements
- Public Information and Communication Plan in accordance with Section I.10.12 of the Technical Requirements
- Health and Safety Plan in accordance with Section I.10.13 of the Technical Requirements
- Environmental Management Plan in accordance with Section I.10.14 of the Technical Requirements
- Emergency Management and Disaster Recovery Plan in accordance with Section I.10.15 of the Technical Requirements
- Shutdown Plan in accordance with Section I.10.17 of the Technical Requirements
- Training Plan in accordance with Section I.10.20 of the Technical Requirements.

15 Maintenance

15.1 Introduction

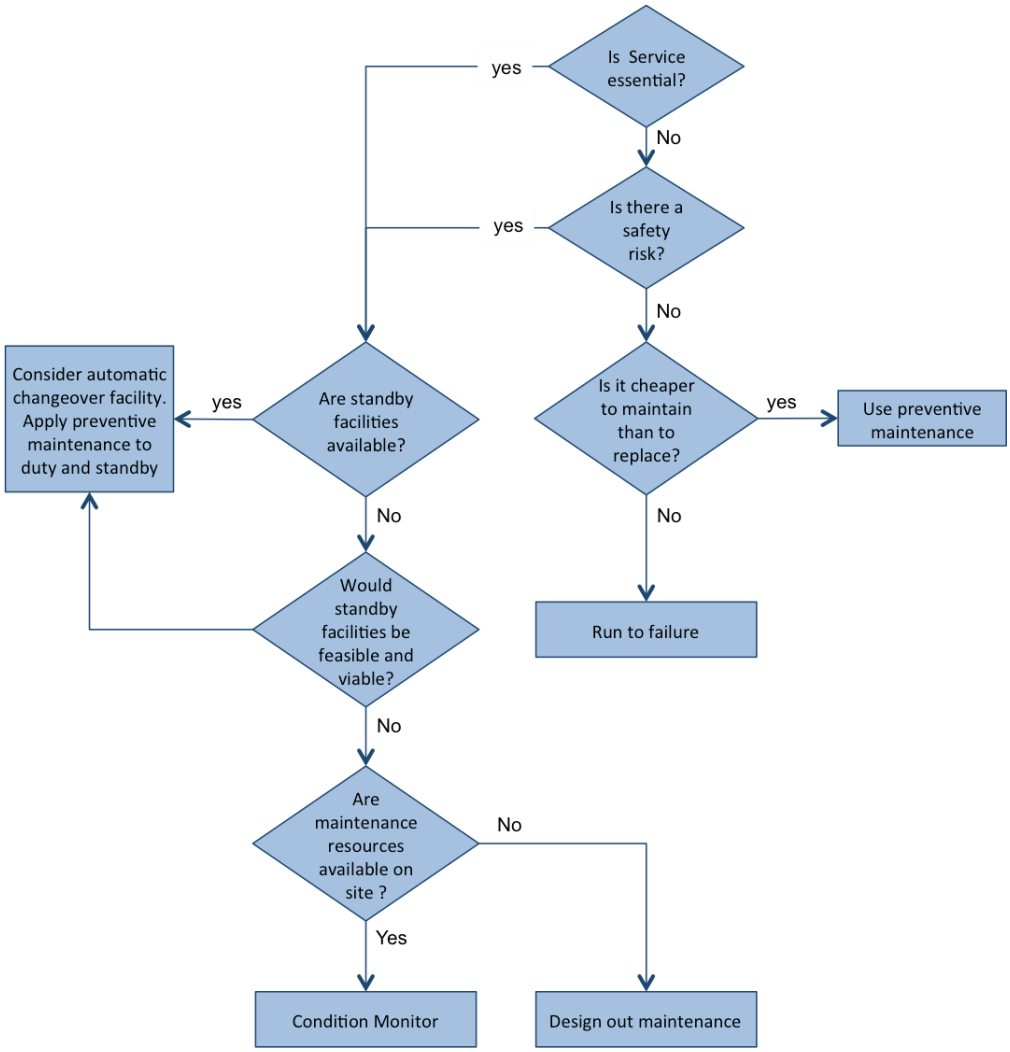
15.1.1 Establishing the maintenance policy

The maintenance policy has been designed for assets within the O&M limits. During installation, the specified maintenance policy can ensure that appropriate and safe means of access and isolation are provided, proper means of identification and test facilities are available and suitable spare parts lists are on hand. The testing and commissioning stages will ensure that the installation can be operated and maintained effectively from handover in line with the original maintenance policy.

The maintenance policy for any installation is likely to be unique, but many of the variables area likely to apply generally. The following questions are intended to help in the formulation of a policy:

- What are the implications of failure
- How is the asset likely to fail?
- What is the probability of failure?
- Are standby facilities available?
- What level of usage is envisaged?
- What type of maintenance is envisaged?
- What level of technical expertise will be available, and how will it be organized?
- Will spares be available on site?
- Can equipment be purchased or rented locally?
- Can a standard of maintenance be stated?
- Will all necessary documentation be provided?
- What financial resources will be available for maintenance?
- How will compliance be demonstrated?

The answers of these questions area also likely to affect how subsequent maintenance decisions are taken, but as more detailed stages are reached beyond the initial design brief the types of decisions needing to be taken may not always relate directly to the policy statement. A structured approach at these stages can beneficial by ensuring that a consistent and logical methods is followed. The following figures shows how such a structured consideration will be applied to the design process and will also influence maintenance planning.



15.1.2 Choice of maintenance

The Developer has determined the most appropriate choice of maintenance procedures as reflected in annex A4 Services to provide, B O&M Equipment Manuals and C Planned Preventive Maintenance Schedule.

The following is an example how this has been approached. It shows part of a list of services in a building and analyses to establish the detailed maintenance requirements. To be effective, such a procedure needs to be kept up-to-date perhaps on a three or five-year basis for new installed Elements but more frequently where services are approaching the end of their economic life.

Eng. Plant or services	Minimum statutory req.	Implication of failure	Age (years at 2017)	Estim. Remain. life (years)	Assessed Current reliability	Relative energy use	Notes
Electrical power installation	Five-yearly inspection	100% loss of building function; no lights or heating. No standby generator	25	5	Fair: localized breakdowns of sub circuits	N/A	Last inspection report indicated deteriorating situation. Inspect every two years. Ensure 24-hours standby. Airport management to isolate sections in emergency-training needed

The statutory requirements planned in the O&M Service plan are based on all applicable laws and regulations as required in Sections I.9.1 Health and Safety Management, I.10.13 Health and Safety Plan of the Technical Requirements.

For all details regarding the planned activity see Annex B – O&M Equipment Manuals and Annex C – Planned Preventive Maintenance Schedule.

15.1.3 Main principles of the planned maintenance system

The following checklist itemizes the details that has been established for a planned maintenance system and that are included in Annex B – O&M Equipment Manuals and Annex C – Planned Preventive Maintenance Schedule:

- Items to be maintained (the asset register).
- Maintenance policy appropriate to each item.
- Work to be done on each item.
- Labour required.
- Material resources required.
- When and how frequently the work is to be done (the maintenance program).
- How the maintenance system will be administered.
- How the results will be recorded, monitored and analysed.

15.2 Inventory[8]

15.2.1 Developer's Elements list

The Developer's Elements list is the recompilation of basic information of individual components, systems or subsystems within the scope and O&M limits and that serves as a reference list of these Elements.

The basic information covers the format, content, delivery, and updating of O&M documentation, of all Elements within the O&M limits, that is initially provided by the design and construction team and will be kept up to date by the Developer during the Operating Period.

15.2.2 Purpose Developer's Element list

The purpose of the Developer's Element list is to guide all members of the O&M team with their responsibilities and commitments as required by the Technical Requirements and the Developers Agreements.

The Developer, in order to be complaint with the Technical Requirements and Development Agreement, shall develop a coherent maintenance schedule and execute accordingly and interact depending on

changing parameters. For this, the Developer's Element list is essential and therefore the Developer shall:

- Maintain and update the O&M limits Element information (like equipment inventory and equipment labelling)
- Maintain equipment inventory and maintenance records in the Developer's CMMS.
- Maintain the same Element identification system/method currently used for new equipment.
- Collect and maintain an inventory of:
    a. All equipment of types that require maintenance of certification pursuant to the Maintenance Standards of applicable code requirements.
    b. Equipment which is operated through a sequence of operations.
    c. Electronic controllers and network devices.
    d. Sensors.
    e. Others.

This Developer's Element list encompasses the following information organized in different sheets:

1. **General O&M Limits Element List**

   This section will reference the file/annex that contains all generic information of every Element in the O&M limits.

2. **Table of Contents**

   The description of equipment includes two parts:

   First part.
   A generic information that lists information related to the system, subsystem, equipment, name and document name and page number.

   Second part
   Project-specific information grouped in different sections and describes either individual pieces of equipment that form part of a built-up system or individual packaged system. Each piece of information shall be identified with an O&M number and shall be placed in the document in the same order and the generic list of the table of contents.

3. **Equipment Data Sheet**

   Each piece of equipment that requires operation or maintenance or both must have its own Equipment Data Sheet. The developed standard Equipment Data Sheet will help all O&M staff as it is an effective method for collecting O&M information from the equipment suppliers in a form that is effective for preparation and execution of O&M programs.

   The Equipment Data Sheet is designed for insertion in a binder. All information collected in the Equipment Data Sheet will be available in an Excel format for data entry and/or updating purposes into the Developer's CMMS system

   The Equipment Data Sheet is also the place where any other link will be inserted to refer to external information sources that is needed for operation and/or maintenance, like for example available video instruction from the manufacturer, suppliers contact information document, etc.

[8] To be updated as detailed design is performed. For the PDA Phase the level of detail will be in accordance to the level of design achieved

4. Maintenance Program Information Requirements

The Equipment Data Sheet must be suitable for the management of the preventive maintenance program. It shall provide the information necessary for a technician to assess the scope of an assigned maintenance task, the location of the equipment to be visited, the time allotted for the task, the O&M instructions available from the O&M documentation package, the specific tools and appliances required to perform the task, the spare parts and consumables required, whether the spare parts and consumables are in the stock room inventory, and the workstation needed for the task.

The Equipment Data sheet shall also provide the information necessary for the maintenance supervisor to schedule technicians effectively. The sheet must also provide information for the stock room purchasing agent to predict requirements for spare parts and consumables, to obtain pricing and delivery quotations from vendors, and to place orders for these spare parts and consumables.

5. Maintenance Program Information Structure

The Equipment data sheet for different types of equipment shall contain much of the same general data but does vary in content of secondary data depending upon the complexity of the pieces of equipment.

Each field or blank in the data sheet shall be planned for a specific purpose. If there is no purpose for a field, it shall not be provided. The following issues discuss the rationale for each of the information fields in the equipment data sheet.

- **Equipment Name**; shall be either the name of a piece of equipment that is installed in a system (pump, chillers, cooling tower, etc.) or the name of a packaged system (rooftop unit, heat pump, packaged-water chillers, etc.)
- **Designation**; shall be an assigned unique equipment number for each piece of equipment. See section 6.3.3 - Codification Equipment Data Sheet, SOP, IOM.
- **Location**; shall be a description of where the piece of equipment is located with an indication of how to gain access to the location. An example is: “Basement C Building, Room B1001, Sump at the Door.”
- **Associated System**; shall be the name and number of the system the piece of equipment serves, unless the piece of equipment is a package system.
- **Manufacturer, Model Number, and Serial Number**; shall provide specific information from the equipment name plate. Changes, such as revised O&M instructions, require retrofit project documentation providing information on new equipment parts that will be required in the future for O&M. An example is “Mfgr: ABC Pump Company; Model No: HSCIOx8x13: Serial No 870015”, where the leading 87 might be the year of manufacture.
- **Vendor Agent, Invoice or Purchase Order Number, and Purchase Order Date**; shall provide the specific information from the contractor or vendor’s files that is necessary to identify the order when obtaining information from the vendor/agent. Many vendors maintain their files for a limited time, particularly when a change of agent occurs. Therefore, it is desirable to provide information that would allow access to the manufacturer’s files. This field may be modified to provide the manufacturer’s order number or contractor’s

purchase order number as necessary to suit the circumstances of the original equipment order.

- **New or Rebuilt, Warranty Term;** shall provide information on the initial status of the equipment and the length and terms of the manufacturer's or builder's warranty. The new or rebuild information fields may not be applicable to new projects but may be useful for commissioning work. Warranty terms vary from manufacturer to manufacturer and on different equipment items from the same manufacturer. In some cases, extended warranties can be purchased as part of the construction contract and, without this entry, may not be known to the maintenance supervisor. An example is "Status: New (X); Warranty: 90 Days on Parts and Labour: one year, Parts only, FOB Plant.
- **Installations, Operation, Maintenance (I/O/M) Instructions, Name and Number; and date;** shall provide a listing of manufacturer's bulletins that apply to the equipment, giving the title, publication number and date of issue of revision. In many cases, the warranty terms include a provision that the equipment be installed and started up in accordance with specific I/O/M instructions. Failure of the installing contractor to follow those terms may void the manufacturer's warranty and cause needless problems in the event of equipment malfunction or failure. The maintenance supervisor and his/her technicians shall familiarize themselves with the applicable publications, verify that the publications are in the maintenance department's reference library, and inspect the equipment installations and start-up report to verify that the manufacturer's conditions for warranty coverage have been met.
- **(I/O/M) Instructions Video Available, Name and Number, and Source of Videos;** shall provide information for the maintenance supervisor on the training aids that are available for the equipment item, the name and number of each video, and the source for ordering the videos. The video approach to training O&M personnel in the specific equipment installed in a building is cost-effective in that it tends to install a disciplined approach to maintenance of other items that may not be covered by videos.
- **Spare/Repair Parts, Part Lists, Minimum Inventory List;** shall provide information about the applicable spare parts list and inventory list, including the designation and date of each list. For some equipment, this field shall be modified to provide information about specific spare parts required, such as belts, filters, and repair kits. And shall note which parts are carried in inventory and which shall be specially ordered.
- **Preventive Maintenance Actions and Time Required;** shall provide, for each of the listed actions, the standard time allotment for each action. Where more than one technician category and skill are required to perform the task, the hours for each category and skill level. The listed actions shall be modified for the specific equipment item covered. For example, a closed-circuit liquid cooler may require chemical treatment, coil and pan cleaning, lubrication, motor starter service, power contactor service, pump seals, and v-belt drive service.
- **Scheduled routing O&M Actions, and Time Required;** shall provide information on the labour requirements for each routing maintenance action for an equipment item for the maintenance supervisor to use in allocating manpower, planning staffing requirements, scheduling routing maintenance operations. A typical list of routing frequencies might include daily, weekly, monthly, quarterly, semi-annual, annual, preseason hours, and

pressure drop basis. The equipment overhaul equipment usually are on the basis of operating hours or performance parameters, such as low oil pressure or low differential pressure. The routine actions listed below are additive, in the sense that each calendar-based action includes the task on the previous action level. A general description/examples of the routing action for a pump might include the following:

Daily	Observe shaft for excessive leakage and listen for bearing noise.
Weekly	Feel pump and motor bearing housing for excessive heat build-up.
Monthly	Measure and record suction and discharge pressure.
Quarterly	Verify lubrication.
Semi-annually	Remove drive guard and check alignment of shaft coupling.
Annually	Check motor amperes drawn at full load; check motor shaft run-out; and perform thermographic scan of motor starter, motor and pump.
Preseason	Quarterly jobs plus clean and paint drip pan.

Each action shall have a listing of the technician categories and skill levels required and number of hours for each technician. Much of the basic information for these entries is available from the fields “preventive maintenance actions”, “Time required”, and “Routing O&M Action description, Skill Level, Tools, and Consumables”.

- **Routine O&M Action Description, Skill Level, Tools and Consumables;** shall provide a fairly detailed description of each action, giving the action name, the technician(s) category and skill level, the special tools and appliances required, the consumables required, and the service cart type containing the basic tools and supplies needed for the task. The O&M action description shall be tailored to the O&M department’s philosophy, whether for predicative, preventive, routing, or breakdown maintenance.

  A typical action description would be:

  Name- Measure amperage drawn by pump motor;

  Technician Category and Skill Level *– HVAC Technician, Level III;*

  Tools/appliances required *– Hand tools, volt/ohm/multimeter, Class II protective gloves;*

  Consumables *– None;*

  Time Allotted *– 0,8 hours;*

  Chart Name *– Electrical Testing;*

  Description of Task *– Advise Building Automation System operator that pump may be shut down at an approximate time for an approximate length of time; Take work order tool room, draw chart cart and special tools; go to task location; stop pump motor from the hand-off automatic switch on starter face and open starter enclosure; restart pump with enclosure open; carefully draw load-side wires from enclosure as required to use multimeter, place sensor jaws around each conductor in turn and read and record phase leg amperage; connect probes to multimeter, read voltage on each phase leg, and record with amperage for same*

leg; stop pump motor, carefully place load-side conductors in enclosure, close enclosure, and restart pump motor; verify that pump is running; return to shop; and analyse test results. If amperage or voltage is greater than 10% between any two legs, notify supervisor.

- **Maintenance History – List for each Maintenance Action;** shall provide a means for obtaining feedback from the technician(s) and include the date the data are recorded; the work order number; a description of the operation performed, if different from the action description; cost for operation performed, to be completed by an O&M Clerk; technician name(s); and comments. The intent of this section is to get comments from the technicians while the work is fresh in their minds. The subjects of comments are expected to be wide-ranging, from the usual complaining about why has to be done at all to constructive comments such as, "*Annually is too often. Do this work when problem is found*", or "*The overload heaters are too large for the measured amperage and shall be changed".*
  The maintenance supervisor can explain that the comment is based on a breakdown maintenance philosophy, while the building is being operated on a predictive maintenance philosophy. In the second case, the supervisor can issue a work order to replace the oversized heater relays.
  This approach requires that the maintenance supervisor reads all of the maintenance history to make full use of the information. It is desirable to have the equipment data sheet copy turned in with the complete work order so that the O&M staff can collect the sheets with comments for the supervisor's review and monthly reports.

15.2.3 Codification Equipment Data Sheets, SOP, IOM

Assets & Functional Area

Each individual asset has been linked to a functional Area that identifies the main speciality of the Maintenance work to be undertaken (including risk Consideration). To allow an easy identification, each functional Area would be identified with a Code of Letter but also with a Colour (as in the List Below).

In any case each asset has an identification code that consist of three letters followed by 2 sequential digits **XXX-DD**. For example SPA-01; SPA-02.

Description	CODE
ELECTRIC FUNCTIONAL AREA	ELEC
Lighting System	LS
HVAC FUNCTIONAL AREA	HVAC
Fire Damper	FDA
Extract fans	NEF
Supply fans	SFA
Fan coil Unit	FCU
VAV Unit	VAV
Unit heater	CBU
Split unit	RTU
Air grilled supply/return	AGI
Kitchen Ventilation duct	KVD
PLUMBING FUNCTIONAL AREA	PLUM
Water Heater	WHH
Water Balancing units	TWA
Safety valves	PSV
Control valve	CV
Drainage	PID
Cold and hot water pipes	PIP
Lavatory Assembly	LWW
Toilet Assembly	TWW
Urinal Assembly	UWW

As a note, the functional Area Colour has been chosen, following the normal fluid in Use for each Functional Area under ANSI/ASME code A13.1 use for piping identification.

ANSI / ASME A13.1-2007 (pipe Identification)			
FLUID	**IDENTIFICATION**	**Color**	**SYSTEMS**
Water	Green		PLUMBLING
Oil	Brown		CONVEYANCE
Air	Blue		HVAC
Solid	Clear Grey		BUILDING
Fire Protection	Red		LIFESFTY
Electric	black		ELECTRIC

Equipment Data Sheet

Codification of the Equipment Data Sheet shall be **DS-XXXX -YYYNN-MM**

- **DS: Data Sheet**
- **XXXX:** 4 Letters for Functional Area Code (provided by as-built drawings)
- **YYYNN:** 3 letters for functional Area Code with the number of the individual Asset
- **MM:** 2 numbers with the identification of the page of the Equipment Data Sheets when printed

Example: DS-HVAC-NEF23-01 is:

- Equipment Data Sheet (DS) of an asset;
- Belonging to the HVAC System (HVAC)

- The asset is an Extract Fan (NEF) and “33” is the sequential number that individual Extract Fan.
- And the 01 is the first page of the printed Equipment Data Sheet

Header of Equipment Data Sheet

The code would include the colour of the Asset System. The header includes the following relevant information:

- Warranty milestone so Maintainers considers the Warranties of each asset
- Designation name of the asset
- Equipment name
- Last modification name

	Equipment Data Sheet	DS-HVAC-NEF23-01
ferrovial	Designation: NEF23 Equipment name: Exhaust FAN Last modification date: nov-29-2016	Next warranty milestone jul-01-2019

The next section of the Equipment Data Sheet includes General Information with Location Code in Developer’s CCMS and a small location map, Floor Level and Associated Electrical Circuit (if available).

GENERAL INFORMATION	
EQUIPMENT NAME	*Exhaust FAN NEF23*
DESIGNATION	*NEF23*
LOCATION	*TML_06_5W_RF01*
FLOOR LEVEL	*L6*
ASSOCIATED SISTEM	*HVAC*
ASSOCIATED ELECTRICAL CIRCUIT	*N/A*

Another section shows the Warranty and Purchase Information.

WARRANTY INFORMATION					
STATUS OF EQUIPMENT	NEW *x*	REBUILT		IN SERVICE	*N/A*
ENERAL COMMENTS WARRANTY	Warranty upon Purchase				
WARRANTY TERMS	*One year from Purchase*	COMMENTS			
WARRANTY EXPIRATION DATE	*jul-19*	COMMENTS			

PURCHASE INFORMATION			
MANUFACTURER	*N/A*	SUPPLIER	*N/A*
MODEL NUMBER	*N/A*	PURCHASE ORDER	*N/A*
SERIAL NUMBER	*N/A*	PURCHASE DATE	*N/A*
STARTUP	By: *N/A*	Date:	*N/A*

The following section collects all Commissioning records.

TESTED				COMMISIONED			
By:	*N/A*	Date:	*N/A*	By:	*N/A*	Date:	*insert comissioning date*
By:	*N/A*	Date:	*N/A*	By:	*N/A*	Date:	*insert comissioning date*
By:	*N/A*	Date:	*N/A*	By:	*N/A*	Date:	*insert comissioning date*
By:	*N/A*	Date:	*N/A*	By:	*N/A*	Date:	*insert comissioning date*
CERTIFICATE	*N/A*						

And another section the Standard Operation Procedures available as reference.

STANDARD OPERATION PROCEDURES INFORMATION				
STANDARD OPERATING PROCEDURE	NAME	*Fan Coils Units Maintenance*	CODE:	*DIA-FM-FER-HVA-SOP-003*
INSTALLATION / OPERATION / MAINTENANCE VIDEO AVAILABLE	*N/A*		FILE:	*N/A*

The following section specific accessibility issues.

ACCESIBILITY			
LEVEL OF VISUAL INTERFERENCE	*N/A*	COMMENTS VISUAL INTERFERANCE	*Depends in final Design*
LEVEL OF FUNCTIONAL INTERFERENCE	*N/A*	COMMENTS FUNCTIONAL INTERFERANCE	*Depends in final Design*
ENCLOSURE REQUIRED	*N/A*	COMMENTS ENCLOSUR	*Depends in final Design*
LEVEL OF ROOM ACCESS	*N/A*	COMMENTS ROOM ACCESS	*Depends in final Design*
DISMOUNT EXTERNAL COMPONENTS	*N/A*	COMMENTS DISMOUN COMPONENTS	*Depends in final Design*

In the following section, the routine Maintenance Task for each individual asset would be included with the required Tools and Spares parts.

ANNUALY Maintenance tasks				
Task #	**task description**	**Duration**		
A01	Check fan drive for problems due to poor aligment or poor bearing seating.Repair or replace as needed to ensure proper operation.	1h		
A02	Check fan blades and fan housingClean, repair or replace as needed to ensure proper operation.	1h		
A03	Asses field-serviceable bearingsLubricate if neccesary	1h		
A04	Check variable-frequency drive for proper operationCorrect if necessary	1h		
A05	Check control box for dirt, debris and /or loose TerminationsClean and tighten as needed	1h		
A06	check integrity of all panels on equipmentReplace fasteners as needed to ensure proper integrity and fit/finish of equipment	1h		
A07	visually inspect exposed ductwork and external piping for insulation and vapor barrier integrityCorrect if necessary	1h		
A08	Check for proper damper operationClean, lubricate, repair, replace or adjust as needed to ensure proper operation.	1h		
A09	Check integrity of flexible connectionsCorrect as needed	1h		
AALL	Estimated time for all preceeding activities in one task	2h		

REQUIRED TOOLS		REQUIRED SPARE PARTS AND CONSUMABLES			
	Mechanical Toolbox				
	I&C Control Box	S.P. CODE	QUANTITY	DESCRIPTION	MAINTENANCE TASK
	Lubrication	*3352017*	1	*Fan Blades*	*A02*
		5352017	1	*Frequency Drive*	*A04*

At the end of the Equipment Data Sheet we will find the Maintenance History of that particular asset.

Maintenance History				
Date	**# Work Order**	**Description**	**NAME**	**COMMENTS**
		insert description of task if different as planned	*name technician*	*insert comments*

Standard Operation Procedures

The Standard Operation Procedure file name has the following structure **SOP-XXXX–YYY**

- **SOP:** Standard Operation Procedure.
- **XXXX:** 4 Letters for the System the asset type belongs to.
- **YYY:** 3 letters for the Functional Area Code.

Manufacturer's Manual

The Manufacturer's Manual file name has the following structure **MAN-XXXX –YYY**

- MAN: Manufacturer's Manual
- **XXXX:** 4 Letters for the System the asset type belongs to
- **YYY:** 3 letters for the Functional Area Code.

15.3 Developer's Asset Management Information System

15.3.1 Objectives

Primary Objective

The primary objective of the Asset Management Information System is the availability of a system that will support the Developer's and the Owner's Asset Management. In particular, in line with the Developer's philosophy, the asset management information system is aimed to assist all stakeholders in:

- Match their assets with business service objectives.
- Optimise performance throughout the useful life of the assets.

The Asset Information System is designed to assist the Developer (and other stakeholders) in its performance responsibilities within the O&M limits in order to be able to adopt best practices for asset management.

The Asset Management Information System is the tool that contributes and promotes the process to assist the Developer to manage demand and guide acquisition, use and disposal of assets to make the most of the Developer's services delivery potential, and manage risks and costs over their entire life.

The major benefits of the Asset Management Information System are encapsulated within the statements of its benefits, like:

- It provides a structure for strategic planning and management of the Owner's infrastructure within the O&M limits to best sustain economic development and delivery of services to the community.
- It ensures minimisation of costs over the life of the asset for providing, maintaining and operating assets to support service and program delivery at specified standards.
- It ensures that investments in assets is at a level commensurate with service delivery requirements and encourages the consideration and adoption of non-asset based options for the delivery of services.
- It ensures that capital programs, priorities and asset risk management practices are consistent with the Owner's and Developer's policies.

A significant component of the benefits of the Asset Management Information system will come with the implementation of the Developer's appropriate asset management practices and the development of the associates skills and competencies within the management.

From the O&M limits perspective, once all data has been implemented, the Developer will be able to manage the assets in scope of the Technical Requirements and Development Agreement. It will be able to view the location of the assets in conjunction with other spatial data sets, such as technical information.

15.3.2 System functionality

The Asset Management Information system consists of two key parts:

- **The asset register**
  The repository of data that identifies and physically describes the assets. It is the heart of the Asset Management Information system as it stores all data to the level deemed appropriate.
- **The asset management functionality**
  Functionality that operates against assets defined in the register. It can include the major functions of asset valuation, asset life cycle, and performance assessment of assets.

The codification of all files related to the assets, like Equipment Data Sheets, Manufacturer's Manual, Standard Operating Procedure, etc. are described in section 6.3.3 – Codification Equipment Data Sheets, SOP, IOM

15.3.3 Performance Assessment

The primary aim of performance assessment of assets is to provide the ability to predict when an asset is likely to fail to meet its required levels of service – and hence when intervention action is needed so that service levels can continue to be met.

Performance shall be measured for any critical stress factors that are likely to lead to asset failure. Examples of such factors are as follows:

- Physical condition of the asset.
- Level of asset utilisation.
- Environmental factors (e.g. health and safety, fire safety, etc.).
- Currency of the asset's technology.
- Level of investment required to keep the asset operational.

Performance ratings will be determined using a risk management approach to identify consequences of variations from agreed benchmarks and assessed in the context of their likely occurrence.

Where performance assessment indicates that an asset is likely to fail, the Asset Management Information system will provide means of assigning priorities to identified intervention actions.

15.3.4 First-time Users

The Developer identifies two categories of first-time users:

- New service providers
- Developer's staff

Both will need the same kind of introduction into the integrated Asset Management Information system. The large difference between both lies in the fact that the provider will need to adapt their strategy to the system and implement it in their global operations responsibilities. This O&M plan does not cover provider's guidelines for adapting and implementing the system.

The Developer, after commencement of its responsibilities will develop adequate programs for its staff in order to be able to:

- Introduce and modify asset register data.
- Develop and create asset register reports.
- Develop the required procedure to ensure keeping the system up-to-date.
- Develop the access and authorization structure

- Develop monitoring procedures using the system
- Etc.

15.3.5 Access Controls

The Asset Management Information system is accessed with usernames and passwords in order to assign predetermined access controls and privileges necessary and aligned with the role of the staff member logged in.

Depending on the systems functionalities, the Developer shall create its own back-ups of the assets and its data within the scope and the O&M limits. Nevertheless, the Developer shall periodically create and store reports that shows all updated data of all assets under the Developer's responsibilities.

15.3.6 System basic key functionalities

Installation. The installation details and procedures of every asset must be available in the Asset Management Information system. However, the assets type's installation information is also referenced in the O&M plan and the original documents can be found in the repository described in the Asset Management Information system as well as in the document management system. See Annex B- O&M Equipment Manuals for the reference to files that include the asset's installations details.

Configuration. The configuration details and procedures of every asset must be available in the Asset Management Information system. However, the assets type's installation information is also referenced in the O&M plan and the original documents can be found in the repository described in the Asset Management Information system as well as in the document management system. See Annex B- O&M Equipment Manuals for the reference to files that include the asset's configuration details.

Starting the System. The starting details and procedures of every asset must be available in the Asset Management Information system. However, the assets type's installation information is also referenced in the O&M plan and the original documents can be found in the repository described in the Asset Management Information system as well as in the document management system. See Annex B- O&M Equipment Manuals for the reference to files that include the asset's starting details.

Stopping the System. The stopping details and procedures of every asset must be available in the Asset Management Information system. However, the assets type's installation information is also referenced in the O&M plan and the original documents can be found in the repository described in the Asset Management Information system as well as in the document management system. See Annex B- O&M Equipment Manuals for the reference to files that include the asset's stopping details.

Suspending the System. The suspending details and procedures of every asset must be available in the Asset Management Information system. However, the assets type's installation information is also referenced in the O&M plan and the original documents can be found in the repository described in the Asset Management Information system as well as in the document management system. See Annex B- O&M Equipment Manuals for the reference to files that include the asset's suspending details.

15.3.7 System Management

The Developer shall use the system management in two main areas:

A. To assist with the strategic asset management plans and associated budget forecasts to sustain service levels.

   These plans are, in effect, forward works programs for the Developer's assets over the defined planning horizon. These forward "treatment plans" will include identified actions (e.g. asset

replacement / refurbishment / disposal) to address any predicted failures of assets to deliver required levels of service, as well as on-going regular maintenance and operation of assets.

The end result of using the Asset Management Information system will include:

- Assets that better match the Owner's airport business service requirements.
- Optimised intervention actions.
- Extension of asset life.
- Managed deferral of expenditure.
- More informed and better disclosure in decision-making at both Developer's and Owner's management levels.

B. For day to day operations of the assets and their maintenance activities

The management of the Asset Management Information system will lead the maintenance scheduling, staff management, work order control, etc. The Developer's operations is responsible for the execution and coordination of various services included in the Technical Requirements and the Development Agreement, and related infrastructures and the system management is an essential part in order to comply with the required service performance levels.

Over the long-term operation of the assets within the O&M limits, a lot of the asset information that is needed to perform the operation and maintenance of the assets will come from activities such as inheriting an asset, maintenance, minor works, breakdowns, major works, end-of-life works, etc. There will be multiple activities under these responsibilities and they can be regarded as "triggers" that will require an update of the Asset Management Information system. These "triggers" do not often deliver information to coincide with the Developer decision points and rules have to be established with regard to the required currency of data and in that regard how frequently documents, graphical data and non-graphical data will be updated and who will do these updates.

Below are some typical pieces of Asset Information that might be provided during the system management of asset operations:

- Descriptions of assets, their functions and the asset system they serve.
- Locations of assets, using spatial referencing or geographical information systems.
- Engineering data, design parameters, and engineering drawings.
- Vendor data (details of the organization that supplied the asset).
- Operating instructions.
- Maintenance instructions.
- Fault finding instructions.
- Commissioning instructions.
- Commissioning dates and data.
- Health and safety files.
- The condition and duty of assets.
- Key performance indicators.
- Asset related standards, processes and procedures.
- Access planning and work schedules.
- Details of tasks to be carried out
- Work instructions together with diagrams and reporting requirements, legal obligations and safety/ environmental considerations.

- Task risk assessments and control measures.
- Criteria of non-conformance and the actions to be taken.
- When assets were last maintained/inspected and when these tasks are next due.
- List of overdue/outstanding tasks.
- Historical record of planned and unplanned maintenance tasks performed.
- Details of historical asset failures, causes and consequences (if known).
- Operational data including performance characteristics and design limits.
- Details of emergency plans including responsibilities and contact details.
- Financial data including, where available the cost of historical and planned future maintenance tasks.
- Asset related contractual information.
- Identities and levels of spares held, storage locations.
- Cost of replacing each asset.
- Etc.

15.4 Maintenance Schedule

All planned and unplanned activities are described in annex C – Planned Preventive Maintenance Schedule; and the needed resources in section 3 – Management and Staffing Plan.

15.5 System Operations

The System Operations are described in detail in the SOP – Standard Operating Procedure; see the SOP table in Annex B O&M Equipment Manuals.

15.6 Extraordinary Events and Special events

Special Events organized by the Owner will take place adjacent to and within the Project Site, during the Project Operating Period, as further described in Section I.5.6 “Special Events” of the Technical Requirements.

Additionally Airport Irregular Operations are exceptional events that require actions and capabilities beyond those considered usual by aviation service providers. The Developer shall interact as required in Section (.5.8 “Accommodation of Irregular Operations” of the Technical Requirements.

Developer shall use reasonable efforts to coordinate with the Owner and adjust its Planned Maintenance Schedule and O&M Services to accommodate to Special Events as required in Section III.4.7 “Special Events” of the Technical Requirements.

15.7 Vegetation Maintenance approach

This section explains the approach of maintenance of landscape vegetation planted within the O&M limits. Work includes irrigation, planting, plant removal and replacement, washing, pruning, fertilizing, weed and pest control, and growth retardants.

Aesthetics, safety concerns, and functional requirements are involved in airport landscaping maintenance. The Developer’s approach is to maintain the landscape areas within the O&M limits as originally designed and planted unless experience indicates otherwise. Planting require a degree of maintenance consistent with:

- The original design.
- Pedestrian and airport vehicles safety.

In line with EPA Executive Order 13514 regarding exceeding the water intensity reductions, The Developer has the objective to reduce the water footprint. Therefore the Developer shall:

- Monitor water meters and tracking use.
- Minimize or eliminate landscape irrigation.

Regarding these water needs, the Developer shall determine the adequate water needs considering the following site conditions:

- Plant species.
- Age of plants.
- Temperature.
- Length of day.
- Soil type.
- Slopes.
- Slope orientation.

The primary objective in maintenance of vegetation is to promote the safety of the users and control of legally designated noxious weeds where the occur within the O&M limits. Other considerations include protection and preservation of natural environment, preserving and enhancing the natural scenic quality of plants, pots, gardens, etc. In all cases the vegetation related maintenance activities are planned and conducted in a way that discourages or eliminates unwanted vegetation and promotes desirable vegetation.

The Developer's approach is a coordinated decision-making and action process that uses the most appropriate vegetation management methods and strategy, along with monitoring and evaluation system, to achieve to maintain the vegetation objectives in an environmentally and economically sound manner.

The process consists of the following principle components:

- Prevention.
- Monitoring.
- Determining action thresholds.
- Proper timing of maintenance efforts.
- Selection of least disruptive control and effective re-vegetation tactics.
- Evaluation.

The vegetation management process provides information for the total management system, which is used to analyse vegetation problems and recommend long-term solutions. This broad overview approach helps the Developer's managers answer four key questions:

- If treatment action is needed.
- Where treatment activity shall take place in the system.
- When action shall take place.
- Which mix of strategies, tactics and treatments are the best to use.

The vegetation management plan shall be developed with the specific needs of this region/airport design in mind and must be updated to reflect improved technology and guidance.

Preventing the introduction and spread of noxious weeds is one objective of the vegetative management. Noxious weeds generally possess one or more to the following characteristics: aggressive and difficult to manager, poisonous, toxic, parasitic, a carrier or host of serious insects, etc.

Noxious weed control: goals and strategies

Goal	Strategy
Control the introduction and spread of weeds caused by moving infested sand, gravel, and fill materials in the plants, pots and gardens.	Use materials that are certified weed free
Avoid to remove sources of weed seed and propagules to prevent new weed infestations and the spread of existing weeds.	Work with specialist and/or assessors with experience in landscaping and biology to identify areas of noxious weed infestation and provide appropriate removal
Prevent the introduction and spread of weeds caused by moving infested sand, grave, and fill material in plants, pots and gardens during the operations of the airport	Incorporate weed prevention and control into project layout, alternative evaluations, and project decisions.
Work with biologist and other experienced sources to provide early detection and control	Determine prevention and maintenance needs to include the use of herbicides, if needed, at the onset of project planning.

