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Autonomous Building

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Abstract:- During a concrete placement on the second story of a building under construction, the supporting cold-formed steel beams collapsed. Four workers were injured. The collapse occurred while concrete was being placed the steel decking. Analysis of the steel beams under the weight of concrete and workers using the applicable American Concrete Institute and American Iron and Steel Institute documents indicated that the beams were overstressed for construction loads. After the collapse, part of the structure was rebuilt using thicker beams.

Keywords:- Futuristic, insulation, increase inefficiency, energy efficient appliances

I. INTRODUCTION

An **Autonomous Building** is a building designed to be operated independently from infrastructural support services such as the electric power grid, gas grid, municipal water systems, sewage treatment systems, storm drains, communication services, and in some cases, public roads.Advocates of autonomous building describe advantages include reduced environmental impacts, increased security, and lower costs of ownership. Some cited advantages satisfy tenets of green building, not independence per se (see below). Off-grid buildings often rely very little on civil services and are therefore safer and more comfortable during civil disaster or military attacks. (Off-grid buildings would not lose power or water if public supplies were compromised for some reason.)

Most of the research and published articles concerning autonomous building focus on residential homes.

British architects Brenda and Robert Vale have said that, as of 2000, "It is quite possible in all parts of Australia to construct a 'house with no bills', which would be comfortable without heating and cooling, which would make its own electricity, collect its own water and deal with its own waste...These houses can be built now, using off-the-shelf techniques. It is possible to build a "house with no bills" for the same price as a conventional house, but it would be (25%) smaller."

“A green building is one which uses less water, optimizes energy efficiency, conserves natural resources, generates less waste and provides healthier spaces for occupants as compared to a conventional building.”

Growth of green building in India Green building design is looked in an integrated way.

Site planning Building envelope design Building system design HVAC (heating ventilation and air conditioning), lighting, electrical, and water heating Integration of renewable energy sources to generate energy onsite.

Water and waste management election of ecologically sustainable materials (with high recycled content, rapidly renewable resources with low emission potential, etc.).
Indoor environmental quality (maintains indoor thermal and visual comfort and air quality).

II. BENEFITS OF GREEN BUILDING

Green building consume 40% to 60% (depending on the range of measures adopted) lesser electricity ascompared to conventional buildings. This is primarily because they rely on passive architectural interventions in the building design, and high efficiency materials and technologies in the engineering design of the building. Green building also attempt to work towards on-site energy generation through renewable energy utilization to cater to its energy needs. For instance, solar thermal systems can help generated hot-water and replace the conventional electrical geyser in buildings. Solar PV panels can help generate electricity which can reduce the buildings dependence on grid power.

Green buildings consumes 40% to 80% (depending on the range of measures adopted) lesser water as compared conventional buildings. By utilizing ultra-low-flow fixtures, dual plumbing systems and rain-water harvesting, green buildings not only reduce their demand for water use but also look at on-site supply options to cater to its internal and external (landscape) water demands.

Green buildings generated lesser waste by employing waste management strategies on site. They may also employ waste to energy or waste to resources (like manure or compost) strategies on site, to minimize their burden on municipal waste management facilities and landfills.

Green buildings generate lesser pollution both during construction materials, barricading of the site to preventair and noise pollution during construction and operation, and so on, ensures reduced impact on thesurrounding environment.

Green building ensures proper safety, health and sanitation facilities for the labourers (during construction)and the occupants (while in use).

Green buildings offer higher image and marketability.

III. WHAT IS GREEN BUILDING RATING SYSTEM?

There are three primary rating systems in India.

Green Rating for Integrated Habitat Assessment (GRIHA) is India’s own rating system jointly developed by TERI andthe Ministry of New and Renewable Energy, Government of India. Commonwealth Games village, New Delhi, Fortis Hospital,

IV. LITERATURE REVIEW

The Dymaxion House, reconstructed and installed in the Henry Ford Museum. In the 1930s through the 1950s, Buckminster Fuller's three prototype Dymaxion houses adopted many techniques to reduce resource use, such as a "fogger" shower head to reduce water use, a packaging toilet, and a vacuum turbine for electric power. While not designed as autonomous per se, Fuller's concern with sustainable and efficient design is congruent with the goal of autonomy, and showed that it was theoretically possible. One of the three prototype Dymaxion houses that Fuller produced was made part of the conventional Graham family residence in Wichita, Kansas, and has now been reconstructed at the Henry Ford Museum.

In the 1970s, a group of activists and engineers calling themselves the New Alchemists believed the warnings of imminent resource depletion and starvation. The New Alchemists were famous for the depth of research effort placed in their projects. Using conventional construction techniques, they designed a series of "bioshelter" projects, the most famous of which was the Ark Bioshelter community for Prince Edward Island. They published the plans for all of these, with detailed design calculations and blueprints. The Ark used wind based water pumping and electricity, and was self-contained in food production. It had living quarters for people, fish tanks raising Tilapia for protein, a greenhouse watered with fish water and a closed loop sewage reclamation system that recycled human waste into sanitized fertilizer for the fish tanks. As of 2007, the successor organization to the New Alchemists still had a web page up as the "New Alchemy Institute". The PEI Ark has been abandoned and partially renovated several times.

