Proactive Maintenance & Technology in Housekeeping (Focus on the Office Environment)

Introduction

Our workspace is where we often spend the greatest part of the day and invest the greatest time and effort. Do we not owe ourselves the absolute best? The Safety and Health at Work Act, 2005 – 12 mandates that all employees be afforded the highest level of protection in the environment in which they work. The journey to achieving this begins with good design implementation and a sound maintenance schedule or programme.

Maintenanceis perpetual, and in its simplest and most raw form is an act of preservation. There is an inherent linkto sustainability and the need to safeguard the earth for future generations, starting with ourselves. Maintenance involves the assessment of a building and all of its components, the compilation of a budget for the servicing or replacement of components and establishing a maintenance schedule or routine.

Definition of Maintenance

Maintenance is defined by the 'Burra Charter' as the continuous protective care of the fabric, contents and setting of a building.

There are four modes of maintenance – reactive, preventative, predictive and proactive and can be defined as follows:

1. A **reactive maintenance** plan takes care of issues as they arise with a "run-to-failure" approach. While this theoretically keeps maintenance costs to a minimum, it can prove to be very costly when equipment actually does fail. Revenue and productivity can be cut significantly with extended periods of downtime, and it can eventually cost more for maintenance with a more immediate demand for labor and parts.
2. A **preventative maintenance** plan works specifically with time-based intervals determining maintenance and service of equipment. This mode is intended to perform service before equipment begins to wear, but it can be fairly inaccurate and cost more. If performed too often, equipment will be replaced while it is still useful.
3. A **predictive maintenance** plan relies on determining when equipment will wear out, rather than using time intervals. This will typically be a more affordable route compared to the previous modes because it decreases downtime while optimizing the usefulness of equipment.
4. A **proactive maintenance** plan combines components of the previous approaches to maintenance by focusing on root causes that lead to equipment wear and failure. This approach prolongs the lifetime of equipment while also preventing redundancy in repairs for things that don't need it.

Building maintenance can also be categorized according to who carries out the maintenance work:

Housekeeping maintenance: maintenancecarried out by property managers; or

Second line maintenance : maintenance carried out by specialist tradespeople.

Equipment installed within a building also needs routine servicing and the replenishment of consumables to keep them in good working order. They usually have specific servicing and maintenance requirements which are provided through a service contract, often with a supplier.

Maintenance Schedule/Plan

The main reason for a maintenance plan is that it is the most cost-effective way to maintain the value of an asset. The advantages of a plan/schedule are:

- the property is organized and maintained in s systematic rather than ad-hoc way;
- building services can be monitored to assist their efficient use;
- the standard and presentation of the property can be maintained;
- subjective decision making and emergency corrective maintenance are minimized.

When buildings are neglected, defects can occur which may result in extensive and avoidable damage to the building fabric or equipment. Neglect of maintenance can also give rise to fire and other safety hazards and increases the risk of use by occupants to injury due to unknown or undocumented factors.

Focus on Maintenance Managers

The maintenance plan or schedule forms a part of a total asset management strategy, with an aim to both improve value for money from the asset and provide a safe environment for the occupant or end user. As a building manager, you need to know and record in detail what you are managing. Without this information you cannot decide on a maintenance policy or estimate your expenditure for a budget. Some basic yet important information that a building manager needs to have includes:

- as-built plans showing the location of all elements, easements and construction details
- services drawings namely Mechanical, Electrical and Plumbing (MEP) drawings
- structural drawings (from the Engineer)
- maintenance requirements
- names and contact information for those responsible for maintenance
- dimensions and areas of accommodation
- reports on the building (structural, environmental etc.)
- Complaint or Observation Log Sheets stating issues encountered by occupants and visitors (building defects, injuries)

Maintenance Log Book

The maintenance log book is another very crucial tool needed by the maintenance manager. In the log book is recorded all maintenance work carried out, including a description of the work, date of completion, estimated and actual (invoiced) cost, the name and contact information of the contractor and any warranties. A cross-reference system should enable details of treatments such as fungicides, pest and termite treatments, paint types and colours to be readily accessible for future reference. As the

log book includes the estimated and actual (invoiced) pricing for work done, it is a valuable source for future budgeting.