The Developer's policy on herbicide use

Herbicides are efficient and effective tools for vegetation management and weed control. The Developer shall use herbicides in two ways:

- To maintain vegetation-free al pavements and other surfaces where necessary.
- To selectively control and eliminate undesirable plants.

For herbicides used to control weeds and other unwanted plants, the Developer shall follow a process that helps ensure herbicides are used appropriately and only when necessary in combination with other effective control measures. The ultimate goal in any treatment is to replace unwanted vegetation with appropriate plants. In many cases herbicides are an effective tool for initial control of a problem. When combined with other control measures, herbicide use can be minimized or eliminated over time.

Any new herbicide products that may be used to vegetation management by the Developer will be formally evaluated for environmental and human health impacts prior to addition to the application protocols. No pesticide products will be used within the O&M limits without approval through the process. As technology changes and new products and procedures are developed, it is anticipated that updated applications will be suggested at the annual meetings for the corresponding approval.

16 Cleaning

16.1 Introduction

In support of the Owner in their goal of maintaining the very high standards of excellence in customer service and the desire to push the forefront of customer experience in all aspects of the project, the Developer will be committed to fostering an environment conducive to these objectives by meeting today´s standards for responsible cleaning and environmental stewardship.

Unlike the traditional industry practices of recent past, green cleaning focuses on products, equipment, and methods that have fewer adverse health effects on their users, building occupants, Patrons and visitors, and also have a lesser environmental impact than what might have been used before. Through its implementation of a green cleaning program, the Developer recognizes the importance of upholding the quality of the life of each and every constituent of the Denver International Airport.

This Cleaning program is comprised of three policies:

- The Green Cleaning Policy.
- Sustainable Purchasing Policy.
- Sustainable Equipment Policy.

The Green Cleaning Policy is a set of standard operating procedures for the green cleaning program. These procedures address how an effective cleaning and hard floor and carpet maintenance system will be managed and audited.

The Sustainable Purchasing Policy incorporates environmentally friendly cleaning, floor and carpet care, and consumables supplies in the program.

The Sustainable Policy ensures that powered janitorial equipment meet established criteria for the program and prescribes their proper use and maintenance.

Scope

The Green Cleaning Program applies to the custodial services provided by the Developer and its interior cleaning operations of the Airport within the O&M limits. The program applies to the processes involved in the cleaning and sanitizing of circulation areas, offices, restrooms, etc. Additionally, the program covers floor care equipment, cleaning chemicals and their dilution systems, paper products, automatic deodorizers and plastic bags.

Goals

The Green Cleaning Program aims to establish and communicate pro-active housekeeping practices that promote a healthy and sustainable environment. These practices, whether they are cleaning methods or procurement standards, ensure that the health of Patrons, airlines personnel, staff, etc. is not compromised by their exposure to potentially hazardous chemicals and pollutants.

Through the program, the Developer will incorporate environmentally friendly cleaning equipment and supplies where applicable.

These include, but are not limited to:

- Products certified by third-party organizations like Green Seal or EcoLogo.
- Products with dispensing systems built into the packaging.
- Non-caustic chemicals to prevent exposure, allergic reactions and splash or splatter accidents.
- Products with reduced effluent waste water contaminants (e.g. corrosives, heavy metals, phosphates).
- Equipment that minimized emissions of air or water pollutants.
- Equipment that operates on a safe, quite manner.

Finally, it also aspires to promote awareness of environmental issues facing members of the Owner and compel the Developer to seek and implement pilot programs that showcase innovative methods in cleaning.

16.2 Purpose of the Cleaning Service Manual

To define the Cleaning Service for the O&M limits within the Denver International Airport, based on a model of committed to efficiency, quality, efficiency and flexibility, with a clear definition of service components and scope.

This Operating Procedures Manual Cleaning Service aims to define those sensitive issues and modernization of the service, incorporating technological, environmental progress and greater mechanization of services, which results in improved service and reduced cost.

16.3 Project Phases

The project will be developed in 4 phases according to the process of remodelling and upgrading of the facilities of the Great Hall Terminal within the O&M limits that is described in the Transition and Phasing Plan.

Each of these construction phases, after finishing the construction relative to that corresponding phase (Terminal improvements), will be the start of an equivalent O&M Segment for the O&M Services. The different O&M Segments will increase the operating services area until reaching the defined definitive O&M limits after finishing the last construction phase.

Developer shall be responsible for evaluating potential construction noise, dust and traffic impacts and for developing and implementing necessary impact mitigation measures as required in section I.9.7 of the Technical Requirements.

16.4 Service Description

This Cleaning Service Plan does not fix the sizing of material and human resources needed to develop the cleaning service to ensure compliance with service levels and quality required as describe in section 12 Projects Control and Quality Management.

16.4.1 Service Components

The components that are part of the Cleaning Services are:

- Interior cleaning.
- Restrooms cleaning.
- Singular elements cleaning.
- Exceptional cleaning requirements.
- Pest control (coordination with Owner)

- Environment and waste management.
- Concession spaces

16.4.2 Cleaning of Interiors

The cleaning of interiors is considered all necessary services that are required to leave in optimal condition all areas and spaces within the O&M limits or those spaces belonging to the same,

Within the cleaning of these space, it also includes all elements in them such as furniture, signage, fixed equipment, decorative elements, etc. This means all existing fixtures and furniture and those that can be installed in the future, will be subject to the scope of cleaning and to the technical characteristics listed in this O&M plan for cleaning, maintenance and conservation.

Subject of cleaning are all items described in table III.5 Performance Standards of the Development Agreement.

16.4.3 Restrooms Cleaning

This section refers to the cleaning of all restrooms within the O&M limits.

16.4.4 Cleaning of singular elements

This section refers to the cleaning of those elements that requires the use of human resources and specific and/or special materials.

The execution of these services are always on demand by the Owner's representatives and must always describe the procedures, techniques and all human resources and material needed for the fulfilment of the cleaning of these singular elements.

16.4.5 Cleaning in exceptional situation

This section refers to all those cleaning services that are not scheduled but that are required to ensure the airport and/or office activities as a result of eventualities or arising from unforeseen emergencies in time, form and volume due to causes of different origin, as for example:

- Accidents, incidents with passengers, vehicles or baggage.
- Epidemics.
- Fires.
- Damage by terrorist or criminal acts of any origin.
- Breakdowns, spills of hazardous or sliding liquids.
- Emissions of fluids or waste.
- Damages/flaws motivated by meteorological or geological phenomena.
- Construction and/or remodelling of facilities.
- Strikes, demonstrations or conflicts.

In any case, this category of cleaning is required whenever an emergency or unforeseen occurs and it involves a real need of cleaning of the Airports facilities within the O&M limits.

No consideration will have those exceptional cleaning activities which, although not scheduled or expected, results in a low volume and/or complexity and therefore will be treated as a cleaning service from those described in paragraphs 7.4.2 (cleaning of interior) or 7.4.3. (restrooms cleaning).

16.4.6 Environmental and waste management

The Owner in its commitment to sustainability, reducing environmental impact and improving public health, encourages cultural and efficiency changes in the use of all the resources that may affect the achievement of the commitment of the Green Footprint of Denver.

To do this, the Developer responsible for cleaning the Airport within the O&M limits, shall assume and meet all state, local, and federal environmental requirements (rules, regulations, statutes, laws and orders).

The Developer's objective is to use green cleaning products and thereby obtain potential benefits that their use involves:

- Increased worker safety in handling and application.
- Increments safety of users of infrastructure.
- Reduced operating costs associated with transportation, storage, handling, application and disposal of hazardous products.
- Use of reusable, refillable or recyclable containers/packages.
- Reducing waste generation and disposal.
- Packaging material with a high content of recyclable items.
- Use concentrated solutions (with a water content <20% by weight).

Waste treatment is integrated into the recycling and composting program implemented in the Airport. To do this the Developer will ensure that once the materials are segregated they will be deposited in suitable containers to properly perform the tasks of recycling and composting.

The Developer will report, on potential improvements areas of the recycling and composting program to the Owner's representatives, where shortcomings and deficiencies are identified (for example, areas where no recycling or composting is carried out, containers with evident signs of contaminations) in order to improve the efficiency and effectiveness of the program.

Waste disposal

Guidelines will be developed for the disposal of a product that may become a residue. The recommendations are based on the physical state and properties of risk posed by the material. If the material is classified as dangerous must be removed in a treatment facility, storage or disposal of hazardous waste in accordance with local, state and federal regulations.

If the material is not hazardous for disposal recommendations are made depending on the physical condition and the known characteristics of the material. The recommendation are based on the physical condition and risk properties that the material may show. If a material is classified as dangerous it will be removed and disposed in a treatment facility, storage or disposal of hazardous waste in accordance with local, state and federal regulations. If the material is not classified as hazardous, the disposal recommendations are based on the physical condition and the known characteristics of the material.

The Developer will comply with all applicable sections of the Emergency Planning and community Right-to-Know (EPCRA). This section includes: Section 302 that refers to extremely dangerous substances in amounts that excesses the defined threshold and must be notified to the Commission of Emergency Response of Colorado (CREC). It is also required to report any situation of leaks to the CECR (Section 304) and the Fire Department.

The Developer will have the inventory of all chemical products used, including its storage and location in the Hazardous material inventory statement (HMIS) of the Denver Fire Department.

In order to comply with the standards promoted by the Environmental Protection Program of the United States, the Green Seal program, and the US Green Building Council LEED EB, the Developer will create and follow a set of guidelines for global service delivery GCSOP. The GCSOP guidelines or green cleaning performed by the Developer will face the tasks of cleaning, selecting and storage of chemicals, the use and safe handling of chemicals, waste disposal, handling and maintenance of equipment, communication protocols, safety of employees, training and sensitization, inspections, reporting and record keeping as described above.

The Developer will create and follow a specific green cleaning plan detailing the actions and timelines to be followed by the O&M manager and its staff in the performance of their duties.

The Developer Is responsible for the training of the staff, communication protocol and procedures establishment, safe management of chemical products as well as the waste management, which must be specific for each infrastructure.

Green cleaning shall minimize waste generation, resource consumption and pollutant emissions in the manufacturing, use and disposal of cleaning products and in the performance of the cleaning tasks. The product packaging shall be minimal and consist of reusable and recyclable containers. Cleaning products must be supplied in large concentrated quantities in order to reduce the need for packaging. The materials and application equipment shall be durable and designed for repeated long term use. The equipment must be maintained and repaired for security reasons and to extend it useful life. Waste disposal shall not be perform at the landfill and shall be reserved only for municipal medical waste. (collected dirt, dusts and soils, ashes, dirty consumer waste, food waste and bio-organic waste).

The Developer is responsible for the removal of all generated waste within the O&M limits. The Developer will have appropriate containers for waste disposals and is solely responsible for coordinating all activities required for disposal. The Developer can use the Denver recycling program for the recycling of those appropriate in order to minimize the total waste.

Extremely care will be taken not to discharge into the Denver's storm water sewage system those products and/or materials considered hazardous and/or highly pollutant. All discharges to the sewer system must comply with the Rules and Regulation of the Owner.

The disposal of any waste outside of the by the Owner authorized premises is prohibited, such removal will be done properly and safely.

In order to inform about the dangers of the use of chemical materials, the O&M Manager will create and deliver a Material Safety Data Sheet (MSDS), which will be reported concisely regarding the products, type and level of required protective equipment for handling and/or use, as well as first aid treatments to be provided in case of contamination or accident.

The MSDS must include the following 16 sections:

- Product identification.
- Hazards identification.
- Composition and Information of Ingredients.
- First aid measures.
- Fire fighting measures.
- Accidental Release Measures.
- Handling and Storage.
- Exposure controls and personal protection.
- Physical and chemical properties.

- Stability and reactivity.
- Toxicological information.
- Ecological Information.
- Disposal.
- Transport Information.
- Regulatory information.
- Other information.

Some conceptual definitions of the above sections:

Product identification:
For the identifications of the products the product name and its synonyms are used. The group or the chemical name and synonyms are mentioned with the formula, where applicable. Along with the risk classification of the OSHA a brief description of the product is made.

Composition and information of ingredients:
According the OSHA (Occupational Safety and Health Administration), a hazardous chemical product is any product which may represent a physical risk if it is combustible, flammable, pyrophoric, chemically unstable, reactive or explosive with water, a compressed gas, organic peroxide or other oxidant. A chemical product may represent a risk for the health when an exposure can cause immediate or chronic adverse health effects. This definition of hazardous material has been adapted from the Hazard Communication Standard OSHA (29 CFR 1910.1200).

First aid measures:
The first aid measures are described for each of the normal routes of exposure. It is important that the first aid has to provide as soon as possible after exposure.

Handling and storage:
This section shall provide vital information for the handling and storage of the product. It is important to follow all recommendations. All chemical containers must retain the original label that shall include the operating instructions and security warnings and instructions. All boxes or containers of chemicals shall have the lot number and manufacturer's quality control.

Physical and chemical properties:
Knowing the physical properties of a substance is required for all decisions related to safety and industrial hygiene. The following are definitions of terms that correspond to the physical data provided in this section:

- ***Freezing/Melting point***: temperature at which a substance changes state from liquid to solid or solid to liquid. For mixtures, there a range may be provided.
- ***Boiling point temperature***: temperature at which a liquid passes gaseous state at a given pressure (usually 760 mmHg, or one atmosphere). For mixtures, it may be the initial boiling point or boiling range. Flammable materials with low boiling points generally present special fire risks.
- ***Decomposition temperature***: temperature at which a substance is broken, or decomposed into smaller fragments.
- ***Specific gravity***: weight of a material compared to an equivalent volume of water; an expression of the density (or weight) of the material.
- ***Overall density***: weight of material per volume unit.
- ***pH***: value showing the acidity or alkalinity of an aqueous solution.
- Acid _____ Neutral _____ Alkaline

- **Vapour pressure**: pressure (usually expressed in millimetres of mercury) characteristic at any given temperature of a vapour in equilibrium with its liquid or solid form.
- ***Solubility in water***: term that expresses the percentage of material (by weight) that will dissolved in water at room temperature. Solubility information can be useful in determining spill clean-up methods and fire extinguishing agents.
- ***Volatiles, percentage by volume***: proportion of a liquid or solid (by volume) that will evaporate at a room temperature of 70°F (unless otherwise indicated).
- ***Evaporation rate***: rate at which a particular material becomes vapour (evaporates), compared to the rate of evaporation of a known material. The evaporation rate can be useful to assess health and fire risks of a material. The known material is, generally, water or butyl acetate with an evaporation rate of 1.0.
- ***Vapour Density (Air = 1)***: Vapour density compared to the density of air (air = 1). If the vapour density is greater than 1, then the vapour is heavier than air.
- **Molecular weight**: the molecular weight of a chemical is the sum of the atomic weights of the atoms composing a molecule of the product.
- ***Coefficient of oil/water***: if a substance that is soluble in both oil and water it is added to a system of oil/water in two phases, then the ratio of the concentration of that substance in oil and its concentration in water It is called distribution coefficient of oil/water.

Exposure control and personal protection:
Proper use of personal protective equipment is extremely important, and the guidelines presented in this section must be followed strictly. Required specific equipment description shall be provided (safety glasses, gloves, respirators, etc.) for routing use. The use of additional protective equipment, as required for fire-fighting and spills and leaks clean-up, are further detailed further in this section (Procedures in case of spills and leaks).

Stability and reactivity:
A substance is considered reactive if a chemical reaction begins instantaneously and undergoes a chemical change. For the purposes of the MSDS, the reactions can be grouped into three categories:

(A) Decomposition: chemical decomposition of a material in parts or into simpler composites.

(B) Polymerization: chemical reaction in which small molecules combine to form larger molecules.

(C) Reactions with other chemicals: any chemical reaction. Materials that can cause dangerous reactions by direct contact with each other are described as incompatible. Common chemicals that react with the product are usually detailed in the MSDS. Hazardous decomposition products including combustion products, are detailed.

Toxicological information:

The consequences of exposure, if any, either by inhalation, in contact with skin or eyes, or ingestion are detailed in this section. The signs, symptoms and effects which are consequence of exposure are described in order to recognize an exposure as soon as possible and be able to take the appropriate actions. The organs that are more susceptible to be attacked are called target organs. The effects and the damage that could result in the exposure of these organs are provided along with the symptoms. Some of the used terms that may be less familiar or who may have a specific inference in the MSDS are defined below:

- ***Immediate effect***: adverse effect on the body of a human or an animal resulting from a single exposure and symptoms occur almost immediately or shortly after exposure. Usually the effect is short-lived.
- ***Chronic effect***: adverse effect on the body of a human or an animal that result from repeated exposure to low levels and symptoms come on slowly over a long period of time or that recur frequently.
- ***Corrosive***: liquid or solid that causes visible destruction or irreversible alterations in human or animal tissues.
- ***Irritation***: response or inflammatory reaction of the eyes, skin or respiratory system.
- ***Allergic sensitization***: process in which to a first exposure to a substance causes a small reaction or it does not provoke a reaction in humans or test animals, but with repeated exposure can cause a marked response that not necessary is limited to the area of direct contact. Skin sensitization is the most common form of sensitization in industrial environment, although respiratory sensitization also occurs in certain cases.
- ***Teratogenic***: substance or agent to which exposure of a pregnant woman or animal can result in malformations of the skeleton and soft tissues of the unborn.
- ***Mutagen***: a substance or agent capable of altering the genetic material in a living organism.
- ***Carcinogenic***: a substance of agent capable of causing cancer in humans or animals. Authorities/organizations that have evaluated whether or not a substance is carcinogenic are the International Agency of Research on Cancer (IARC), the National Toxicology Program of the US (NTP) and OSHA.

Green cleaning shall make use of products and processes that are based on the specific chemical effectiveness and synergistic application of energy. The products used and waste shall easily degrade in the environment by exposure to air, sunlight, or normal microbial activity. Aqueous waste suitable for discharge to the sewer system must be easily degraded under basic conditions of waste water treatments.

Products containing fragrances, dyes, and added ingredients not required for the primary function of the product shall be avoided. Avoid products that could be rejected by workers and/or the public in general.

The products listed below are expressly prohibited for use in the cleaning service due to its high impact on public health or the environment:

- Products that contain toxic compounds.
- Products containing asbestos.
- Products containing known carcinogens, mutagens and teratogens.
- Products containing the following substances except in trace amounts (<0,1%).
  - Alkylphenothoxylate.
  - Paradichlorobenzene.
  - 1,4-dioxane.
  - Nitrilotriacetic acid.
  - Ethylenediaminetetraacetic acid sodium.
- Halogenated compounds with potential greater ozone depletion than 0.01.
- Products with flashpoints below 100º Fahtenheir.
- Products with a high risk of causing spontaneous combustion.
- Products that are highly oxidizing.

- Products containing chemicals considered by the Environmental Health Department of Denver to present risks to human health or the environment in its use or disposal.

The Developer must submit documentation demonstrating that all products and services purchased meet the above prohibition.

A list of chemicals banned for use for cleaning services due to its high impact on health or the environment are included.

Table of prohibited chemical products:

PROHIBITED CHEMICALS			
	CHEMICAL NAME	Nº CAS REGISTER	COMMENTS
1	Arsenic	7440-38-2	
2	Arsenic compounds	various	
3	Barium compounds	various	Alloys not included
4	Cadmium compounds	various	Alloys not included
5	Tetrachloride Carbone	56-23-5	
6	Chlorobenzene	108-90-7	
7	Chloroform	67-66-3	
8	Chromium compounds	various	Alloys not included
9	1,2 Dichlorobenzene	95-50-1	
10	1,4 Dichlorobenzene	106-46-7	
11	1,2 Dichloroethane	107-06-2	
12	1,1 Dichloroethylane	75-35-4	
13	Hexachlorobenzene	118-74-11	
14	Hexachloroethane	67-72-1	
15	Hydrofluoric acid	7664-39-3	
16	Lead compounds	various	Alloys not included
17	Elemental mercury	7439-97-6	Excluding amalgams
18	Mercury compounds	various	
19	Methylene compounds	75-09-2	
20	Nitrobenzene	98-95-3	
21	Pentachlorophenol	87-86-5	
22	Selenium compounds	various	
23	Silver compounds	various	Alloys not included
24	Tetrachlorethyene	127-18-4	
25	1,1,1 – Trichloroethane	71-55-6	
26	1,1,2 - Trichloroethane	79-00-5	
27	Trichloroethylane	79-01-6	
28	2,4,5 - Trichlorophenol	95-95-4	
29	2,4,6 - Trichlorophenol	88-06-2	
30	Vinyl chloride		

Procedure in case of spills and leaks

When cleaning spills or leaks, it may be required to use personal protective equipment additional compared to the normal PPE for normal activities. Recommendations are provided for the use of additional equipment compared to that described in section 13.2.7 Personal Protective Equipment.

16.5 Operational procedures and service plan

The Developer's goals is to comply with the recommendations described in the hygiene and sanitation guide of air transport of the Pan-American Health organization, and in particular all that refers to cleaning and disinfection of facilities in order to protect the health of passengers and workers linked to the airport.

When the term cleaning is used, Developer refers mainly to the removal of visible dirt or particles; however, in this process the use of certain products also produce disinfection. Usually, tasks are performed routinely and recurrent.

Regarding disinfection we refer to those measures and adopted operations in order to take control and/or eliminate potentially infectious agents. These operations shall be planned and unplanned.

Therefore it is necessary to have a documented program with routine cleaning tasks as well as planned monitoring of the quality of the performance to ensure that the O&M limits within airport are cleaned regularly and hygienically.

It is required that the cleaning staff meets the needs of the service and have the required training to perform their activity.

The Developer shall guarantee to use appropriate techniques and equipment.

16.5.1 Interior cleaning

This section refers to the cleaning of general spaces within the O&M limits of the airport, like floors, walls, skirting boards, columns, ceilings, doors, fittings, windows and other glasses furniture and fixtures, desks, etc.

Floor cleaning and treatment

Within the successful completion of all work and operations required for a perfect cleaning service of the O&M limits within the airport, due to the fact that the floors and pavements do collect a high percentage of dirt, these must be subject to a particularized study in each case, taking into account its physical-technical characteristics, in order to apply a special care in cleaning a systematic treatment.

In general, the Developer shall proceed with previous cleaning and conditioning of pavements, so that subsequent maintenance Is facilitated and rationalized as much as possible, with the objective to achieve a more rapid, effective and efficient removal of dirt, as well as obtain a higher degree of hygiene and aesthetics.

- **Cleaning of not granitic hard floors (terrazzo, marble, etc.)**

  In these type of finishes, when the maintenance cleaning does not achieve an acceptable result, and according with the general conditions of floor treatments, the Developer shall carry out a crystallization treatment by using rotary cleaner and applying crystallizer products, prior pickling and neutralizing of the pavement, with the objective to obtain high gloss and protection.

  To perform this procedure, a detergent solution shall be used that must remain on the surface around 3 to 5 minutes, following the operation with a rotary cleaner at low speed (<200 rpm) equipped with a blue of floor pad.

  Also, in transit areas with a high traffic of people, in order to recover the wear and tear, that may arise, and restore the original appearance, a diamond hone and crystallization process shall be performed.

  This will help to recover of the original surface getting up to 90% of light reflection, protecting the pavement of all attacks produced by products that could be spilled and of transit of people, facilitating easy maintenance afterwards.

After finishing these tasks, the floor will have a uniform appearance, without lines, marks, detergent residue, or any debris on the floor. There will be no splash marks or scratches on the furniture, walls, boards, etc.

- **Cleaning of unpolished granitic hard floors**
  In these types of finishes, periodical cleaning will be undertaken by using equipment that washes, using mild acid and water solutions to remove the accumulation of oils and greases. Subsequently the Developer shall proceed to rinse the surface and remove debris, ensuring the safety of both the Patrons and employees.

  After finishing these tasks, the floor will have a uniform appearance, without lines, marks, detergent residue, or any debris on the floor. There will be no splash marks or scratches on the furniture, walls, boards, etc.

- **Cleaning of ceramic or clay tiles**
  In these types of finishes, the cleaning is performed by sweeping and mopping. A damped mop and wringer and bucket is used with a germicide neutral detergent solution for removing non-permanent stains on the surface. The detergent solution shall be changed regularly and must remain around 3 to 5 minutes on the floor. The rinsing with clean water of all surfaces shall be guaranteed.

  After finishing these tasks, the floor will have a uniform appearance, without lines, marks, detergent residue, or any debris on the floor. There will be no splash marks or scratches on the furniture, walls, boards, etc.

- **Cleaning of synthetic smooth and rough floors (vinyl, rubber, etc.)**
  In case of smooth synthetic finishes, when the usual maintenance cleaning does not achieve a satisfactory result, an in depth scraping shall be performed by using a rotary cleaner, with floor pad with scraping product, afterwards it shall be neutralized and all produced waste shall be vacuumed.

  Then, a protective coating of synthetic wax shall be applied that allow the brightening and that will protect the finishing from dirt, stains and especially against the black marks caused by aniline that are present in the rubber soles of shoes, luggage wheels, trolleys, etc.

  When cleaning synthetic rough floors, a thorough cleaning shall be performed with rotary cleaner with brush, using in each case cleaning and disinfection product suitable to the area and dirt. Then the finishing shall be neutralized and water vacuumed in order to remove all dirt and all residue products that have been used.

  After finishing these tasks, the floor will have a uniform appearance, without lines, marks, detergent residue, or any debris on the floor. There will be no splash marks or scratches on the furniture, walls, boards, etc.

- **Cleaning of cement/concrete floors, ceramic anti-slip, epoxy resins, etc.**

  In this type of finishes and in accordance with the frequencies set for each case, a thorough cleaning with degreasing, descaling and disinfectant products shall be performed as often as necessary and not only to achieve a clean appearance but also to achieve hygienically surfaces, as these type of surfaces, due to their characteristics, can be susceptible to become a shelter of microorganisms.

To perform this cleaning, polishing equipment shall be used with synthetic discs and suitable brush, and will operate at low speed (<200 rpm).

After the in depth cleaning, the floors shall be vacuumed in order to remove residual products and all dirt embedded in the roughness of the surface.

A specific sealer shall be applied following the recommendations of each manufacturer.

After finishing these tasks, the floor will have a uniform appearance, without lines, marks, detergent residue, or any debris on the floor. There will be no splash marks or scratches on the furniture, walls, boards, etc.

- **Cleaning of textile floors (carpets and rugs)**
  The cleaning method will be the most suitable for every type of carpet and rug according the technical characteristics of the product.

  For the cleaning process, the characteristics of the physiochemical fibres of the carpet/rug as well as the characteristics of its backing, shall be taken into account.

  Before cleaning these kind of finishes the appropriate colour fastness test shall be performed.

  The carpets and rugs shall be vacuumed in depth as often as necessary with special care, since the present of dust in these finishes is critical.

  Dust present in the carpets and rugs acts, under the effect of footsteps, as blades, cutting and wearing away the fibre. For this reason, the Developer shall use exclusively vacuum cleaner with HEPA filters to guarantee effective dust removal, avoid appearance of mites and prevent premature wear. According the de program to be determined and adapted to specific circumstances, such as degree of dirt, characteristics of carpet and rug, etc. a more thorough cleaning will be performed using shampoo with dry foam or injection system – extraction, that in addition with the cleaning procedure, will have as objective to enhance the colours of these finishes back to their original appearance.

  Likewise, all stains will be removed regularly and whenever needed, avoiding that too much time passes by, not allowing them to penetrate into the textile fibre.

  <u>BONNET METHOD WITH SHAMPOO</u>
  To perform this method of dry cleaning, the carpet or rug must be vacuumed, fibre brushed, apply dry cleaning chemical solution followed by another vacuuming. All stained areas shall be treated with a stain cleaning solution, following the recommendations and instructions of the manufacturer. To apply the shampoo, a rotary cleaner will be used with floor pads at low revolution (z200 rpm), independent if it is with a pad driver or a carpet bonnet. All inaccessible areas for the cleaner shall be treated with the same product manually. The applied product must be remain sufficient time to allow a successful absorption by the treated finishing, proceeding afterward to an in depth vacuuming in the same direction obtaining a clean and uniform carpet/rug.

  <u>DRY CLEANING METHOD WITH SHAMPOO</u>
  To perform this method of dry cleaning, the carpet or rug must be vacuumed, fibre brushed, apply dry cleaning chemical solution followed by another vacuuming. The vacuuming must be performed with a horizontal vacuum cleaner. All stains treatments shall be performed following the recommendations and instructions of the carpet/rug manufacturer. The applied product must be remain sufficient time to allow a successful absorption by the treated finishing, proceeding

afterward to an in depth vacuuming in the same direction obtaining a clean and uniform carpet/rug.

INJECTION-EXTRACTION CLEANING METHOD

This method of cleaning is probably the most used method in large facilities that require a high degree of cleaning and hygiene.

It is performed with a machine, that has incorporated two deposits, one for clean water and the other for waste water. The machine injects in the carpet, with 2 bar (or higher) pressure, a soapy water solution, at 122º to 158º Fahrenheit, with special anti foam detergent in accordance with the recommendations and instructions of the carpet/rug manufacturer, and the rotary brushes will eliminate the dirt and brush the surface. Immediately, and with a powerful vacuum cleaner, the remaining water shall be vacuumed until the carpet/rug is almost dry and perfectly cleaned. The use of water vapour and special detergents will guarantee the success of cleaning and disinfection of the carpet or rug.

Due to the great variety of qualities and dyes used in the manufacturing of carpets and textile surfaces, a test shall be performed, in a corner that is almost not visible, to guarantee that there are no risk before the cleaning performances. Once the tasks has been performed and in order to be able to transit shortly afterwards over the surfaces, propulsion turbines shall be used that generate a curtain of hot air at ground level and that uses ambient air.

To execute the procedure, the following conditions must be taken into account: vacuum the whole carpet or rug before using the injection-extraction machine to remove all dirt that is loose. Treating exceptional stains pulverizing them with the same soapy water solution that uses the injection-extraction machine in order to softening them and that will help their cleaning. At last, the surfaces shall be vacuumed once they are totally dried, as the soap crystalizes when drying and can help removing some more rebellious debris. The vacuuming must be in one direction to enhance the appearance of the carpet/rug.

- **Maintenance of terrazzo, marble, cement, ceramic anti-slip, clay, epoxy resin, polished granite, smooth and rough synthetic, linoleum floors.**

  In these type of floor finishes the periodical cleaning is performed by sweeping, dust vacuuming and strains removal with disinfectant detergents suitable to the area, and a damp mop, followed by mopping with a double bucket method, microfiber mop and/or a system without a bucket and without water with mop cover of treated microfiber , using in each case the cleaning an disinfection product suitable to the area and dirt.

  Cleaning trolleys shall be used equipped with all cleaning tools, such as: ecological atomizers, buckets, sweeping and damp mops, garbage bags for paper collection, etc. all differentiated using standard colours. The trolley will be equipped with double bucket and wringer. Mops will be dimensioned to the spaces.

  NOTE: All protection treatments and coatings applied must be anti-slip.

  Automatic sweepers and scrubbers will be used in all spaces that allows these automatic devices.

- **Cleaning and treatment of Non-Washable walls, columns, partition wall, doors, etc.**
  Independent of the removal of permanent stains that may occur on these surfaces, a periodical cleaning shall be performed with special equipment and products, in function of the support, painting, finishing, etc.

- **Cleaning and treatment of Washable walls, columns, partition wall, doors, etc.**
  In these surfaces and in the determined frequencies, the removal of stains shall be done using disinfectant detergent products suitable to the areas as well as the dedusting with a damp mop.

  Likewise, and in accordance with the determined frequencies, they will be mopped with cleaning and disinfection products suitable to the areas and dirt, with exception of natural wood surfaces which will be cleaned using vapour at 150ª Fahrenheit to obtain a total hygienic result.

  NOTE: When cleaning wooden surfaces, a system without buckets or water shall be used, with treated mop covers and cleaning and disinfectant products suitable to the areas and dirt in order to avoid the wood to absorb water resulting in deterioration.

  The cleaning of these surfaces will be done vertically, starting at the top, in order to drag all the dirt to the floor.

- **Cleaning and treatment of ceilings**

  Porous suspended ceilings:
  These types of ceiling, and according the determined frequencies, a dedusting will be undertaken using a damp mop and/or vacuum cleaner with a total HEPA filter.

  Likewise, and according the determined frequencies, an in depth cleaning will be performed using a pulverization with an enzymatic solution. Once the enzymatic product has had the time to act, the surface will be vacuumed with a vacuum cleaner with telescopic handle with total HEPA filter.

  Non-Porous suspended ceilings:

  These types of ceiling, and according the determined frequencies, a dedusting will be undertaken using a vacuum cleaner with a total HEPA filter.

  Likewise, and according the determined frequencies, an in depth cleaning will be performed using a pulverization with an enzymatic solution. Once the enzymatic product has had the time to act, with the help of a sponge all dissolved dirt and products residues will be collected of the surface, including the grills and lighting fixtures. For this telescopic stick will be used.

  Non-Porous washable suspended ceilings:

  These types of ceiling, and according the determined frequencies, stains shall be removed with disinfectant detergent suitable for the area, and dedusting will be undertaken using a damp mop and/or vacuum cleaner with a total HEPA filter.

  Likewise, and in accordance with the determined frequencies, they will be mopped with cleaning and disinfection products suitable to the areas and dirt.

- **Cleaning and treatment of stairs and handrails**

  For the cleaning of interior stairs, at first a damped sweeping shall be undertaken with mop and scrubbing with mop and double bucket system, using a disinfecting detergent of last generation quaternary ammonium compounds.

When the scrubbing process has finished, the staircases must be totally dry.

Then rinse and vacuum will be undertaken on the surfaces with a water vacuum cleaner with total HEPA filter.

After the thorough cleaning, and in accordance with the frequencies determined, maintenance task consist in sweeping and mopping with damp mop and scrubbing with wringer and mop with a double bucket system with disinfectant detergent of last generation quaternary ammonium compounds.

For the handrails, special cleaning products shall be used and for its finishing protection finger-proof products in order to ensure a permanent cleaned appearance.

- **Cleaning of furniture**
  For dust removal a special trapping dust cloth shall be used and a vacuum cleaner that allows to remove dust as well as fluffs, small trash heaps, etc. of the horizontal surfaces of tables, chairs, filing cabinets and other office furniture and equipment.

  For the cleaning with furniture and accessories spray, a sponge or clean cloth will be used by applying a neutral detergent using a spray, with a germicidal cleaner solution or glass cleaner to remove fingerprints, and in this way clean and disinfect all surfaces of furniture and accessories.

  Once the dust has been removed and all surfaces are cleaned, these will have a uniform appearance, free of lines and stains, dust, fluffs, etc.

16.5.2 Restrooms cleaning

Given the criticality of the restrooms cleaning for the airport's image and the perception of the users, the Developer shall guarantee the commitment to clean the restrooms and for this, and as quality indicator, a survey-brochure will be available in all bathrooms so users can be assessed using this survey to evaluate the cleaning performance. Surveys-brochures and mailboxes will be available in all restrooms.

The brochure will present the commitment by the Denver International Airport with the bathroom cleaning, as well a contact phone number and an e-mail that will address all complaints from users and to which shall be responded within a shorter period than 24 hours.

The cleaning of the restrooms deserves special attention as it is a place that presents important infection risks.

This task requires conscientious performance, especially considering that the restroom cleaning has a major influence in Patron's overall perception of the airport quality.

The cleaning shall be performed ensuring the disinfection of all elements in the restrooms. For that, all floor residues will be removed by sweeping the floor. All organic and inorganic residues will be removed from sanitary appliances using brushes.

After removing all residues, the Developer shall proceed to clean with hot water and a germicidal disinfectant solution, or a compatible detergent. Biodegradable products shall be used to respect the environment.

It is important to clean the interior or the toilets and urinals using a brush, for the interior and external surfaces of the toilets and urinals a sponge shall be used differentiated with a colour to distinguish form other cleaning tools to avoid to use this one in other surfaces and elements like toilet seats and other surfaces of appliances and walls between the toilets and urinals.

For the interior and exterior cleaning of the toilets and urinals a germicidal solution will be used, solution that also is used for the cleaning of walls and tiles around these sanitary appliances.

Special attention is required in the toilet seats, as the cleaning must start with the upper surface and end with the rest of the surfaces and shall be finished drying the seat with a dry cloth.

Regarding all metallic elements (taps, hand dryers, accessories, etc.) shall be cleaned using suitable products using a soft baize in order to avoid scratching, finishing the cleaning by drying the elements with a dry cloth.

The wall cleaning and floors of shower cabins, a germicidal detergent solution shall be used, using a sponge and wet abrasive pad to clean all shower surfaces.

For cleaning lime strains, usual in restrooms, a descaling product shall be used.

The basic sanitary elements and accessories that can be found in restrooms of a public infrastructure are:

- Sink.
- Taps, cold and hot water (optional).
- Toilet.
- Shower.
- Mirrors.
- Roll holder.
- Container paper towels.
- Special accessories for disabled persons.
- Extracting equipment of hot air for drying hands.
- Trash bins with removable plastic bags.
- Others.

The operational of cleaning of restrooms:

The cleaning shall be performed and according an established order:

- Place a sign in front of the restroom warning that staff in undertaken the cleaning.
- Place a sign warning that the floor is wet/slippery.
- The cleaning staff shall use all required individual protective equipment.
- Disconnect electrical appliances that are installed in the restroom.
- Empty waste bins/baskets.
- Sweep floors.
- Clean walls.
- Clean doors and hardware.
- Clean sinks and faucets drying with a cloth.
- Clean shower tray (if any) and their taps, dry them with a cloth.
- Clean urinals and faucets with a cloth.
- Clean toilets.
- Clean mirrors.
- Clean paper, towel, soap, etc. container.
- Replace all consumable items (toilet paper, sanitary paper towels, liquid soap, tampons, etc.
- Mopping the floor.
- Spray the restroom with an air spray freshener.