The 1990s saw the development of Earthships, similar in intent to the Ark project, but organized as a for-profit venture, with construction details published in a series of 3 books by Mike Reynolds. The building material is tires filled with earth. This makes a wall that has large amounts of thermal mass (see earth sheltering). Berms are placed on exposed surfaces to further increase the house's temperature stability. The water system starts with rain water, processed for drinking, then washing, then plant watering, then toilet flushing, and finally black water is recycled again for more plant watering. The cisterns are placed and used as thermal masses. Power, including electricity, heat and water heating, is from solar power.

1990s architects such as William McDonough and Ken Yeang applied environmentally responsible building design to large commercial buildings, such as office buildings, making them largely self-sufficient in energy production. One major bank building in the Netherlands was constructed to be autonomous and artistic as well.

The first known building code was included in Hammurabi’s code of laws, around the 1700sB.C. The Babylonian king of Mesopotamia ruled that the builder of a house should be put to death if a building he constructed fell and killed its owner. Building codes became less draconianbut far more specific as they responded to damage and loss of life from fires, earthquakes, and other building failures. Steps along the way included London regulations in 1189 A.D. for theconstruction of common walls and for rights to light access, drainage, and safe egress in case of fire; US Colonial-period bans on wood chimneys and thatch roofs; and the New York CityTenement House Act of 1867, covering such things as fire escapes, ventilation, water supply,toilets, and stair railings. In 1905, the National Board of Fire Underwriters, an insurance industry group, wrote the first National Building Code for the United States. Seismic codes were adopted in many geologically active areas following the San Francisco earthquake in 1906.By 1940, three different code organizations had been established in the United States, withmodel codes that reflected regional variations and made it difficult to work across different codeenforcementareas. Decades of efforts to harmonize the three codes ultimately resulted in thecreation of the International Code Council (ICC) family of codes, the first full edition of which was published in 2000. Included in the 11 codes making up the ICC family were the International Building Code,

International Residential Code, and "International" versions of the Mechanical, Plumbing, Fire, and Energy Conservation codes (the National Fire Protection Association [NFPA] later split from the ICC process and began developing its own building code to compete with the ICC).
In Canada, responsibility for build

V. ADVANTAGES

As an architect or engineer becomes more concerned with the disadvantages of transportation networks, and dependence on distant resources, their designs tend to include more autonomous elements. The historic path to autonomy was a concern for secure sources of heat, power, water and food. A nearly parallel path toward autonomy has been to start with a concern for environmental impacts, which cause disadvantages.

Autonomous buildings can increase security and reduce environmental impacts by using on-site resources (such as sunlight and rain) that would otherwise be wasted. Autonomy often dramatically reduces the costs and impacts of networks that serve the building, because autonomy short-circuits the multiplying inefficiencies of collecting and transporting resources. Other impacted resources, such as oil reserves and the retention of the local watershed, can often be cheaply conserved by thoughtful designs.

Autonomous buildings are usually energy-efficient in operation, and therefore cost-efficient, for the obvious reason that smaller energy needs are easier to satisfy off-grid. But they may substitute energy production or other techniques to avoid diminishing returns in extreme conservation.

An autonomous structure is not always environmentally friendly. The goal of independence from support systems is associated with, but not identical to, other goals of environmentally responsible green building. However, autonomous buildings also usually include some degree of sustainability through the use of renewable energy and other renewable resources, producing no more greenhouse gases than they consume, and other measures.

VI. DISADVANTAGES

First and fundamentally, independence is a matter of degree. Complete independence is very hard or impossible to attain. For example, eliminating dependence on the electrical grid is one thing but growing all of your own food is a more demanding and time-consuming proposition.

Living in an autonomous shelter can require one to make sacrifices in one's lifestyle choices, personal behavior, and social expectations. Even the most comfortable and technologically advanced autonomous houses may require some differences in behavior. Some people adjust easily. Others describe the experience as inconvenient, irritating, isolating, or even as an unwanted full-time job. A well-designed building can reduce this issue, but usually at the expense of reduced autonomy.

An autonomous house must be custom-built (or extensively retrofitted) to suit the climate and location. Passive solar techniques, alternative toilet and sewage systems, thermal massing designs, basement battery systems, efficient windowing, and the array of other design tactics require some degree of non-standard construction, added expense, ongoing experimentation and maintenance, and also have an effect on the psychology of the space.The Vales, among others, have shown that living off-grid can be a practical, logical lifestyle choice—under certain conditions.