

What are the different systems in our building?

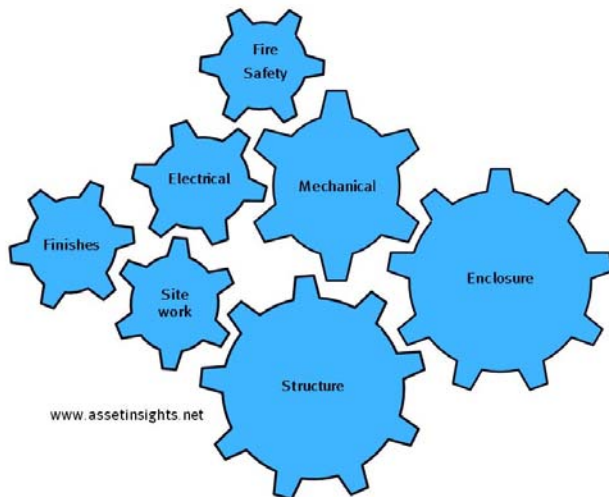
David Albrice, 2010



Introduction

The first information bulletin introduced the concept of “asset management.” In this bulletin we turn our attention to the different types of physical systems within a building.

Buildings are comprised of seven primary physical systems that are integrated with one another and interact with the occupants of the building. The size and complexity of the building will determine the nature and extent of the systems that are present in the building -- for example, high-rise buildings have additional components that are not present in townhouse complexes, such as elevators, hallway ventilation systems, underground parking garages. Similarly, commercial buildings have equipment that may not be present in residential buildings.



The following sections discuss each of these seven building systems as well as their significance in the context of asset management for the building.

1: Structure

The structural system is similar to the skeleton of the human body. It provides the primary support for the building and is comprised of various assemblies and components, including the foundation, walls and columns, floors and roof support structure.

The structure of the building is often inaccessible or hidden by interior finishes (on the inside) and elements of the building enclosure (on the outside). The fact that this system is difficult to access and supports all other systems in the building means that it should last the life the building with minimal maintenance and renewal activities. A possible exception to this general rule is an underground parking structure where components are more accessible and can therefore be inspected and maintained to some extent.

The photographs below show some of the elements of the structural system in typical condominium buildings.



CONCRETE COLUMNS IN PARKADE



INTERIOR STAIRS

2: Enclosure

The building enclosure (also known as the building “envelope”) separates the exterior environment from the interior environment of the building. It is analogous to the skin on the human body. Some of the primary assemblies in this system are the roofs, walls, windows, and exterior doors. The

photographs below show some of the different facets of the enclosure system.



SLOPED ROOFS



FLAT ROOFS



WALL CLADDING



WINDOWS



BALCONIES



EXTERIOR DOORS



SERVICE PENETRATIONS



PARKADE TRAFFIC DECK

The enclosure system has the closest relationship with the structural system - to which it is attached. The enclosure system also has localized relationships with the electrical and mechanical systems, particularly at service penetrations through the wall and roof assemblies (such as dryer vents and fireplace vents).

The building envelope is only partially accessible, often with several hidden layers or components. The components and materials of the building enclosure are generally exposed to the exterior environment and therefore will deteriorate over time. Maintenance and renewals of this system is critical not only to the ongoing performance of the building enclosure, but also for the other building systems that the building enclosure protects.

3: Electrical

The electrical system is similar to the nervous system in the human body. It distributes power to the different parts of the building and contributes to the controls and communications. Some of the primary electrical assemblies include the transformer, power distribution panels, light fixtures, telecommunications, and security equipment. The photographs below show different elements of the electrical system.



POWER TRANSFORMER



EMERGENCY GENERATOR



ENTERPHONE CONTROL PANEL



DISTRIBUTION PANELS



FIRE CONTROL PANEL



DOOR ACCESS CONTROL



SECURITY CAMERAS



LIGHT FIXTURES

The electrical system has a close relationship with the mechanical system because of the power and control requirements of mechanical equipment.