Microorganism treatment:

DESINFECTANT	Bacteria Gram+ Gram-	Mycobacteria	Spore	Fungus and yeast	Virus	Antagonism	Synergisms
Chlorinated compounds	+++ +++	+ -	+	++	+	- Organic materials - Sulphates - Sulphides - Ferrous salts	
iodinated compounds	+++ +++	+ +	++	+++	+	- Organic materials - Sodium thiosulfate - Mercury compounds	- Soaps - Quaternary ammonium
Quaternary Ammonium Compounds	+++ +	+ -	+ - discussed	+ -	+ -	- Organic materials - Phenolic compounds	- Cresol

(+): indicates against which microorganisms is an effective disinfectant
(-): Indicates that this disinfectant is not very effective against this microorganism
Bacteria Gram +: They are purple and do not have an outer membrane
Bacteria Gram -: They are red and do have an outer membrane
(+++): High resistant to all disinfectant
(+ y -): May or may not have resistance to all disinfectant
(++): medium resistance to disinfectants
(+): Low resistance to disinfectants

Disinfectants commonly used indicating the dilutions used, properties and possible applications (Taken from Biosafety Manual of World Health Organization)

		Contact time in minutes		Inactive Microorganisms		Main characteristics								Possible applications			
	Dilution used g/ l	lipid virus	Spread spectrum	vegetative bacteria	bacterial spores	Conservation> 1 week	Corrosive	Residue	inactivated organic matter	skin irritant	eye irritant	respiratory irritant	Toxic	Work surfaces	dirty glassware	Surface decontamination equipment	Liquids equipment
Quaternary Ammonium Compounds	1-20	10	NS	+		+			+		+		+	+	+	+	
Hypo chlorites	5-10	10	30	+	+		+	+	+			+	+	+	+	+	+
Iodophor	0,075-16	10	30	+	+	+	+	+	+		+		+	+	+	+	
Ethyl alcohol	700-850	10	NS	+	¨	+							+	+	+	+	
Isopropyl alcohol	700-850	10	NS	+	¨	+							+	+	+	+	

(NS): Not Specified

(+): Indicates that it is present

(¨) or blank: Indicates that it is absent

16.5.3 Cleaning of singular elements

Mechanical escalators and moving walkways:

The Developer shall sweep and mop these elements taking into account the recommendations and instructions of the manufacturer.

In order to guarantee that these mobile elements have a degree of conservation, security and a long useful life, the cleaning equipment used must be able to remove dust and all deposit residue from them. Also, the mopping shall allow to recover the original appearance of the mechanical escalators and moving walkways.

- **Murals:**
  The existing art mural in the airport, shall have a special treatment in function with their constructive characteristics. The cleaning shall be performed using the most suitable material to ensure their conservation and its value.

  Under no circumstances products that can attack, degrade or modify the appearance of the Murals shall be used.

- **Vending zones:**

  While the vending areas are not in the scope of the Developer, it must provide such cleaning services and monitoring to the vending machines, in cases where the concessionaires of such machines do not perform the cleaning.

  The Developer shall use biodegradable products for the cleaning of these elements, using damp cloths and subsequent drying.

- **Glass cleaning:**

  To clean crystals of large dimensions and crystals in general, these shall be wetted first with wash-glass brush. To do this, entire surface of the glass shall be wetted and rubbed, with special attention to the corners in order to assure the elimination of dust. It shall start at the top of the glass and zigzagging down to the bottom, without leaving any glass surface without soap.

  If the glass surface is very high, a telescopic pole shall be used. In the cases that stairs must be used, they must be placed on a stable floor areas.

  Once the glass soaping ends the Developer will proceed to use a squeegee to remove all water and dry the surface.

  In order to guarantee that the glass maintains clean and without any rest of soap, two techniques can be used:

- This technique is by placing the blade of the squeegee on the top left of the glass horizontally and without much pressure lower it to the bottom of the glass tilting the blade slightly to the right to drain the water. Then go back up, moving to the right of the previous zone and repeat the action, to cover the entire surface.
- This technique by placing the squeegee blade in the upper left side in a vertical position and moving from right to left and left to right continuously, without stopping to cover the entire glass.
- The draining of the blade can be carried out in two ways:
- Beating slightly the blade away from the glass being cleaned to avoid wetting the surface again.

- In the case of stickers or other adhesives, the procedure is to moistening intensively the stickers and with a knife scratch the glass and these will be removed completely.

- **Blinds cleaning:**

  This shall be performed frequently to prevent the accumulation of dust between the louvers which hinder cleaning. This requires a duster. In cases of exterior blinds, these shall be cleaned with a cloth soaked in soapy water, rinse well and dry with absorbent paper.

16.5.4 Cleaning in exceptional situations

This section refers to all those cleaning services unscheduled as required by airport operations or offices as a result of eventualities or due to unforeseen emergencies in time, form and volume and produced by causes of different origin, as for example:

- Accidents or incidents with passengers, attendants, baggage, etc.
- Epidemics.
- Fire.
- Terrorist or criminal actions of any kind.
- Malfunctions, leaks, broken pipes, fluid emissions, waste, etc.
- Meteorological or geological phenomena.
- Strikes, demonstrations and other conflicts.

In short, any emergency or unscheduled action involving a real need of cleaning services and cannot be undertaken under the scheduled actions.

Therefore, under this item it shall not be considered as a corrective cleaning in exceptional situations when it is a situation of low volume and/or low complexity (which will be assumed by the usual scheduled cleaning actions).

16.6 Cleaning Tasks and frequencies

The tasks and frequencies shall be adjusted to the requirements of cleaning service needed in areas. See Annex D for Cleaning Tasks and Frequencies details.

16.7 Human resources

The cleaning service provider will undertake the activity, object of this service, with all the human means suitable for this purpose.

The management, organization and control of human resources will be the responsibility of the cleaning provider as an independent company as well as an autonomous organization and its owners are not related with the Owner.

The provider, in order to not damage the image of the Owner, has the commitment to adopt all those measures that it deems necessary for its human resources to comply with the following requirements:

Use work clothes and/or regulatory uniforms and keep it in perfect state of presentation, as well as the identification badges established by both the provider and the Denver International Airport;

Any other service that the provider may perform, other than what is defined in the agreement between the Airport and the Cleaning Service Provider, must be undertaken with different uniforms and with an identification easily distinguishable;

The definitive criteria related to the uniformity of the cleaning personnel in terms of colours and identifying badges shall be agreed with the Airport, the logo of the provider must be clearly identifiable and appear in a clearly visible space.

Perform its functions complying with all the regulations that regulate the airport, and in particular the O&M limits; as a result the provider being solely and exclusively responsible for violations incurred by its teams;

In particular, in the O&M limits, the individual identification card assigned by the Airport's security services must be visible and must comply strictly with the authorizations and restrictions of the same;

All personnel of the cleaning service provider shall be subject to compliance with all safety, police and internal rules governing the airport.

With regard to human resources, the cleaning service provider will expressly be obliged to:

Provide the service with a suitable workforce to achieve optimum performance and the highest quality of service;

It will be the responsibility of the service provider to present to the representative assigned by the Owner all those initiatives that can produce efficiency and reduce costs in the service provision, which in all cases must be approved in writing by the representative or other authorized officials of the Owner/Airport.

In order to avoid paralyzes or decrease in the quality of the services, the distribution of staff's vacation periods will not affect the provision of the services that shall always be covered.

The cleaning service staff assigned to the cleaning of the O&M limits will be replaced, by others of equal technical capacity and shall be entitled to temporary incapacity, holidays, personal matters, etc.

In the above case, the cleaning service provider must guarantee the transfer of knowledge of the service in the O&M limits in order to guarantee the quality of the service.

There will be supervisions of service in each shift, that jointly with the Service Manager must undertake:

- Supervision and monitoring of services
- Daily and monthly scheduling of services
- Incident management of the service
- Monitoring and inspection of quality indicators
- Report all incidents, schedules and service deviations to the airport's representative

16.8 Material and technical means

The cleaning service provider must provide all necessary material and technical means to fulfil all the requirements of the service with the defined quality, the cleanings service, whether machinery sweepers, scrubbers, polishes, vacuum cleaners, etc.), as cleaning detergents, basic disinfectants, bleaches, polishers, glass cleaners, garbage gabs, waste containers, ladders, etc.) or cleaning utensils (mops, buckets, gloves, etc.), clothing equipment, protective equipment and how many products or utensils are required for the provision of the service.

The cleaning service provider must guarantee at all times the supply and level of adequate stocks for the correct provision of the service.

Likewise, the provider shall provide all equipment and materials to deal with situations of special cleaning or cleaning of unique elements, such as special scaffolding equipment, spider cranes, pressure water poles, etc.

Given the hygienic sanitary characteristics of the restrooms and especially the sanitary appliances, the cleaning materials will be different and exclusive for this task, clearly identifying such utensils and materials in order to avoid their use in other areas. This condition applies at least to scrub buckets and mops, wipes, scouring pads and gloves. In no case will the bucket of scrubbing the restrooms be used for other surfaces.

Likewise, it will be the responsibility of the service cleaning provider to maintain and safeguard all the material means that it uses, as well as the compliance with the norms, dispositions and current legislation regarding the certifications, approval and authorization of all equipment and cleaning products.

All mobile equipment used inside the airport will be electric, combustion motor vehicles are forbidden in order to guarantee a smoke-free, odour-free environment.

The elements used for the signalling and isolation of the areas where service is provided must comply the current regulations (configuration, composition and co-location).

It will be mandatory for the cleaning service provider to use products and materials of the highest quality and brands of recognized solvency and that are in all cases suitable to the areas subject to the service, having to comply at all times with the environmental regulations.

As a guidance and not limiting, some of the typologies of machinery, materials and tools that are usually necessary for a correct delivery of the service:

- Electrical vehicles for interior and exterior.
- Communication equipment (homologated for its use by the airport).
- Automatic scrubber.
- Vacuum cleaners.
- Rotary floor polishers.
- Autonomous pressure machines.
- Elevators of appropriate type for services or activities in height and/or scaffolding.
- Vacuum cleaners for dust and water.
- Blowers.
- Machines for cleaning mobile walkways.
- Machines for cleaning of escalators.
- Machines for cleaning carpets and other textiles.
- Cleaning trolleys with compartments for separation of waste types.
- Mops, buckets, glass-washing equipment.
- Cleaning chemicals.
- Disinfectant products.
- Aromatic products.
- Toilet supplies (toilet paper, hand towels, tampons, etc...).
- Water bilge pumps.
- Individual protection equipment.
- Other equipment, materials and elements for carrying out the service.

All machinery must be in perfect condition of use, conservation and maintenance, that guarantees the safety in its use and appropriate to the environment in which it is used.

The cleaning service provider shall deliver to the Owner's representative a list of the equipment that will be made available exclusively for the service, indicating manufacturer, model and age of equipment.

Whenever there is a change or incorporation of a new equipment, the Owner's representative will be informed of the characteristic of the same before its use in the cleaning service.

All vehicles travelling in pedestrian areas must have a permanently flashing lamp.

All materials, equipment and machinery must have a perfect state of image, must be clean, without blows, stains, etc., and must be kept perfectly preserved.

The vehicles and equipment used for the cleaning service inside the airport premises must comply with the measures against the emission of gaseous and particulate pollutants from the internal combustion engines installed in the mobile machinery.

The cleaning service provider must modify both the number and characteristics of the equipment used whenever necessary for safety, environmental or operational reasons.

16.9 Cleaning Service reports

The cleaning report is part of the O&M report that shall be delivered as described in Section 10 of this O&M Services plan and as required in Section III.4.11 of the Technical Requirements.

17 Maintenance Schedule and frequencies

17.1 Planned Preventive Maintenance Plan (PPMP)

The Preventive Planned Maintenance Schedule, including the frequencies, is included in annex C – Planned Preventive Maintenance Schedule

The purpose of regular maintenance of plant, equipment and services is to sustain their operating efficiency and to prolong their economic life.

Service frequencies applied in practice may be derived from a variety of sources including:

- Statutory requirements (for instance, as required health and safety or other legislation).
- Manufacturer's recommendations.
- "Standard" frequencies.

17.1.1 Statutory inspection frequencies

The inspection frequencies for an asset where condition and fitness for purpose are critical in terms of the health and safety of users (e.g. electrical installation) are controlled by statutory legislation such as that relating to health and safety. In the majority of cases the frequency is based on a risk assessment of the particular plan and system related to condition and use and undertaken by a competent person. Failure to have undertaken appropriate inspections and have the relevant records available could expose the Developer to action by the Health and Safety Executive.

17.1.2 Manufacturer recommendation

Manufacturers of equipment usually publish maintenance guidance or instructions for issue with their products. This documentation comprises details of the service or maintenance attention required together with a recommended frequency of attention.

In general, manufacturer's maintenance recommendations are standard lists compiled with no knowledge of the particular application of the product. For this reason, these instructions trend to be to conservative on the safe side and the maintenance frequencies quoted are often generous. In applying manufacturer's recommendations, it is prudent to state that the Developer shall review maintenance frequencies continually to achieve an optimum or more cost-effective regime.

17.1.3 "Standard" maintenance frequencies

Maintenance frequencies are, for convenience, generally based on calendar increments, like for example daily, weekly, fortnightly, monthly, quarterly, six-monthly, annually and multiples of years. In some instances, the selection of a frequency for a particular maintenance function is fairly arbitrary while, for other applications, extensive statistical data may be available. The important consideration is that a frequency must be appropriate to the specific application and take account of all relevant conditions of the usage.

With assets where the operational duty is predominantly seasonal (e.g. heating boilers), major servicing requirements shall be scheduled to ensure no interference with availability of the asset when it is most required.

The most effective approach to what might be termed “standard” maintenance frequencies are those published by the equipment Association. These standards are used to be developed with wide collaboration from the building service industry and are subject to regular review. The maintenance frequencies may, therefore, be considered to reflect a broad spectrum of opinion and shall be appropriate for a wide range of applications.

17.1.4 Adjustment of maintenance frequencies

Optimising the frequencies of individual maintenance visits is likely to be impractical due to the amount of information required to be collated and the logistics of organising the labour resources. However, maintenance frequencies shall be kept under review.

For example, a possible indication of a need for more frequent maintenance (or a different mode of maintenance) could be the frequent failure of a particular component or mechanism. Conversely, where there is no loss of performance efficiency of a particular mechanism, there may be scope for an increase in the intervals between maintenance.

Generally, marginal increases in maintenance frequencies can be made with reasonable confidence and, with a large-scale operation, can result in worthwhile savings on labour. For there to be confidence in significant extensions of maintenance intervals there would need to be supporting considerations. These may take the form of condition monitoring or wide-ranging, long-term records of maintenance experience with similar equipment. It may also be advisable to discuss any proposed extensions of maintenance intervals with the equipment manufacturer.

17.1.5 Preventive maintenance schedule

For details of the schedule, including the frequencies, see annex C – Planned Preventive Maintenance Schedule

17.2 Planned Statutory Maintenance

The following scheme shows the coding of the statutory maintenance description of every asset within the scope and the O&M limits

Person Group	Description	Standard Reference Code for statutory maintenance description
ELECTRIC	**ELECTRIC FUNCTIONAL AREA**	
ELECTRIC	LIGHTING SYSTEM	ELEC-LTG-01-03M/02-02Y/02-05Y/03-01Y
FACPAINT	**FACPAINT FUNCTIONAL AREA**	
FACPAINT	FINISHING	FP-FI-01-01Y
HVAC	**HVAC FUNCTIONAL AREA**	
HVAC	EXTRACT FAN	HVAC-EF-01-01Y
HVAC	RELIEF FAN	HVAC-FAN-01-01Y
HVAC	FAN COIL UNIT	HVAC-FCU-01-03M
HVAC	VAV UNIT	HVAC-TMU-01-01Y
HVAC	UNIT HEATER	HVAC-UHT-01-01Y
HVAC	SPLIT UNIT	HVAC-ACR-03-01Y/HVAC-ACR-02-01Y
HVAC	KITCHEN VENTILATION DUCT	KTCH-GRL-01-03M
PLUMBING	**PLUMBING FUNCTIONAL AREA**	
PLUMBING	WATER HEATER	PLMB-DWS-03-01Y
PLUMBING	WATER BALANCING/DOZING UNIT	PLMB-DWS-03-01Y
PLUMBING	SAFETY VALVE	PLMB-VLV-02-01Y/01-01M/06-05y
PLUMBING	CONTROL VALVE	PLMB-VLV-02-01Y/01-01M/06-05y
PLUMBING	DRAINAGE	PLMB-DP-01-01Y
PLUMBING	COLD AND HOT WATER PIPES	PLMB-WP-01-01Y
PLUMBING	LAVATORY ASSEMBLY	PLMB-LA-01-01Y
PLUMBING	TOILET ASSEMBLY	PLMB-TA-01-01Y
PLUMBING	URINAL ASSEMBLY	PLMB-UA-01-01Y

See Annex E for all Statutory Maintenance of the Elements within the O&M Limits

18 Renewal work Plan

18.1.1 Introduction

The Renewal work Plan provides to the Owner with information regarding the current condition of the Elements within the O&M Limits, service performance of Elements and projection of the planned investment in renewals.

The Renewal work Plan provides to the Developer with information to reasonably plan a program for reconstruction, rehabilitation, restoration, renewal or replacement and anticipating investment during the Operating period.

The Renewal work Plan provides a combination of all relevant information from the assessments and a summary of findings and provides rudimentary schedule and cost analysis for the purpose of planning and viability studies of capital projects.

There are several fundamental financial analysis tools that the Developer may use to perform project evaluations and budgeting. Each financial tool provides value and insight in a specific application. The following tools/philosophies will be applied by the Developer:

- Capital versus Expense
- Cost Benefit Analysis

18.1.2 Capital versus Expense – Repair versus Replace

The Developer will continuously monitor the performance of every Element, not only form a Performance Standards point of view, also from a financial perspective. The Developer will face the moment when to decide to reconstruct, rehabilitate, restore, renew or replace an Element. For that the Developer will take into consideration two different scenarios:

- keep records of all maintenance interaction on each Elements, keep an financial accounting on spending of every Element and decide to perform a major repair or to reconstruct, rehabilitate, restore, renew or replace.
- Keep track of the end of the rated life of every Element and if no signs of deterioration are present, decide to reconstruct, rehabilitate, restore, renew or replace or not.

All capital assets (Elements) depreciate and eventually become outdated, obsolete, or non-operational. The following shall be applied:

- Primary Elements that are critical to key business operations shall be replaced on a pre-set condition or run-time.
- Elements that are critical to human comfort and general business operations shall be replaced when they are approaching the end of their useful life and before major repair expenditures must be made.

The final decision whether to repair or reconstruct, rehabilitate, restore, renew or replace are depending on the following parameters:

- Safety and health risks
- Criticality of Element to key business operation
- Useful life rate of Elements
- Expense budget for major repairs
- Capital budget for reconstruction, rehabilitation, restoration, renewal or replacement costs.

18.1.3 Cost Benefit Analysis

For all substantial capital expenditures, the Developer shall perform a cost benefit analyses. This will be on a continuously as for example, the Developer wants to increase the frequency of preventive maintenance on any electrical system, an analysis of the benefits of a more reliable electrical system shall show the financial returns that can be expected and justify the proposed increment in preventive actions.

The Return on Investment (ROI) shall provide the Developer with relevant data in order to decide when to change its planned preventive maintenance schedule in order to evaluate an investment in any Element or when to schedule/execute a capital investment.. The generic process for calculating return on investment (ROI) is:

a. Determine all benefits of the project
b. Determine the life of the project (or Element)
c. Determine all front-end costs
d. Calculate all on-going costs
e. Determine and add up all the on-going benefits
f. Calculate the simple payback as follows:

$$\frac{\text{Start-up costs (c) + [on-going costs (d) x life cycle (b)]}}{\text{Start-up benefits (a) + [on-going benefits (e) x life cycle (b)]}}$$

Building System/Component	Useful Life (years)
Substructure	50
Interiors – Hollow Metal Door	30
Interiors – Ceramic Tiles	25
Interiors – Carpet	12
Interiors – Resilient Vinyl Tile	20
Interiors – Terrazzo Floor	50
Interiors – Acoustical Tile Ceiling	15
Mechanical – Pumps and Valves	15
Mechanical – Hot Water Generator/Boiler	30
Mechanical – Plumbing Fixtures	35
Mechanical – Air Handling Units	20
Mechanical – Package/Terminal Units	20
Electrical – Lighting	20

18.1.4 Renewal Plan Follow up

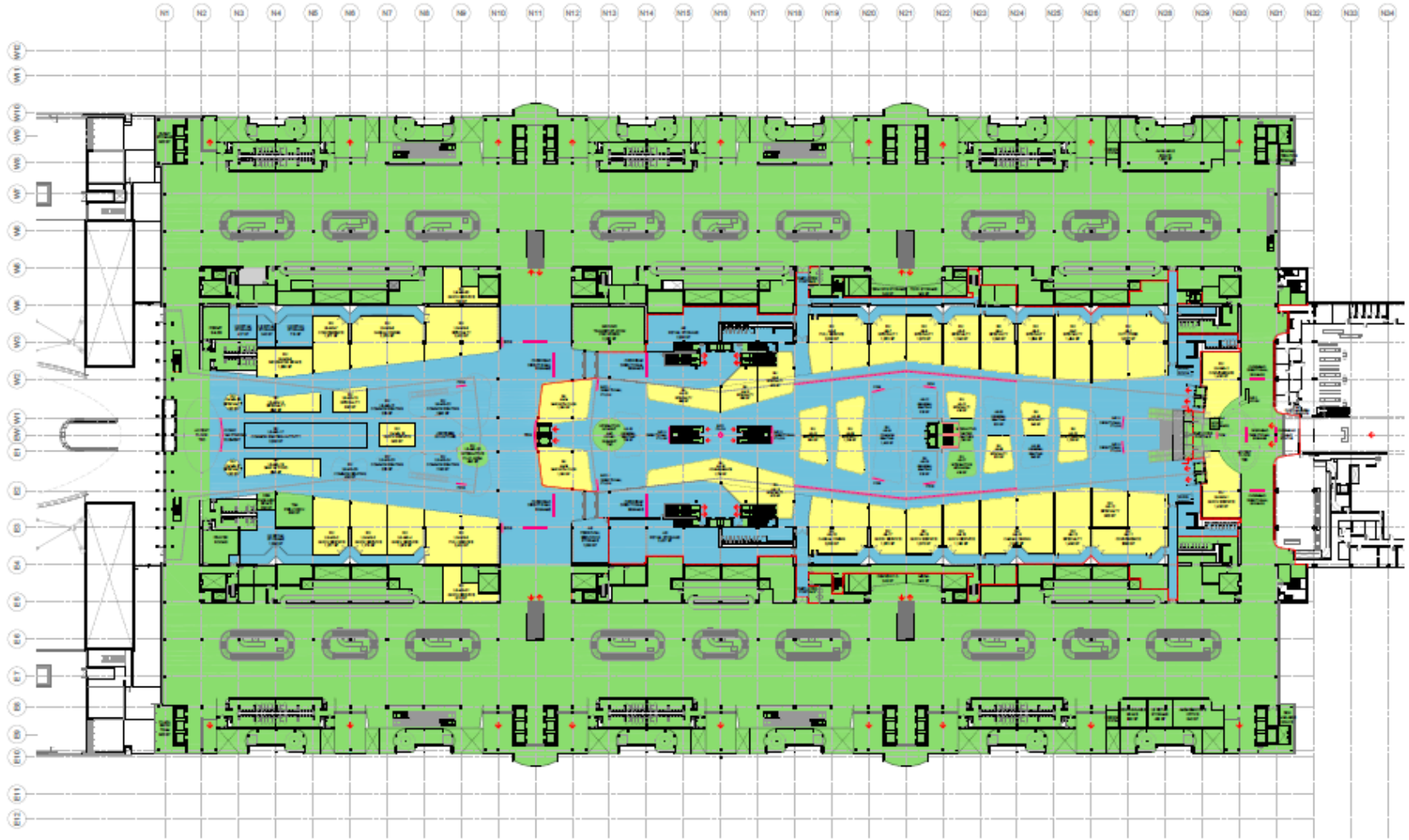
Additionally to the constant routine inspections considered in the Preventive maintenance Plan, mandatory different Inspection and Audits are required following Codes and good practices:

19 Overall approach to addressing hand back renewal work

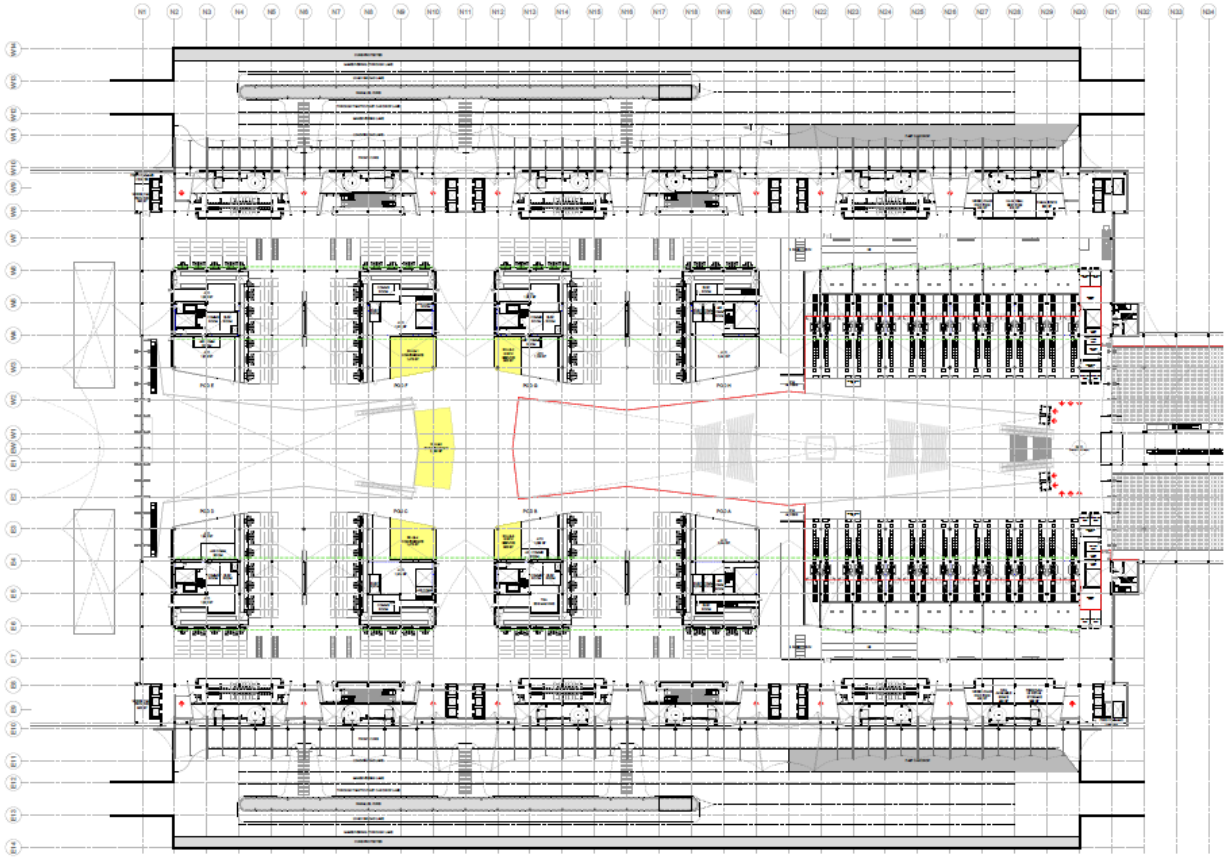
TBD

A O&M LIMITS PLAN DRAWING

A1 O&M limits Level 5



A2 O&M limits Level 6



Drawings will be updated once the Final Physical Project Plan is approved.

A3 Services to be provided[9]

For the services to be provided see Appendix 8 – O&M Tables of the Technical Requirements

[9] Both means that specific individual system elements are assigned to DEN or GHP

A4 Asset Lists[10]

Person Group	Description	Asset Comments	Asset Responsible	Number of Asset
BMS	BUILDING MANAGAMENT SYSTEM FUNCTIONAL AREA			
	Control Panel	Only for tenants	GHP	1,00
	Workstation	Only for tenants	GHP	1,00
	Allow for Control unit for HVAC water Pump for Tenants	Only for tenants	GHP	6,00
	Fancoil Controller (tenants)	Only for tenants	GHP	39,00
	Allow for Control unit for FAN (grease exhaust and makeup air)	Only for tenants	GHP	32,00
	Allow for tenants meters control	Only for tenants	GHP	114,00
	Allow for domestic plumbing hot water recirculation pumps control (ten	Only for tenants	GHP	18,00
	BACNet Controller BMS	Only for tenants	GHP	8,00
	Servers for BMS	Only for tenants	GHP	2,00
EMCS				
	Control Panel	Energy management control system	DEN	1,00
	Allow for Control unit for AHU		DEN	24,00
	VAV Unit control system		DEN	177,00
	Fan Powered VAV Box Unit control system		DEN	40,00
	Fancoil Controller		DEN	56,00
	Allow for Control unit for FAN		DEN	95,00
	Air Curtain Controller		DEN	67,00
	Allow for Control unit for HVAC water Pump		DEN	6,00
	Allow for Control unit for Heat Exchanger		DEN	2,00
	Allow for domestic water booster pump control		DEN	3,00
	Allow for domestic plumbing hot water recirculation pumps control		DEN	10,00
	BACNet Controller		DEN	8,00
	Air flowrate sensor - Duct mounted		DEN	24,00
	Air flow measuring station - FAN		DEN	64,00
	Temperature sensor		DEN	340,00
	CO2 sensor		DEN	46,00
ELECTRIC	ELECTRIC FUNCTIONAL AREA			
	112.5 kVA Dry-Type Stepdown Transformer		DEN	10,00
	30 kVA Dry-Type Stepdown Transformer		DEN	2,00
	45 kVA Dry-Type Stepdown Transformer		DEN	17,00
	75 kVA Dry-Type Stepdown Transformer		DEN	1,00
	15 kVA Dry-Type Stepdown Transformer		DEN	2,00
	Video Wall Media Displays		DEN	192,00
	Escalator Media Displays		DEN	702,00
	Interactive floor panel connection units		DEN	12,00
	Battery inverter - 15 kVA, 480 V		DEN	2,00
	Battery inverter - 8 kVA, 480 V		DEN	24,00
	Lightning protection - aluminium spikes		DEN	120,00
	Lightning protection - #28/14 stranded bare copper conductor		DEN	3.120,00
	Earth bars		DEN	19,00
	Distribution Panel - 800A, 277/480V	Distribution Panel	DEN	2,00
	Distribution Panel - 800A, 277/480V	Distribution Panel	DEN	2,00
	Distribution Panel - 600A, 277/480V	Distribution Panel	DEN	1,00
	Distribution Panel - 600A, 277/480V	Distribution Panel	DEN	1,00
	Distribution Panel - 600A, 277/480V	Distribution Panel	DEN	1,00
	Distribution Panel - 600A, 277/480V	Distribution Panel	DEN	1,00
	Distribution Panel - 400A, 277/480V	Distribution Panel	DEN	8,00
	Distribution Panel - 400A, 277/480V	Distribution Panel	DEN	1,00
	Distribution Panel - 400A, 277/480V	Distribution Panel	DEN	1,00
	Branch Circuit Panel - 200A MLO, 277/480V	Distribution Panel	DEN	22,00
	Branch Circuit Panel - 100A MLO, 277/480V	Distribution Panel	DEN	12,00
	Branch Circuit Panel - 100A MCB, 277/480V	Distribution Panel	DEN	4,00
	Branch Circuit Panel - 400A MCB, 120/208V	Distribution Panel	DEN	15,00
	Branch Circuit Panel - 100A MCB, 120/208V	Distribution Panel	DEN	2,00
	Branch Circuit Panel - 40A MCB, 120/208V	Distribution Panel	DEN	4,00
	Branch Circuit Panel - 150A MCB, 120/208V	Distribution Panel	DEN	16,00
	Branch Circuit Panel - 150A MCB, 277/480V	Distribution Panel	DEN	2,00
	Branch Circuit Panel - 150A MCB, 120/208V	Distribution Panel	DEN	2,00
	Branch Circuit Panel - 60A MCB, 120/208V	Distribution Panel	DEN	2,00
	Branch Circuit Panel - 250A MCB, 120/208V	Distribution Panel	DEN	1,00
	MCCB 400/3	moulded case circuit breaker	DEN	8,00
	MCCB 150/3	moulded case circuit breaker	DEN	2,00
	MCCB 100/3	moulded case circuit breaker	DEN	19,00
	MCCB 200/3	moulded case circuit breaker	DEN	4,00
	MCCB 70/3	moulded case circuit breaker	DEN	2,00
	MCCB 50/3	moulded case circuit breaker	DEN	2,00
	MCCB 125/3	moulded case circuit breaker	DEN	1,00
	ACB 800AF	air circuit breake	DEN	2,00
	Tenant Meters		GHP	67,00
	Earth bars		DEN	19,00

[10] This asset list will be updated with the final design

Person Group	Description	Asset Comments	Asset Responsible	Number of Asset
FACPAINT	FACPAINT FUNCTIONAL AREA			
	Structural	in L5 & L6 under O&M limits	DEN	Please clarify
	Finishing	in L5 & L6 under O&M limits	GHP	Please clarify
FID-BIDS	FID-BIDS Functional Area			
	46" full HD LCD monitor		DEN	48,00
	Deinstallation and installation of existing Displays or installation of new Display, per display		DEN	298,00
SECURITY ACCESS CONTROL FACILITY				
	Door access control facility		DEN	50,00
	Employee Portal Controller		DEN	8,00
PUBLIC ADDRESS SYSTEM - PAS				
	Public Address point		DEN	1.448,00
	Power Amplifier 1000W		DEN	12,00
	Rack cabinet		DEN	12,00
	Speaker 3W		DEN	965,00
	Speaker 5W for office area		DEN	232,00
	Speaker 15W for open area		DEN	251,00
	Microphone Stations		DEN	8,00
HVAC	HVAC FUNCTIONAL AREA			
	Air handling		DEN	24,00
	Ducted fan coil unit supply flow rate (600 CFM)	in L5 & L6 under O&M limits	DEN	25,00
	Ducted fan coil unit supply flow rate (800 CFM)	in L5 & L6 under O&M limits	DEN	32,00
	Air curtain	in L5 & L6 under O&M limits	DEN	68,00
	Humidifier	in L5 & L6 under O&M limits	DEN	18,00
	Exhaust fan toilets	in L5 & L6 under O&M limits	DEN	16,00
	Smoke Exhaust fan	in L5 & L6 under O&M limits	DEN	31,00
	Relief Air fan	in L5 & L6 under O&M limits	DEN	48,00
	Kitchen Exhaust Fan	in L5 & L6 under O&M limits	GHP	16,00
	Terminal primary chilled water Variable Speed Pumps		GHP	3,00
	Terminal primary heater water Variable Speed Pumps		GHP	3,00
	Terminal secondary chilled water Variable Speed Pumps		GHP	3,00
	Terminal secondary heater water Variable Speed Pumps		GHP	3,00
	Hot water heat exchanger		GHP	1,00
	Chilled water heat exchanger		GHP	1,00
	Remote tenant BTU meter		GHP	78,00
	Supply Swirl Diffusers VDW 600x48	in L5 & L6 under O&M limits	DEN	1.094,00
	Jet nozzle DUK 400	in L5 & L6 under O&M limits	DEN	318,00
	Linear slot SDS	in L5 & L6 under O&M limits	DEN	4.022,00
	Egg crate grille	in L5 & L6 under O&M limits	DEN	146,00
	Egg crate grille with damper	in L5 & L6 under O&M limits	DEN	126,00
	Supply/Return Air grilled AH-DG-1225x525	in L5 & L6 under O&M limits	DEN	140,00
	Supply/Return Air grilled AH-DG-1225x225	in L5 & L6 under O&M limits	DEN	903,00
	Motorized Smoke Fire Damper DN 45	in L5 & L6 under O&M limits	DEN	16,00
	Motorized Smoke Fire Damper 18"x18"	in L5 & L6 under O&M limits	DEN	17,00
	Motorized Smoke Fire Damper 20"x20"	in L5 & L6 under O&M limits	DEN	11,00
	Motorized Smoke Fire Damper 22"x22"	in L5 & L6 under O&M limits	DEN	19,00
	Motorized Smoke Fire Damper 24"x24"	in L5 & L6 under O&M limits	DEN	65,00
	Motorized Smoke Fire Damper 30"x30"	in L5 & L6 under O&M limits	DEN	18,00
	Motorized Smoke Fire Damper 60"x50"	in L5 & L6 under O&M limits	DEN	8,00
	Motorized Smoke Fire Damper 42"x42"	in L5 & L6 under O&M limits	DEN	49,00
	Motorized Damper 10"x10"	in L5 & L6 under O&M limits	DEN	39,00
	VAV	in L5 & L6 under O&M limits	DEN	183,00
IT	IT FUNCTIONAL ARES			
	TO Telecommunications Outlet	in L5 & L6 under O&M limits	DEN	2.614,00
	Patch panel optical 24p including 4 SC-APC connectors	in L5 & L6 under O&M limits	DEN	22,00
	MUTOA Multi-user Telecommunications Outlet Assembly	in L5 & L6 under O&M limits	DEN	213,00
	NT Network Termination	in L5 & L6 under O&M limits	DEN	71,00
	Communications Rack 19" 42U	in L5 & L6 under O&M limits	DEN	32,00
	Media Outlet	in L5 & L6 under O&M limits	DEN	2,00
	Deinstallation and installation of Wireless Access Point	in L5 & L6 under O&M limits	DEN	62,00
TELESURVEILLANCE SYSTEM				
	Installation of new DEN CCTV camera HD IP PoE	in L5 & L6 under O&M limits	DEN	208,00
LIFESFTY	LIFESAFETY FUNCTIONAL AREA			
	Fire-Extinguisher 5 Lbs ABC	in L5 & L6 under O&M limits	DEN	234,00
	Fire deparment valve cabinet	in L5 & L6 under O&M limits	DEN	29,00
	Fire-Extinguisher 5 Lbs C02	in L5 & L6 under O&M limits	DEN	57,00
	Fire-Extinguisher 6 liters class K	in L5 & L6 under O&M limits	DEN	9,00
	Gate valve (OS&Y) 4" with supervisory switch (OSYSU)	in L5 & L6 under O&M limits	DEN	32,00
	Zonal control riser 4"	in L5 & L6 under O&M limits	DEN	32,00
	Sprinkler head Upright	in L5 & L6 under O&M limits	DEN	171,00
	Concealed Sprinkler head	in L5 & L6 under O&M limits	DEN	6.049,00
	Sidewall Sprinkler	in L5 & L6 under O&M limits	DEN	410,00
	Dry Sprinklers Head	in L5 & L6 under O&M limits	DEN	30,00
	Riser manifold for Sprinkler system	in L5 & L6 under O&M limits	DEN	50,00
	Automatic air release valves	in L5 & L6 under O&M limits	DEN	10,00

