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Facility Management in Residential Township

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Abstract - *Facility management is a sequence of services like planning, organizing and maintaining the facilities provided. Safety and security is a mandatory service to be provided to residents. It includes automatic fire system which will warn residents as well as reduce fire through water sprinklers. Smoke detectors are connected with HVAC system to remove harmful gas from closed area. Home automation controls the house premises with the help of Artificial Intelligence devices (Amazon alexa, Google chrome). Since electricity is generated with non-renewable resources, we can generate it with renewable source like solar. Solar can be used to heat water and generate electricity for daily purpose. Nowadays the concept of Solid waste management is in demand. Keeping this in mind the unit for composting is used to convert organic waste to reusable manure. Waste water is water that is intended to remove from community but has adverse effects on environment. The treatment procedure is developed to treat water and reuse for gardening as well as toilet flushing.*

Key Words: Facility Management, HVAC, Solar Gaps, Solar Water Heater, Home Automation System, Safety & Security Services, Stack Parking, Composting, etc.

1. INTRODUCTION

Facility management is related with building management. It provides different disciplines like planning, designing, constructing and managing space and facilities. By provision of such management to any structure that uses automated process to control automatically building's operations like heating, ventilation, A.C., lighting, safety and security services and other system. It also reduces energy use and optimizes how space is used & Includes long term planning and focus on its users. Facility Management also includes long term, cost benefits, providing maintenance support, project management and user management during the building life cycle. The main purpose of facility management is to minimize the usage of natural non renewable resources and replacing them with natural renewable resources which is available in abundance and also to maintain ecological balance. The bottom line of this project is to highlight social, environmental and economical benefits to be adopted for sustainable approach of facility management.

Following are the elements which work together to make the building sustainable:- Heat, Ventilation and Air Conditioning (HVAC) system is provided so as to meet the requirements of comfort, cost, efficiency and aesthetic appeal [1]. Solar Gaps are External aluminum Venetian blinds with solar panels, which generate electricity. By using solar energy, we can significantly reduce CO2 emissions in the environment. Solar water heater (SWH) is the conversion of sunlight into heat for water heating [2]. Home automation system (HAS) involves automatic controlling of home appliances using different technologies and controllers over desktops, laptops smart phones or tablets [3]. Automatic fire alarm systems are activated through fire detectors, such as smoke or heat sensors [4]. A smoke detector is an electrical device that detects smoke and an indication of fire [5]. A Stack parking is a multiple levels stacked vertically to maximize the area of parking spaces while minimizing land usage [6]. Sewage Treatment Plant (STP) is a process where waste water produced from toilets, baths, showers, and kitchens, sinks that are treated and reused for various purposes [7]. Compost is organic matter that has been decomposed and it is a process where recycles of organic waste products and produces a soil conditioner [8].

2. LITERATURE SURVEY

In this paper, they have studied the existing solar water system and their application. This paper is reviewed to understand the concept of construction, application, and dimensions of solar thermal system. They have studied two types of solar system i.e.

passive solar system and active solar system. In present solar system passive solar system is used. Author has described the definition of composting and it further gave importance on composting process so that it can use in agricultural purpose. Materials are kept under strict observation and after testing of material with proper composter bin this waste material are convert into organic materials and further useful by-products which can be used for reduces landfill space, surface and groundwater contamination, methane emissions, transportation costs, air pollution from burning waste. In this paper, they have shown the short term as well as long term parking facilities as well as future parking improvement and proper plan is given. As demand is increasing so author has provided information on different parking system as well as PCU. Parking surveying as well as PCU graph and comparison is carried out in between parking facilities.

3. PROPOSED WORK

Facility Management is transforming a building into Smart building which is beneficial for both Owner & Organizations. As an increasing number of residential buildings have been developed over recent decades, the demand for facilities Management has also grown accordingly. It includes the following elements:-

3.1 HEAT, VENTILATION & AIR-CONDITIONING

For Fresh air, Cooling & heating - the Heat, Ventilation & Air Conditioning (HVAC) play an important role in designing & managing a building. It provides fresh air & removes pollutants. The saving can be improved by providing such system. As a result, a less efficient heating & cooling plant in a system with separated functions can deliver significant energy savings at the same time as improving air quality, comfort, and reliability.

3.2 SOLAR GAPS

Solar gaps are Smart blinds which are automatically track the sun & can be used as an alarm clock in the morning and keep the privacy during the night which can be easily controlled by Smartphone. It is installed on the outside of homes which provide shading and protection of building from external influences. Solar gaps generate the electricity & the Energy generated from Solar Gaps can be either sent to the grid or to ESS (energy storage system). Installation of blinds requires specialized knowledge, therefore must be installed by authorized installers.

