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To Study Of Building Information Modeling (BIM) In Construction Industry

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Abstract : ***The case study findings reveal the significant enhancement of traditional scheduling and cost estimating methods through the integration of BIM, offering a more dependable and automated technological solution. Through an examination of BIM alongside the case study results, it becomes evident that three key areas stand out for potential future development: the progression towards higher levels of detail (LOD) within BIM models as technological advancements continue, the simultaneous integration of time and cost parameters into BIM components to facilitate seamless financial analysis, and the optimization of resource allocation using 4D BIM models to analyze and strategize resource usage based on the most current design iterations, including the simulation of resource allocation scenarios. These insights underscore the transformative potential of BIM within the construction industry, promising increased accuracy, efficiency, and planning capabilities. Keywords: BIM, modeling, cost estimation, resource allocation, construction scheduling***

INTRODUCTION:

Building Information Modeling (BIM) presents a comprehensive approach integrating policies, processes, and technologies to manage crucial building design and project data digitally throughout the building's lifecycle. The crucial role of contractors in ensuring timely and budget-friendly project completion is highlighted, emphasizing their significance in the project lifecycle. The project aims to showcase the benefits of BIM technology for architects, engineers, and contractors in estimating, scheduling, and cost controls, commencing with an introductory exploration of BIM and its differentiation from traditional CAD methodologies. Furthermore, it will delve into the practical applications of scheduling and cost estimating within the BIM framework, complemented by a detailed case study illustrating its effectiveness. BIM is recognized as an emerging technology globally, fundamentally transforming the Architecture, Engineering, and Construction (AEC) industries by reshaping workflows, methodologies, processes, and relationships. Despite its transformative potential, challenges arise due to the existing gap between construction and BIM technologies, with a significant portion of technology development tailored for office environments, while construction activities primarily occur on-site. This incongruity necessitates a shift towards integrating BIM technologies seamlessly into on-site construction practices to fully realize its benefits and enhance productivity and efficiency in the construction industry

AUTODESK REVIT:

Autodesk Revit serves as an indispensable tool in the domain of building information modeling (BIM), catering to architects, structural engineers, MEP engineers, designers, and contractors alike. This software empowers users to create intricate 3D representations of buildings and structures, complemented by annotations using 2D drafting elements, while seamlessly accessing essential building data from the model's database. Going beyond traditional 3D modeling, Revit is equipped with 4D BIM capabilities, enabling users to plan and track various stages throughout a building's lifecycle, spanning from conception to eventual demolition. Originally conceived to provide architects and building professionals with a platform for designing and documenting buildings, Revit pioneered the concept of parametric three-dimensional modeling, which subsequently evolved into Building Information Modeling (BIM). Unlike its predecessors such as ArchiCAD and Reflex, Revit introduced parametric components developed through a graphical "family editor" rather than conventional programming languages. A standout feature of Revit lies in its comprehensive capture of relationships between components, views, and annotations within the model, ensuring automatic propagation of changes across the entire model. This bidirectional associativity ensures model consistency and coordinated documentation, embodying the essence of Revit's namesake as a contraction of "Revise-It". At the core of Revit lies its parametric change propagation engine, leveraging context-driven parametric technology to drive the entire building model and its associated documentation. This departure from traditional vibrational and history-driven parametric methods, prevalent in mechanical CAD software, underscores Revit's scalability and adaptability. Coined as a parametric building model, Revit signifies a shift where changes to parameters initiate comprehensive updates across the entire building model and its associated documentation, rather than isolated modifications to individual component.

LITERATURE REVIEW:

In the literature review, Jia Qi et al. highlighted the concerning rate of fatalities in the construction industry, attributing a portion of these incidents to designers' lack of construction safety knowledge, prompting the proposal of a Prevention through Design (PTD) tool to enforce safety principles via computer software. Similarly, Brittany K. Giel et al. discussed the transformative influence of building information modeling (BIM) and virtual design and construction (VDC) on the AEC industry, addressing concerns about BIM implementation costs by emphasizing its potential for cost savings through reduced schedule overruns, RFIs, and change orders. Additionally, Nawari O. Nawari emphasized the increasing acceptance of BIM as the preferred method for communicating design intent, particularly in off-site construction, due to its effectiveness in coordinating building system fabrication. In the results and discussion section, the project examined involved a frame structure residential building encompassing multiple floors, including parking, ground, first, and terrace levels, along with a staircase cap level. Notably, Revit's workflow diverges from AutoCAD, enabling users to first create a direct 3D model before generating 2D drawings with material quantities and construction management details. The study showcased the creation of a 3D model facilitating the extraction of 2D drawings and material quantity calculations, alongside tabulated schedules for various building elements such as foundation, columns, beams, floors, and walls, highlighting Revit's efficiency and accuracy in managing construction projects