Person Group	Description	Asset Comments	Asset Responsible	Number of Asset
PLUMBING	PLUMBING FUNCTIONAL AREA			
	7000 GAL GREASE INTERCEPTOR		DEN	1,00
	2000 GAL GREASE INTERCEPTOR		DEN	2,00
	6000 GAL GREASE INTERCEPTOR		DEN	1,00
	Automatic Air Vent	in L5 & L6 under O&M limits	DEN	32,00
	Hose bibbs	in L5 & L6 under O&M limits	DEN	16,00
	Floor drain-square	in L5 & L6 under O&M limits	DEN	40,00
	Floor drain-round	in L5 & L6 under O&M limits	DEN	183,00
	Lavatory, Vitreous China, Slab Type	in L5 & L6 under O&M limits	DEN	244,00
	Urinal, Wall Hung	in L5 & L6 under O&M limits	DEN	98,00 FL
	Toilet, Wall Hung, Siphon Jet, with Trigger Control Hand Sprayer	in L5 & L6 under O&M limits	DEN	156,00 FL
	Toilet, Wall Hung, Siphon Jet, Wheelchair Accessible, with Trigger Contro	in L5 & L6 under O&M limits	DEN	84,00
	Lavatory, Wheelchair	in L5 & L6 under O&M limits	DEN	26,00
	Drinking fountain	in L5 & L6 under O&M limits	DEN	52,00
	Electric Water Heater 40 gal	in L5 & L6 under O&M limits	DEN	32,00
	Water meter	in L5 & L6 under O&M limits	GHP	18,00
	Booster pump for 345 GPM at 96Psi aproximately		DEN	3,00
	Recirculating pump for 8 GPM at 10Psi aproximately		DEN	32,00
	Assembly with dual drain (standard roof drain and roof overflow drain)		DEN	18,00
	standard 4" roof drain		DEN	14,00
RF DISTRIBUTION	ANTENNA SYSTEM UHF			
	Primary Hub DAS OMU	in L5 & L6 under O&M limits	DEN	1,00
	Secondary Hub DAS Repeater	in L5 & L6 under O&M limits	DEN	1,00
	Remote Unit	in L5 & L6 under O&M limits	DEN	5,00
VERTICAL CIRCULA	CONVEYORS			
	Elevators		DEN	6,00
	Escalators		DEN	33,00
	Passenger Conveyors		DEN	12,00
NATURAL GAS SYST	NATURAL GAS FUNCTIONAL AREA			
	Gas METER	in L5 & L6 under O&M limits	GHP	18,00 FL
FIRE ALARM				
	Touchscreen Graphical Interface for Firefichter's	in L5 & L6 under O&M limits	DEN	2,00
	Fire Alarm Pull Station	in L5 & L6 under O&M limits	DEN	95,00
	Fire Alarm Pull Station WP	in L5 & L6 under O&M limits	DEN	16,00
	Fire Alarm Strobe Light	in L5 & L6 under O&M limits	DEN	364,00
	Fire Alarm Strobe Light Wall mounted	in L5 & L6 under O&M limits	DEN	347,00
	Fire Alarm Strobe Light Wall mounted WP	in L5 & L6 under O&M limits	DEN	16,00
	Fire Alarm Horn/Strobe Light Wall mounted WP	in L5 & L6 under O&M limits	DEN	12,00
	Control Module (Output)	in L5 & L6 under O&M limits	DEN	178,00
	Monitor Module (Input)	in L5 & L6 under O&M limits	DEN	48,00
	Sprinkler Valve Supervisory Switches	in L5 & L6 under O&M limits	DEN	26,00
	Water flow switch	in L5 & L6 under O&M limits	DEN	26,00
	Tamper switch	in L5 & L6 under O&M limits	DEN	26,00
	Damper switch	in L5 & L6 under O&M limits	DEN	154,00
	Pressure Alarm switch	in L5 & L6 under O&M limits	DEN	6,00
	Beam detector	in L5 & L6 under O&M limits	DEN	6,00
	Transponder Panel (existing)	in L5 & L6 under O&M limits	DEN	10,00
	Transponder Panel	in L5 & L6 under O&M limits	DEN	8,00
	Fire Alarm Terminal Panel	in L5 & L6 under O&M limits	DEN	20,00
	Photoelectric Smoke Detector	in L5 & L6 under O&M limits	DEN	119,00
	Smoke / Heat Detector	in L5 & L6 under O&M limits	DEN	55,00
	Heat Detector	in L5 & L6 under O&M limits	DEN	33,00
	Smoke Duct detectors	in L5 & L6 under O&M limits	DEN	48,00
	IDNAC Repeater Panel (existing)	in L5 & L6 under O&M limits	DEN	2,00
	IDNAC Repeater Panel	in L5 & L6 under O&M limits	DEN	56,00
DEN ENTERPRISE &	SECURITY LAN			
	Cisco Catalyst PoE stack Enterprise	in L5 & L6 under O&M limits	DEN	11,00
	Cisco Catalyst Security	in L5 & L6 under O&M limits	DEN	8,00
LIGHTING SYSTEM				
	Type 1: 2'x4' LED Luminaire Recessed	in L5 & L6 under O&M limits	DEN	1.395,00
	Type 2: LED Recessed downlight 24W	in L5 & L6 under O&M limits	DEN	1.019,00
	Type 3: LED Recessed downlight 20W	in L5 & L6 under O&M limits	DEN	1.046,00
	Type 4: Enclosed LED luminaire 32W	in L5 & L6 under O&M limits	DEN	1.709,00
	Type 5: LED Luminaire 10500lm - Wide beam	in L5 & L6 under O&M limits	DEN	5.037,00
	Type 6: LED Floodlighting 26000lm	in L5 & L6 under O&M limits	DEN	140,00
	Type 7: LED Luminaire 20500lm - Wide beam	in L5 & L6 under O&M limits	DEN	273,00
	Type 8: LED Luminaire 38000lm	in L5 & L6 under O&M limits	DEN	493,00
	Type 9: Bollard with integrated LED Luminaire	in L5 & L6 under O&M limits	DEN	44,00
	Emergency exit signs	in L5 & L6 under O&M limits	DEN	539,00
	Network-Based Lighting Control Panel	in L5 & L6 under O&M limits	DEN	6,00
	Network-Based Lighting Control Panel	in L5 & L6 under O&M limits	DEN	20,00
	Occupancy Sensors	in L5 & L6 under O&M limits	DEN	414,00
	Daylight Photosensors	in L5 & L6 under O&M limits	DEN	146,00
	Room Dimming Controllers	in L5 & L6 under O&M limits	DEN	18,00

B O&M EQUIPMENT MANUALS[11]

[11] The O&M equipment manuals will be updated with final design

O&M reference list					
Code	Equipment name	Designation	Floor level	Associated System	File Name
OM-ELEC-LS1	Lightning System	LS1	L5	ELEC	
OM-HVAC-AGI1	Air grilled supply/return	AGI1	TBD	HVAC	
OM-HVAC-CUH1	Cabinet Unit Header	CUH1	L6	HVAC	
OM-HVAC-FCU47	Fan Coil Unit	FCU47	L5	HVAC	
OM-HVAC-KVD1	Kitchen Ventilation duct	KVD	L6	HVAC	
OM-HVAC-NEF23	Extract FAN	NEF23	L6	HVAC	
OM-HVAC-RTU	Roof Top (Split) Unit	RTU1	L6	HVAC	
OM-HVAC-SFA1	Relief fans	SFA1	L6	HVAC	
OM-HVAC-VAV1	Variable Air Volume Devices	VAV1	L6	HVAC	
OM-PLUM-WHH1	Water Heater	WHH	L5	PLUM	
OM-PLUM-CV1	Control valve	CV1	L5	PLUM	
OM-PLUM-LWW1	Lavatory Assembly	LWW1	L5	PLUM	
OM-PLUM-PID1	Drainage	PID	L5	PLUM	
OM-PLUM-PIP1	Cold and hot water pipes	PIP	L5	PLUM	
OM-PLUM-PSV1	Safety valves	PSV	L5	PLUM	
OM-PLUM-TWA1	Water Balancing/Dozing units	TWA	L5	PLUM	
OM-PLUM-TWW8	Toilet Assembly TWW8	TWW8	L5	PLUM	
OM-PLUM-UWW1	Urinal Assembly	UWW	L5	PLUM	

Equipment Data Sheets reference list						
ECS – Code	**Equipment name**	**Designation**	**System**	**Floor level**	**Location**	**File Name**
DS-ELEC-LS1	Lightning System	LS1	ELEC	L5	TBD	
DS-HVAC-AGI1	Air grilled supply/return	AGI1	HVAC	TBD	TBD	
DS-HVAC-CUH1	Cabinet Unit Header	CUH1	HVAC	L6	TML_06_5E_ST99	
DS-HVAC-FCU47	Fan Coil Unit	FCU47	HVAC	L5	ML_05_5E_ST99	
DS-HVAC-KVD1	Kitchen Ventilation duct	KVD	HVAC	L6	TBD	
DS-HVAC-NEF23	Extract FAN	NEF23	HVAC	L6	TML_06_5W_RF01	
DS-HVAC-RTU	Roof Top (Split) Unit	RTU1	HVAC	L6	Roof EAST	
DS-HVAC-SFA1	Relief fans	SFA1	HVAC	L6	TBD	
DS-HVAC-VAV1	Variable Air Volume Devices	VAV1	HVAC	L6	TBD	
DS-PLU-WHH1	Water Heater	WHH	PLUMBING	L5	TBD	
DS-PLUM-CV1	Control valve	CV1	PLUMBING	L5	TBD	
DS-PLUM-LWW1	Lavatory Assembly	LWW1	PLUMBING	L5	IEW1, EAST	
DS-PLU-TWW8	Drainage	TWW8	PLUMBING	L5	TML_05_11W_092	
DS-PLUM-PID1	Cold and hot water pipes	PID	PLUMBING	L5	TBD	
DS-PLUM-PIP1	Safety valves	PIP	PLUMBING	L5	TBD	
DS-PLUM-PUM1	Water Balancing/Dozing units	PUM	PLUMBING	L6	TBD	
DS-PLUM-TWA1	Toilet Assembly TWW8	TWA	PLUMBING	L5	TBD	
DS-PLU-UWW1	Urinal Assembly	UWW	PLUMBING	L5	TML_05_11W_092	

SOP reference list			
EDS-Code	Model	Associated System	File Name
SOP-ELEC-LS1	Lightning System	ELEC	SOP ELEC-LS1 v2
SOP-HVAC-AGI1	Air grilled supply/return	HVAC	SOP HVAC-AGI1 v1
SOP-HVAC-CUH1	Cabinet Unit Header	HVAC	SOP HVAC-CUH1 v2
SOP-HVAC-FCU47	Fan Coil Unit	HVAC	SOP HVAC-FCU47 v2
SOP-HVAC-KVD1	Kitchen Ventilation duct	HVAC	SOP HVAC-KVD1 v1
SOP-HVAC-NEF23	Extract FAN	HVAC	SOP HVAC-NEF23 v2
SOP-HVAC-RTU	Roof Top (Split) Unit	HVAC	SOP HVAC-RTU v2
SOP-HVAC-SFA1	Relief fans	HVAC	SOP HVAC-SFA1 v1
SOP-HVAC-VAV1	Variable Air Volume Devices	HVAC	SOP HVAC-VAV1 v2
SOP-PLUM-WHH1	Water Heater	PLUMBING	SOP PLUM-WHH1 v1
SOP-PLUM-CV1	Control valve	PLUMBING	SOP PLUM-CV1 v1
SOP-PLUM-LWW1	Lavatory Assembly	PLUMBING	SOP PLUM-LWW1 v1
SOP-PLUM-PID1	Drainage	PLUMBING	SOP PLUM-PID1 v1
SOP-PLUM-PIP1	Cold and hot water pipes	PLUMBING	SOP-PLUM-PIP1 v3
SOP-PLUM-PSV1	Safety valves	PLUMBING	SOP PLUM-PSV1 v1
SOP-PLUM-TWA1	Water Balancing/Dozing units	PLUMBING	SOP PLUM-TWA1 v1
SOP-PLUM-TWW8	Toilet Assembly TWW8	PLUMBING	SOP PLUM-TWW8 v2
SOP-PLUM-UWW1	Urinal Assembly	PLUMBING	SOP PLUM-UWW1 v1

Installation/Operation/Maintenance (IOM) reference list			
EDS-Code	Model	Associated System	File Name
MAN-ELEC-LS1	Lightning System	ELEC	MAN ELEC-LS1 v1
MAN-HVAC-AGI1	Air grilled supply/return	HVAC	MAN HVAC-AGI1 v1
MAN-HVAC-CUH1	Cabinet Unit Header	HVAC	MAN HVAC-CUH1 v1
MAN-HVAC-FCU47	Fan Coil Unit	HVAC	MAN HVAC-FCU47 v1
MAN-HVAC-KVD1	Kitchen Ventilation duct	HVAC	MAN HVAC-KVD1 v1
MAN-HVAC-NEF23	Extract FAN	HVAC	MAN HVAC-NEF23 v1
MAN-HVAC-RTU1	Roof Top (Split) Unit	HVAC	MAN-HVAC-RTU1 v1
MAN-HVAC-SFA1	Relief fans	HVAC	MAN HVAC-SFA1 v1
MAN-HVAC-VAV1	Variable Air Volume Devices	HVAC	MAN HVAC-VAV1 v1
MAN-PLUM-WHH1	Water Heater	PLUMBING	MAN PLUM-WHH1 v1
MAN-PLUM-CV1	Control valve	PLUMBING	MAN PLUM-CV1 v1
MAN-PLUM-LWW1	Lavatory Assembly	PLUMBING	MAN PLUM-LWW1 v1
MAN-PLUM-PID1	Drainage	PLUMBING	MAN PLUM-PID1 v1
MAN-PLUM-PIP1	Cold and hot water pipes	PLUMBING	MAN PLUM-PIP1 v1
MAN-PLUM-PSV1	Safety valves	PLUMBING	Draft MAN-PLUM-PSV1
MAN-PLUM-TWA1	Water Balancing/Dozing units	PLUMBING	MAN PLUM-TWA1 v1
MAN-PLUM-TWW8	Toilet Assembly TWW8	PLUMBING	MAN PLUM-TWW8 v1
MAN-PLUM-UWW1	Urinal Assembly	PLUMBING	MAN PLUM-UWW1 v1

C PLANNED PREVENTIVE MAINTENANCE SCHEDULE

This annex includes an example with the maintenance operations of each system under O&M limits, also in this document the frequency of each task is defined for a one year period.

Maintenance introduction

Management of maintenance comprises more than the control of activities associated with each item of equipment and can be addressed broadly under the headings of “technical” and “control”.

The technical content includes determining what plant is to be maintained, how and when; identifying problems and diagnosing causes; monitoring effects; preparing and analysing records and technical information: initiating procedures to cope with situations before they arise; and ensuring that the chosen techniques are achieving the required result.

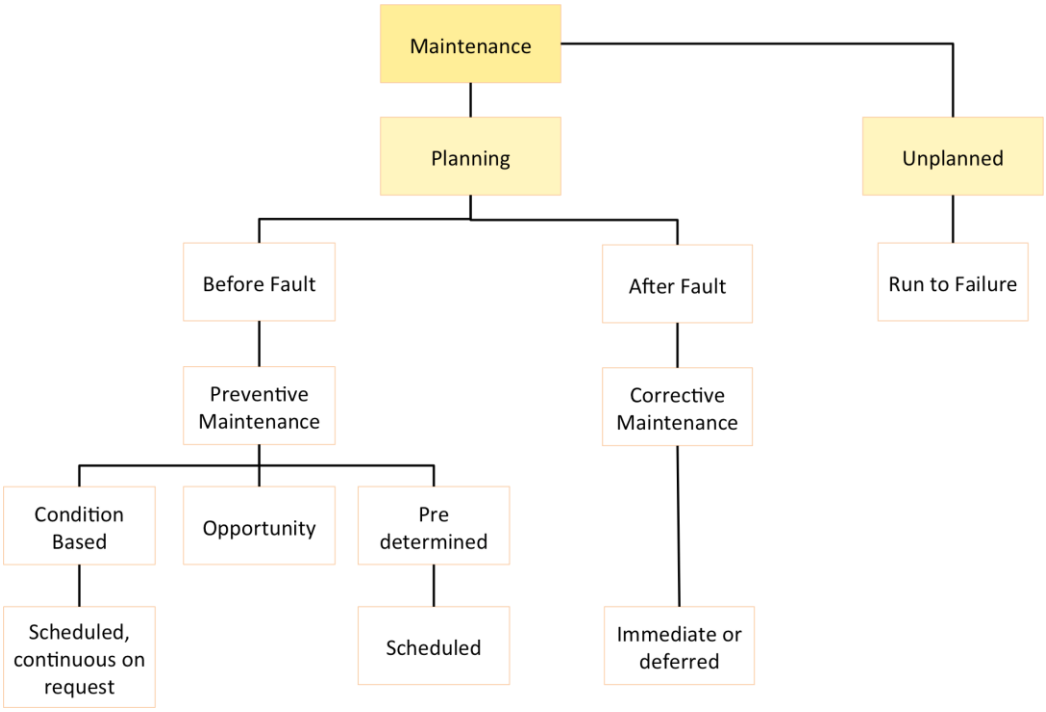
The control element is aimed at providing the required technical service at minimum expense and can involve management of labour, spares and equipment to match the workload; locating where work is required; organizing transport; setting priorities; coordinating action; monitoring expenditure, identifying high maintenance costs plant and collecting information to form a basis for decision making.

Effective maintenance management will minimize the costs associated with non-availability of an engineering service. It shall be recognized that in addition to enabling the engineering services to be

available when required, maintenance is vital to ensure that the services retain their value as assets within the building.

Types of maintenance

Maintenance can be divided into two broad categories: unplanned and planned.



Planned maintenance is organized, controlled and follows a recognizable procedure. It can take several forms, such as:

- Preventive maintenance.
- Corrective (or reactive) maintenance.
- Scheduled maintenance.
- Opportunity maintenance.
- Condition-based maintenance.
- Reliability-centred maintenance.
- Business-focused maintenance.

A mixture of these methods has been implemented for the maintenance of all assets within the O&M limits of the Denver International Airport. It started with an assessment of what effective followed by a decision as to what is desirable and a consideration of the resources available in terms of labour, materials and facilities; together, these provide the rational basis for the developed program of planned maintenance.

Condition-based maintenance is initiated in those equipment and systems that are existing within the O&M limits. The concept is that a parameter has been established which gives a good indication of plan condition and also reflects the likely mode of failure. By monitoring this parameter, the required timing and type of maintenance has been determined. Monitoring has been assessed by establishing trends over time in the available historical records to identify marked departures from the normal, or

by condition checking where readings are compared with established parameters for the particular item of plan or equipment on a “go/no go” basis.

All assets that justify a condition monitoring are those that:

- Are expensive to maintain.
- Are expensive to replace if run to failure.
- Failure could lead to high consequential costs.
- Failure could lead to an unacceptable situation (creating a safety hazard or causing an essential building function, to cease to operate).
- Critical to the overall airport operation.

The methodology used for these kind of evaluation are based on Net Present Value Assessment.

Another technique that will be implemented and that is increasingly being adopted in the process industry, is known as “Reliability Centred Maintenance” (RCM). It entails relating the operational requirements of specific plant to known or recorded reliability information using a structured maintenance decision making tool that focuses resources to areas of greatest effect. This can allow more cost effective use to be made of maintenance resources, particularly labour. Methodically listing plant items and components, and using group analyses has been undertaken to review and improve the existing maintenance regime. On-going monitoring of the results of changes will be used to meet the aim of continuing improvement. One part of the process is identifying significant modes of failure using “failure modes and effects critical analysis” (FMECA) to lead to the appropriate maintenance tasks.

Maintenance Manual

This section shall identify the areas into O&M limits that the systems serve, the location of monitoring checkpoints (meters and gauges), the expected performance reading at the design-load condition and, where applicable, at part-load condition. The system’ operating during the day, night, weekend, as well

as seasonal start-up and turndown, safety devices and their function, control devices and their function, pollution control devices, etc. shall also be described.

It is recommended that the function of the controls for individual systems be described alongside the description of the system function and that an overview of the entire control system be described separately.

The following is an example of a listing of Elements within the O&M Limits:

- Heating HVAC (concession spaces in O&M Limits)
- Cooling HVAC (concession spaces in O&M Limits)
- Air distribution.
- Lighting.
- Chemical water treatment.
- Refrigeration.
- Plumbing.
- Special purpose.

The maintenance manual shall contain the following information:

- Description of the equipment or system: this shall consist of easy-to-read drawings accompanied by a clear description of each component.
- Description of function, as applicable: the function of the equipment, functional parameters (input, output) at the design load and at part loads, procedures before start-up, and performance verification procedures.
- Recommended maintenance procedures and their recommended frequency for the site-specific application.
- Recommended list of spare parts, part numbers, and places from which the can be obtained.
- Original purchase order number, date of purchase; name, address, phone, emails, and fax number of the vendor; warranty information.
- Installation and repair information: any other information needed for preparation of documents supporting management of operation and maintenance program.

The documentation provided by supplier or the installer shall focus only on the model installed. It shall then be supplemented by project-specific information developed by the DBJV.

Maintenance tasks

The third level of information deals with the actual maintenance work that shall be carried out on individual systems and items of plan. Collection of this produces considerable quantities of data and careful though has been given to the value of the information produced.

The information collected relates to planned and unplanned maintenance work and for each maintenance task, planned or unplanned, the following details have been used:

- Assets.
- Job/maintenance procedure applied.
- Time taken.
- Grade of operative(s).
- Materials needed.
- Etc.

The planned maintenance has been considered in relation to the frequency at which each task is carried out and has been predominantly based on regular inspection, cleaning and replacement of

consumables and irregular tasks associated with remedial work, replacement or redundancy. Care has been taken in selecting general job titles to allow later manipulation of the data. Examples of titles are:

- Inspection.
- Cleaning.
- Safety checks.
- Testing.
- Performance assessment against stated criteria.
- Calibration.
- Replacement of consumables.
- Replacement of parts.
- Refurbishment of plant.
- Replacement of plant.

Unplanned work has been considered in relation to the cause. Again general titles have been used, like:

- Wear/corrosion/other progressive deterioration.
- Manufacturing defect.
- Material defect.
- Design defect.
- Installation defect.
- Inadequate maintenance.
- Maintenance reassembly defect.
- Maintenance adjustment defect.
- Operational mistake
- Malicious damage.

Utilisation of labor

The following level provides a systematic approach to identifying core activities of maintenance resources. Careful analysis of such labor utilisation shall produce a number of indicators of the

effectiveness of maintenance management and the actual work carried out. Again, it is important to distinguish between planned and unplanned activities.

Planned activities

These can include the following:

- Replenishment/replacement of consumables.
- Inspection.
- Functional testing.
- Safety testing.
- Repairs, resulting from planned activities.
- Supervision/receiving particular instructions.
- Procurement of material, tools, spares and equipment...
- Travelling, cleaning and tidying.
- Minor new or improvement work initiated by maintenance management.
- Other planned activities (training, administration, record keeping, etc.).

Unplanned activities

These can include the following:

- Response to complaints to assess situation.
- Remedial work which result from unplanned activities.
- Attendance to unforeseen failure including fault diagnosis.
- Emergency repairs associated with unforeseen failures.
- Minor new or improvement works initiated outside maintenance organization.
- Major new works.
- Dedicated travelling time.
- Tidying and cleaning following contingency and/or unplanned work.
- Material, tools and equipment procurement.
- Other unplanned activities.

Definition Maintenance Tasks

Preventive Maintenance
The care and servicing by personnel for the purpose of maintaining equipment in satisfactory operating condition by providing for systematic inspection, detection, and correction of incipient failures either before they occur or before they develop into major defects.

Routine Maintenance
Simple small-scale activities (usually requiring only minimal skills or training) associated with regular (daily, weekly, monthly, etc.) and general upkeep of equipment against normal work and tear.

Corrective Maintenance
Activities undertaken to detect, isolate, and rectify a fault so that the failed plant, equipment, machine, or system can be restored to its normal operable state within the tolerances or limits established for in-service operations.

Predictive Maintenance
Techniques that are designed to help determine the condition of in-service equipment in order to predict when maintenance shall be performed. This approach promises cost savings over routine or time-based preventive maintenance, because tasks are performed only when warranted.

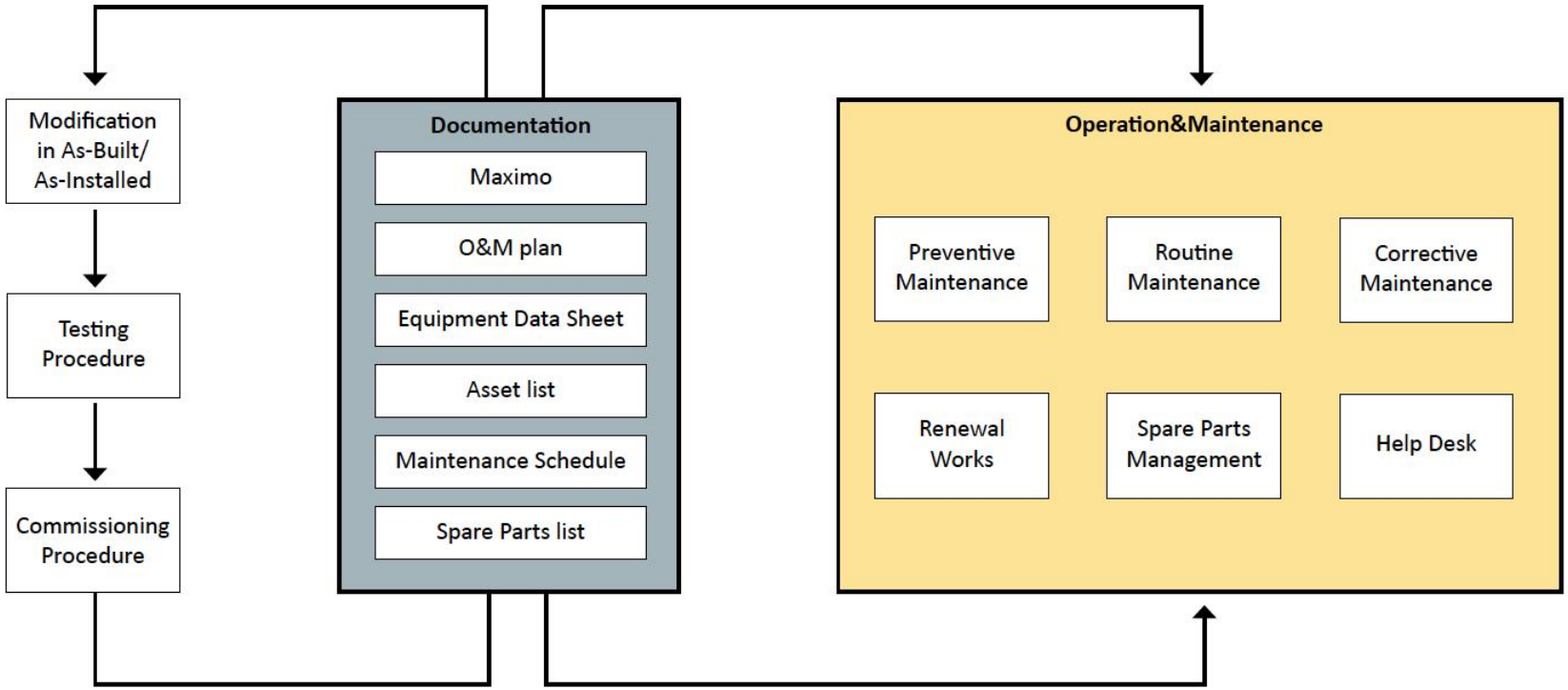
Conductive Maintenance

A combination of technical and administrative tasks needed to preserve an asset, like sensory inspections, reading of parameters in control systems, reading of on-site parameters (with local instruments), simple measurements, and similar.

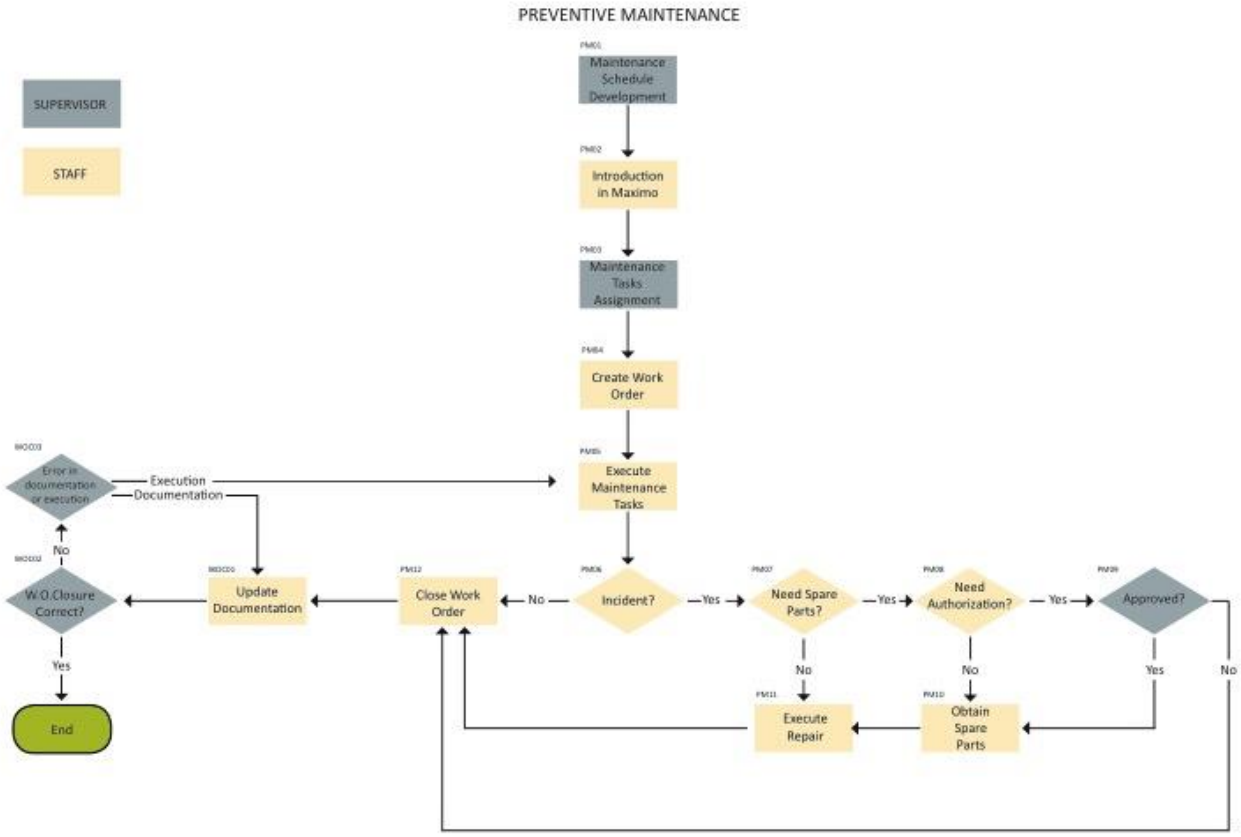
Maintenance Procedures

This document shall include all the forms necessary for management of operation and maintenance programs, including operating logs, inspection sheets, inspection and maintenance schedules, work order forms, and material purchasing forms.

Overall Maintenance Procedure scheme



I Preventive Maintenance flow chart



PM01: ***Development of annual preventive maintenance schedule***
The O&M Manager/Supervisor of the Developer will develop annually the preventive maintenance schedule as required in the Technical Requirements and the Development agreement and in accordance with the manufacturer's recommendations, enclosure requirements (if applicable) and airport activities.

PM02: ***Introduction in Developer's CMMS***
After the approval of the annual preventive maintenance schedule, the Staff/Admin will introduce the schedule into Developer's CMMS for its further management.

PM03: ***Maintenance tasks assignment***
For every maintenance task or group of tasks that are defined in the annual preventive maintenance schedule, the O&M Manager/Supervisor will assign an O&M staff member or a provider who will be responsible for the execution of the tasks

PM04: ***Create preventive maintenance Work Order***
Once the preventive maintenance schedule has been inserted in Developer's CMMS, the Work Order will be generated manually or automatically by the Staff/admin. The O&M Manager/Supervisor will be responsible for managing the work orders in the system (approve, start, introduce additional info and recommendations, incidents, open issues, etc.). The O&M staff member/provider will check the related Equipment Data Sheets, SOP, IOM, and Manufacturer's Manual and collect all required details (required tools, spare parts, etc.) for the maintenance task execution.

Any kind of information related with the work order will be updated in the Developer's CMMS system.

PM05: ***Execute preventive maintenance Tasks***
The O&M staff/provider responsible of its execution will carry out the defined preventive maintenance tasks.

PM06: ***Incident?***
During the execution of the preventive maintenance tasks by the O&M staff/provider problems could appear. The protocol for progressing is the following:

- There is a problem → continue with activity PM07.
- There is no problem → continue with activity PM09.

PM07: *Need Spare Parts?*
The O&M staff/provider after detecting an incident during the execution of the planned preventive maintenance tasks must evaluate if spare parts are needed. The protocol for progressing is the following:

- Spare Parts are needed → continue with activity PM08.
- Spare Parts are not needed → continue with activity PM11.

PM08: *Need Authorization?*
The O&M staff/provider responsible of its execution will evaluate according with the instruction and information in the O&M plan if any kind of authorization is required before solving the incident detected in activity PM06. The protocol for progressing is the following:

- Authorization is needed → continue with activity PM09.
- Authorization is not needed → continue with activity PM10.

PM09: *Approved?*
The O&M Manager/Supervisor will evaluate the information gathered and presented/communicated by the O&M staff/provider and decide if the incident may be solved or not. The protocol for progressing is the following:

- O&M staff/provider is authorized to solve the incident → continue with activity PM10.
- O&M staff/provider is not authorized to solve the incident → continue with activity PM12.

PM10 - *Obtain Spare Parts*
The O&M staff/provider if authorize to or after receiving the authorization will request and obtain the needed spare parts in the spare part storage room.

PM11: *Execute Repair*
The O&M staff/provider after detecting an incident during a planned preventive maintenance task and after a possible authorization and/or approval review to proceed, will repair the default detected and gather all required information and data for the means of administration.

PM12: *Close Work Order*
The O&M staff/provider, after executing all required maintenance actions, will proceed to close the Work Order in Developer's CMMS and updating all data related to time spent, material used, enclosure details, time of non-performance of asset, improvement suggestions, etc. The system will consider the Work Order open or

in progress until all required data has been updated in the system, affecting all related performance indicators. In particular, when a default has been detected, all related information and data will be recorded in the system to allow management to interact accordingly.

Work Order Closure procedure

WOC01: ***Update documentation***
The O&M staff/provider after closing the work order in Developer's CMMS will create all mandatory documentation that is required to deliver to O&M Manager/Supervisor.