3.3 SOLAR WATER HEATER

Solar water heater is using a Solar Thermal Collector to conversion of sunlight into heat for heating water. It is used at homes for producing hot water that can be used for bathing, cleaning, and washing. Solar water heater of 100-300 litres capacity is suited for domestic application. Hot water at 60-80^{o}C is possible through use of solar water heaters. Benefits by using such system are, Fuel Savings - A 100 litres capacity SWH can replace an electric geyser for residential use and saves 1500 units of electricity annually & Saves cost on power generation - The use of 1000 SWHs of 100 litres capacity each can contribute to a peak load saving of 1 MW.

3.4 HOME AUTOMATION SYSYTEM

Home automation system makes the operations of various home appliances more convenient and saves energy. It involves automatic controlling of all electrical or electronic devices in homes or even remotely through wireless communication techniques such as Bluetooth, GSM, ZigBee, Wi-Fi. Home automation system is designed and developed by using a single controller which has the ability to control and monitor different interconnected appliances such as power plugs, lights, temperature and humidity sensors, smoke, gas and fire detectors as well as emergency and security systems. One of the greatest advantages of this system is that it can be controlled and managed easily from devices such as smart phone, tablet, desktop and laptop.

3.5 SAFETY & SECURITY SERVICES

It is used to provide Smoke Detector & Automatic Fire Alarm System.

Smoke Detector: - Smoke detection system being an important safety device nowadays. These detectors are kept in plastic enclosures and usually designed like a disk about 6 inches diameter and 1 inch in thickness, but size and shape can vary. Smoke can be

sensed either photoelectric or by ionization, smoke detectors may use either or both the methods. This system operated by indicating an increase temperature above the safe limit in the room where it was fixed. It consists of two basic parts which are sensor to sense the smoke and a sounder or alarm to warn people. Smoke detectors can run off of a 9V battery. Smoke Detector is a sensitive device against the smoke & range up to 30m to 40m.

Automatic fire alarm system: - These systems are activated with the help of smoke detectors or heat sensors. Manual fire system is activated with the help of manual pull levers which will just activate an alarm that will only warn residents to evacuate the facility. But our system will be connected with the sprinklers which will be activated when there is fire hazard in the facility. Fire alarm, detectors and sprinklers will be installed in the parking area.

3.6 SEWAGE TREATMENT PLANT

Sewage treatment is process of removing contaminants from domestic waste water as well as runoff. It includes physical, chemical and biological process. Its objective is to treat the water for reuse or discharge and also dispose the sludge into environment. This water is contaminated with many organic and inorganic toxic compounds. The liquid waste must be treated before disposal, since it can endanger public health or cause offensive conditions. The treatment of sewage consists of many complex functions which can be classified as:- Preliminary treatment, Primary treatment, Secondary treatment, Tertiary treatment.

3.7 STACK PARKING

Stack Parking is a program that takes advantage of space within designated parking facilities to double-park vehicles without disrupting traffic circulation. It has the capacity to hold three cars, Initially there is one parking at the ground level and the other two are below the ground. As the first one is occupied it gets lifted up and makes way for the second parking same goes for second as well as for third one. When the first car is to leave, the lift moves downwards into the ground bringing the top car to the ground level to leave.

3.8 COMPOSTING

Compost is organic matter that has been decomposed in a process called composting. This process recycles various organic materials otherwise regarded as waste products and produces a soil conditioner (the compost). Compost is rich in nutrients. It is used, for example, in gardens, landscaping, horticulture, urban agriculture and organic farming. A healthy compost pile should have much more carbon than nitrogen. The benefits of composting is, it Absorbs odours and degrades volatile organic compounds & Prevents pollutants in storm water runoff from reaching water resources, and protects groundwater quality. It also avoids methane production & leachate formation in landfills by diverting organics for composting.

3. CONCLUSIONS

To provide innovative services to our model of residential township which leads to include long term, cost benefits, providing maintenance support, project management and user management during the building life cycle. We have developed a model of 15 FLOOR with the help of Autodesk Revit to clearly mention the position of elements. We have installed solar gaps which will generate and store electricity with the help of solar panels and use it for domestic purpose. HVAC system is also installed which is connected with smoke detectors that will emit out harmful gases. Home automation system is also installed which is interlinked with wireless supported electronic device. We have also provided various amenities like automatic fire system, smoke detectors, CCTV. Also we have designed STP for 420 – 2 BHK apartments by assuming 5 persons per apartment. Total sewage flow daily is to be 285 m^3 and thus per person sewage generation will be 135 LPD. We have also installed a 3 layer stack parking which can park 3 vehicles in place of 1 vehicle. This parking system helps to park more vehicles than conventional parking. Composting units are also installed for solid waste management purpose.

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