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Analysis of Green Building

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Abstract - *Building a green structure is a crucial step in creating an environment free from adverse effects. As a result, the research study focuses on describing the international green building rating systems through the lens of various nations and the standards that they employ to assess the buildings. Also, the primary goal of this study is to demonstrate how the environmental sustainability features were attained from an engineering and architectural perspective by illustrating several significant case studies drawn from various climate zones that apply those requirements. This study intends to create the opportunity to investigate in-depth a number of problems that architects, engineers, and designers frequently encounter and how constructive solutions are accomplished by strengthening the properties of the structure.*
Key Words: *Free of negative impact*

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I. INTRODUCTION

In order to meet societal demands, improve quality of life, and support a nation's economic development, the building industry is crucial. Due to its extensive use of natural resources and energy, the building industry has come under fire for contributing significantly to environmental degradation, carbon emissions, and global warming. Statistics show that it consumes a third of global resources, a sixth of freshwater withdrawals, 25% of harvested wood, and 40% of all raw materials. The production of construction materials uses about 10% of the total energy supply in the world. Also, the building industry contributes 40% of all solid waste in developed nations by producing enormous amounts of construction and demolition debris. To reduce and improve the use of natural resources and manage pollution, authorities and organisations started the rating systems for green buildings. Buildings that have received certification from those grading systems use less energy, produce better indoor conditions, and enhance the property's reputation as a whole. On a global scale, there are thought to be 600 grading systems. The best and original rating tool for evaluating building performance based on predetermined target values for several criteria is known as BREEAM.

II. LITRATURE

The articles that are discussed below discuss numerous inexpensive building materials and strategies that can be used to create a building and reduce construction costs. Also, they discuss the environment, its features, and the materials employed in this kind of climate.
Paper 1: Alternative Low-Cost Construction Materials & Techniques

Sudesh Bharsakhale (2020)

Summary: The study focuses on a low-cost home that is designed and constructed using Rat Trap Bond and Filler Slab to achieve the same foundation, structure, and strength as other homes. The proper use of locally available building materials and techniques that are long-lasting, inexpensive, and require little upkeep results in cost savings. Inferences: The lack of affordable housing for urban poor people is a key concept, and alternative construction methods like Rat trap Bond and Filer slab are suggested. It describes the purpose, application, and benefits of that technology and links them to the cost-effectiveness of both by indicating the rough proportion of material and cost savings.

3.1. CASE STUDY

CENTRE FOR INTERACTIVE RESEARCH ON SUSTAINABILITY UBC

British Colombia, Canada

LEED Rating System Architect: Perkins & Will

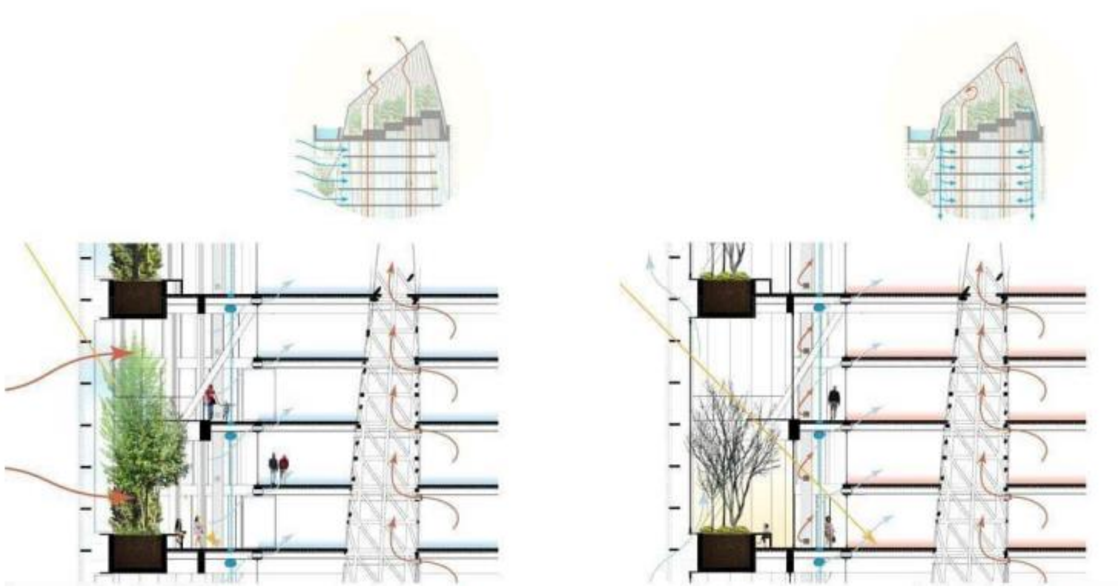
Size: 5,675 sqm

At the University of British Columbia, the Center for Interactive Research on Sustainability (CIRS) is situated on a congested site close to Sustainability Street. 200 researchers from the public and private sectors are housed in the Centre for Interactive Research with a Focus on Sustainability [CIRS]. By operating in a net-positive way, the Center hopes to improve not just the environment but also the lives of those who reside there and the wider community. is intended to serve as a live test site for sustainable building standards, accelerating their adoption into urban improvement. The main goal is to learn from research triumphs and failures in order to inform future sustainable solutions.