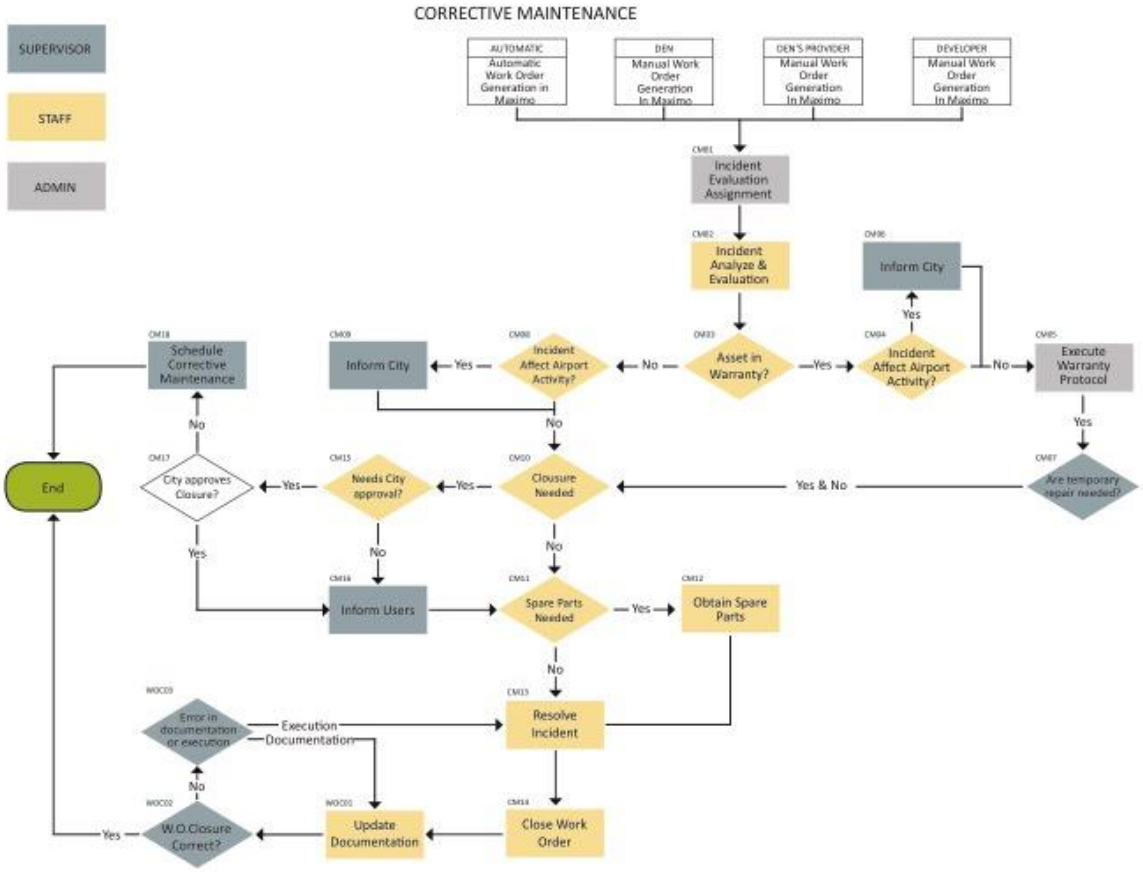
WOC02: ***Work Order closure correct?***
The O&M Manager/Supervisor will periodically at its discretion evaluate the preventive maintenance performance and can audit all closed work orders for its control purposes. The protocol for progressing is the following:

- The Work Order closure is correct → continue to "End" activity.
- The Work Order closure is not correct → continue with activity WOC03.

WOC03: ***Error in documentation or execution?***
The O&M Manager/Supervisor after evaluating the closed work orders and detecting an incorrect closure will proceed with the following protocol:

- The Work Order closure has a documentation error → return to activity WOC01.
- The Work Order closure has an execution error → return to activity PM05

II Corrective Maintenance flow chart



Any incident can be created in different ways, like an automatic WO generation in Developer's CMMS, a manual WO generation in Developer's CMMS by the Owner's staff members, Owner's Providers or the Developer. Once created the WO will continue in activity CM01

CM01: ***Incident Evaluation Assignment***
The O&M Admin will evaluate the WO if the data is correct like the Priority Code, location, etc. and assign the WO to a Developer's Staff member

CM02: ***Incident Analyse & Evaluation***
The O&M Staff/Provider will analyse and evaluate the WO and prepare its execution.

CM03: ***Asset in Warranty?***
The O&M Staff/Provider will see If the asset related to the incident is in warranty or not. The protocol for progressing is the following:

- The asset is in warranty → continue with activity CM04.
- The asset is not in warranty → continue with activity CM08.

CM04: ***Incident Affect Airport Activity?***
The O&M staff/provider after evaluate if the incident affects the airport's activities. The protocol for progressing is the following:

- The incident does not affect the Airport Activity → continue with activity CM05.
- The incident does affect the Airport Activity → continue with activity CM16.

CM06: ***Inform Owner***
The O&M Staff/Provider will inform the O&M Manager or delegated person who will inform the Owner regarding the incident and provide all related information.

CM05: ***Execute Warranty Protocol***
The O&M Admin will execute the warranty protocol regarding the asset involved in the incident and that is in warranty.

CM07: ***Are temporary repair needed?***
The O&M staff/provider in collaboration with the Owner and the Supervisor will decide to proceed with the standard repair protocol or if to implement a temporary solution as the incident is affecting the Airport:

- Temporary repair is needed → continue with activity CM10.
- Temporary repair is not needed → continue with activity CM10. (The difference will be CM13).

CM10: ***Is closure needed?***
The O&M staff/provider will decide to if closure is needed to proceed resolving the incident. The protocol for progressing is the following:

- Closure is needed → continue with activity CM15.
- Closure is not needed → continue with activity CM11.

CM11: ***Spare Parts Needed?***
The O&M staff/provider after evaluates if spare parts are needed to solve the incident. The protocol for progressing is the following:

- Spare Parts are needed → continue with activity CM012.
- Spare Parts are not needed → continue with activity CM13.

CM12 - ***Obtain Spare Parts***
The O&M staff/provider after evaluating the need for spare parts will request and obtain the needed spare parts in the spare part storage room.

CM13: ***Resolve Incident***
The O&M staff/provider will execute the corrective maintenance tasks in order to solve the incident and taking into account if it is a standard solution protocol or if a temporary solution is required (CM07).

CM14: ***Close Work Order***
The O&M staff/provider, after executing all required corrective maintenance actions, will proceed to close the Work Order in Developer's CMMS and updating all data related to time spent, material used, enclosure details, time of non-performance of asset, improvement suggestions, etc. The system will consider the Work

Order open or in progress until all required data has been updated in the system, affecting all related performance indicators. In particular, when a default has been detected, all related information and data will be recorded in the system to allow management to interact accordingly.

CM08: ***Incident Affect Airport Activity?***
The O&M staff/provider after evaluate if the incident affects the airport's activities. The protocol for progressing is the following:

- The incident does not affect the Airport Activity → continue with activity CM10.
- The incident does affect the Airport Activity → continue with activity CM09.

CM09: ***Inform Owner***
The O&M Staff/Provider will inform the O&M Manager or delegated person who will inform the Owner regarding the incident and provide all related information.

CM15: ***Needs Owner approval?***
The O&M staff/provider has decided that a closure is needed (CM10) and needs Owner Approval. The protocol for progressing is the following:

- Approval needed for closure → continue with activity CM17.
- Approval not needed for closure → continue with activity CM16.

CM16: ***Inform Users***
The O&M Staff/Provider before executing the corrective actions will make sure that users are informed properly of the required closure.

CM17: ***Owner approves Closure?***
The Owner will decide if the closure is approved or not. The protocol for progressing is the following:

- Closure is approved → continue with activity CM16.
- Closure is not approved → continue with activity CM18.

CM18: ***Schedule Corrective Maintenance***
The O&M Staff/Provider after the needed closure has not been approved will schedule the maintenance tasks in Developer's CMMS.

Work Order Closure procedure

WOC01: ***Update documentation***
The O&M staff/provider after closing the work order in Developer's CMMS will create all mandatory documentation that is required to deliver to O&M Manager/Supervisor.

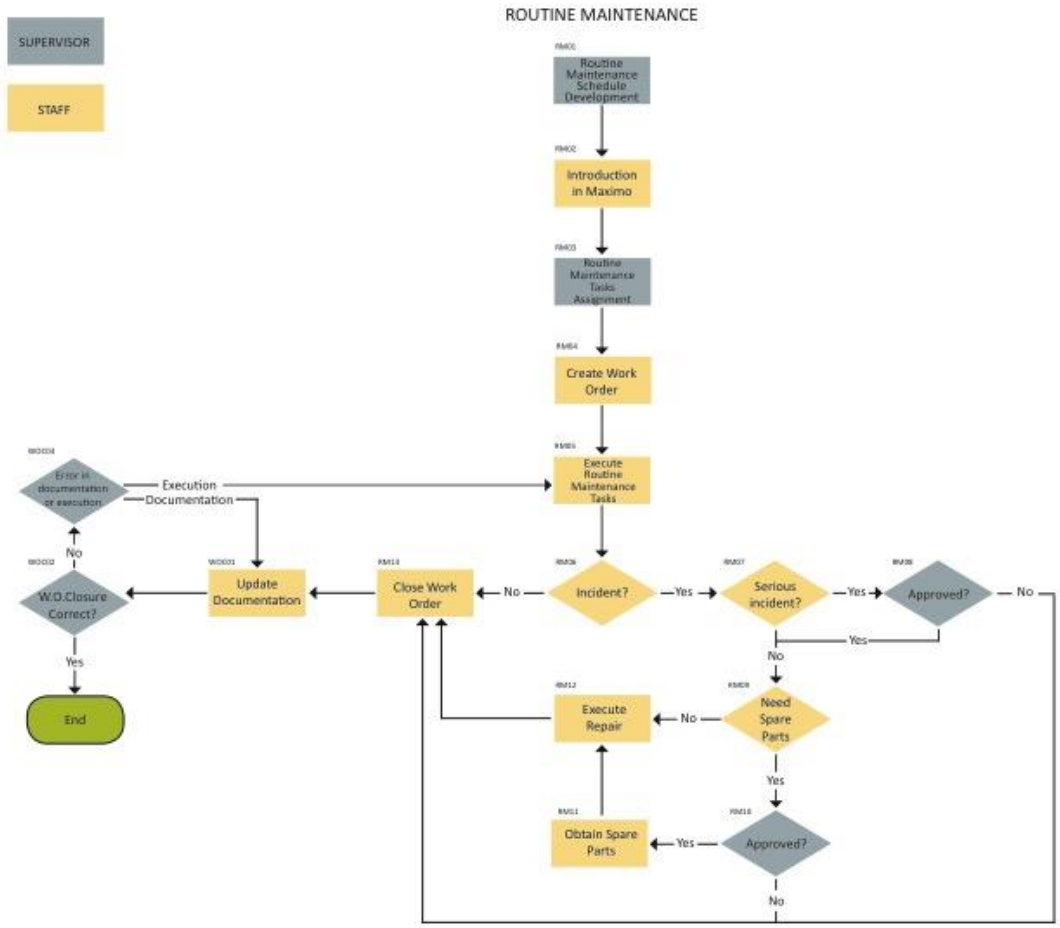
WOC02: ***Work Order closure correct?***
The O&M Manager/Supervisor will periodically at its discretion evaluate the preventive maintenance performance and can audit all closed work orders for its control purposes. The protocol for progressing is the following:

- The Work Order closure is correct → continue to "End" activity.
- The Work Order closure is not correct → continue with activity WOC03.

WOC03: ***Error in documentation or execution?***
The O&M Manager/Supervisor after evaluating the closed work orders and detecting an incorrect closure will proceed with the following protocol:

- The Work Order closure has a documentation error → return to activity WOC01.
- The Work Order closure has an execution error → return to activity CM13

III Routine Maintenance flow chart



RM01: ***Routine Management Schedule Development***
The O&M Manager/Supervisor of the Developer will develop annually the routine maintenance schedule as required in the Technical Requirements and the Development agreement and in accordance with the manufacturer's recommendations, enclosure requirements (if applicable) and airport activities.

RM02: ***Introduction in Developer's CMMS***
After the approval of the annual routine maintenance schedule, the Staff/Admin will introduce the schedule into Developer's CMMS for its further management.

RM03: Routine ***Maintenance tasks assignment***
For every maintenance task or group of tasks that are defined in the annual routine maintenance schedule, the O&M Manager/Supervisor will assign an O&M staff member or a provider who will be responsible for the execution of the tasks

RM04: ***Create Work Order***
Once the routing maintenance schedule has been inserted in Developer's CMMS, the Work Order will be generated manually or automatically by the Staff/admin. The O&M Manager/Supervisor will be responsible for managing the work orders in the system (approve, start, introduce additional info and recommendations, incidents, open issues, etc.). The O&M staff member/provider will check the related Equipment Data Sheets, SOP, IOM, and Manufacturer's Manual and collect all required details (required tools, spare parts, etc.) for the maintenance task execution.

Any kind of information related with the work order will be updated in the Developer's CMMS system.

RM05: ***Execute Routine maintenance Tasks***
The O&M staff/provider responsible of its execution will carry out the defined routine maintenance tasks.

RM06: ***Incident?***
During the execution of the routine maintenance tasks by the O&M staff/provider problems could appear. The protocol for progressing is the following:

- There is a problem → continue with activity RM07.
- There is no problem → continue with activity RM13.

RM07: *Serious incident?*
The O&M staff/provider after detecting an incident during the execution of the planned routine maintenance tasks must evaluate if the incident is serious and can affect performance, business, other assets, etc. The protocol for progressing is the following:

- It is a serious incident → continue with activity RM08.
- It is a minor serious incident → continue with activity PM09.

PM08: *Approved?*
The O&M Manager/Supervisor will evaluate the information gathered and presented/communicated by the O&M staff/provider and decide if the incident may be solved or not. The protocol for progressing is the following:

- O&M staff/provider is authorized to solve the incident → continue with activity RM09.
- O&M staff/provider is not authorized to solve the incident → continue with activity RM13.

RM09: *Need Spare Parts?*
The O&M staff/provider after detecting an incident during the execution of the planned routine maintenance tasks must evaluate if spare parts are needed. The protocol for progressing is the following:

- Spare Parts are needed → continue with activity RM10.
- Spare Parts are not needed → continue with activity RM12.

RM10: *Approved?*
The O&M Manager/Supervisor will evaluate the information gathered and presented/communicated by the O&M staff/provider and decide if the staff member may use spare parts or not. The protocol for progressing is the following:

- Spare parts may be used → continue with activity RM11.
- Spare parts may not be used → continue with activity RM13.

RM11 - *Obtain Spare Parts*
The O&M staff/provider after receiving the approval for using spare parts for the incident will request and obtain the needed spare parts in the spare part storage room.

RM12: *Execute Repair*
The O&M staff/provider after detecting an incident during a planned routine maintenance task and after the approval to proceed, will repair the default detected and gather all required information and data for the means of administration.

RM12: *Close Work Order*
The O&M staff/provider, after executing all required maintenance actions, will proceed to close the Work Order in Developer's CMMS and updating all data related to time spent, material used, enclosure details, time of non-performance of asset, improvement suggestions, etc. The system will consider the Work Order open or in progress until all required data has been updated in the system, affecting all related performance indicators. In particular, when a default has been detected, all related information and data will be recorded in the system to allow management to interact accordingly.

Work Order Closure procedure

WOC01: *Update documentation*
The O&M staff/provider after closing the work order in Developer's CMMS will create all mandatory documentation that is required to deliver to O&M Manager/Supervisor.

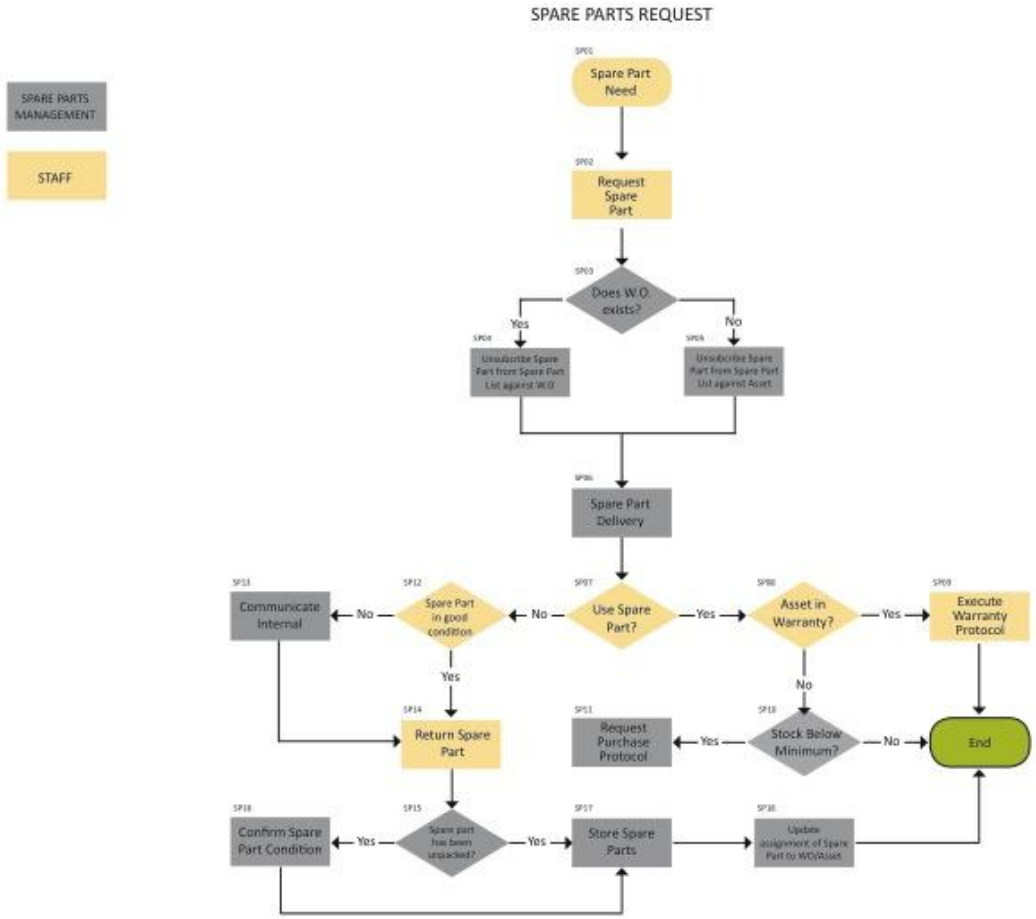
WOC02: *Work Order closure correct?*
The O&M Manager/Supervisor will periodically at its discretion evaluate the preventive maintenance performance and can audit all closed work orders for its control purposes. The protocol for progressing is the following:

- The Work Order closure is correct → continue to "End" activity.
- The Work Order closure is not correct → continue with activity WOC03.

WOC03: *Error in documentation or execution?*
The O&M Manager/Supervisor after evaluating the closed work orders and detecting an incorrect closure will proceed with the following protocol:

- The Work Order closure has a documentation error → return to activity WOC01.
- The Work Order closure has an execution error → return to activity RM05

IV Spare Part request flow chart



SP01: ***Spare Part Need***
In the previous flow charts, when a spare part parte is needed, will follow in this action

SP02: ***Request Spare Part***
The O&M staff/Provider will request officially the required spare parts via the request spare parts protocol

SP03: ***Does W.O. exists?***
The O&M Spare Parts Management will check if the W.O. exists. The protocol for progressing is the following:

- The W.O exists → continue with activity SP04.
- The W.O. exists → continue with activity SP05.

SP04: ***Unsubscribe Spare Parts form Spare Part List against W.O.***
The O&M Spare Parts Management unsubscribe in the system the requested spare parts inserting the W.O. number in the spare part request.

SP05: ***Unsubscribe Spare Parts form Spare Part List against Asset***
The O&M Spare Parts Management unsubscribe in the system the requested spare parts inserting the Asset identification code in the spare part request.

SP06: ***Spare Part Delivery***
The O&M Spare Parts Management will deliver the requested spare parts to the O&M staff/Provider

SP07: ***Use Spare Part?***
The O&M staff/Provider may or may not use the spare parts in the maintenance actions. The protocol for progressing is the following:

- The spare parts are used → continue with activity SP08.
- The spare parts are not used → continue with activity SP12.

SP08: ***Asset in Warranty?***
The O&M Staff/Provider will see If the asset related to the incident is in warranty or not. The protocol for progressing is the following:

- The asset is in warranty → continue with activity SP09.
- The asset is not in warranty → continue with activity SP10.

SP09: ***Execute Warranty Protocol***
The O&M Staff/Provider will execute the warranty protocol regarding the asset involved in the incident and that is in warranty.

SP10: ***Stock below minimum?***
The O&M Spare Parts Management will evaluate if the requested spare parts have reached the minimum required level. The protocol for progressing is the following:

- Stock is below level → continue with activity SP11.
- Stock is not below level → END.

SP11: ***Request Purchase Protocol***
The O&M Spare Parts Management will request the purchase of the delivered spare parts that have reached the minimum required level of stock.

SP12: ***Spare Part in good condition?***
The O&M Staff/Provider will evaluate if the returned requested spare parts are still in good condition. The protocol for progressing is the following:

- The spare part is in good condition → continue with activity SP14.
- The spare part is not in good condition → continue with activity SP13.

SP13: ***Communicate Internal***
The O&M Spare Parts Management will communicate internally the fact that spare part that have been delivered and returned in a not good condition.

SP14: ***Return Spare Part***
The O&M Staff/Provider will return the spare parts to spare part storage.

SP15: ***Spare Part has been unpacked?***
The O&M Spare Parts Management will evaluate if the returned spare parts have been unpacked form its original package. The protocol for progressing is the following:

- The spare part has been unpacked → continue with activity SP16.
- The spare part has not been unpacked → continue with activity SP17.

SP16: ***Confirm Spare Part Condition***
The O&M Spare Parts Management will confirm that the Spare parts are in good condition and update the spare parts lists with all related date of the item.

SP17: ***Store Spare Part***
The O&M Spare Parts Management will store the Spare parts in the designated space in the storage room.

SP18: ***Update assignment of Spare Part W.O./Asset***

The O&M Spare Parts Management will update the data of the W.O. (SP04) or Asset (SP05) as it has not been used in the maintenance tasks.

C1 PLANNED PREVENTIVE MAINTENANCE SCHEDULE

Planned Preventive Maintenance Master Plan Schedule – week 1-26

DEN MASTER PREVENTIVE MAINTENANCE PLAN

ASSET TYPE	FREQUENCY		ACTIVITY DESCRIPTION	UNITS	LEVEL	DURATION PER UNIT (min)	HOURS / YEAR	REFERENCE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
EXHAUST FAN	6M	2	Semi Annual Preventive Maintenance for Exhaust Fan	16	9/L / 11.3	60	32	Attached PMP Checklist	6M																						6M	
EXHAUST FAN	Y	1	Annual Preventive Maintenance for Exhaust Fan	16	9/L / 11.3	120	32	Attached PMP Checklist	Y																							
FAN COIL UNIT	3M	4	Quarterly Preventive Maintenance for fan coils units	57	16L5	120	456	Attached PMP Checklist	3M											3M											3M	
FAN COIL UNIT	6M	2	Monthly Preventive Maintenance for Fan Coil Units	57	16L5	180	342	Attached PMP Checklist	6M																						6M	
FAN COIL UNIT	Y	1	Annual Preventive Maintenance for Fan Coil Units	57	16L5	300	285	Attached PMP Checklist	Y																							
FAN POWER VAV	3M	4	Quarterly Preventive Maintenance for Fan Power VAV	183	87L5 / 35L6	30	366	Attached PMP Checklist	3M											3M											3M	
FAN POWER VAV	6M	2	Semmi anual Preventive Maintenance for fan power VAV	183	87L5 / 35L6	60	366	Attached PMP Checklist	6M																						6M	
FAN POWER VAV	Y	1	Annual Preventive Maintenance for Fan power VAV	183	87L5 / 35L6	120	366	Attached PMP Checklist	Y																							
KITCHEN VENTILATION DUCT	3M	4	Quarterly Preventive Maintenance for Kitcheb Ventilation Duct	16	L6	60	64	Attached PMP Checklist	3M											3M											3M	
SPLIT UNIT	Y	1	Annual Preventive Maintenance for Split Units	0	L6	30	0	Attached PMP Checklist	Y																							
relief FANS	Y	1	Annual Preventive Maintenance for Relief Fans	16	L6	30	8	Attached PMP Checklist	Y																							
DRAINAGE	Y	1	Annual Preventive Maintenance for Drainage Pipes	223	L5&L6	5	19	Attached PMP Checklist		Y																						
DOMESTIC WATER PIPES / Hose Blibs	Y	1	Annual Preventive Maintenance for Hot and Cold Water Pipes	16	L5&L6	20	5	Attached PMP Checklist		Y																						
LAVATORY ASSEMBLY	M	12	Monthly Preventive Maintenance for lavatory assembly	26	L5&L6	20	104	Attached PMP Checklist		M					M					M					M					M			
PUMP	Y	1	Annual Preventive Maintenance for Pumps	22	L5&L6	10	4	Attached PMP Checklist		Y																						
TOILET ASSEMBLY	M	12	Monthly preventive maintenance for toilet assembly	28	L5&L6	20	112	Attached PMP Checklist		M					M					M					M					M			
URINAL ASSEMBLY	M	12	Monthly preventive maintenance for urinal assembly	14	L5&L6	20	56	Attached PMP Checklist		M					M					M					M					M			
WATER HEATER	Y	1	Annual Preventive Maintenance for Water Cooler / Heater	32	L5&L6	20	11	Attached PMP Checklist		Y																						
WATER SAFETY VENTS	Y	1	Annual Preventive Maintenance for Water Safety Valve Units	32	L5&L6	20	11	Attached PMP Checklist		Y																						
WATER Balancing UNIT	Y	1	Annual Preventive Maintenance for Water Treatment Unit	46	L5&L6	10	8			Y																						
LIGHTING SYSTEM	Y	1	Annual Preventive Maintenance for Lighting	1097	L5 & L6	1	18	Attached PMP Checklist			Y																					
MUTOA Multi-user Telecommunications Outlet	2M	2	Bimonthly Preventive Maintenance for Socket Points MUTOA Multi-user Telecommunications Outlet Assembly	213	L5 & L6	10	213	Attached PMP Checklist				2M										2M									2M		
NT Network Termination	2M	2	Bimonthly Preventive Maintenance for Socket Points NT Network Termination	71	L5 & L6	10	71	Attached PMP Checklist				2M										2M									2M		
FINISHING	Y	Year ly once	27	NA		Attached PMP Checklist	Y																									

LEGEND	
DESCRIPTION	ABBREVIATION
DAIRY MAINTENANCE	D
WEEKLY MAINTENANCE	W
2 WEEKLY MAINTENANCE	2W
MONTHLY MAINTENANCE	M
2 MONTHLY MAINTENANCE	2M
3 MONTHLY MAINTENANCE	3M
4 MONTHLY MAINTENANCE	4M
6 MONTHLY MAINTENANCE	6M
YEARLY MAINTENANCE	Y
2 YEARLY MAINTENANCE	2Y
5 YEARLY MAINTENANCE	5Y

Planned Preventive Maintenance Master Plan Schedule – week 27-52

DFN MASTER PREVENTIVE MAINTENANCE PLAN

ASSET TYPE	FREQUENCY		ACTIVITY DESCRIPTION	UNITS	LEVEL	DURATION PER UNIT (min)	HOURS / YEAR	REFERENCE
EXHAUST FAN	6M	2	Semi Annual Preventive Maintenance for Exhaust Fan	16	9R / 1L3	60	32	Attached PMP Checklist
EXHAUST FAN	Y	1	Annual Preventive Maintenance for Exhaust Fan	16	9R / 1L3	120	32	Attached PMP Checklist
FAN COIL UNIT	3M	4	Quarterly Preventive Maintenance for fan coils units	57	16LS	120	456	Attached PMP Checklist
FAN COIL UNIT	6M	2	Monthly Preventive Maintenance for Fan Coil Units	57	16LS	180	342	Attached PMP Checklist
FAN COIL UNIT	Y	1	Annual Preventive Maintenance for Fan Coil Units	57	16LS	300	285	Attached PMP Checklist
FAN POWER VAV	3M	4	Quarterly Preventive Maintenance for Fan Power VAV	183	87LS / 35L6	30	366	Attached PMP Checklist
FAN POWER VAV	6M	2	Semmi anual Preventive Maintenance for fan power VAV	183	87LS / 35L6	60	366	Attached PMP Checklist
FAN POWER VAV	Y	1	Annual Preventive Maintenance for Fan power VAV	183	87LS / 35L6	120	366	Attached PMP Checklist
KITCHEN VENTILATION DUCT	3M	4	Quarterly Preventive Maintenance for Kitcheb Ventillation Duct	16	L6	60	64	Attached PMP Checklist
SPLIT UNIT	Y	1	Annual Preventive Maintenance for Split Units	0	L6	30	0	Attached PMP Checklist
relief FANS	Y	1	Annual Preventive Maintenance for Relief Fans	16	L6	30	8	Attached PMP Checklist
DRAINAGE	Y	1	Annual Preventive Maintenance for Drainage Pipes	223	LS&L6	5	19	Attached PMP Checklist
DOMESTIC WATER PIPES / Hose Blibs	Y	1	Annual Preventive Maintenance for Hot and Cold Water Pipes	16	LS&L6	20	5	Attached PMP Checklist
LAVATORY ASSEMBLY	M	12	Monthly Preventive Maintenance for lavatory assembly	26	LS&L6	20	104	Attached PMP Checklist
PUMP	Y	1	Annual Preventive Maintenance for Pumps	22	LS&L6	10	4	Attached PMP Checklist
TOILET ASSEMBLY	M	12	Monthly preventive maintenance for toilet assembly	28	LS&L6	20	112	Attached PMP Checklist
URINAL ASSEMBLY	M	12	Monthly preventive maintenance for urinal assembly	14	LS&L6	20	56	Attached PMP Checklist
WATER HEATER	Y	1	Annual Preventive Maintenance for Water Cooler / Heater	32	LS&L6	20	11	Attached PMP Checklist
WATER SAFETY VENTS	Y	1	Annual Preventive Maintenance for Water Safety Valve Units	32	LS&L6	20	11	Attached PMP Checklist
WATER Balancing UNIT	Y	1	Annual Preventive Maintenance for Water Treatment Unit	46	LS&L6	10	8	
LIGHTING SYSTEM	Y	1	Annual Preventive Maintenance for Lighting	1097	LS & L6	1	18	Attached PMP Checklist
MUTOA Multi-user Telecommunications Outlet	2M	6	Bimonthly Preventive Maintenance for Socket Points MUTOA Multi-user Telecommunications Outlet Assembly	213	LS & L6	10	213	Attached PMP Checklist
NT Network Termination	2M	6	Bimonthly Preventive Maintenance for Socket Points NT Network Termination	71	LS & L6	10	71	Attached PMP Checklist
FINISHING	Y	Yearly preve	27	NA		Attached PMP Checklist	Y	

ASSET TYPE	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
EXHAUST FAN																										
EXHAUST FAN																										Y
FAN COIL UNIT											3M												3M			
FAN COIL UNIT																										
FAN COIL UNIT																										Y
FAN POWER VAV											3M												3M			
FAN POWER VAV																										
FAN POWER VAV																										
KITCHEN VENTILATION DUCT											3M												3M			
SPLIT UNIT																										
relief FANS																										
DRAINAGE																										
DOMESTIC WATER PIPES / Hose Blibs																										
LAVATORY ASSEMBLY	M					M					M					M					M				M	
PUMP																										
TOILET ASSEMBLY	M					M					M					M					M				M	
URINAL ASSEMBLY	M					M					M					M					M				M	
WATER HEATER																										
WATER SAFETY VENTS																										
WATER Balancing UNIT																										
LIGHTING SYSTEM																										
MUTOA Multi-user Telecommunications Outlet								2M										2M								2M
NT Network Termination								2M										2M								2M
FINISHING																								Y		

LEGEND		
DESCRIPTION	ABBREVIATION	
DAIRY MAINTENANCE	D	
WEEKLY MAINTENANCE	W	
2 WEEKLY MAINTENANCE	2W	24
MONTHLY MAINTENANCE	M	
2 MONTHLY MAINTENANCE	2M	
3 MONTHLY MAINTENANCE	3M	
4 MONTHLY MAINTENANCE	4M	
6 MONTHLY MAINTENANCE	6M	
YEARLY MAINTENANCE	Y	
2 YEARLY MAINTENANCE	2Y	0,5
5 YEARLY MAINTENANCE	5Y	0,2

Planned Preventive Maintenance HVAC Schedule – week 1-26

DEN MASTER PREVENTIVE MAINTENANCE PLAN

ASSET TYPE	FREQUENCY		ACTIVITY DESCRIPTION	UNITS	LEVEL	DURATION PER UNIT (min)	HOURS / YEAR	REFERENCE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
EXHAUST FAN	6M	2	Semi Annual Preventive Maintenance for Exhaust Fan	16	9ft / 11.3	60	32	Attached PMP Checklist	6M																							6M	
EXHAUST FAN	Y	1	Annual Preventive Maintenance for Exhaust Fan	16	9ft / 11.3	120	32	Attached PMP Checklist	Y																								
FAN COIL UNIT	3M	4	Quarterly Preventive Maintenance for fan coils units	57	16L5	120	456	Attached PMP Checklist	3M												3M											3M	
FAN COIL UNIT	6M	2	Monthly Preventive Maintenance for Fan Coil Units	57	16L5	180	342	Attached PMP Checklist	6M																							6M	
FAN COIL UNIT	Y	1	Annual Preventive Maintenance for Fan Coil Units	57	16L5	300	285	Attached PMP Checklist	Y																								
FAN POWER VAV	3M	4	Quarterly Preventive Maintenance for Fan Power VAV	183	87L5 / 35L6	30	366	Attached PMP Checklist	3M												3M											3M	
FAN POWER VAV	6M	2	Semmi anual Preventive Maintenance for fan power VAV	183	87L5 / 35L6	60	366	Attached PMP Checklist	6M																							6M	
FAN POWER VAV	Y	1	Annual Preventive Maintenance for Fan power VAV	183	87L5 / 35L6	120	366	Attached PMP Checklist	Y																								
KITCHEN VENTILATION DUCT	3M	4	Quarterly Preventive Maintenance for Kitcheb Ventilation Duct	16	16	60	64	Attached PMP Checklist	3M												3M											3M	
SPLIT UNIT	Y	1	Annual Preventive Maintenance for Split Units	0	16	30	0	Attached PMP Checklist	Y																								
relief FANS	Y	1	Annual Preventive Maintenance for Relief Fans	16	16	30	8	Attached PMP Checklist	Y																								

LEGEND

DESCRIPTION	ABBREVIATION	
DAILY MAINTENANCE	D	
WEEKLY MAINTENANCE	W	
2 WEEKLY MAINTENANCE	2W	2W
MONTHLY MAINTENANCE	M	
2 MONTHLY MAINTENANCE	2M	
3 MONTHLY MAINTENANCE	3M	
4 MONTHLY MAINTENANCE	4M	
6 MONTHLY MAINTENANCE	6M	
YEARLY MAINTENANCE	Y	
2 YEARLY MAINTENANCE	2Y	0,5
5 YEARLY MAINTENANCE	5Y	0,2

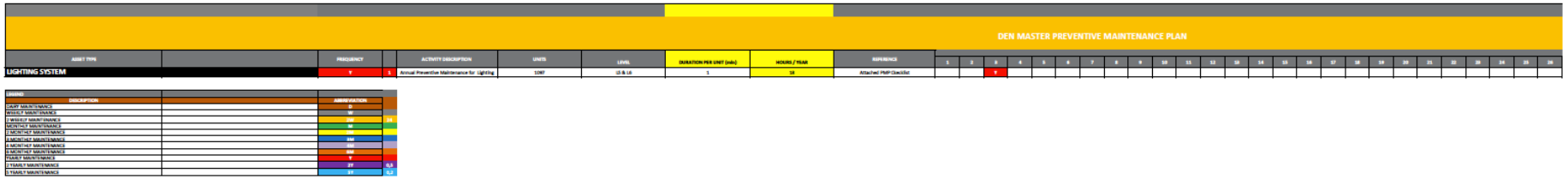
Planned Preventive Maintenance HVAC Schedule – week 27-52

DEN MASTER PREVENTIVE MAINTENANCE PLAN

ASSET TYPE	FREQUENCY		ACTIVITY DESCRIPTION	UNITS	LEVEL	DURATION PER UNIT (min)	HOURS / YEAR	REFERENCE	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
EXHAUST FAN	6M	2	Semi Annual Preventive Maintenance for Exhaust Fan	16	98 / 113	60	32	Attached PMP Checklist																									
EXHAUST FAN	Y	1	Annual Preventive Maintenance for Exhaust Fan	16	98 / 113	120	32	Attached PMP Checklist																									Y
FAN COIL UNIT	3M	4	Quarterly Preventive Maintenance for fan coils units	57	1&5	120	456	Attached PMP Checklist											3M												3M			
FAN COIL UNIT	6M	2	Monthly Preventive Maintenance for Fan Coil Units	57	1&5	180	342	Attached PMP Checklist																									
FAN COIL UNIT	Y	1	Annual Preventive Maintenance for Fan Coil Units	57	1&5	300	285	Attached PMP Checklist																									Y
FAN POWER VAV	3M	4	Quarterly Preventive Maintenance for Fan Power VAV	183	8715 / 3516	30	366	Attached PMP Checklist											3M												3M			
FAN POWER VAV	6M	2	Semmi anual Preventive Maintenance for fan power VAV	183	8715 / 3516	60	366	Attached PMP Checklist																									
FAN POWER VAV	Y	1	Annual Preventive Maintenance for Fan power VAV	183	8715 / 3516	120	366	Attached PMP Checklist																									
KITCHEN VENTILATION DUCT	3M	4	Quarterly Preventive Maintenance for Kitcheb Ventilation Duct	16	L6	60	64	Attached PMP Checklist											3M												3M			
SPLIT UNIT	Y	1	Annual Preventive Maintenance for Split Units	0	L6	30	0	Attached PMP Checklist																									
relief FANS	Y	1	Annual Preventive Maintenance for Relief Fans	16	L6	30	8	Attached PMP Checklist																									

LEGEND	
DESCRIPTION	ABBREVIATION
DAIRY MAINTENANCE	D
WEEKLY MAINTENANCE	W
2 WEEKLY MAINTENANCE	2W
MONTHLY MAINTENANCE	M
2 MONTHLY MAINTENANCE	2M
3 MONTHLY MAINTENANCE	3M
4 MONTHLY MAINTENANCE	4M
6 MONTHLY MAINTENANCE	6M
YEARLY MAINTENANCE	Y
2 YEARLY MAINTENANCE	2Y
5 YEARLY MAINTENANCE	5Y