Periodic Inspection Survey

All properties should be inspected at regular intervals in order to identify and deterioration and required maintenance work, including cleaning. Records outline the previous and existing condition and are a guide to likely issues in the future and the associated costs to repair. The inspection also indicates whether a property is being over-maintained or under-maintained or misused. It can also show if previous effected maintenance was inappropriate or if there are design or material defects.

There would be some advantage in recording the long-term performance of repair materials and the procedures of installation in order to assess the suitability and viability for future maintenance work.Where there may be changes in maintenance personnel, the failure to keep detailed records could result in the repetition of previous mistakes. The usefulness of written records will often be enhanced by taking photographs periodically to illustrate detrimental changes in the performance of the repair.

During your interior inspection it is important to:

- Check the condition of floors, ceilings and walls
- Look for leaks or water damage in bathrooms and ceilings
- Ensure that doors lock and unlock easily
- For fire safety, ensure that egress doors are not blocked and corridors are free of trash and large items which could impede safe and easy movement

As you move outside to inspect the exterior of the building it is important to:

- Check the perimeter pathways, sidewalks etc. for possible tripping hazards such as cracks and potholes and other defects and effect repairs
- Check the condition of windows and doors
- Ensure that debris is cleared from the gutters at roof heights
- Ensure that debris and garbage is cleaned up and cannot block drains and manholes
- Look at the condition of the exterior finish (paint, siding/panels)
- Check for loose railings

As you inspect your building systems, be sure to:

- Test the fire alarm system, smoke detectors and sprinkler system where this type of fire suppression system is installed. Have periodic inspections by the Barbados Fire Service and include fire drills.
- Test the building alarm system. Check in with the security provider to ensure that modules are properly functioning

- For the electrical inspection, look around for loose wires, outlets or fixtures, signs of hot or burning outlets. You can schedule a comprehensive inspection by an electrician at desired intervals.
- Check the HVAC (heating and cooling systems).

Make sure to keep your notes after the inspection so that records are accurate and that action can be taken where required.

Focus on Non-Maintenance Managers

The occupant or user of a building is equally as important as the maintenance manager, after all, buildings were designed for use, and safe use by human beings for human beings. The occupant is the alert system for the maintenance manager as they will interact with many of the facets of a building on a daily basis. From turning the knob or pushing the buzzer to gain entry, utilizing a work station, moving to the kitchen or restrooms or simply moving to a colleague's work station come as second nature and with a level of trust that nothing will happen. What do you do when you notice that some doesn't look quite right? You make a complaint or observation! Alerting staff to an issue before it festers and becomes a major problem is of great importance and can save an occupant from potential injury and an owner from damages through a lawsuit. The occupant has an incredible part to play in the collection of data and is considered a partner in the successful execution any maintenance plan.

The Role of a Building's Architecture and Maintenance

Webster's dictionary defines architecture as "the art or science of building, specifically the art or practice of designing and building structures, especially habitable ones". Simply put, Architecture is the study of the built environment. World renowned architect Charles-Edouard Jeanneret-Gris, better known as Le Corbuiser declared that "Architecture is the starting point for anyone who wants to take humanity towards a better future".He also declared that "the house is a machine for living" and by extension the office is a machine for working. In this, the importance of design decisions in the creation of any building can never be understated. Safety of the occupant is paramount,and flow seamlessly with the optics of aesthetics and a delectable materials palette, well organized and programmed spaces and memorable and effective communication to these spaces. The idea of successfully designing, constructing and operating energy efficient and high performance buildings embodies all members of the design team (the owner, architect, engineers (structural and MEP), quantity surveyors, the contractors and other specialists). This outlook holds the hand of sustainability and ensures that through conscious design decisions, the world will be preserved and left in better condition for our future generations. Design cues such as ensuring that spaces are designed with adequate light and ventilation with appropriately sized windows, adequate square footage per user/space, appropriate cladding materials for the facades and roof, along with thresholds at entry and exit doors to prevent entry of rain (driving rain) are some of the ideals that are pursued and enacted.The comfort and safety of the interior

spatial setting is achieved with a well thought out and efficiently constructed building envelope. Let us not forget the idea of the air curtain which helps to mitigate good interior temperature and quality of air as one moves directly into an air conditioned building from the outside. This transition point ensures that the AC units work as efficiently as possible by maintaining the desired air temperature and preventing the intrusion of too much hot exterior air.