The architects employed passive environmental techniques, such as appropriate solar orientation and glazing ratio, strategic window placement for lighting and natural ventilation, and solar control techniques like canopies, overhangs, and fritted glass, to lower the building's heating and cooling loads. The U-shaped design of the building helps achieve the goal of providing 100% natural lighting and ventilation for every resident. Building energy burdens are minimised through the design gives the occupant freedom over their own personal quarters and has energy-saving appliances. While solar shades and spandrel panels in the glazing system and the living wall are intended to limit glare and heat gain, daylighting is available in 100% of inhabited spaces. Also, the design of the living façade enables the structure to absorb warmth from the sun in the winter while providing shading in the summer.

The primary source of lighting in the lecture hall is daylight. Modern audio-visual technology can be found in this 423-seat theatre, which also acts as a classroom for undergraduate courses.

To allow for natural ventilation inside the building, a courtyard is situated in the middle of the structure. Heat Exchange System Recycles waste heat from the Earth & Ocean Sciences (EOS) building next door as well as from CIRS's internal building systems.



1) Energy Efficiency

In order to achieve net-positive energy, CIRS absorbs sunlight using building-integrated photovoltaics, collects waste heat from a nearby building, and trades heating and cooling with the earth. The western facade's live solar screen is planted with deciduous vines once grown in, the screen will operate as a dynamic shading mechanism that responds to seasonal change, and the building incorporates photovoltaics for roughly 10% of energy, shade adjustable windows, and. By reflecting the solar regulations into the building in the cramped hallway, PV panels installed in the atrium skylight serve as both a sustainable function and an architectural feature. 10% of the building's electrical needs are met by sunlight, while 60% of the need for hot water heating is met by sunlight.

2) Water Efficiency

Rainwater is collected from the high-albedo roofs using a straightforward method, stored in a below-ground system, filtered, and then disinfected on-site before being delivered for use in the building's potable water applications. 100 percent of the building's wastewater is recovered, processed, and reused inside the facility using a solar aquatics bio filtration system. A dosed-loop water cycle is created when water is collected from fixtures throughout the building and treated water is then used inside the structure for irrigation and toilet flushing. The purifying procedures of naturally occurring water systems close to where people live, like streams and wetlands, are replicated by the solar aquatics system. At the southwest corner of the structure, in a glass-walled area, is where the solar aquatic system is housed. Westward visibility is excellent

3) Used Materials
In addition to cost, churability, and maintenance requirements, the ecological and human health effects of the project's building materials, as well as their visual and tactile expression, were taken into account during the design of CIRS. Wood was eventually chosen as the main building material in response. Wood is one of the most environmentally friendly building materials available because it is produced by the sun and can store carbon. It also supports a significant portion of the local economy.

Laminated wood roof with a green roof over the auditorium; low reflectance.

35% of the walls are glass, and the staircase enclosures are made of white brick.

Table -1: Analysis of Case Study

Area	5675 sqm	170000 sqft
Location	British Colombia, Canada	Gurgaon, India
Building Type	Research Center	Industry
Climate	Tropical	Composite
Materials	Laminated wood, Green roof on auditorium	Fly ash base cement

Fig

3.2. CASE STUDY

BUILDING: ITC GREEN CENTRE

LOCATION: GURGAON, INDIA

FLOOR AREA: 170000 SQ.FT

ARCHITECT: RAJENDER KUMAR & ASSOCIATES NEW DELHI, INDIA

Green Materials:

The first challenge was obtaining environmentally friendly building materials, which at the time were difficult to come by in the nation, such as low-volatility organic compounds and green wood from sustainably managed forests. In this case, USGBC provided assistance to ITC in locating the materials.

It was necessary to undertake numerous energy sensitivity exercises with ITC design and architecture consultants and staff to raise their awareness of environmental conservation issues.

Glass is the primary building material since it served a number of purposes for the architects. 19% of the glass used here is recycled.

Fly ash-based concrete was one of many recycled and recyclable materials utilised in the construction of the structure. In actuality, more than 10% of the total material in a structure is recycled, renovated, or salvaged from other places.

Local materials: To lessen the impact of material transportation, a conscious effort was made to purchase as much construction material as possible from neighbouring suppliers.

on the natural world. The majority of the stuff came from within 500 miles.

miles of the location.

Adhesives and sealants with low VOC levels are low emission products.

III. CONCLUSIONS

To prevent the ruin of our world, the building sector must adhere to certain standards. Authorities and organisations have taken the effort to develop sustainable construction criteria. Although there are numerous rating systems with various standards and grades, all of them adhere to the sustainable design and green construction principles.

To gain a thorough understanding of the various systems that contributed to the achievement of certified buildings with a significantly decreased impact on the environment, four green buildings have been examined. The table 1 outlines the active, passive, or combined strategies used by each structure to achieve sustainability. We can infer that all four instances used natural lighting to reach interior quality. The sole structure that uses natural ventilation is the Crystal Conference Center; all other structures rely on mechanical ventilation. For energy efficiency, photovoltaic panels are used in every building. Regarding water conservation, the Crystal Conference Center, Sheikh Zayed Desert Learning Centre, and Learning Centre all make use of water-saving fixtures and include rainwater collection systems for recycling rainwater.

We draw the conclusion that sustainable building is the direction of the construction industry from the data gathered and the explicating case studies. Although the initial outlay may be greater than for a low-performing building, the long-term benefits far outweigh this.

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