Planned Preventive Maintenance ELEC Schedule – week 1-26

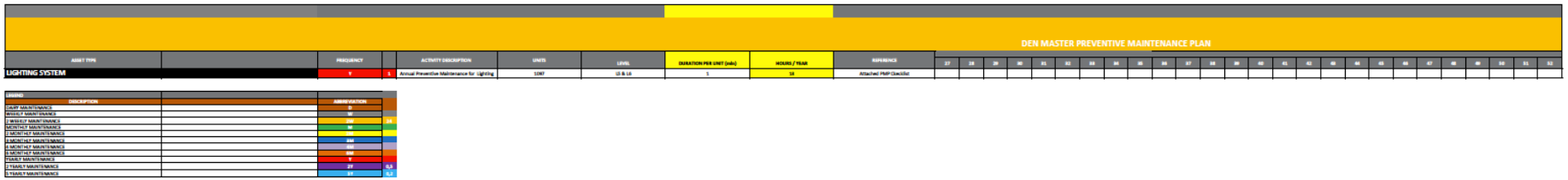


DEN MASTER PREVENTIVE MAINTENANCE PLAN

ASSET TYPE		FREQUENCY		ACTIVITY DESCRIPTION	UNITS	LEVEL	DURATION PER UNIT (min)	HOURS / YEAR	REFERENCE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
LIGHTING SYSTEM		Y	1	Annual Preventive Maintenance for Lighting	1087	L5 & L6	1	18	Attached PMP Checklist			Y																						

LEGEND		
DESCRIPTION		ABBREVIATION
DAILY MAINTENANCE		D
WEEKLY MAINTENANCE		W
2 WEEKLY MAINTENANCE		2W
MONTHLY MAINTENANCE		M
2 MONTHLY MAINTENANCE		2M
3 MONTHLY MAINTENANCE		3M
4 MONTHLY MAINTENANCE		4M
5 MONTHLY MAINTENANCE		5M
YEARLY MAINTENANCE		Y
2 YEARLY MAINTENANCE		2Y
5 YEARLY MAINTENANCE		5Y

Planned Preventive Maintenance ELEC Schedule – week 27-52



DEN MASTER PREVENTIVE MAINTENANCE PLAN

ASSET TYPE		FREQUENCY		ACTIVITY DESCRIPTION	UNITS	LEVEL	DURATION PER UNIT (min)	HOURS / YEAR	REFERENCE	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
LIGHTING SYSTEM		Y	1	Annual Preventive Maintenance for Lighting	1087	L5 & L6	1	18	Attached PMP Checklist																										

LEGEND		
DESCRIPTION		ABBREVIATION
DAILY MAINTENANCE		D
WEEKLY MAINTENANCE		W
2 WEEKLY MAINTENANCE		2W
MONTHLY MAINTENANCE		M
2 MONTHLY MAINTENANCE		2M
3 MONTHLY MAINTENANCE		3M
4 MONTHLY MAINTENANCE		4M
5 MONTHLY MAINTENANCE		5M
YEARLY MAINTENANCE		Y
2 YEARLY MAINTENANCE		2Y
5 YEARLY MAINTENANCE		5Y

Planned Preventive Maintenance PLMB Schedule – week 1-26

DEN MASTER PREVENTIVE MAINTENANCE PLAN

ASSET TYPE	FREQUENCY		ACTIVITY DESCRIPTION	UNITS	LEVEL	DURATION PER UNIT (min)	HOURS / YEAR	REFERENCE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
FLOOR DRAINS	Y	1	Annual Preventive Maintenance for Drainage Pipes	220	LS&L6	5	19	Attached PMP Checklist		Y																							
DOMESTIC WATER PIPES / Hose Blibs	Y	1	Annual Preventive Maintenance for Hot and Cold Water Pipes	16	LS&L6	20	5	Attached PMP Checklist		Y																							
LAVATORY ASSEMBLY	M	12	Monthly Preventive Maintenance for lavatory assembly	26	LS&L6	20	104	Attached PMP Checklist		M					M					M					M					M				
PUMP	Y	1	Annual Preventive Maintenance for Pumps	22	LS&L6	10	4	Attached PMP Checklist		Y																							
TOILET ASSEMBLY	M	12	Monthly preventive maintenance for toilet assembly	28	LS&L6	20	112	Attached PMP Checklist		M					M					M					M					M				
URINAL ASSEMBLY	M	12	Monthly preventive maintenance for urinal assembly	14	LS&L6	20	56	Attached PMP Checklist		M					M					M					M					M				
WATER HEATER	Y	1	Annual Preventive Maintenance for Water Cooler / Heater	32	LS&L6	20	11	Attached PMP Checklist		Y																							
WATER SAFETY VENTS	Y	1	Annual Preventive Maintenance for Water Safety Valve Units	32	LS&L6	20	11	Attached PMP Checklist		Y																							
WATER Balancing UNIT	Y	1	Annual Preventive Maintenance for Water Treatment Unit	46	LS&L6	10	8			Y																							

LEGEND	
DESCRIPTION	ABBREVIATION
DAILY MAINTENANCE	D
WEEKLY MAINTENANCE	W
2 WEEKLY MAINTENANCE	2W
MONTHLY MAINTENANCE	M
2 MONTHLY MAINTENANCE	2M
3 MONTHLY MAINTENANCE	3M
4 MONTHLY MAINTENANCE	4M
6 MONTHLY MAINTENANCE	6M
YEARLY MAINTENANCE	Y
2 YEARLY MAINTENANCE	2Y
5 YEARLY MAINTENANCE	5Y

Planned Preventive Maintenance PLMB Schedule – week 27-52

DEN MASTER PREVENTIVE MAINTENANCE PLAN

ASSET TYPE	FREQUENCY		ACTIVITY DESCRIPTION	UNITS	LEVEL	DURATION PER UNIT (min)	HOURS / YEAR	REFERENCE	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
FLOOR DRAINS	Y	1	Annual Preventive Maintenance for Drainage Pipes	220	LS&L6	5	19	Attached PMP Checklist																									
DOMESTIC WATER PIPES / Hose Blibs	Y	1	Annual Preventive Maintenance for Hot and Cold Water Pipes	16	LS&L6	20	5	Attached PMP Checklist																									
LAVATORY ASSEMBLY	M	12	Monthly Preventive Maintenance for lavatory assembly	26	LS&L6	20	104	Attached PMP Checklist	M					M					M					M					M					M	
PUMP	Y	1	Annual Preventive Maintenance for Pumps	22	LS&L6	10	4	Attached PMP Checklist																									
TOILET ASSEMBLY	M	12	Monthly preventive maintenance for toilet assembly	28	LS&L6	20	112	Attached PMP Checklist	M					M					M					M					M					M	
URINAL ASSEMBLY	M	12	Monthly preventive maintenance for urinal assembly	14	LS&L6	20	56	Attached PMP Checklist	M					M					M					M					M					M	
WATER HEATER	Y	1	Annual Preventive Maintenance for Water Cooler / Heater	32	LS&L6	20	11	Attached PMP Checklist																									
WATER SAFETY VENTS	Y	1	Annual Preventive Maintenance for Water Safety Valve Units	32	LS&L6	20	11	Attached PMP Checklist																									
WATER Balancing UNIT	Y	1	Annual Preventive Maintenance for Water Treatment Unit	46	LS&L6	10	8																										

LEGEND	
DESCRIPTION	ABBREVIATION
DAILY MAINTENANCE	D
WEEKLY MAINTENANCE	W
2 WEEKLY MAINTENANCE	2W
MONTHLY MAINTENANCE	M
2 MONTHLY MAINTENANCE	2M
3 MONTHLY MAINTENANCE	3M
4 MONTHLY MAINTENANCE	4M
6 MONTHLY MAINTENANCE	6M
YEARLY MAINTENANCE	Y
2 YEARLY MAINTENANCE	2Y
5 YEARLY MAINTENANCE	5Y

Planned Preventive Maintenance CIVIL Schedule – week 1-26

DEN MASTER PREVENTIVE MAINTENANCE PLAN																													
ASSET TYPE	FREQUENCY	ACTIVITY DESCRIPTION	UNITS	LEVEL	DURATION PER UNIT	REFERENCE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
FINISHING	Y	Yearly preventive maintenance for finishing painting	27	NA		Attached PMP Checklist	Y																									

LEGEND	
DESCRIPTION	ABBREVIATION
DAIRY MAINTENANCE	D
WEEKLY MAINTENANCE	W
2 WEEKLY MAINTENANCE	2W
MONTHLY MAINTENANCE	M
2 MONTHLY MAINTENANCE	2M
3 MONTHLY MAINTENANCE	3M
4 MONTHLY MAINTENANCE	4M
6 MONTHLY MAINTENANCE	6M
YEARLY MAINTENANCE	Y
2 YEARLY MAINTENANCE	2Y
5 YEARLY MAINTENANCE	5Y

Planned Preventive Maintenance CIVIL Schedule – week 27-52

DEN MASTER PREVENTIVE MAINTENANCE PLAN																													
ASSET TYPE	FREQUENCY	ACTIVITY DESCRIPTION	UNITS	LEVEL	DURATION PER UNIT	REFERENCE	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
FINISHING	Y	Yearly preventive maintenance for finishing painting	27	NA		Attached PMP Checklist																										Y

LEGEND	
DESCRIPTION	ABBREVIATION
DAIRY MAINTENANCE	D
WEEKLY MAINTENANCE	W
2 WEEKLY MAINTENANCE	2W
MONTHLY MAINTENANCE	M
2 MONTHLY MAINTENANCE	2M
3 MONTHLY MAINTENANCE	3M
4 MONTHLY MAINTENANCE	4M
6 MONTHLY MAINTENANCE	6M
YEARLY MAINTENANCE	Y
2 YEARLY MAINTENANCE	2Y
5 YEARLY MAINTENANCE	5Y

C2 PLANNED PREVENTIVE MAINTENANCE SCHEDULE

HVAC Frequency Checklist

ASSET TYPE	FREQUENCY	ACTIVITY DESCRIPTION
	3M	Check for particular accumulation on filters. Clean or replace as necessary to ensure proper operation.
	3M	Check ultraviolet lamp. Clean or replace as necessary to ensure proper operation.
	6M	Check P trap. Prime as needed to ensure proper operation
	6M	Check fan belt tension. Check for belt wear and replace if necessary to ensure proper operation.
	6M	Check sheaves for evidence of improper aligments or evidence of wear and correct as needed.
	6M	Check variable frequency drive for proper operation. Correct as needed.
	6M	Check for proper operation of cooling / heating coil for damage or evidence of leaks. Clean, restore and repalce as required.
	6M	Check control system and devices for evidence of improper operation. Clean, lubricate, repair, adjust or replace components as needed, to ensure proper operation.
	Y	Visually inspect exposed ductwork and external piping for insulation. Correct as needed.
	Y	Check condensate pump. Clean or replace.
	Y	Check air filter fit and housing seal integrity. Correct as needed
SPLIT UNIT	Y	Check control box for dirt debris and or loose terminations. Clean and tighten as needed.
	Y	Check motor contactor for pitting or other sign of damage. Repair or replace as needed
	Y	Check fan blades and fan housing. Clean repair or replace as needed to ensure proper operation.
	Y	optimal operating levels
	Y	Check integrity of all panels on requirement. Replace fasteners as needed to ensure proper integrity and fit/finish of equipment
	Y	Check drain pan drain line, and coil for biological growth and debris. Clean as needed.
	Y	Check evaporator coil fins. Restore if possible. Replace coil if necessary to return to proper functioning.
	Y	Inspect for evidence of moisture carryover beyond the drain pan from cooling coils. Make corrections or repairs as necessary
	Y	Inspect air cooled condenser surfaces for damage or evidence leaks. Repair or clean as needed.
	Y	Visually inspect areas of moisture accumulations for biological growth. If present, clean or disinfect as needed.
	Y	Assess field serviceable bearing. Lubricate if necessary
	3M	Check for particular accumulation on filters. Clean or replace as necessary to ensure proper operation.
	3M	Check ultraviolet lamp. Clean or replace as needed to ensure proper operation.
	3M	Check steam system traps, pumps and controls. Clean or replace as needed to ensure proper operation.
	6M	Check control system and devices for evidence of improper operation.
	6M	Clean lubricate repair adjust or replace components as needed to ensure proper operation.
	6M	Check P-trap. Prime as needed to ensure proper operation.
	6M	Check fan belt tension. Check for belt wear and replace if necessary to ensure proper operation.
	6M	Check sheaves for evidence of improper aligments or evidence of wear and correct as needed.
	6M	Check for proper operation of cooling or heating coil and for damage or evidence of leaks. Clean restore or replace as required
	Y	Check air filter fit and housing seal integrity. Correct as needed
CABINET UNIT HEATER	Y	Check control box for dirt debris and or loose terminations. Clean and tighten as needed.
	Y	Check fan blades and fan housing Clean repair or replace as needed to ensure proper operation.
	Y	operating levels.
	Y	Check for evidence of buildup or fouling on heat exchange surfaces. Restore as needed to ensure proper operation.
	Y	Check integrity of all panels on equipment. Replace fasteners as needed to ensure proper integrity and fit/ finish of equipment. A
	Y	Assess field serviceable bearings. Lubricate as necessary.
	Y	Check for proper fluid flow. Clean adjust and repair as needed to restore proper flo
	Y	Check drain pan drain line and coil for biological growth. Clean as needed.
	Y	Check coil fins. Restore if possible. Replace coil if necessary to return to proper functioning.
	Y	Inspect for evidence of moisture carryover beyond the drain pan from cooling coils. Make corrections or repairs as necessary
	Y	Check for proper damper operation. Clean lubricate, repair replace or adjust as needed to ensure proper operation.
	Y	Visually inspect areas of moisture accumulation for biological growth. If present clean or disinfect as needed.
	Y	Check condensate pump. Clean or replace.
	3M	Check for particular accumulation on filters. Clean or replace as necessary to ensure proper operation.
	3M	Check ultraviolet lamp. Clean or replace as needed to ensure proper operation.
	3M	Check steam system traps, pumps and controls. Clean or replace as needed to ensure proper operation.
	6M	Check control system and devices for evidence of improper operation.
	6M	Clean lubricate repair adjust or replace components as needed to ensure proper operation.
	6M	Check P-trap. Prime as needed to ensure proper operation.
	6M	Check fan belt tension. Check for belt wear and replace if necessary to ensure proper operation.
	6M	Check sheaves for evidence of improper aligments or evidence of wear and correct as needed.
	6M	Check for proper operation of cooling or heating coil and for damage or evidence of leaks. Clean restore or replace as required
	Y	Check air filter fit and housing seal integrity. Correct as needed
FAN COIL UNIT	Y	Check control box for dirt debris and or loose terminations. Clean and tighten as needed.
	Y	Check fan blades and fan housing Clean repair or replace as needed to ensure proper operation.
	Y	Check refrigerant system temperatures. If outside of recommended levels, find cause repair and adjust refrigerant to achieve optimal operating levels.
	Y	Check for evidence of buildup or fouling on heat exchange surfaces. Restore as needed to ensure proper operation.
	Y	Check integrity of all panels on equipment. Replace fasteners as needed to ensure proper integrity and fit/ finish of equipment. A
	Y	Assess field serviceable bearings. Lubricate as necessary.
	Y	Check for proper fluid flow. Clean adjust and repair as needed to restore proper flo
	Y	Check drain pan drain line and coil for biological growth. Clean as needed.
	Y	Check coil fins. Restore if possible. Replace coil if necessary to return to proper functioning.
	Y	Inspect for evidence of moisture carryover beyond the drain pan from cooling coils. Make corrections or repairs as necessary
	Y	Check for proper damper operation. Clean lubricate, repair replace or adjust as needed to ensure proper operation.
	Y	Visually inspect areas of moisture accumulation for biological growth. If present clean or disinfect as needed.
	Y	Check condensate pump. Clean or replace.
	6M	Check fan belt tension. Check for belt wear and replace if necessary to ensure proper operation. Check sheaves for evidence of improper aligment or evidence of wear and correct as needed.
	Y	Check fan drive for problem due to poor aligment or poor bearing seating. Repair or replace as needed.
	Y	Check fan blades and fan housing. Clean repair or replace as needed to ensure proper operation
	Y	Assess field serviceable bearings. Lubricate if necessary
	Y	Check variable frequency drive for proper operation. Correct as needed. A

ASSET TYPE	FREQUENCY	ACTIVITY DESCRIPTION
SUPPLY FAN	Y	Check control box for dirt debris and or loose terminations. Clean and tighten as needed. A
	Y	Check motor contactor for pitting or other signs of damage. Repair or replace as needed.
	Y	Check integrity of all panels on equipment. Replace fasteners as needed to ensure proper integrity and fit / finish equipment.
	Y	Visually inspect exposed ductwork and external piping for insulation and vapor barrier integrity. Correct as needed.
	Y	Check for proper damper operation. Clean lubricate, repair replace or adjust as needed to ensure proper operation.
	Y	Check control systems and devices for improper operations. Clean lubricate, repair or adjust as needed to ensure proper operation
	Y	Check integrity of flexible connections. Correct as needed
	6M	Check fan belt tension. Check for belt wear and replace if necessary to ensure proper operation. Check sheaves for evidence of improper aligment or evidence of wear and correct as needed.
	Y	Check fan drive for problem due to poor aligment or poor bearing seating. Repair or replace as needed.
	Y	Check fan blades and fan housing. Clean repair or replace as needed to ensure proper operation
	Y	Assess field serviceable bearings. Lubricate if necessary
	Y	Check variable frequency drive for proper operation. Correct as needed. A
SMOKE CONTROL FAN	Y	Check control box for dirt debris and or loose terminations. Clean and tighten as needed. A
	Y	Check motor contactor for pitting or other signs of damage. Repair or replace as needed.
	Y	Check integrity of all panels on equipment. Replace fasteners as needed to ensure proper integrity and fit / finish equipment.
	Y	Visually inspect exposed ductwork and external piping for insulation and vapor barrier integrity. Correct as needed.
	Y	Check for proper damper operation. Clean lubricate, repair replace or adjust as needed to ensure proper operation.
	Y	Check control systems and devices for improper operations. Clean lubricate, repair or adjust as needed to ensure proper operation
	Y	Check integrity of flexible connections. Correct as needed
	3M	Check for particulate accumulation on filters. Clean or replace as necessary to ensure proper operation.
	6M	Check control system and devices for evidence of improper operation. Clean or replace as necessary to ensure proper operation
	6M	Check for proper operation of cooling or heating coil and for damage or evidence of leaks. Clan lubricate repair adjust or replace components as needed to ensure proper operations.
	6M	Check for proper fluid flow. Clean adjust and repair as needed to restore proper flow.
FAN POWER VAV	Y	Check air filter fit and housing seal integrity. Correct as needed
	Y	Check fan blades and fan housing. Clean repair or replace as needed to ensure proper operation.
	Y	Check integrity of all panels on equipment. Replace fasteners as needed to ensure proper integrity and fit finish of equipment
	Y	Check for proper damper operation. Clean lubricate repair or adjust as needed to ensure proper operation
	Y	Visually inspect areas of moisture accumulation for biological growth. If present clean or disinfect as needed.
	Y	Visually inspect exposed ductwork and external piping for insulation and vapor barrier for integrity. Correct as needed.
	M	Check control box for dirt debris and or loose terminations. Clean and tighten as needed.
	M	Check motor contactor for pitting or other signs of damage. Repair or replace as needed.
	M	Check integrity of all panels on equipment. Replace fasteners as needed to ensure proper integrity and fit / finish equipment.
KITCHEN HOOD	M	Visually inspect exposed ductwork and external piping for insulation and vapor barrier integrity. Correct as needed.
	M	Check for proper damper operation. Clean lubricate, repair replace or adjust as needed to ensure proper operation.
	M	Check control systems and devices for improper operations. Clean lubricate, repair or adjust as needed to ensure proper operation
	M	Check integrity of flexible connections. Correct as needed
	M	Visually inspect the filters or cartridges for grease accumulation
	M	Remove grease cup, empty contents and replace cup.
	Y	Check closure springs. If damaged or defective, repair or replace.
FIRE DAMPER	Y	Clean the damper blades and other working parts as necessary.
	Y	Lubricate linkage, bearings, and other moveable parts with a silicone or graphite lubricant. Do not use petroleum-based products as they could cause excessive dust buildup
	Y	Cycle the damper/actuator following the manufacturer s instructions.
	Y	Using flow hoods, traverse pitot or anemometer to verify minimum and maximum air flows against the report.
AIR GRILLES SUPPLY / RETURN	Y	Use pressure gauges to verify water flow rates against the report.
	Y	Verify readings agree with BAS readings, to within 5-10%.
	3M	Check with operator to verify cleaning program
	3M	Check with operating or area personnel for any deficiencies.
	3M	Check nuts, bolts, and screws for tightness; tighten or replace as required.
	3M	Inspect grease trough, drip tray, splash guard, and surface condition.
	3M	Examine gas utility supply line, valve packing, tighten fittings as required.
	3M	Examine/clean burners and elements.
	3M	On gas operated units, check pilot and gas burners for uniform flame; adjust as required.
KITCHEN VENTILATION DUCT	3M	On electrically operated units, check switches, connections, and wiring for loose or overheated conditions.
	3M	Check calibration of thermostats; calibrate if required
	3M	Check flue for proper draft or obstructions.
	3M	Lubricate gas valves.
	3M	Check elements to obtain maximum heat transfer take amperage measurement and check against nameplate.
	3M	Examine burner guards, grates, covers or cook top surfaces for cracks or damage.
	3M	Check all controls, mechanisms for proper operation; adjust as required.
	3M	Check electric power line condition, switch, disconnect, etc.; or check condition of gas supply, valves, regulators, and inspect pilot, check for Gas leaks.
	3M	Examine control knobs and indicating lights; adjust/replace as required.
	Y	Check refrigerant system temperatures. If outside of recommended levels, find cause repair and adjust refrigerant to achieve optimal operating levels.
WATER COOLER	Y	Check for evidence of buildup or fouling on heat exchange surfaces. Restore as needed to ensure proper operation.
	Y	Check for proper fluid flow. Clean adjust and repair as needed to restore proper flo
	Y	Check coil fins. Restore if possible. Replace coil if necessary to return to proper functioning.
	Y	Check for evidence of buildup or fouling on heat exchange surfaces. Restore as needed to ensure proper operation.
WATER HEATER	Y	Check for proper fluid flow. Clean adjust and repair as needed to restore proper flo
	Y	Check coil fins. Restore if possible. Replace coil if necessary to return to proper functioning.

ELEC Frequency Checklist

ASSET TYPE	FREQUENCY	ACTIVITY DESCRIPTION
ELECTRICAL PANEL	M	Visually inspect the state of all control and protection mechanisms.
	M	Check the mechanical operation of the contactors
	M	Inspect the inner cables.
	M	Connect all switches and verify the absence of overheating and noise.
	M	Press the test button of the differential mechanism
	M	Check grounding and continuity in the whole panel
	M	Check the condition of tightening the terminals.
	M	Check the insulation of all circuits from the main switch.
	M	Check the performance of circuit breakers with a tester
	M	Check all control parameters of switches and mechanisms (In, sensitivity, time delay ...)
	M	Inspect the correct state of painting.
	M	Clean inside the electrical panel
ELECTRICAL DISTRIBUTION PANEL	M	Visually inspect the state of switchgear control and protection
	M	Check the readings of voltmeters and ammeters
	M	Check overheating in some of the elements of panel, either switches or drivers
	M	Check the condition of tightening screws
	M	Check the status of terminals
	M	Check the mechanical operation of the contactors
	M	Inspect the inner cables Measuring the value of consumption of each circuit and check that does not exceed the rated switch
	M	Press the test button of the differential mechanisms.
	M	Check grounding in panel, measure ground resistance in the junction box and record the value on the card
	M	Clean the inside of the electrical panel with pressurized air
	M	Check the insulation of each output and performance of the corresponding differential switch with a tester
	M	Check all control parameters of switches and mechanisms (sensitivity, time delay ...).
	M	Inspect the correct state of painting.
EMERGENCY LIGHTING	M	A functional test shall be conducted on every required emergency Lighting system at 30-day intervals for a minimum of 30 seconds
	Y	An annual test shall be conducted for the 1 1/2 hour duration of the test
	Y	Verify any additional controllers are working properly (dimmers,motion sensors)
	Y	Verify all wire connectors are proplery connected and input voltage is within specs.
LIGHTING SYSTEM	Y	An annual test shall be conducted for the 1 1/2 hour duration of the test
	Y	Verify any additional controllers are working properly (dimmers,motion sensors)
	Y	Verify all wire connectors are proplery connected and input voltage is within specs.
SWITCHBOARD	Y	Perform an initial Megger or DC test of the switchboard insulation, between phases and ground
	Y	Remove dust and debris from busbars, connections, supports, and enclosure surfaces.
	Y	After cleaning, perform a second Megger or DC test of the switchboard insulation between phases and ground
	Y	Inspect busbar and cables for visible damage.
	Y	. Visually inspect connections for overheating and damage
	Y	All busbar and cable connections should be checked and torqued
	Y	. Inspect for broken wire strands and pinched or damaged insulation on cable connections
	Y	All busbar, structure insulation in the switchboard, including bus supports, bus shields, bus bracing, insulating barriers, and so on, should be
	Y	Visually inspect circuit breakers for signs of discoloration, cracking, scorching, overheating, or broken parts.
	Y	Visually inspect the switching mechanism and fuse connections.
	Y	Visually inspect the fusible devices for signs of discoloration, cracking, scorching, overheating, or broken parts. Replace any worn parts or the entire switch.
	Y	Visually inspect the switch contacts, blades, and mechanism to ensure that the mechanism is in the OPEN/OFF position.
	Y	Remove dust and dirt from exterior with a dry lint-free cloth
	Y	Check all secondary wiring connections to ensure that they are properly connected to the switchboard ground bus
	Y	Check all grills and ventilation ports for obstructions and accumulations of dirt. Clean ventilation ports
POWER FACTOR CORRECTION	6M	inspect the individual capacitor cells for bulging
	6M	To verify the general condition of the capacitors, take a current measurement in each capacitor phase
	6M	Remove any dust and dirt that may have accumulated within your capacitor cabinet
	6M	Check to ensure that the enclosure is properly and adequately ventilated
	6M	check to see that wire terminations are securely fastened to capacitor terminals.
	6M	check torque on all terminations
CIRCUIT BREAKERS	Y	Loose dust and dirt can be removed from external surfaces using an industrial quality vacuum cleaner and/or lint free cloth
	Y	Verify the general condition of the mechanical components of circuit braker and trip unit.
	Y	Lubricate as required.
DISTRIBUTION BOARD	M	Visually inspect the state of all control and protection mechanisms.
	M	Check the mechanical operation of the contactors
	M	Inspect the inner cables.
	M	Connect all switches and verify the absence of overheating and noise.
	M	Press the test button of the differential mechanism
	M	Check grounding and continuity in the whole panel
	M	Check the condition of tightening the terminals.
	M	Check the insulation of all circuits from the main switch.
	M	Check the performance of circuit breakers with a tester
	M	Check all control parameters of switches and mechanisms (In, sensitivity, time delay ...)
	M	Inspect the correct state of painting.
	M	Clean inside the electrical panel

PLMB Frequency Checklist

ASSET TYPE	FREQUENCY	ACTIVITY DESCRIPTION
LAVATORY ASSEMBLY	M	Check flushometer regularly for leaks and make repairs as needed.
	M	Check the handles to make sure no water drips when the handles are turned to the off position and check underneath the sinks for water stains or drips when the water is running.
	M	Unclog slow drains. Repair, as needed.
	M	Remove and clean your faucet head of any sediment that may have accumulated.
	M	Check all exposed pipes and appliances for water leaks. Watch for visible signs of a leak such as water stains on walls and ceilings, or puddles of water. Also be wary of mildew
URINAL ASSEMBLY	M	Check flush valve regularly for leaks and make repairs, as needed.
	M	Inspect cartridge, Remove, as necessary.
	M	Unclog slow drains. Repair, as needed.
TOILET ASSEMBLY	M	Check flush valve regularly for leaks and make repairs, as needed.
	M	Check all exposed pipes and appliances for water leaks. Watch for visible signs of a leak such as water stains on walls and ceilings, or puddles of water. Also be wary of mildew
	M	Unclog slow drains. Repair, as needed.
PUMP	Y	Any auxiliary systems installed must be monitored, if necessary, to ensure they function correctly.
	Y	Gland packing must be adjusted correctly to give visible leakage and concentric alignment of the gland follower to prevent excessive temperature of the packing or follower.
	Y	Check for any leaks from gaskets and seals. The correct functioning of the shaft seal must be checked regularly.
	Y	Check bearing lubricant level, and the remaining hours before a lubricant change is required.
	Y	Check that the duty condition is in the safe operating range for the pump.
	Y	Check vibration, noise level and surface temperature at the bearings to confirm satisfactory operation.
H/C WATER PIPES	Y	Maintain a log of water line repairs.
	Y	Repair clamps placed on water lines
	Y	Overhaul control valves
	Y	Check supports and inspect for loose-fittings
	Y	Check for soundness of pipework
	Y	Inspect for signs of corrosion and leakage
	Y	Disconnect any unused pipes and fittings connected to the service installations
WATER / COOLER HEATER	Y	Inspect anode rod If the anode rod show signs of depleted it should be replaced.
	Y	The temperature-pressure relief valve must be manually operated
	Y	The water heater should be drained if being shut down during freezing temperatures.
	Y	Cleaning water heater inside
	Y	Inspect leakages and corrosion
PRESSURIZED UNIT	Y	Sewage Ejector (Pneumatic Tank Type Ejectors)
	Y	Inspect pipe insulation integrity, damage and complete coverage.
	Y	Check system pressure will be verified
	Y	Control Thermal Expansion
	Y	Control Water Pressure
	Y	Inspect check valves in compressor or air storage tank inlet lines to tank, and suction and discharge lines of sewage pot.
	Y	Check that vent line is clear of any obstructions.
	Y	Clean up work area and remove all debris
WATER SAFETY VALVE	Y	Inspect, clean and replace worn valve disc, disconnect control pipe and unscrew bonnet from valve body
	Y	Use of a pressure gauge is recommended to verify correct pressure setting.
CONTROL VALVE	Y	Visual inspection to locate leaks and external damages
	Y	Functional inspection including: closing, opening and regulation.
	Y	Close upstream and downstream isolating valves (and external operating pressure when used).
	Y	Disassemble the actuator and examine its parts carefully for signs of wear, corrosion, or any other abnormal conditions.
	Y	Replace worn parts and all the Elastomers. Lubricate the bolts and studs threads with Anti seize grease.
WATER STORAGE TANK	Y	Inspect signs of leakage, abnormal vegetation growth, ponding, settlement, cracking, gravel spillage or exposed reinforcing steel.
	Y	examine foundation to make sure that no fractures have developed.
	Y	examine foundation to make sure that no wash outs have developed
	Y	Examine the condition of sanitary items such as the overflow discharge screening and vent screening.
	Y	Visually inspect empty tank interior through the deck (roof) man-way and repair as neccesary
DRAINAGE PIPES	Y	Inspect drainage pipes. Verify clodd and the elements drainages.
	Y	Clean drainages.
	Y	Remove all trash or debris (such as cornstalks) that have accumulated around the inlet.
	Y	If trash often collects around the inlet, install a larger diameter screen (e.g., page wire) around it.
	Y	Check and clean catch basin sumps as needed. Ensure the grates are in place to keep out trash and rodents.
WATER TREATMENT UNIT	Y	Cold water services system should be inspected and cleaned by treatmen disinfection and flushing.
	Y	Hot water services system should be inspected and cleaned by treatment disinfection and flushing.
	Y	Take hot and cold water samplings from faucets and drainages

CIVIL Frequency Checklist

ASSET TYPE	FREQUENCY	ACTIVITY DESCRIPTION
FINISHING	Y	Inspect undamage panels, walls partition, undercoats paints. Repair, as necessary.

D Cleaning Tasks and Frequencies

The actual tasks and frequencies are:

TASK	FREQUENCY
FIRST AND SECOND SHIFT BASICS	
Rearrange out of place chairs and furniture.	1 x per shift
Clean and disinfect all drinking fountains, all telephones and any kiosks. Polish chrome and metal.	2 x per shift
Spot clean building and furniture surfaces including all walls, pillars, stainless steel, counters, carousels, etc.	2 x per shift
Sweep, spot mop and tack mop hard floor surfaces.	2 x per shift
Dust and/or spray clean, polish dry where applicable, all surfaces including but not limited to: ledges, window sills/ blinds, podiums, counters, consoles, furniture (as well as chair legs, arm rests, tops of lockers, etc.).	2 x per shift
Remove gum, stickers, tape, etc.	2 x per shift
Empty all trash containers as needed. Any container that is more than half full shall be emptied. Replace with a new liner. Spot clean the exterior of the cans.	4 x per shift
Check all recycle containers, empty into appropriate containers and replaced with a new liner as needed. Clean the interior and exterior of container as needed.	4 x per shift
Police all floors, surfaces, equipment, planters, etc., and remove all litter and obvious trash. Sweep under all furniture. Report any lost item found (Deliver lost items to the Owner Lost and Found).	4 x per shift
Sweep at all entrances and exits. Vacuum mats at all entrances and exits.	4 x per shift
On-call, spot clean carpet. Upon request	Upon request

TASK	FREQUENCY
DEVELOPER'S OFFICE BASICS	
Empty all trash receptacles. Clean out the inside of the container if needed. Wipe down the exterior of the container. Replace the liner if needed.	1 x per shift
Dust all horizontal building and furniture surfaces. Do not rearrange items on desks unless specifically told to do so.	1 x per shift
Spot clean all building and furniture surfaces.	1 x per shift
Arrange furniture as required.	1 x per shift
Pick up any obvious trash on the floor.	1 x per shift
Clean and disinfect telephones.	1 x per shift
Sweep tile floors and mop as needed.	1 x per shift
Vacuum carpeted floors thoroughly.	1 x per shift
De-trash all planters	1 x per shift
Report any carpet stains that require special work and any broken or damaged items to your Supervisor immediately.	1 x per shift
Dust vents, partitions and window sills weekly. Also, dust window blinds where applicable once a week.	Weekly

TASK	FREQUENCY
DEVELOPER'S OFFICE BASICS	
Thoroughly wet mop all vinyl type floors and other hard surface flooring. Raised computer flooring to be damp mopped only and buckets with water are to remain outside of raised floor areas.	Weekly
Perform high dusting of horizontal surfaces over arms reach.	Monthly
Detail vacuum all carpeted areas along edges, corners and other hard to reach areas or areas inaccessible with upright.	Monthly
Vacuum upholstered furniture including under cushions where applicable.	Monthly
Perform high dusting of vertical surfaces over arms reach.	Quarterly
Wash painted doors, door jambs, hinges etc.	Quarterly
Dust and/or damp wipe the interior of fluorescent light lenses.	Annually
Completely wash and polish dry all desks, file cabinets, credenzas, counters, consoles and other enclosures, housings etc.	Annually

1. AREAS WITHIN O&M LIMITS
First and Second Shift – All areas listed shall be cleaned using the specifications listed under "First and Second Shift Basics".