FIG.1. FRONT VIEW

Fig.2 SIDE VIEW

Fig.3. BACK VIEW

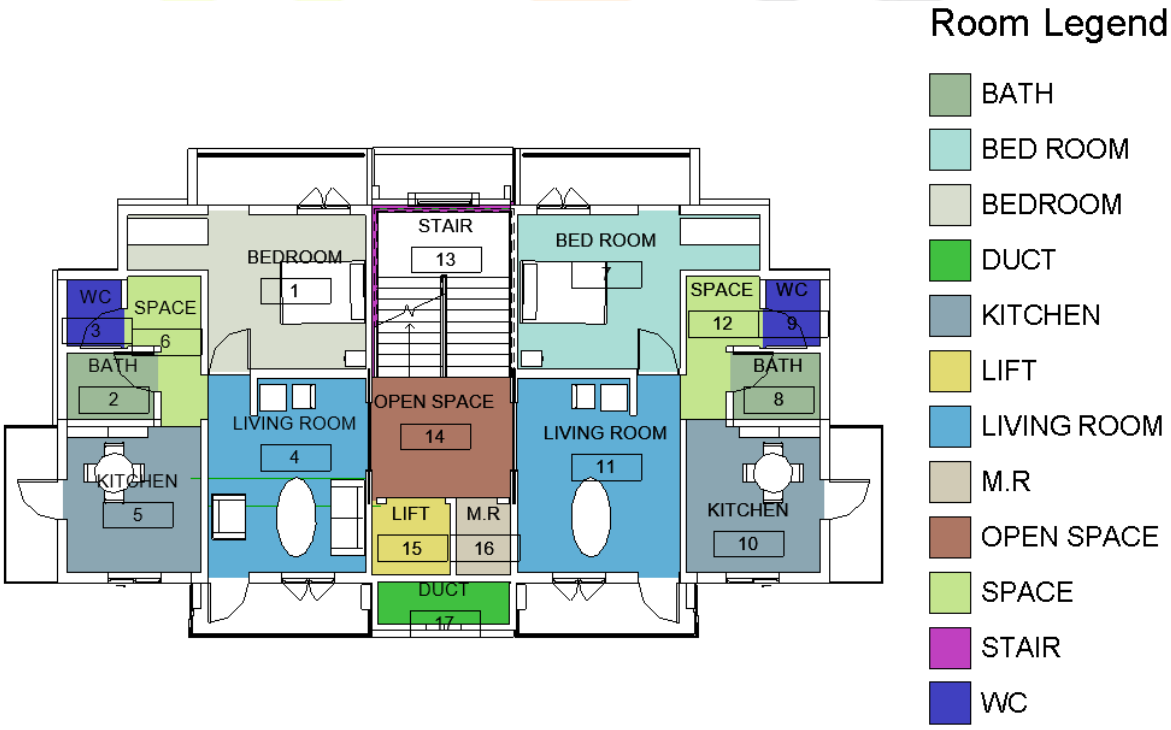

Fig. 4. FIRST FLOOR

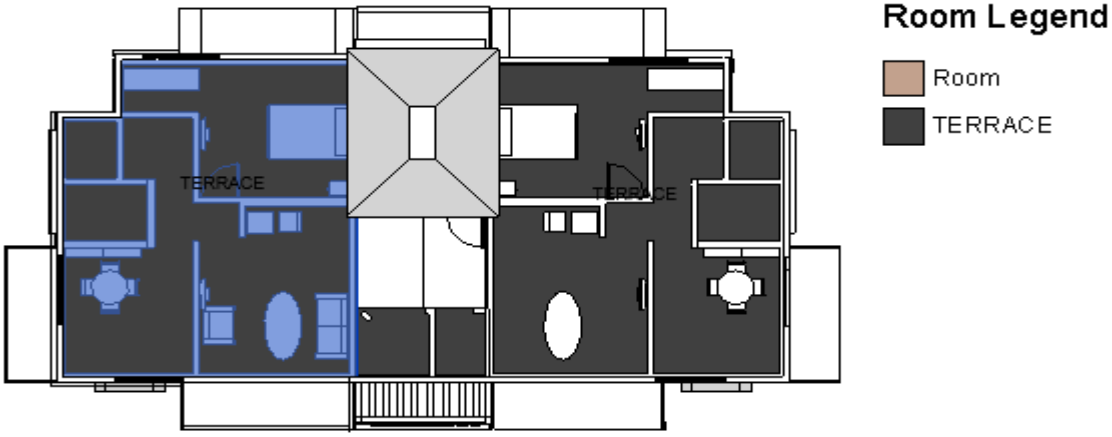

Fig. 5. TERRACE

TABLE NO.1 Foundation Schedule

Foundation Schedule				
Type	**Length**	**Width (mm)**	**HIGHT. (mm)**	**Volume. (m^3)**
F1	2133	2133	609	2.722
F2	2133	2133	609	2.722
F3	2133	2133	609	2.722
F4	2133	2133	609	2.722
F5	2133	2133	609	2.722
F6	2133	2133	609	2.722
F7	2133	2133	609	2.722
F8	2133	2133	609	2.722
F9	2133	2133	609	2.722
F10	2133	2133	609	2.722
F11	2133	2133	609	2.722
F12	2133	2133	609	2.722
F13	2133	2133	609	2.722
F14	2133	2133	609	2.722
F15	2133	2133	609	2.722
F16	2133	2133	609	2.722
TOTAL	**34128**	**34128**		**43.552**

TABLE NO.2 Floor Schedule:

Floor Schedule		
Level	**Area (m^2)**	**Vol. (m^3)**
First Floor Level	1766.91	910.44
Second Floor Level	1766.91	910.44
Third Floor Level	1766.91	910.44
Fourth Floor Level	1766.91	910.44
Terrace Level	1298	639.48

TABLE NO.3 Column Schedule

Column Schedule					
Type	**Column Name**	**Length (mm)**	**WIDTH (m^3)**	**HIGHT (mm)**	**Vol. (m^3)**
C-1’2”x1’6”	C-1	457	355	18000	2.92
C-1’2”x1’6”	C-2	457	355	18000	2.92
C-1’6”X2’6”	C-3	762	457	18000	6.26
C-1’6”X2’6”	C-4	762	457	18000	6.26
C-1’2”x1’6”	C-5	457	355	18000	2.92
C-1’2”x1’6”	C-6	457	355	18000	2.92
C-1’2”x1’6”	C-7	457	355	18000	2.92
C-1’2”x1’6”	C-8	457	355	18000	2.92
C-1’6”X2’6”	C-9	762	457	18000	6.26
C-1’6”X2’6’’	C-10	762	457	18000	6.26
C-1’2”x1’6”	C-11	457	355	18000	2.92
C-1’2”x1’6”	C-12	457	355	18000	2.92
C-1’2”x1’6”	C-13	457	355	18000	2.92
C-1’6”X2’6”	C-14	762	457	18000	6.26
C-1’6”X2’6	C-15	762	457	18000	6.26
TOTAL	**15**	**8685**	**5937**	**270000**	**63.84**

RESULT & DISCUSSION :

In the results and discussion section, the project revolves around a residential building structured as a frame, encompassing levels such as parking, ground, first, terrace, and staircase cap. Adjacent to the building lies a lawn area, with a connecting ramp to the parking section for accessibility. Notably, Revit operates in a contrasting manner to AutoCAD, allowing for the initial creation of a 3D model before generating 2D drawings, complete with essential construction details and material quantities, thus streamlining the construction management process. This approach facilitates the efficient generation of 3D models, followed by accurate calculations of material quantities through the extraction of 2D drawings. Furthermore, a detailed schedule for critical building components including foundation, columns, beams, floors, and walls is meticulously tabulated, showcasing Revit's prowess in overseeing construction projects comprehensively and efficient.

CONCLUSION:

In summary, the adoption of Building Information Models (BIM) brings forth notable benefits in the management of construction projects. Once these models are established, they enable the generation of quantity take-offs, facilitating accurate cost estimations. Moreover, the utilization of BIM-based 4D scheduling enhances the understanding of construction components and progress in the schedule, ultimately leading to improved construction planning. Essentially, BIM contributes to both time and cost efficiencies while also ensuring the delivery of high-quality construction outcomes. Overall, Building Information Modeling represents a highly advantageous concept within the construction industry.

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