Consequences of Poorly or Partially implemented Maintenance Schedule/Programmes

The fallout from a poorly implemented maintenance schedule or programme can be devastating and require large injections of money to make the issues right. Constantly deferring required repairs usually means that problems fester and spiral out of control resulting in glaring defects to the building and possible illness and injury of employees (Sick Building Syndrome). Indoor air quality can be affected by inadequately maintained AC units, with the result being increased complaints of respiratory illness by employees. What happens if we add uncleared gutter systems and roof leaks to this? The build-up of vegetation in uncleared gutter systems can lead to leakage of water into walls over time resulting in efflorescence (pealing of paint as the water drives minerals to the surface of the wall). If left unresolved, this too can cause respiratory issues for employees. Unresolved plumbing leaks can easily lead to flooding of a space and the possibility of injury due to slipping. The possibility of drastically increased water bills is another gremlin which could raise its ugly head. Non-functioning locks on doors is a security and health risk as occupants can become trapped in spacesand the panic to gain freedom can lead to injury.

The fallout from lack of maintenance not only registers physically, but emotionally as well as the resulting drop in morale can be measured in a drop in productivity by employees. If the space in which they spend most of their day is not up to par, then the questions of why should I invest my health and time come to bare. Customers can easily loose interest in doing business and this directly affects the capital of a business.

It is definitely not worth it to risk to an employee and customer's health and the opportunity to do business. A little maintenance definitely goes a long way!

Technology : Improving efficiency in the Office Setting

We live in the technological age, where there is an app for everything, and efficiency is always at our finger tips. We have the distinct ability and opportunity to positively affect our work environment. There are modules which can control window shades based on the angle of the sun's rays, occupancy sensors that control when a light turns on or off. There are even modules which control the amount of water and energy that is used. We can also secure and monitor our homes and offices with our smart phones. Technology allows us to conserve our resources and be comfortable and efficient at the same time.

We are able to utilize the power of the sun for energy production through the use of the photovoltaic system and decrease our dependence on fossil fuels for energy generation. Our buildings can not only

produce energy, but preserve and protect our planet as well. Depolluting or Photocatalytic concrete assists in the removal of contaminants from our environment. Photocatalysts accelerate the chemical reaction where strong sunlight or ultraviolet light decompose organic materials in a slow and natural process. When use on or in a concrete structure, the photocatalyst decomposes organic materials, biological organisms and airbourne pollutants. Titanium dioxide (TiO2), a white pigment is the primary catalytic ingredient and can be incorporated during the cement manufacturing process. By utilizing this product when we build, we are taking responsible steps in the reduction of CFCs and aiding our trees in the production of quality air. When it rains, the particles are washed from the buildings are return to the earth. We are lowering our carbon footprint! This improves our quality of life and safeguards our earth for future generations!Let's not forget BIM, which stands for Building Information Modeling. Software such as Autodesk Revit, Archicad and Bentley Microstation are three of the options on the market and are utilised by architects, engineers and other designers in the execution of design, planning and construction of buildings. This affords the opportunity for greater detail and exploration in design as all players can be better integrated in the process. The production time is greatly reduced and clients are able to better visualize the end product through the renders which are easily produced. At this point there is also the opportunity to utilize Virtual Reality which allows the client to be immersed in their project before a block is laid. BIM greatly enhances the opportunity for 3d printing and prefabrication on the job site and provides high quality end products. How do we benefit one might ask? Well, the client is able to have access to the end product much quicker. By extension, the time line to have maintenance executed is reduced as building information is readily available, and, where materials and parts are required, they can be had rather quickly.This puts less strain on the employer and employee and makes for a better work environment and allows the team to focus on their goals.

Questions / Comments

Appendix

Further information and reference materials used for this presentation:

*https://www.buildings.com/article-details/articleid/21146/title/sooner-or-later-weighing-the-feasibility-of-proactive-maintenance

https://www.fiixsoftware.com/scheduled-maintenance-critical-percent/

Case Study for Photocatalytic Concrete: https://www.youtube.com/watch?v=bS7HwQcXBFE

Technology in Architecture – Kinetic Buildings: https://www.youtube.com/watch?v=ivZk6fOtxZ0