2. PUBLIC RESTROOMS WITHIN O&M LIMITS	FREQUENCY
Shift	
Complete the following tasks twelve times per shift restrooms and eight times per shift all other restrooms. The restroom cleaner must wear rubber gloves and safety glasses while completing the assigned work. After completion of work, gloves shall be removed and hands thoroughly washed. If gloves have contacted potentially infectious materials they shall be discarded.	
Police floors, pick up all loose trash and debris in the restroom and place in the appropriate waste disposal container.	12/8 x per day
Empty trash receptacles and sanitary napkin disposal boxes by removing liners and dispose of in waste bag. Replace with a new liner.	12/8 x per day
Re-supply towels, tissue, seat covers and hand soap. Be sure that all dispensers are full. Clean all dispensers on a daily basis to avoid build-up of soap and film.	12/8 x per day
Clean the inside surfaces of commodes and urinals as needed with a bowl mop and bowl cleaner. Pay special attention to cleaning under the rims and corners of commodes and urinals.	12/8 x per day
Clean the outside surfaces of the commodes and urinals, as needed, with disinfectant cleaner. Be sure to clean under the bowls and bottoms of the urinals. All metal and chrome shall be polished with a clean, soft cloth. Pay special attention to the cleaning of walls and partitions adjacent to commodes and urinals. Clean and dry both sides of the toilet seats and leave them in an upright position.	12/8 x per day
Clean sinks as needed with a disinfectant cleaner; liquid cleanser may be used as needed. Pay special attention to the chrome fixtures. Make sure that all pipes are cleaned daily.	12/8 x per day
Clean all stainless steel and partitions as needed with water and/or wipe clean with a soft dry cloth. Remove any graffiti, stickers, etc.	12/8 x per day
Clean mirrors as needed.	12/8 x per day
Dust all surfaces, including tops of partitions, as needed.	12/8 x per day
Restroom floors shall be spot mopped as needed using a cleaner disinfectant solution. All areas inaccessible to the mop must be hand scrubbed. Any gum, stickers, graffiti, etc., shall be removed. Disinfectant cleaner shall be changed periodically to ensure that floors are not being cleaned with dirty water. At the end of the shift, mop heads shall be cleaned and stored so that they will dry; mop heads shall be replaced as needed.	12/8 x per day

3. PUBLIC RESTROOMS - ALL AREAS SERVICED	FREQUENCY
Shift	
Close the restroom to the general public for deep clean. The restroom cleaner must wear rubber gloves and safety glasses while completing the assigned work. After completion of work, gloves shall be removed and hands thoroughly washed. If gloves have come in contact with any potentially infectious materials they shall be discarded.	
Pick up all loose trash and debris in the restroom and place the waste into the appropriate waste receptacle.	3 x per day
Empty trash receptacles and sanitary napkin disposal boxes by removing liners and dispose of in waste bag. Wash the trash container if needed. Replace with a new liner.	3 x per day
Re-supply towels, tissue, seat covers and hand soap. Be sure that all dispensers are full. Clean all dispensers on a daily basis to avoid build-up of soap and film.	3 x per day
Clean the inside surfaces of commodes and urinals as needed with a bowl mop and bowl cleaner. Pay special attention to cleaning under the rims and corners of commodes and urinals.	2 x per day
Clean the outside surfaces of the commodes and urinals, as needed, with disinfectant cleaner. Be sure to clean under the bowls and bottoms of the urinals. All metal and chrome shall be polished with a clean, soft cloth. Pay special attention to the cleaning of walls and partitions adjacent to commodes and urinals. Clean and dry both sides of the toilet seats and leave them in an upright position.	2 x per day
Clean sinks with a disinfectant cleaner; liquid cleanser may be used as needed. Pay special attention to the chrome fixtures. Make sure that all pipes are cleaned daily.	2 x per day
Clean all stainless steel and partitions as needed with water and/or wipe clean with a soft dry cloth. Remove any graffiti, stickers, etc.	2 x per day
Clean mirrors.	2 x per day
Dust all surfaces, including high dusting of partitions and vents. This includes dusting of all door jams and hinges.	1 x per day
Clean out floor drains as needed and pour water down them to keep them from drying out.	1 x per day
Restroom floors shall be mopped thoroughly using a cleaner disinfectant solution. All areas inaccessible to the mop must be hand scrubbed. Any gum or stickers shall be removed. Disinfectant cleaner shall be changed periodically to ensure that floors are not being cleaned with dirty water. At the end of the shift, mop heads shall be cleaned and stored so that they will dry; mop heads shall be replaced as needed.	1 x per day
Any damaged, broken and/or missing items must be reported to Supervisor immediately.	1 x per day
At the end of shift all items are to be properly stored and the janitor closet is to be left neat and clean.	1 x per day

Clean out floor drains as needed and pour water down them to keep them from drying out.	1 x per day
Vacuum the entrance walls, all ceiling vents, diffusers, and return air grills.	2 x per day
Completely wash down partitions with a disinfectant solution and towel dry.	2 x per day
Completely wash down exterior portions of commodes and urinals with a disinfectant solution and towel dry.	2 x per day
Cover all mechanical dispensers with liquid resistant material. Wash and dry all ceramic tile walls with disinfectant solution.	2 x per day
Machine scrub all ceramic tile floors with disinfectant solution.	Monthly
Dust and wash tops of light fixtures not recessed in ceiling.	Monthly
Dust and wash the interior side of light lenses where applicable.	Semi-Annually

3. STAIRWELLS - ALL AREAS SERVICED	**FREQUENCY**
First and Second Shift	
Clean all doors, rails and walls. Graffiti may be removed with approved chemical.	1 x per day
Sweep and dust mop floors, paying special attention to all corners and edges. After sweeping, mop all floor surfaces.	1 x per day
Dust all vents.	1 x per day
Police floors, remove gum, stickers, tape, etc., from all surfaces.	1 x per day
Dust all light fixtures and horizontal ledges.	1 x per day
Second Shift	
Dust and/or vacuum all horizontal and inclined surfaces within arms reach (i.e. ledges, steel I-beam, tops of fire extinguishers, tops of light fixtures, etc.).	Weekly
Thoroughly wet mop floors/steps.	Weekly
Dust and/or vacuum vertical surfaces (i.e. walls) to a height of 8' from each step and landing.	Quarterly
Wash all painted structural steel (i.e. I-beams, steel railings, etc.).	Quarterly
Wash fire extinguisher, holding bracket, etc.	Quarterly
Vacuum and/or wash any ductwork, conduit, pipes, vents and grills.	Quarterly
Wash all painted walls.	Semi-Annually
Wash the tops, sides, interior and exterior lens cover, reflector portion, etc., of light fixtures.	Semi-Annually

4. ARTWORK	FREQUENCY
First Shift	
Dust and/or damp map all horizontal and inclined surfaces within arms reach	Monthly

5. UNSCHEDULED WORK	FREQUENCY
All Shift	
DEN will require the Developer to perform Unscheduled Work. Unscheduled Work means work that is needed due to emergency or unexpected occurrences, and exceeds the scope of the regular, recurring scheduled janitorial services. For example requested cleaning services, water pick up as a result of major overflow of back up plumbing, roof leak, busted pipes, etc.	Per Occurrence

6. NO WAY FINDING SIGNS	FREQUENCY
First Shift	
Dust and/or damp map all “no way finding signs” within arms reach	Every 3 wks and / or requested
Second Shift	
Wash all painted walls.	Semi-Annually

PERIODIC HARD FLOOR AND CARPET CARE

NATURAL / STONE FLOORS:

AREA	WORK TO BE PERFORMED	FREQUENCY
Main Terminal		
Great Hall 5th Floor	Acid Wash and Machine Scrub with Lithofin SCS	Monthly

HARD SURFACE “FINISH” FLOORS

AREA	WORK TO BE PERFORMED	FREQUENCY
Main Terminal		
Great Hall Centre	Machine Scrub and Recoat (2 coats finish)	Monthly
Great Hall Centre	Machine Strip, Seal, Finish (2 coats seal, 3 coats finish)	Annually
Public Areas	Machine Strip, Seal, Finish (2 coats seal, 3 coats finish)	Annually
Non-Public Areas	Machine Scrub and Recoat (2 coats finish)	Quarterly
Non-Public Areas	Machine Strip, Seal, Finish (2 coats seal, 3 coats finish)	Annually

E STATUTORY MAINTENANCE

Statutory Maintenance of Elements

ELECTRICAL FUNTIONAL AREA

ELEC-LTG-01-03M/ 02-02Y/ 02-05Y/03-01Y
Frequency: Quarterly **Dimmer and Control, Stage and General Lighting** Application: This standard card applies to dimmers and control panels, both at unit and remotely located, used to control light levels of general and special lights in auditoriums, large conference rooms, etc. **Special Instructions:** 1. In addition to the procedure(s) outlined in this standard, the equipment manufacturer's recommended maintenance procedure(s) and/or instruction(s) shall be strictly adhered to. 2. Schedule and coordinate work with operating personnel. 3. Obtain and review manufacturer's instructions. 4. Follow lock out/tag out procedures at all times. De-energize or discharge all hydraulic, electrical, mechanical, or thermal energy prior to beginning work. **Check Points:** Dimmer Unit: 1. Remove necessary access covers and panels. 2. Check supply voltage. 3. Tighten all connections to main breaker, sub breakers, contactors, etc. 4. Check operation of contactors, clean and adjust as necessary. 5. Check operation of drive motor and drive mechanism. Lubricate as necessary. 6. Check for discoloration and overheating on rheostat and printed circuit board. 7. Check all wiring, including control wiring for deterioration, overheating, etc. 8. Clean interior of housing. 9. Clean rheostat contact surface. 10. Check dimmer rating against actual load. Control Unit (Local and Remote): 1. Remove, disassemble and clean slide bars. 2. Check indicator lamps, replace as necessary. 3. Clean interior of unit. 4. Check all connection to slide bars, terminal strip switches, etc. 5. Check calibration of voltage meters. 6. Lubricate control buttons, slide bars and switches. 7. Reassemble unit. 8. Test operation of dimmer throughout full range noting light fluttering or level difference (required for each control unit). 9. If applicable, check time clock, programming and time schedules. 10. If applicable, check each relay form the BAS interface via BAS front end.

11. Replace covers on dimmer unit after making any adjustments.

12. Clean exterior of units.

Recommended Tools, Materials, and Equipment:

1. Standard tools.

2. Cleaning supplies and materials. Consult the Material Safety Data Sheet (MSDS) for hazardous ingredients and proper Personal Protective Equipment (PPE).

3. Multimeter.

4. Amp-meter.

5. Lubricants. Consult the MSDS for hazardous ingredients and proper PPE.

ELEC-LTG-02-02Y

Frequency: 2-Year

Fluorescent Lighting Fixture, Washing and Re-lamping

Application: This standard card applies to the group replacement of standard fluorescent lamps in office areas of a single building. Work performed by a two-person crew. Time is allowed for disassembly, washing, reassembly, and replacement of lamps in each fixture. For types of fixtures that cannot be disassembled, time is allowed to clean in place.

Special Instructions:

1. In addition to the procedure(s) outlined in this standard, the equipment manufacturer's recommended maintenance procedure(s) and/or instruction(s) shall be strictly adhered to.

2. Schedule and coordinate work with operating personnel.

3. Obtain and review manufacturer's instructions.

4. Follow lock out/tag out procedures at all times. De-energize or discharge all hydraulic, electrical, mechanical, or thermal energy prior to beginning work.

5. This standard requires that the fluorescent light fixtures be washed every 2.5 years. However, since the expected life of the fluorescent light tubes are in excess of five years, the tubes shall be replaced only every other washing. The existing tubes shall be reused on the interim washing.

6. Turn off branch circuit at panel or individual light switch in room as appropriate. Do not attempt to wash energized lights.

7. Follow manufacturer's instructions on specular reflectors and specular parabolic lens (diffusers). Use gloves during handling because fingerprints are difficult to remove. Do not use industrial detergents as they will damage these items.

8. Ensure that the replacement lamps are of the same type and colour as removed from the fixture. T-12 and T-8 lamps require different ballasts. Using the wrong lamp in a fixture will cause the lighting system to not function properly and will lead to premature failure. Wherever possible, us energy efficient T-8 lamps and electronic ballasts.

9. If the ballast requires replacement, use only T-8 lamps and electronic ballasts as replacements. Replace ballasts in the entire fixture for uniform lighting appearance.

10. The disposal of old lamps may be regulated by state or local governments, depending on the number of lamps removed. Lamps shall be disposed of as universal waste in accordance with local, state requirements. Refer to Appendix G for the Universal Waste Guide.

11. PCB fluorescent light ballasts must be removed and disposed of in accordance with 40 CFR 761, and state and local regulations.

Check Points:

1. Disassemble fixture. Wash all removable parts with warm water and a mild detergent. Rinse and allow to drip dry.

2. Damp wipe remaining body of fixture in place.

3. Remove old fluorescent lamps and install new lamps.

4. Test light fixtures. Replace starters and ballasts where necessary. Note and report any needed electrical repairs.

5. Reassemble all removable parts to fixture.

6. Clean up area and remove any trash.

Recommended Tools, Materials, and Equipment:

1. Standard tools - basic.

2. Ladder constructed in accordance with OSHA/ANSI standards. Check the ladder for defects. Do not use defective ladders.

3. Cleaning materials – consult the Material Safety Data Sheets (MSDS) for hazardous ingredients and proper personal protective equipment (PPE).

ELEC-LTG-02-05Y Frequency: 5-Year

Fluorescent Lighting Fixture, Re-lamping Only

Application:

This standard card applies to the group replacement of standard fluorescent lamps in office areas of a single building. Work performed by a two-person crew. Fixture height is such that the work can be accomplished with the use of an eight foot stepladder. Group re-lamping on a more frequent basis than once every five years must be justified and request for some submitted to Central Office through the regional office for approval.

Special Instructions:

1. In addition to the procedure(s) outlined in this standard, the equipment manufacturer's recommended maintenance procedure(s) and/or instruction(s) shall be strictly adhered to.

2. Schedule and coordinate work with operating personnel.

3. Obtain and review manufacturer's instructions.

4. Follow lock out/tag out procedures at all times. De-energize or discharge all hydraulic, electrical, mechanical, or thermal energy prior to beginning work.

5. Turn off branch circuit at panel or individual light switch in room as appropriate.

6. The disposal of old lamps may be regulated by state or local governments, depending on the number of lamps removed. Lamps shall be disposed of as universal waste in accordance with local, state requirements. Refer to Appendix G for the Universal Waste Guide.

7. PCB fluorescent light ballasts must be removed and disposed of in accordance with 40 CFR 761, and state and local regulations.

8. Ensure that the replacement lamps are of the same type and colour as removed from the fixture. T-12 and T-8 lamps require different ballasts. Using the wrong lamp in a fixture will cause the lighting system to not function properly and will lead to premature failure. Wherever possible, us energy efficient T-8 lamps and electronic ballasts.

9. If the ballast requires replacement, use only T-8 lamps and electronic ballasts as replacements. Replace ballasts in the entire fixture for uniform lighting appearance.

Check Points:

1. Remove louver or diffuser as necessary.

2. Remove all fluorescent lamps and install new lamps.

3. Test light fixture. Replace starters or ballasts where necessary.

4. Note and report any needed electrical repairs.

5. Reassemble louver or diffuser as required.

6. Clean up area and remove any trash.

Recommended Tools, Materials, and Equipment:

1. Standard tools - basic.

2. Ladder constructed in accordance with OSHA/ANSI standards. Check the ladder for defects. Do not use defective ladders.

ELEC-LTG-03-01Y Frequency: Annually

Lighting, Special Feature

Application:

This standard card applies to special lighting fixtures such as found in lobbies, porticos, court rooms, and auditoriums, and for fixtures above 12 feet.

Special Instructions:

1. In addition to the procedure(s) outlined in this standard, the equipment manufacturer's recommended maintenance procedure(s) and/or instruction(s) shall be strictly adhered to.

2. Schedule and coordinate work with operating personnel.

3. Obtain and review manufacturer's instructions.

4. Follow lock out/tag out procedures at all times.

1.De-energize or discharge all hydraulic, electrical, mechanical, or thermal energy prior to beginning work. Check Points: 1. Clean fixture thoroughly.

2. Check all sockets, replace as needed.

3. Inspect anchors or anchoring device, tighten as needed.

4. Examine fixture glass, side panels, diffusers, etc., for cracks, breaks, etc. Replace if necessary.

5. If group re-lamping is due, change all lamps; otherwise, replace only those that are burned out.

6. Check operation.

7. Clean up work area and remove all debris.

Recommended Tools, Materials, and Equipment:

1. Standard tools - basic.

2. Ladder constructed in accordance with OSHA/ANSI standards. Check the ladder for defects. Do not use defective ladders.

FACPAINT FUNTIONAL AREA

FP-FI-01-01Y

Frequency: Annually

Finishing

Application: This standard card applies to painting finishes.

Special Instructions:

1. In addition to the procedure(s) outlined in this standard, the equipment manufacturer's recommended maintenance procedure(s) and/or instruction(s) shall be strictly adhered to.

2. Schedule and coordinate work with operating personnel.

3. Obtain and review manufacturer's instructions.

4.- Compliance with OSHA regulations (work safety) respiratory protection program, ladders and stair ways standards, HAZ-COMM and EPA.

Check points:

Identifying surface conditions that might repair painting and recommending clean and other surface preparation.

Inspecting for compliance with OSAH and EPA specifications, surface preparation, removal, corrosion.

HVAC FUNTIONAL AREA

HVAC-EF-01-01Y

Frequency: Annually

Extract fans

Application This standard applies to all dampers in the HVAC system including extract fans.

Special Instructions:

1. In addition to the procedure(s) outlined in this standard, the equipment manufacturer’s recommended maintenance procedure(s) and/or instruction(s) shall be strictly adhered to.

2. Schedule shutdown with operating personnel, as needed.

3. Review manufacturer's instructions.

4. During servicing, moveable surfaces shall be cleaned.

5. De-energize or discharge all hydraulic, electrical, mechanical, or thermal energy prior to beginning work. Follow lock out/tag out procedures at all times.

Check points:

Checked (using chemical smoke) that air flows into exhaust fan grille(s)

If fans are running but air is not flowing toward the exhaust intake, check for the following:

• Inoperable dampers

• Obstructed, leaky, or disconnected ductwork

• Undersized or improperly installed fan

• Broken fan belt

NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).

Checked (using chemical smoke) that air is drawn into the room from adjacent spaces

Stand outside the room with the door slightly open while checking airflow high and low in the door opening.

Ensured that air is flowing toward the exhaust intake.

Checked that the exhaust ductwork downstream of the exhaust fan (which is under positive pressure) is sealed and in good condition.

Check wiring Verify all electrical connections are tight.

Inspect ductwork Check and refasten loose connections, repair all leaks

Coils Confirm that filters have been kept clean, as necessary

Insulation Inspect, repair, replace all compromised duct insulation

HVAC-FAN-01-01Y

Frequency: Annually

Relief fan

Application This standard is for centrifugal fans typically found in air handling systems. Although they may be found in other systems such as exhaust systems This standard will typically be performed with the parent standard as noted below. Motor PM shall be performed at the same time as the fan PM.

Special Instructions:

1. In addition to the procedure(s) outlined in this standard, the equipment manufacturer's recommended maintenance procedure(s) and/or instruction(s) shall be strictly adhered to.

2. Schedule shutdown with operating personnel, as needed.

3. Review manufacturer's instructions.

4. Follow lock out/tag out procedures at all times. De-energize or discharge all hydraulic, electrical, mechanical, or thermal energy prior to beginning work.

5. All tests shall conform to the appropriate NETA test procedure and the values used as standards shall conform to the manufacturer's, NETA, and ANSI Standards specifications.

6. Review the Standard Operating Procedure for "Selection, Care and Use of Respiratory Equipment."

7. Refer to appropriate standard cards and manufacturer's instructions for motor maintenance.

Parent of this Piece of Equipment

Air Handlers

Check points:

1. Check fan blades for dust build-up and clean if necessary.

2. Check fan blades and moving parts excessive wear. Clean as needed.

3. Check fan RPM to design specifications.

4. Check bearing collar set screws on fan shaft to make sure they are tight.

5. Remove old or excess lubricant while fan is off.

6. Vacuum interior of unit if accessible. Clean exterior.

7. Lubricate fan shaft bearings while unit is running. Add grease slowly until slight bleeding is noted from the seals. Do not over lubricate.

8. Check belts for wear, adjust tension or alignment, and replace belts when necessary. Multiple belts shall be replaced with matched sets.

9. Check pulley wheels and clean and lubricate as required.

10. Check structural members, vibration eliminators, and flexible connections. Check fan housing to ensure there is no damage and the housing is tight.

11. Remove all trash and clean area around fan and fan room.

Recommended Tools, Materials, and Equipment:

1. Standard Tools - Basic

2. Tachometer

3. Cleaning equipment and materials - Consult the Material Safety Data Sheets (MSDS) for hazardous ingredients and proper personal protective equipment (PPE).

4. Vacuum

5. Grease guns, lubricants - Consult the MSDS for hazardous ingredients and proper PPE.

6. Respirator

HVAC-FAN-02-01Y

Frequency: Annually

Relief fan

Application This standard is for propeller or axial fans typically found in air handling systems. Although they may be found in other systems such as exhaust systems. This standard will typically be performed with the parent standard as noted below. Motor PM shall be performed at the same time as the fan PM.

Special Instructions:

1. In addition to the procedure(s) outlined in this standard, the equipment manufacturer's recommended maintenance procedure(s) and/or instruction(s) shall be strictly adhered to.

2. Schedule maintenance with operating personnel.

3. Obtain and review manufacturer's information for servicing, testing and operating.

4. Follow lock out/tag out procedures at all times. De-energize or discharge all hydraulic, electrical, mechanical, or thermal energy prior to beginning work.

Parent of this Piece of Equipment

Air Handlers

Check Points:

1. Clean unit, especially fan blades.

2. Inspect pulleys, belts, couplings, etc.; adjust tension and tighten mountings as necessary. Change badly worn belts. Multiple belts shall be replaced with matched sets.

3. Perform required lubrication and remove old or excess lubricant.

4. Clean motor with vacuum or low pressure dry air (less than 40 psig). Check for obstructions in motor cooling and air flow.

5. Remove all trash and debris.

6. Start unit and check for vibration and noise.

Recommended Tools, Materials, and Equipment:

1. Standard Tools - Basic

2. Vacuum

3. Cleaning materials - Consult the Material Safety Data Sheets (MSDS) for hazardous ingredients and proper personal protective equipment (PPE).

HVAC-FCU-01-03M

Frequency: Quarterly

Fan Coil Unit

Application

This standard applies to all fan coil units; with or without fan speed control in two or four pipe systems. These units may be found in various locations including wall mounted, under window mounted, or ceiling mounted.

Special Instructions:

1. In addition to the procedure(s) outlined in this standard, the equipment manufacturer's recommended maintenance procedure(s) and/or instruction(s) shall be strictly adhered to.

2. Schedule shutdown with operating personnel, as needed.

3. Review manufacturer's instructions.

4. De-energize or discharge all hydraulic, electrical, mechanical, or thermal energy prior to beginning work. Follow lock out/tag out procedures at all times.

Check Points:

1. Check fan blades for dust build-up and clean if necessary.

2. Check fan blades and moving parts for cracks and excessive wear.

3. Check running motor amperes. Compare with manufacturer’s specifications.

4. Tighten all electrical connectors to proper torque

5. Check that the fan runs properly in all speeds as applicable.

6. Check dampers for dirt accumulations, clean as necessary. Check felt, repair or replace as necessary.

7. Check damper actuators and linkage for proper operation as applicable. Adjust linkage on dampers if out of alignment.

8. Lubricate mechanical connections of dampers sparingly as applicable.

9. Check the valve(s) for signs of leakage and proper operation. Repair or replace as necessary.

10. Clean coils by brushing, blowing, vacuuming, or pressure washing.

11. Check coils for leaking, tightness of fittings.

12. Use fin comb to straighten coil fins.

13. Check belts for wear and cracks, adjust tension or alignment as applicable. Replace belts when necessary.

14. Check rigid couplings for alignment on direct drives, and for tightness of assembly. Before heating season on units with outside air (chilled water coils only): a. Drain cooling coils; b. Blow down to remove moisture.

2. Check freeze stat for proper temperature setting and operation on units with outside air. 3. Vacuum interior of unit. 4. Check filter door for proper gasketing and air leaks. Correct as necessary. 5. Change the filter with the correct size and type filter. 6. Insure that drain(s) are clear and running. 7. Clean up work area.

Recommended Tools, Materials, and Equipment:

1. Tool Group A 2. Vacuum. 3. Fin comb 4. Cleaning tools and materials. Consult the MSDS for hazardous ingredients and proper personal protective equipment (PPE). 5. Safety goggles.

HVAC-TMU-01-01Y

Frequency: Annually

VAV units

Application:

This maintenance standard applies to most terminal units (mixing boxes) which are found in most types of air handling systems. The terminal unit may be VAV, CAV, dual duct, with or without heating/re-heating or cooling, and be pressure dependant or pressure independent. These mixing boxes will be controlled by either pneumatics or Direct Digital Controls (DDC). The re-heat coil maintenance shall be combined with this standard.

Special Instructions:

1. In addition to the procedure(s) outlined in this standard, the equipment manufacturer's recommended maintenance procedure(s) and/or instruction(s) shall be strictly adhered to.

2. Review manufacturer's specifications.

3. Read and understand manufacturer's instructions of each device before making adjustments to the device or to the system. Understand what effects making adjustments will have on the overall Building Automation System and the operation of the building PRIOR to making any control changes.

4. For pneumatic systems, verify proper main line pressure per manufacturer's specifications.

5. De-energize or discharge all hydraulic, electrical, mechanical, or thermal energy prior to beginning work. Follow lock out/tag out procedures at all times.

Check Points:

1. Check to see that the operating control sensor activates the damper per design specifications. If not, recalibrate or replace the operating control sensor with the same temperature range sensor.

2. Check damper linkage for tightness or damage. Lightly oil moving parts using an approved lubricant.

3. Inspect damper(s) for free movement in mixing box. Replace felt or other type seals as required.

4. Inspect mixing box and connecting ductwork for air leaks. Correct leaks with approved duct tape or tighten connections, as required.

5. Tighten electrical connections to all servo-motor actuators, and test as applicable.

6. Check the heating or cooling valve (if present) for leakage around the stem or between the seat and disk. Repair or replace as needed.

7. Check velocity sensor tubing for cracks, tightness, or holes if applicable. Re-heat (if applicable)

8. Check electrical connections and insulators on re-heat coils.

9. Vacuum or blow out the fins, coils, etc.

10. Comb fins as required.

11. Remove obstructions to air flow.

12. Check coils for leaks. Correct or report any leaks.

13. Test and inspect controls that protect coils against freezing.

14. Check for rust or corrosion around coil frame and coil mounting bracket.

15. Clean, prepare for painting and coat with proper type paint as necessary.

16. Record differential air pressure across the coil.

Pneumatic:

1. Check damper linkage for tightness or damage. Lightly oil moving parts using an approved lubricant for pneumatic systems.

2. Inspect damper(s) for free movement in mixing box. Replace felt or other type seals as required.

3. Inspect mixing box and connecting ductwork for air leaks. Correct leaks with approved duct tape or tighten connections, as required.

4. Inspect damper actuator(s) for tightness to mounting brackets.

5. Inspect damper actuator diaphragm for leaks by performing a pressure test of the diaphragm.

6. Check the damper actuator spring range. Replace spring, adjust pilot positioner, or add pilot positioner as needed.

7. If pneumatic actuator does not stroke properly, correct sticking valve stem or binding linkage. Replace or repair the diaphragm or actuator if necessary.

8. Check the heating or cooling valve for leakage around the stem or between the seat and disk. Repair or replace as needed.

9. Inspect the valve actuator for leaks by performing a pressure test of the diaphragm. Repair or replace as needed.

10. Check the spring range of the valve actuator. Replace spring, adjust pilot positioner or add pilot positioner as needed.

11. Inspect for air leaks around actuator and in the air line between controller and pneumatic actuator.

12. Inspect operating control thermostat and/or pressure sensor for proper location and check main and branch air lines at thermostat for crimps, breaks, etc. Repair or replace if needed.

13. Check all inline filters for oil and/or moisture. Replace as needed.

14. Check all installed pressure gages for proper range and operability as applicable. Replace if needed.

15. Perform a spring range check for all remaining end devices.

16. Calibrate the operating control thermostat. Replace if it is defective with the same type action (direct or reverse action) and temperature range.

17. Check to see that the operating control thermostat activates the damper per design specifications. If not, recalibrate the operating control thermostat. Re-heat (if applicable)

18. Check electrical connections and insulators on re-heat coils.

19. Vacuum or blow out the fins, coils, etc.

20. Comb fins as required.

21. Remove obstructions to air flow.

22. Check coils for leaks. Correct or report any leaks.

23. Check for rust or corrosion around coil frame and coil mounting bracket.

24. Clean, prepare for painting and coat with proper type paint as necessary.

25. Record differential air pressure across the coil.

Recommended Tools, Materials, and Equipment:

1. Tool Group B 2. Control drawings 3. Calibration tools 4. Lubricants. Consult the Material Safety Data Sheets (MSDS) for hazardous ingredients and proper personal protective equipment (PPE). 5. Duct tape 6. Cleaning materials and equipment. Consult the MSDS for hazardous ingredients and proper PPE. 7. Safety goggles

HVAC-UHT-01-01Y

Frequency: Annually

Unit Heater, Steam or Hot Water

Application

Unit heaters are usually used to heat otherwise unconditioned spaces These units can be horizontal or vertical and are usually heating only.

Special Instructions:

1. In addition to the procedure(s) outlined in this standard, the equipment manufacturer's recommended maintenance procedure(s) and/or instruction(s) shall be strictly adhered to.

2. Review manufacturer's instructions.

3. Schedule shutdown with operating personnel.

4. Follow lock out/tag out procedures at all times. De-energize or discharge all hydraulic, electrical, mechanical, or thermal energy prior to beginning work.

Check Points:

1. Check valve for full stroke operation in both directions.

2. Check valve for signs of abnormal wear and leaks. Replace packing if needed.

3. Clean the coil with vacuum cleaner.

4. Comb the fins as needed.

5. Clean all fans and motors.

6. Check operation of controls and safeties.

7. Lubricate as required.

8. Check all motors, belts, pulleys, shafts, etc. for alignment.

9. Treat all rusted areas with rust inhibitor and touch up paint.

Recommended Tools and Equipment:

1. Tool Group A and B 2. Vacuum cleaner and attachments 3. Rust inhibitor, paint, brushes. Consult the Material Safety Data Sheet (MSDS) for hazardous ingredients and proper personal protective equipment (PPE). Consult the MSDS to ensure that the paint lead level is 0.06% or less. 4. Cleaning and patching materials. Consult the MSDS for hazardous ingredients and proper PPE.

KTCH-GRL-01-03M

Frequency: Annually

Kitchen ventilation duct

Application: This standard card applies to Kitchen ventilation duct.

Special Instructions:

1. In addition to the procedure(s) outlined in this standard, the equipment manufacturer's recommended maintenance procedure(s) and/or instruction(s) shall be strictly adhered to.

2. Review manufacturer's instructions.

3. Follow lock out/tag out procedures at all times. De-energize or discharge all hydraulic, electrical, mechanical, or thermal energy prior to beginning work.

Check points:

Ducts A continuous passageway for the transmission of air and vapours that, in addition to the containment components themselves, might include duct fittings, dampers, plenums, and/or other items or air-handling equipment.

Bleed Air Duct. An intake duct in a manifold duct system, designed to input air to maintain system balance.

Grease Ducts. A containment system for the transportation of air and grease vapours that is designed and installed to reduce the possibility of the accumulation of combustible condensation and the occurrence of damage if a fire occurs within the system.

General.

Ducts shall not pass through fire walls.

All ducts shall lead directly to the exterior of the building, so as not to unduly increase any fire hazard.

Duct systems shall not be interconnected with any other building ventilation or exhaust system.

All ducts shall be installed without forming dips or traps that might collect residues. In manifold (common duct) systems, the lowest end of the main duct shall be connected flush on the bottom with the branch duct.

ACCESS PANEL— DO NOT OBSTRUCT

Airflow.

Air Velocity.

The air velocity through any duct shall be not less than 365.8 m/min (1200 ft /min).

Air Volume.

Exhaust air volumes for hoods shall be of a sufficient level to provide for capture and removal of grease-laden cooking vapours.

Test data, performance acceptable to the authority having jurisdiction, or both, shall be provided, displayed, or both, upon request.

Lower exhaust air volumes shall be permitted during no-load cooking conditions provided they are sufficient to

Exhaust Fan Operation.

A hood exhaust fan(s) shall continue to operate after the extinguishing system has been activated unless fan shutdown is required by a listed component of the ventilation system or by the design of the extinguishing system.

The hood exhaust fan shall not be required to restart upon activation of the extinguishing system if the exhaust fan and all cooking equipment served by the fan have previously been shut down.

Replacement Air.

Replacement air quantity shall be adequate to prevent negative pressures in the commercial cooking area(s) from exceeding 4.98 kPa (0.02 in. water column).

When its fire-extinguishing system discharges, makeup air supplied internally to a hood shall be shut off.

Operating Procedures.

Exhaust systems shall be operated whenever cooking equipment is turned on.

Filter-equipped exhaust systems shall not be operated with filters removed.

Openings provided for replacing air exhausted through ventilating equipment shall not be restricted by covers, dampers, or any other means that would reduce the operating efficiency of the exhaust system.

Instructions for manually operating the fire extinguishing system shall be posted conspicuously in the kitchen and shall be reviewed with employees by the management.

Listed exhaust hoods shall be operated in accordance with the terms of their listings and the manufacturer's instructions.

Cooking equipment shall not be operated while its fire-extinguishing system or exhaust system is non-operational or otherwise impaired

Inspection of Exhaust Systems. The entire exhaust system shall be inspected by a properly trained, qualified, and certified company or person(s) acceptable to the authority having jurisdiction in accordance with

Type or Volume of Cooking Frequency

Systems serving solid fuel cooking operations

Monthly

Systems serving high-volume cooking operations such as 24-hour cooking, charbroiling, or wok cooking

Quarterly

Systems serving moderate-volume cooking operations

Semi-annually

Systems serving low-volume cooking operations, such as churches, day camps, seasonal businesses, or senior centres

Annually

Cleaning of Exhaust Systems.

Upon inspection, if found to be contaminated with deposits from grease-laden vapours, the entire exhaust system shall be cleaned by a properly trained, qualified, and certified company or person(s) acceptable to the authority having jurisdiction in accordance with Section.

Hoods, grease removal devices, fans, ducts, and other appurtenances shall be cleaned to bare metal prior to surfaces becoming heavily contaminated with grease or oily sludge.

At the start of the cleaning process, electrical switches that could be activated accidentally shall be locked out.

Components of the fire suppression system shall not be rendered inoperable during the cleaning process.

Flammable solvents or other flammable cleaning aids shall not be used.

Cleaning chemicals shall not be applied on fusible links or other detection devices of the automatic extinguishing system.

After the exhaust system is cleaned to bare metal, it shall not be coated with powder or other substance.

All access panels (doors) and cover plates shall be replaced.

Dampers and diffusers shall be positioned for proper airflow.

When cleaning procedures are completed, all electrical switches and system components shall be returned to an operable state.

When a vent cleaning service is used, a certificate showing date of inspection or cleaning shall be maintained on the premises.

After cleaning is completed, the vent cleaning contractor shall place or display within the kitchen area a label indicating the date cleaned and the name of the servicing company, and areas not cleaned.

Where required, certificates of inspection and cleaning shall be submitted to the authority having jurisdiction.

General Requirements. Recirculating systems containing or for use with appliances used in processes producing smoke or grease-laden vapours shall be equipped with components complying with the following:

Use and Maintenance.

Automatic or manual covers on cooking appliances, especially fryers, shall not interfere with the application of the fire suppression system.

All filters shall be cleaned or replaced in accordance with the manufacturer's instructions.

All ESPs shall be cleaned a minimum of once per week following manufacturer's cleaning instructions.

The entire hood plenum and the blower section shall be cleaned a minimum of once every 3 months.

Inspection and testing of the total operation and all safety interlocks in accordance with the manufacturer's instructions shall be performed by qualified service personnel a minimum of once every 6 months or more frequently if required.

Signed and dated log of maintenance as performed.

Procedures for Inspection, Cleaning, and Maintenance for Solid Fuel Cooking. Solid fuel cooking appliances shall be inspected, cleaned, and maintained in accordance with procedures outlined

The combustion chamber shall be scraped clean to its original surface once each week and shall be inspected for deterioration or defects.

Any significant deterioration or defect that might weaken the chamber or reduce its insulation capability shall be immediately repaired.

The flue or chimney shall be inspected weekly for the following conditions:

(1) Residue that might begin to restrict the vent or create an additional fuel source. The flue or chimney shall be cleaned before these conditions exist.

(2) Corrosion or physical damage that might reduce the flue's capability to contain the effluent. The flue or chimney shall be repaired or replaced if any unsafe condition is evident.

Spark arrester screens located at the entrance of the flue or in the hood assembly shall be cleaned prior to becoming heavily contaminated and restricted.

Filters and filtration devices installed in a hood shall be cleaned.

PLUMBING FUNTIONAL AREA

PLMB-DWS-03-01Y

Frequency: Annually

Domestic Hot Water Heater - Electric

Application This standard applies to electric domestic hot water heaters.

Special Instructions:

1. In addition to the procedure(s) outlined in this standard, the equipment manufacturer's recommended maintenance procedure(s) and/or instruction(s) shall be strictly adhered to.

2. Review manufacturer's instructions.

3. If the insulation is known or suspected to contain asbestos, check the building's asbestos management plan to see it has been tested for asbestos. If it is suspect but has not been tested, have it tested. Manage asbestos in accordance with the plan.

4. Follow lock out/tag out procedures at all times. De-energize or discharge all hydraulic, electrical, mechanical, or thermal energy prior to beginning work.

Check Points:

1. Attach drain hose. Drain several gallons from tank to remove sediment.

2. Manually check operation of safety valve. Ensure that no personnel are in area of relief piping discharge. Check for corrosion around valve.

3. Check all connections - electric and water. Tighten as necessary. Ensure power is disconnected to electric heaters prior to checking connections.

4. Check operation and setting of aqua stat. Check hot water temperature with dial thermometer, and set aqua stat at minimum value required for all uses.

5. Check amperage draw of upper and lower elements and compare to name plate data.

6. Clean element contacts, and check for proper closing under load.

7. Clean pump, controls, switches, and starters. Check condition of pump seal or packing, and replace as required.

8. If applicable, Remove and inspect Anode, replace if necessary

9. Clean up work area and remove trash.

10. If the insulation contains asbestos, it is considered hazardous waste. Refer to Appendix G for the Universal Waste Guide.

PLMB-VLV-01-01M

Frequency: Monthly

Valve, Safety Relief

Application: This standard card applies to safety relief valves installed on boilers, steam lines, and other equipment. The safety valves are designed to safely relieve excessive pressure, thus preventing rupture or explosion of the pressure parts. Safety valves differ from relief valves in that the safety relief valve opens fully when the applied pressure exceeds its lifting set-point and remains open until the applied pressure drops below its reset point. Relief valve start to open when pressure overcomes the spring pressure and remains open to the degree that the applied pressure pushes it open. When pressure drops, the spring closes the valve.

Special Instructions:

1. In addition to the procedure(s) outlined in this standard, the equipment manufacturer's recommended maintenance procedure(s) and/or instruction(s) shall be strictly adhered to.

2. Review manufacturer's instructions.

3. Schedule shutdown with operating personnel.

4. Follow lock out/tag out procedures at all times. De-energize or discharge all hydraulic, electrical, mechanical, or thermal energy prior to beginning work.

5. The safety relief valves are designed to be operated by steam and shall only be tested when sufficient pressure exists to clear the seating area of any debris.

6. Check with foreman and operating personnel before performing this test.

7. If materials to be worked on are known or suspected to contain asbestos, check the building's asbestos management plan to see if they have been tested for asbestos. If they are suspect but have not been tested, have them tested. Manage asbestos in accordance with the plan

Check Points:

1. Inspect condition of spring, flanges, and threaded connections

2. Inspect the manual lifting lever for obstruction and damage, Note follow manufacturers procedures for manually lifting valve via valve lever. Check for binding of the stem or seat. Make sure that the valve returns to proper position when the lever is released.

3. Inspect support brackets and tighten as required

4. Check that the discharge piping support is tight and not causing stress on the valve. 5. Clean the valve body. 6. Lubricate the stem and lever pivot.