Except for light fixtures, power receptacles and panel boards, most elements of the electrical system are inaccessible. As a result, the expected useful service life of the inaccessible elements (like wiring) is often intended to be for the life of the building or very long periods of time. Accessible components do require periodic inspection, maintenance and renewals.

4: Mechanical

The mechanical system is analogous to the vital organs of the human body (such as the heart, liver and lungs). It comprises, amongst other things, pumps and filters for the efficient passage of fluids and air through the building. The mechanical system provides water, heating, cooling and ventilation to meet the interior conditioning and service requirements for the building occupants. The photographs below illustrate some of the typical elements of the mechanical system.



HOT WATER HEATERS



HEAT EXCHANGER



AIR MAKE-UP UNIT



DISTRIBUTION PIPING



FIRE SPRINKLER VALVES



ELEVATOR MACHINES



GAS REGULATORS



BOOSTER PUMPS

Some components of the mechanical system are hidden within wall and floor spaces and may be difficult to maintain. However, many other elements are located in locked utility rooms and therefore accessible for maintenance and renewals activities. Periodic inspection, testing and parts replacement are all part of the maintenance and renewals work associated with mechanical systems.

5: Fire Safety

The fire safety system monitors, detects and suppresses fire hazards. The fire safety system is in some ways analogous to the autoimmune system of the human body, which removes bacteria and viruses from the human body.



COMPRESSOR



DRY SPRINKLER VALVES



FIRE EXTINGUISHERS



SPRINKLER HEADS

The fire safety system overlaps both the electrical and mechanical systems in the following ways

- Fire detection equipment (such as heat and smoke detectors) is often classified as electrical components;
- Fire suppression equipment (such as pumps and sprinklers) is treated as part of the mechanical domain.

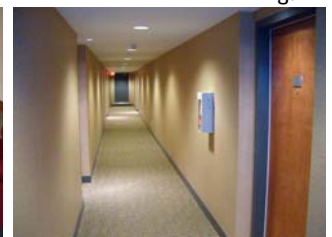
Suppressing fires and controlling smoke transmission is a type of autoimmune response. The system also includes components to facilitate the efficient evacuation of people from the premises, such as exit signs and emergency lighting.

6: Interior Finishes & Amenities

The interior finishes provide comfort, utility and ambiance of the interior common areas, such as lobbies, hallways and amenity rooms. The finishes includes the aesthetic surfaces of the floors, walls and ceilings. The photographs below show the interior finishes in some of the common areas of a building.



LOBBY FURNISHINGS



HALLWAY CARPETS & PAINTING



ELEVATOR CAR INTERIOR



RECREATION FACILITIES



FITNESS EQUIPMENT



INTERIOR WATER FEATURES

Unlike many of the other building systems, interior finishes are almost always readily accessible and can therefore be maintained and renewed relatively easily. As elements of this system primarily affect aesthetic appearances, they have little impact on the performance of other systems within the building.

7: Sitework

This system contributes to the exterior appearance of the property, provides access to the building perimeter, and may sometimes also provide outdoor recreation amenity space for the owners. The assemblies in this system fall into two broad categories:

- “Hard” landscaping, such as roadways, pathways, retaining walls, and water features.
- “Soft” landscaping, such as and lawns, trees, shrubs, and plant beds.

Within these assemblies, some of the primary components are plants, fences, roadways, walkways, outdoor stairs.



WALKWAYS



LAWNS



PERIMETER FENCING



WATER FEATURES

The sitework is sometimes considered to be an entirely separate system from the building and its renewal costs are sometimes calculated with the land. Grounds that are properly maintained create a good first impression for guests and others who arrive at the property.

Next Steps

In the next bulletin we will discuss the procedures involved in the development of an inventory of the assets. The inventory forms the baseline database of information that is used by the asset management team to track and analyze the assets over their service life.

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