Recommended Tools, Materials, and Equipment:

1. Tool Group C

PLMB-VLV-04-01Y

Frequency: Annually

Valve, Critical Check

Application: This standard card applies to check valves in primary fluid systems that improve operating efficiency or prevent damage to system components. It applies only to check valves not serviced in conjunction with their associated equipment.

Special Instructions:

1. In addition to the procedure(s) outlined in this standard, the equipment manufacturer’s recommended maintenance procedure(s) and/or instruction(s) shall be strictly adhered to.

2. Review manufacturer's instructions.

3. Schedule shutdown with operating personnel.

4. Follow lock out/tag out procedures at all times. De-energize or discharge all hydraulic, electrical, mechanical, or thermal energy prior to beginning work.

5. If materials to be worked on are known or suspected to contain asbestos, check the building's asbestos management plan to see if they have been tested for asbestos. If they are suspect but have not been tested, have them tested. Manage asbestos in accordance with the plan.

Check Points:

1. Remove the cover and clean the valve seat and disc.

2. Examine the hanger, disc, and seat for cracks or wear.

3. Check seals, packing, and gaskets for deterioration; replace if necessary.

4. Reassemble valve using a new cover gasket or seal. 5. Test under operating conditions if possible.

Recommended Tools, Materials, and Equipment:

1. Tool Group C 2. Packing and gaskets 3. Lubricants. Consult the Material Safety Data Sheets (MSDS) for hazardous ingredients and proper personal protective equipment (PPE)

PLMB-DP-01-01Y

Frequency: Annually

Drainage

Application: This standard card applies to check drainage pipes that improve operating efficiency or prevent damage to system components.

Special Instructions:

1. In addition to the procedure(s) outlined in this standard, the equipment manufacturer’s recommended maintenance procedure(s) and/or instruction(s) shall be strictly adhered to.

2. Review manufacturer's instructions.

3. Schedule shutdown with operating personnel.

Check Points:

Inspect drainage pipes. Verify clod and the elements drainages.

Clean drainages.

Remove all trash or debris (such as cornstalks) that have accumulated around the inlet.

If trash often collects around the inlet, install a larger diameter screen (e.g., page wire) around it.

Check and clean catch basin sumps as needed. Ensure the grates are in place to keep out trash and rodents.

Field Level

Check for signs of surface erosion in the fields. If found, call a licensed tile drainage contractor for solutions. It may be necessary to install a surface inlet or grassed waterway.

Check for "blowouts" – holes in the field created when a hole forms in the tile drainage pipe. Mark the location of the blowout and call a licensed tile drainage contractor for repairs.

Mark the location of wet spots in the field and call a licensed tile drainage contractor to investigate and resolve the problem

PLMB-WP-01-01Y

Frequency: Annually

Hot / cold water pipes

Application: This standard card applies to check drainage pipes that improve operating efficiency or prevent damage to system components.

Special Instructions:

1. In addition to the procedure(s) outlined in this standard, the equipment manufacturer's recommended maintenance procedure(s) and/or instruction(s) shall be strictly adhered to.

2. Review manufacturer's instructions.

3. Schedule shutdown with operating personnel.

Check Points:

Meters Take meter reading and check water consumption for early signs of leakage

Check the meter in correct working order

Ensure ease of opening to access doors/covers

Clean out as necessary

Pipework Check supports and inspect for loose-fittings

Check for soundness of pipework

Inspect for signs of corrosion and leakage

Disconnect any unused pipes and fittings connected to the service installations

Pumps Check operation of pumps in order and ensure noise levels to be minimal.

PLMB-LA-01-01Y

Frequency: Annually

Lavatory assembly

Application: This standard card applies to check lavatory assembly that improve operating efficiency or prevent damage to system components.

Special Instructions:

1. In addition to the procedure(s) outlined in this standard, the equipment manufacturer's recommended maintenance procedure(s) and/or instruction(s) shall be strictly adhered to.

2. Review manufacturer's instructions.

3. Schedule shutdown with operating personnel.

Check Points:

Check leakages ad verify operation faucets.

Check nut and body assembly.

Clean filter assembly.

Clean and remove aerator

Avoid abrasive cleaners, steel wool, and harsh chemicals as these will dull the finish and void your warrant.

PLMB-TA-01-01Y

Frequency: Annually

toilet assembly

Application: This standard card applies to check toilet assembly that improve operating efficiency or prevent damage to system components.

Special Instructions:

1. In addition to the procedure(s) outlined in this standard, the equipment manufacturer's recommended maintenance procedure(s) and/or instruction(s) shall be strictly adhered to.

2. Review manufacturer's instructions.

3. Schedule shutdown with operating personnel.

Check Points:

Check leakages and blockages

Verify operation flush and ball floats.

Avoid abrasive cleaners, steel wool, and harsh chemicals as these will dull the finish and void your warrant.

PLMB-UA-01-01Y

Frequency: Annually

Urinary assembly

Application: This standard card applies to check urinal assembly that improve operating efficiency or prevent damage to system components.

Special Instructions:

1. In addition to the procedure(s) outlined in this standard, the equipment manufacturer's recommended maintenance procedure(s) and/or instruction(s) shall be strictly adhered to.

2. Review manufacturer's instructions.

3. Schedule shutdown with operating personnel.

Check Points:

Check leakages and blockages. Clean it.

Verify operation flush.

Avoid abrasive cleaners, steel wool, and harsh chemicals as these will dull the finish and void your warrant.

F REPORTS

This annex includes an example of the periodically reports to send the Owner, defined in section 10 of this document

G Developer's emergency procedures

The Developer's procedures for interfacing and coordinating with the Owner in event of emergencies and Irregular Operations are:

G1 Armed Hold-up

In the event of an armed hold-up situation the Developer and its staff shall:

- Comply with the instructions given by the offender at all times. Try to REMAIN CALM.
- Only do what they are told to do – NO MORE, NO LESS.
- NOT argue with, threaten or stare at the offender.
- NOT attempt to disarm or otherwise apprehend the offender.
- Assume the offender is armed, even if a weapon cannot be seen.
- If the offender is carrying a firearm, it shall be regarded as being loaded.
- Raise the alarm (if available) only if it is safe to do so.
- Answer any question when asked.
- Avoid any sudden movement that could panic the offender.
- Observe as many details of the offender as possible.
- Note any item and surfaces touched by the offender.
- Immediately after the incident, the O&M manager shall:
    - Secure the immediate vicinity (for example, lock the room in which the hold-up occurred)
    - Do not allow anyone to approach the area in which the offender was located.
    - Notify the police
    - Advise the Owner and attend to the post-incident needs indicted by the Owner.
    - Ensure patrons, airlines employees, airport users, etc. are not in the immediate vicinity of the hold-up are kept away from it.

G2 Bomb threat or threatening calls

If a bomb threat or a threatening call is received by telephone, the Developer and its staff shall:

- STAY CALM.
- NOT hang up.
- Refer to the Bomb Threat Checklist
- Try to get as much information as possible.
- Notify the O&M manager. If the O&M manager is off site, notify the person in charge. DO NOT COMMUNICATE THE THREAT TO ANYONE ELSE.
- Contact Police
- Notify the Owner (Security Services).
- Implement the airport's emergency management plan.
- The Developer shall not search for the bomb.
- The Developer shall not allow a search by its staff or others.
- Decide whether the O&M limits is to be evacuated.
- If evacuation signalled, proceed to designated assembly area.
- Ensure staff, patrons, airlines employees, airport users take bags and other belonging with them.
- Leave doors and windows open.

If a bomb threat is received by mail, the Developer and its staff shall:

- Avoid handling of the letter or envelope.
- Place the letter in clear plastic bag or sleeve.
- Inform O&M manager.
- Contact Police and notify the Owner
- Consider the need to evacuate the Developer's assigned spaces.

If a bomb or other explosive device is sighted in the O&M limits, the Developer shall

- Keep staff, patrons, airlines employees, airport users, etc. calm and promptly clear the area in an orderly and calm manner.
- The Developer shall not impede an explosive inspector from entering the O&M limits and its premises.
- The Developer shall no handle any explosive found within the O&M limits.

Bomb Threat Checklist

By Telephone: The person receiving the call is to note/record as many details ns ask as many questions as possible. Record this on this form as soon as is practicable.

From any other source: (e.g. Police or the Owner) This form is still to be used. The source of notification is asked to provide as much detail as possible.

TELEPHONE BOMB THREATS CHECKLIST	
1. General Questions to ask	
What is it?	
When was it set to explode or When will the substance be released?	
Where did you place it?	
What does it look like?	
When did you put it there?	
How will the bomb explode or How will the substance be released?	
Did you put it there?	
Why did you put it there?	
2. Bomb threat questions	
What type of bomb is it?	
What is the bomb?	
What will make the bomb explode?	
When is it set to explode?	
3. Chemical/Biological threat questions	
What kind of substance is it?	
How much of the substance is there?	
How will the substance will be released?	
Is the substance a liquid, powder or gas?	
4. Other questions to ask	
What is your name?	
Where are you?	
What is your address	
5. Observations from the voice	
Speaker was:	☐Male ☐Female ☐Child ☐Severe
Age:	☐Very young ☐Adolescent ☐Adult ☐Old
Sobriety:	☐Normal ☐Intoxicated ☐Drugged
Speech:	☐Normal ☐Stammer ☐Slurred ☐Lisp ☐Incoherent ☐Well Spoken ☐Abusive ☐Irrational
Accent was:	☐Message sounded like it was being read by caller ☐Message was taped Other:
6. Observations about the call	
Source:	Did it sound as if a public telephone was used? ☐Yes ☐No

Background noises:	☐Music ☐Children ☐Talking ☐Typing ☐Traffic ☐Machinery ☐Aircraft ☐Harbor ☐Other
Call received by:	…….. at …….. pm/am Line no. …….. Ext. no.: ……..
Duration of call:	Time: ……..
Origen of call:	☐Bomber ☐Police ☐Fire Brigade ☐Other
7. Other information that the receiver is able to add	

G3 Casualties

In the event of an accident – the Developer shall first administer first aid in accordance with the circumstances of the occurrence of the accident - the Developer and its staff shall:

- NOT PANIC.
- If necessary, seek assistance from someone who is qualified in first aid.
- NOT LEAVE THE INJURED PERSON(S) ALONE. Send someone else for help.
- If no-one is available to go for help, do whatever you can to assist the person until help arrives.
- NOT become a casualty. Protect yourself, the casualty and any other person from the danger.
- If the injured person is still in danger, either:
  - Remove him or her from the hazard (for example, in the case of smoke inhalation, move the person to an area where is fresh air); or
  - Remove the hazard from the person (for example, in the case of electrocution, switch the power off)
- If the situation looks life threatening, try to get urgent medical attention from paramedics or medical practitioner.
- When medical help arrives, assist in the management of the casualty if asked to do so.

G4 Chemical Contamination Event

Chemical contamination events that impact on, or have the potential to impact on, the patrons, airlines employees, airport users, etc. within the O&M limits may be as a result of a local mishap or may originate off-site. An example of a localised event could be in the form of an explosion and chemical fire at an asset that uses hazardous products. An off-site event could be in the form of an explosion and

chemical fire at assets or spaces outside the O&M limits, with the resultant toxic smoke plume at risk of inundating the O&M limits.

Whilst such events are rare, it is important to appreciate the difference between the two types and to respond appropriately to the circumstances at the time.

Chemical Contamination event within the O&M limits

In the event of a chemical spill or other chemical contamination occurrence that originates within the O&M limits, the response must be immediate and in accordance with the circumstances that are present at that time.

- If the chemical spill is indoors and presents a potential risk to safety (e.g. explosive or toxic vapour/gas), evacuate the room immediately. Move to a save area well aware from the spill.
- Upon exiting the room/space, close all doors and if possible, isolate the electrical power supply to the room/space in question.
- If the event is outside the control and capacity of the O&M manager to deal with, call the airport emergency services.
- In all cases, notify the Owner and/or airport emergency services.

Chemical Contamination event outside the O&M limits

In the event of a chemical spill or other chemical contamination (e.g. fire resulting in toxic smoke) that originates outside the O&M limits but which has the potential to adversely impact on the O&M limits.

The Fire and Emergency Services Authority or other agency responsible or appointed by the Owner or the Owner will:

- Make contact with the O&M manager and provide advice and/or direction as the circumstances dictates. This may involve lockdown or evacuation – any direction given must be complied with.
- Fire and Emergency Services Authorities may request on-site monitoring for air contaminants entering the O&M limits.

G5 Civil Disorder

Based on the information available, the O&M manager shall consider the following operational levels:

Level	Comments
Level 1 . Normal Operation	N/A
Level 2. Report of a Potential Situation	If there are indications that trouble is a distinct possibility and the information has been received from credible sources: - Notify Police and request assistance - Notify the Owner - Restrict Staff, Patrons, airlines employees, airport users, etc. to quadrangle areas - Secure perimeter if it is required - Prevent people leaving or entering the area
Level 3. Incident is Imminent	Refer to lockdown procedure

G6 Tornados

The O&M manger shall establish links, in accordance with the Owner, with their local State Emergency Services as soon as possible and familiarise themselves with the various actions required under each “alert stage” and complaint with Airport Rules and Regulations.

G7 Earthquake

In the event of an earthquake, REMAIN CALM and reassure staff, patrons, airlines employees, airport users, etc. within the O&M limits.

- Stay indoors and seek shelter under tables, desks or strongly constructed door frames.
- Check that evacuation routes are safe.
- Instruct staff, patrons, airlines employees, airport users, etc. to collect belongings (UNLESS THREAT IS IMMEDIATE)
- Ensure all staff, patrons, airlines employees, airport users, etc. evacuate in an orderly manner on being given evacuation instructions.
- Stay away from windows and other fixtures the may become unstable.
- Provide assistance to people with disabilities or special needs.
- Turn off electricity, gas and water (ONLY WHEN IT IS SAFE TO DO SO).

After the earthquake

- Check staff members at the designated assembly area.
- Liaise with emergency services.
- Check for injured people. DO NOT MOVE SERIOUSLY INJURED PEOPLE UNLESS THER ARE IN IMMEDIATE DANGER. WAIT FOR EMERGENCY SERVICES.
- Survey damage.
- Turn off electricity, gas and water (ONLY WHEN IT IS SAFE TO DO SO)
- Check for damage, gas leaks, power failure and any other hazard. ENSURE THAT NO-ONE. RETURNS TO ANY BUILDING UNLESS AUTHORISED TO DO SO.

Evacuation instructions

On hearing the alert (verbally, automatic alarm or manual alarm)

- All staff, patrons, airlines employees, airport users, etc. shall collect their belongings (UNLESS THE THREAT IS IMMEDIATE, SUCH AS A FIRE OR EARTHQUAKE).
- In the event of a threat of fire, close all doors and windows and turn off power supply (ONLY WHEN IT IS SAFE TO DO SO).
- In the event of a bomb threat open all doors and windows.
- Move staff, patrons, airlines employees, airport users, etc. along designated routes to the designated assemble area(s).
- Assist to staff, patrons, airlines employees, airport users, etc. with disabilities or special needs.
- Remain with staff, patrons, airlines employees, airport users, etc. and wait for further instructions form incident controller.
- Return to work place in an orderly and safe manner, when instructed to do so.

G8 Fire

In the event of a fire:

- Raise the alarm.
- Alert O&M manager.
- Evacuate everyone form the immediate vicinity of the fire.
- Fight fire with existing equipment (ONLY WHEN IT IS SAFE TO DO SO).
- Sound the evacuation alert if evacuation is necessary.
- Allow staff, patrons, airlines employees, airport users, etc. to collect their belongings (ONLY WHEN IT IS SAFE TO DO SO).
- On sounding of the alert, evacuate all staff, patrons, airlines employees, airport users, etc. within the O&M limits in an orderly manner.
- Close all doors and windows.
- Arrange for power supply to be switched off at the electrical switchboards (ONLY WHEN IT IS SAFE TO DO SO).
- Move staff, patrons, airlines employees, airport users, etc. along designated routes to the designated assemble area(s).
- Assist to staff, patrons, airlines employees, airport users, etc. with disabilities or special needs.
- Remain with staff, patrons, airlines employees, airport users, etc. and wait for further instructions form incident controller.
- DO NOT leave assembly area until advised to do so by the incident controller.
- Return to the airport spaces switchboards (ONLY WHEN IT IS SAFE TO DO SO).

G9 Handling of Suspect Mail and Packages

It is appropriate that staff handling mail remain vigilant and cautious, but it shall be remembered that most reports of suspicious packages are false alarms.

All staff handling mails shall be made aware of the emergency procedures for responding to and reporting a suspicious article.

When possible, the sorting and processing of mail and packages shall be conducted in an area that is separate from the main airport O&M limits.

The procedures outlined below are to be followed shall staff receive a suspicious or mail item.

If the package or mail item has not been opened:

- Do not disturb, move or touch the item any further. If any material has split from the item, do not try to clean it up, or brush it from your clothing.
- Keep your hands away from your face to avoid contaminating your eyes, nose or mouth.
- If possible, without leaving your work area, wash your hands.
- Stay in your office or immediate work area – this also applies to coworkers in the same room – and prevent others from entering the area and becoming contaminated. **Remember** that they are not in immediate danger.
- Call the Police for help. Inform the Police operator about:
  - Exact location of the incident – street address, building floor, etc.
  - Number of people potentially exposed.
  - Package/device.
  - Action taken.
- Wait for help to arrive.

If the package or mail item has been opened:

- Do not disturb, move or touch the item any further. If any material has split from the item, do not try to clean it up, or brush it from your clothing.
- Keep your hands away from your face to avoid contaminating your eyes, nose or mouth.
- If possible, without leaving your work area, wash your hands.
- Stay in your office or immediate work area – this also applies to coworkers in the same room – and prevent others from entering the area and becoming contaminated. **Remember** that they are not in immediate danger.
- Call the Police for help. Inform the Police operator about:
  - Exact location of the incident – street address, building floor, etc.
  - Number of people potentially exposed.
  - Package/device.
  - Action taken.
- Wait for help to arrive.

If there is suspicion that the mail item may contain an EXPLOSIVE DEVICE:

- Follow your normal emergency procedures.
- Ring 911 and report the package to the Police.
- Evacuate the area.

G10 Siege/Hostage Situation

Siege and hostage situation are two of the most significant emergencies or critical incidents that can be encountered. They often develop with unpredictability, speed and lethality. These events may involve armed or unarmed people, using a carefully planned or completely unplanned method. Many of these

situations are over within several minutes. It is essential that, if the safety of staff, patrons, airlines employees, airport users, etc. is at immediate risk, decisive actions are taken to reduce access to additional victims. This includes immediate notification with the Police.

Before the arrival of emergency services, the decision to instigate lockdown or to evacuate all or part of the O&M limits is a decision to be taken in collaboration with the Owner or Owner's emergency services. Where time permits this decision shall be made in consultation with the Police.

Large scale evacuation will always be a last resort. The decision will need to balance the risks as to whether staff, patrons, airlines employees, airport users, etc. are afforded better protection by remaining

where they are or by evacuation. If a decision to evacuate is made, the aim will be to evacuate the optimum number of people expeditiously and safely.

The preservation of life will take precedence. Perpetrators shall not be approached or challenged.

G11 Suicide

Although this kind of event is not common in airport environments, it needs to be taken into consideration and have a guidance for its processing. Particular consideration includes:

- Providing opportunities for enhancing the health and well being of staff is a significant way to prevent suicide.
- Every staff member expressing suicidal thoughts or threats or engaging in self harm behaviour need to be taken seriously. Consultation with a psychologist (HR) is recommended.
- Staff with an identified risk of suicidal or self harming behaviour shall be appropriately assessed and supported.
- Raising staff awareness if risk factors associated with suicidal behaviour.
- Maintaining alertness to suicide risk and behaviour in staff.
- Avoiding any strategies that normalise, glamorise or increase identification with a person who died by suicide.

G12 Emergencies and critical incident Response

The Developer has the role to response and assess emergency and critical incident situations and assist those in danger. The following checklist will help the Developer and its staff in the assessment and assistance:

ASSESS THE SITUATION, CALL EMERGENCY SERVICES (the Owner) AND ASSIST THOSE IN DANGER	
ACTIONS	**COORDINATED BY**
☐ Verify information.	
☐ Take appropriate safety precautions (e.g. turn of gas, water and/or electricity).	
☐ Administer First Aid where appropriate	
☐ Contact emergency services as appropriate. Ambulance, Police, Fire Brigade, gas provider, water provider, electricity provider. Inform/Notify the Owner.	
☐ Ensure the incident site/area remains secure and undisturbed where Police are likely to be involved.	
☐ Remove people form the scene to an appropriate assembly area or space.	
☐ Account for everyone in the vicinity.	
☐ Activate and incident management team to plan further actions and enact the response plan. Allocate specific responsibilities.	
☐ Record details of event, including the source(s) of information. Make notes as information is received.	
☐ Gain Police and Owner authorities to release information.	

Evacuate or Lockdown

In case of the decision of evacuation and/or lockdown has been taken the following checklist will help the Developer and its staff.

EVACUATE OR LOCKDOWN	
ACTIONS	**COORDINATED BY**
☐ Consider the need to evacuate either on-site (O&M limits) or off the O&M limits (other airport areas or outside the airport)	
☐ Liaise with the Owner's and Owner's providers staff, other agencies in considering lockdown.	
☐ Communicate the evacuation or lockdown using predetermined activation signals.	
☐ Notify the Police and seek advice as to whether off-site situation is safe.	

Support those affected

The following checklist will help the Developer and its staff in supporting those affected.

ORGANISE TO SUPPORT DEVELOPER'S STAFF AFFECTED	
ACTIONS	**COORDINATED BY**
☐ Offer immediate comfort and support to those most affected.	
☐ Make direct contact with affected staff of families. (in case of death, Police contact the family)	
☐ Prepare a statement for informing stakeholders under the Owner's directions.	
☐ Brief all staff of known facts. Ensure everyone knows how to respond to media (i.e. direct all enquires to the Owner) and understands support strategy for staff.	
☐ Inform staff using a prepared statement and offer comfort and support.	
☐ Set up a recovery space/room/area	
☐ Send the inconsolable to a recovery area and/or company psychology staff.	
☐ Consider staff absent or off-site today, relief staff.	
☐ Identify and notify others who need early advice (e.g. key community agents, etc.)	

Undertake recovery operations at the End of the Day

The following checklist will help the Developer and its staff in undertaking the recovery at the End of the Day.

UNDERTAKE RECOVERY OPERATIONS AT THE END OF THE DAY	
ACTIONS	**COORDINATED BY**
☐ Debrief all staff as necessary. Review with the Emergency Management team and plan for the next day.	
☐ Organize necessary relief/additional staff to meet O&M, including administration and front office needs.	
☐ Ensure support for the leaders in response and those who have been supporting others.	
☐ Liaise with the Owner, local agencies, etc. for possible after hours/weekend support	

Following days and longer term recovery

The following checklist will help the Developer and its staff in following days and longer term recovery

FOLLOWING DAYS AND LONGER TERM RECOVERY	
ACTIONS	**COORDINATED BY**
☐ Identify and offer more specialized personal support to vulnerable and/or most affected staff.	
☐ Provide recovery support and advice for staff about normal cycle of recovery and indicators that extra support may be required.	
☐ Follow up contact with family/families involved to express sympathy, arrange retrieval of personal items of staff member as appropriate and discuss with Owner in ongoing support.	
☐ Update information to staff, family, etc. as appropriate. Control rumors.	
☐ Cultural considerations	
☐ Death notice	
☐ Memorial service	
☐ Funeral attendance, with attention to the wishes of the family	
☐ Continuing support for staff	
☐ Maintaining documentation	
☐ Ongoing liaison with other affected or vulnerable staff members	
☐ Consider ex-staff members	
☐ Process for meeting visitors	
☐ Instruct staff (reception) as to what information is to be told to agencies, press, family, etc.	
☐ Review responses and continuing needs	
☐ Operational debrief	
☐ Review and modify (if needed) the emergency and incident response and reporting	
☐ Anniversary dates	
☐ Update emergency and incident reports	

H Planned Preventive Maintenance DASHBOARD

This annex includes an example of templates will be used to upload and update the Developer's CMMS with the new Element list.

I DEVELOPER'S DAMAGE SURVEY FORM

Developer's Damage Survey Form

Date of incident:		**Date of DAP:**	
Name/Title of person conducting DAP:		**Phone number:**	
Facility Area:			
General Impression of Damage to Airport's O&M limits	☐None ☐Minor ☐Moderate ☐Severe ☐Total Loss		

Type of incident:	☐Fire ☐Power Failure ☐Vandalism ☐Explosion without fire ☐Natural Gas Failure ☐Incident of Violence ☐Severe Weather	☐HVAC Failure ☐Civil Disturbance/Riot ☐Internal Flooding ☐Technology Failure ☐Vehicle Striking Building ☐Criminal Activity
Other Mechanical System Failure:		
Object Striking the Building:		
Incident Description in detail:		

Interior (O&M limit) Assessment	
☐Fire Damage ☐Smoke Damage ☐Interior content Damage ☐Interior Structural Damage	☐Water Damage ☐Presence of Mold o Mildew ☐Hazardous material spill, leak or exposure ☐Blood, Body Fluids or Other Bio-hazard present
Comments:	

Developer's Damage Survey Form

Interior (O&M limit) Components Assessment					
	Affected	**Damaged**	**Destroyed**	**Major**	**Minor**
☐Glass/Windows					
☐Interior Doors					
☐Electrical Door					
☐Door handles					
☐Door lock					
☐Floor					
☐Floor finishes					
☐Floor tiles					
☐Carpeting					
☐Wall (partition)					
☐Wall finishes/covering					
☐Wall structure (studs, framing, etc.)					
☐Graffiti					
☐Ceiling					
☐Ceiling finishes					
☐Stairs					
☐railings					
☐Elevator cab					
☐Elevator shaft					
Comments:					

Developer's Damage Survey Form

Interior MEP (O&M limit) Components Assessment					
	Affected	**Damaged**	**Destroyed**	**Major**	**Minor**
☐Electrical outlets					
☐Electrical switches					
☐Circuit breaker boxes					
☐light fixtures					
☐open/exposed wiring					
☐Public Address System					
☐Fire extinguisher					
☐Fire control panel					
☐Horn/strobe devices					
☐Smoke detectors					
☐Heat detectors					
☐Tamper switches					
☐Sprinkler piping					
☐Sprinkler heads					
☐Control valves					
☐Boilers					
☐Sump pumps					
☐Elevator equipment					
☐Emergency Generator					
☐Hot water tanks					
☐Hot water heaters					
☐Return unit heaters					
☐Gas pipes					
☐Condensers					
☐Air condition units					
☐Pumps					
☐Water meter					
☐Utility meter					
Comments:					
Interior Furniture/Fixtures (O&M limit) Components Assessment					

Developer's Damage Survey Form

	Affected	Damaged	Destroyed	Major	Minor
☐Desks					
☐Fax machines					
☐Printers					
☐Office Furniture					
☐Airport Furniture					
☐Paper Shredders					
☐Filing cabinet					
☐Computer					
☐Shelving					
☐Copy Machines					
☐Monitors					
☐Other Office Equipment					

Interior Restrooms (O&M limit) Components Assessment					
	Affected	Damaged	Destroyed	Major	Minor
☐Toilets					
☐Sinks					
☐Showers					
☐Plumbing fixtures					
☐Mirrors					
☐Restroom equipment					
☐Sump pumps					
☐Elevator equipment					
☐Emergency Generator					
☐Hot water tanks					
Comments:					

Developer's Damage Survey Form

Illicit practices (O&M limit) Assessment			
☐Evidence of Burglary		☐Evidence of Looting	
Inventory of items missing	☐Appliances	☐Food items	☐Entertainment Equipment
	☐Supplies	☐Furniture	☐Mechanical Equipment
	☐Personal Items	☐Artwork	☐Computer Equipment
Description missing items in detail			

Developer's Damage Survey Form	

Inaccessible Spaces/Areas (O&M limit) Assessment	
Space/Area	**Description**
☐_____	
☐_____	
☐_____	
☐_____	
☐_____	

Additional Narrative

Developer's Damage Survey Form

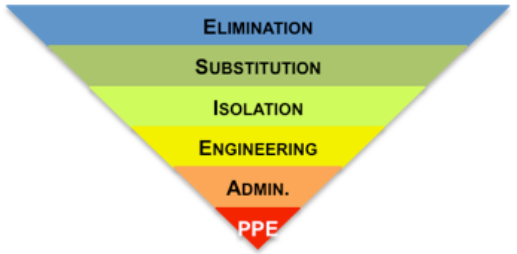
J SAFE WORK METHODS STATEMENT

SAFE WORK METHOD STATEMENT (SWMS) PART 1

ACTIVITY:	SWMS #:	PRINCIPAL CONTRACTOR (PC):	
COMPANY NAME:	ABN:	ADDRESS:	
COMPANY ADDRESS:		PROJECT ADDRESS:	
COMPANY CONTACT:	PHONE #:	PROJECT MANAGER (PM):	CONTACT PH. #:
SWMS APPROVED BY *EMPLOYER / O&M MANAGER / THE CITY:*		DATE SWMS PROVIDED TO PC:	
NAME:		PM SIGNATURE:	DATE:
SIGNATURE:	DATE:		
PERSON/S RESPONSIBLE FOR ENSURING COMPLIANCE WITH SWMS:			
PERSON/S RESPONSIBLE FOR REVIEWING THE SWMS:			
RELEVANT WORKERS CONSULTED IN THE DEVELOPMENT, APPROVAL AND COMMUNICATION OF THIS SWMS:			

NAME	SIGNATURE	DATE

HIERARCHY OF CONTROLS



DETERMINE THE RISK SCORE

LIKELIHOOD	CONSEQUENCE: INSIGNIFICANT	MINOR	MODERATE	MAJOR	CATASTROPHIC
ALMOST CERTAIN	3 HIGH	3 HIGH	4 ACUTE	4 ACUTE	4 ACUTE
LIKELY	2 MODERATE	3 HIGH	3 HIGH	4 ACUTE	4 ACUTE
POSSIBLE	1 LOW	2 MODERATE	3 HIGH	4 ACUTE	4 ACUTE
UNLIKELY	1 LOW	1 LOW	2 MODERATE	3 HIGH	4 ACUTE
RARE	1 LOW	1 LOW	2 MODERATE	3 HIGH	3 HIGH

RECORD RISK SCORE ON WORKSHEET (NOTE – RISK SCORES HAVE NO ABSOLUTE VALUE AND SHOULD ONLY BE USED FOR COMPARISON AND TO ENGENDER DISCUSSION.)

SCORE	ACTION
4A: ACUTE	**DO NOT PROCCED.** REQUIRES IMMEDIATE ATTENTION. INTRODUCE FURTHER HIGH-LEVEL CONTROLS TO LOWER THE RISK LEVEL. RE-ASSESS BEFORE PROCEEDING.
3H: HIGH	**REVIEW BEFORE COMMENCING WORK.** INTRODUCE NEW CONTROLS AND/OR MAINTAIN HIGH-LEVEL CONTROLS TO LOWER THE RISK LEVEL. MONITOR FREQUENTLY TO ENSURE CONTROL MEASURES ARE WORKING.
2M: MODERATE	**MAINTAIN CONTROL MEASURES.** PROCEED WITH WORK. MONITOR AND REVIEW REGULARLY, AND IF ANY EQUIPMENT/PEOPLE/MATERIALS/WORK PROCESSES OR PROCEDURES CHANGE.
1L: LOW	**RECORD AND MONITOR.** PROCEED WITH WORK. REVIEW REGULARLY, AND IF ANY EQUIPMENT/PEOPLE/MATERIALS/WORK PROCESSES OR PROCEDURES CHANGE.

SWMS Scope:	Environment:

Personal Protective Equipment (PPE): Ensure all PPE meets relevant State, Federal and Local Standards. Inspect, and replace PPE as needed.

Foot Protection	Hearing Protection	High Visibility	Head Protection	Eye Protection	Face Protection	Hand Protection	Protective Clothing	Breathing Protection	Sun Protection	
										Rings, watches, jewellery that may become entangled in machines must not be worn. Long and loose hair must be tied back.
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

This work activity involves the following "High Risk Work"

- ☐ Confined Spaces
- ☐ Mobile Plant
- ☐ Demolition
- ☐ Asbestos
- ☐ Using explosives
- ☐ Artificial extremes of temperature
- ☐ Tilt up or pre-cast concrete
- ☐ Pressurised gas distribution mains or piping chemical, fuel or refrigerant lines energised electrical installations or services
- ☐ Structures or buildings involving structural alterations or repairs that require temporary support to prevent collapse
- ☐ Working at heights greater than 2 Metres
- ☐ Work in an area that may have a contaminated or flammable atmosphere
- ☐

Planning & Preparation

Liaise with Developer and City to establish that the following on-site systems and procedures are in place:

- Health and Safety Rules
- Induction for all workers – site specific
- Supervisory arrangements
- Communication
- Injury reporting
- Emergency Management
- Hazard reporting
- PPE
- Exclusion Zones
- Risk Assessments
- SWMS

All persons involved in task must have this SWMS communicated to them prior to work commencing

- Daily Tool Box Talks will be undertaken to identify, control and communicate additional site hazards.
- Work must cease immediately if incident or near miss occurs. SWMS must be amended in consultation with relevant persons.
- Amendments must be approved by O&M Manager and communicated to all affected workers before work resumes.
- SWMS must be made available for inspection or review as required by WHS legislation.
- Record of SWMS must be kept as required by WHS legislation (until job is complete or for 2 years if involved in a notifiable incident).

Emergency Evacuation Procedure

R	• **Rescue** or **Relocate** people in immediate danger if you can do so without endangering yourself.
A	• Sound the **Alarm**.
C	• **Confine** the dangerous situation, fire or hazardous material.
E	• **Evacuate** the area on direction from the O&M Manager or when it is unsafe to remain in the area.

Emergency Response

Follow Site Emergency Procedures and the directions of wardens and first aiders.

1. Call 000 (Mobile 111)
2. State type and scale of emergency
3. State workplace name and location
4. Number of casualties if applicable
5. Hazards that may be involved such as chemicals of fuel
6. Specific access point on site/space/area e.g. side entrances
7. Provide contact name and phone number
8. Answer all questions and follow instructions given by Emergency Services operator
9. DO NOT hang up until instructed.

First Aid Kit (FAK) ☐ Yes ☐ No
Fire Extinguisher ☐ Yes ☐ No
Spill Kit ☐ Yes ☐ No

JOB STEP:		POTENTIAL HAZARDS	CONTROL MEASURES TO REDUCE RISK		
NOTE: RISK-RATINGS AND PERSON RESPONSIBLE TO IMPLEMENT CONTROL MEASURES ARE RECORDED AT THE END OF EACH CONTROL SECTIION. INHERENT RISK-RATING (IR) RESIDUAL RISK-RATING (RR)					
1			IR:	RESPONSIBLE PERSON:	RR:
2			IR:	RESPONSIBLE PERSON:	RR:
3			IR:	RESPONSIBLE PERSON:	RR:
4			IR:	RESPONSIBLE PERSON:	RR:
5			IR:	RESPONSIBLE PERSON:	RR:
6			IR:	RESPONSIBLE PERSON:	RR:
7			IR:	RESPONSIBLE PERSON:	RR:
8			IR:	RESPONSIBLE PERSON:	RR:
9			IR:	RESPONSIBLE PERSON:	RR:
10			IR:	RESPONSIBLE PERSON:	RR:
11			IR:	RESPONSIBLE PERSON:	RR:
12			IR:	RESPONSIBLE PERSON:	RR:
13			IR:	RESPONSIBLE PERSON:	RR:
14			IR:	RESPONSIBLE PERSON:	RR:
15			IR:	RESPONSIBLE PERSON:	RR:

SAFE WORK METHOD STATEMENT VERSION NO: 1 ACTIVITY: AUTHORISED BY: REVIEW NO: DATE:

SAFE WORK METHOD STATEMENT - PART 2	
FORMAL TRAINING, LICENCES REQUIRED FOR WORKERS UNDERTAKING THIS TASK:	**RELEVANT LEGISLATION & CODES OF PRACTICE**
Delete or add as relevant Licence to Perform High Risk Work (operating certain plant, equipment) recognised training organisation Construction Induction Card (or equivalent) Competent in operation of make/model of plant Emergency procedures – emergency response PPE Traffic Management Plans	*Insert legislation references applicable to the O&M limits for this SWMS.* - - - - - - - -
PLANT/TOOLS/EQUIPMENT LIST FOR THE JOB.	
(Make & Model)	- - -
DETAILS OF SUPERVISORY ARRANGEMENTS FOR WORKERS UNDERTAKING THIS TASK:	
Delete or add as relevant Suitably qualified supervisors for job Direct on-site supervision Remote site – communication systems/ schedule Audits Spot Checks, etc. Reporting systems	
DETAILS OF: REGULATORY PERMITS/LICENSES ENGINEERING DETAILS/CERTIFICATES/WORKCOVER. APPROVALS:	
Delete or add as relevant Local permits Authorisation to work Confined Space Permit Building Approvals EPA approvals/permits Certain plant to be registered with State Authority PPE to comply with relevant State/Federal/Local Standards	
REFERENCE DOCUMENTS	

SAFE WORK METHOD STATEMENT - PART 3					
This SWMS has been developed in consultation and cooperation with *employee/workers* and relevant *Employer/Persons Conducting Business or Undertaking (PCBU).* I have read the above SWMS and I understand its contents. I confirm that I have the skills and training, including relevant certification to conduct the task as described. I agree to comply with safety requirements within this SWMS including risk control measures, safe work instructions and Personal Protective Equipment described.					
OVERALL RISK RATING AFTER CONTROLS	☐ 1 LOW	☐ 2 MODERATE	☐ 3 HIGH		☐ 4 ACUTE
EMPLOYEE/WORKER NAME	JOB ROLE / POSITION	SIGNATURE	DATE	TIME	EMPLOYER/PCBU/ SUPERVISOR