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Analysis of BIM (Building Information Modelling) by Using 7D

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***Abstract:** Today's construction stakeholders don't care about the elegance of the building information model (BIM). They ensure that the building is completed on time and minimize overruns or errors. Traditionally, BIM has been used as a design tool in architecture, engineering, and construction. (AEC). Expertise in building and infrastructure planning and construction. But beyond BIM, there is more to consider. The construction process integrates the entire life cycle of the building to manage construction work, teamwork and overall productivity. Project management model and engineering model are on a collaborative platform. Data from different sources can be combined and used to make more informed decisions before and after construction. This integrated process helps all relevant personnel to fully understand the project so that they can coordinate before this data-driven process also provides relevant personnel with analysis and business intelligence. You can not only build trust, but also optimize the entire business process and procedures and operation.*

I. INTRODUCTION

A. General

Building information modeling (BIM) is a cycle upheld by different apparatuses, innovations and agreements including the age and the executives of computerized portrayals of physical and useful attributes of spots. Building information models (BIMs) are PC documents which can be removed, traded or organized to help dynamic with respect to a constructed resource. BIM programming is utilized by people, organizations and government offices who plan, plan, develop, work and keep up buildings and different actual frameworks, like water, deny, power, gas, correspondence utilities, streets, rail lines, scaffolds, ports and passages.

The idea of BIM has existed since the 1970s. The primary programming devices created for modeling buildings arose in the last part of the 1970s and mid 1980s, and included workstation items, for example, ChuckEastman's Building Description System and GLIDE, RUCAPS, Sonata, Reflex andGable 4D Series.The early History applications, and the equipment required torun them, were costly, which restricted boundless reception.

The term 'building model' (in the feeling of BIM as utilized today) was first utilized in quite a while during the 1980s in a 1985 paper by Simon Ruffle at last distributed in 1986, and later in a 1986 paper by Robert Aish then at GMW Computers Ltd, engineer of RUCAPS programming - alluding to the product's utilization at London's Heathrow Airport. The term 'Building Information Model' first showed up in a 1992 paper by G.A. van Nederveen and F.P. Tolman.

In any case, the terms 'Building Information Modeling'did not become prevalently utilized until somewhere in the range of 10 years after the fact. In 2002, Autodesk delivered a white paper named "Building Information Modeling" and other programming vendorsalso began to state their association in the field. By facilitating commitments from Autodesk, Bentley Systems and Graphisoft, in addition to other industry spectators in 2003 Jerry Laiserin advocated and normalize the term as a typical name for the advanced portrayal of the building interaction. Working with trade and interoperability of information in advanced configuration had recently been offered under contrasting wording by Graphisoft as "Virtual Building", Bentley Systems as "Incorporated Project Models", and via Autodesk or Vectorworks as "Building Information Modeling".

These applications contrast from design drafting instruments like AutoCAD by permitting the expansion of additional information (time, cost, producers' subtleties, maintainability, and support information, and so on) to the building model.

B. Meaning of project title "analysis of bim"

Building Information Modeling (BIM) is an advanced portrayal of physical and practical attributes of an office. A BIM is a common information asset for information about an office shaping a dependable reason for choices during its life-cycle; characterized as existing from soonest origination to destruction.

Building Information Modeling (BIM) can be characterized as a dependable, computerized, three dimensional, virtual portrayal of the task to be worked for use in plan dynamic, development booking and arranging, quotes and upkeep of development projects. The

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BIM Handbook (2008) characterized BIM as a PC helped modeling innovation to deal with the information of a development project zeroing in on creation, correspondence and investigation of building information models.
"A BIM is a computerized portrayal of physical and utilitarian qualities of an office. As such it fills in as a common information asset for information about an office shaping a dependable reason for choices during its lifecycle from commencement ahead."
The Architectural, Engineering and Construction (AEC) area across the globe is gradually gazing to take an action from 2D and 3D CAD to BIM-based practice. Albeit the pace of take-up fluctuates across nations, areas and development firms, a vertical pattern has gotten clear. It is currently progressively attractive that the remainder of the area, especially development firms comprehend the business prospects offered by BIM. This will empower industry bodies and development firms to recognize the chances and challenges, and set them up for changes in the AEC area set off by BIM. Yet, what is BIM? Without an essential establishing in the innovations, wordings and in particular, the manners by which it tends to be utilized, it isn't workable for a business to comprehend the advantages to be acquired from BIM reception.

C. Objectives Of The Project

1) To study existing scenario of BIM.
2) Analysis of G+2 Building in AUTO CAD.
3) Analysis of G+2 Building in REVIT.
4) Identify the Scheduling of existing Building.
5) Identify the Estimation of existing Building.
6) Identify Sustainability of existing Building.
7) Identify BIM Maintenance of existing Building.

D. Study Of Bim

Information systems with ever-growing and increasingly complex functionality are being actively introduced into the operation services. In the process of development, the information technology finds new ways to improve efficiency of economic activities for enterprises. However, the use of automated operation control systems in the absence of representation of the construction object as a single system leads to an increase in labor costs and resource losses. There are in efficiently used operation facilities of the maintenance services that have to be solved, including energy efficiency. Many experts of operation do not have enough skills to interact with information model. There is a need to expand the application of BIM beyond construction and design, to learn to use the information obtained at these stages. Automated data collection of BIM can solve such problems with the help of BIM scenario or BIM-use. Each set of works with information about the stage of the life cycle of the project and part of project in international practice is called BIM scenarios. In general, the use of BIM scenarios and information modeling(IM) shows a composite, yet little-researched activity that can provide the necessary effect in maintenance, operation, document management, checking the energy efficiency of the building. BIM technology is gaining successful experience in implementing various tasks along the life cycle. The interoperability of design and construction information modeling technologies with building management systems in general is extremely important and still poorly researched. This study can serve as a source for the requirements model, to encourage the promotion of data and information transfer between BIM and FM, to induce the establishment of a process of integration of BIM in FM, providing a clear conception of the relationship between the parties involved.

Figure 1 BIM 7D

E. What Is Auto Cad

AutoCAD is a commercial computer-aided design (CAD) and drafting software application. Developed and marketed by Autodesk, AutoCAD was first released in December 1982 as a desktop app running on microcomputers with internal graphics controllers. Before AutoCAD was introduced, most commercial CAD programs ran on mainframe computers or minicomputers, with each CAD operator (user) working at a separate graphics terminal. AutoCAD is used in industry, by architects, project managers, engineers, graphic designers, city planners and other professionals.

AutoCAD is known as Computer Aided Design. It is used for creating blueprints for multi-storey building, stadiums,bridges, etc. AutoCADis 2-dimensionaland 3-dimensionalcomputer aided drafting software application. The existing designs can be modified easily and can save more time. It can be more accurate than hand drawing models.

F. 3D BIM

Revit is a used throughout the 3D modelling process and it is a full-featured building information modeling platform. “Building Elements” like walls, roofs, windows, and floors to create 3D models are used in the Autodesk Revit software. Conceptual massing capabilities is also an feature available in Revit which uses basic shapes to model building form and orientation earlier in the design process. Revit also has tools for MEP design and structural design apart from the Architectural modelling. It is the modelling end of the Energy simulationworkflow. Hence, it is very popular in the AEC industry for design purposes.

BIM is a shared knowledge resource for information on a facility forming a reliable basis for decisions during its lifecycle. The role of BIM is to gather and link data relating to the design, construction, and operation of a building to produce a comprehensive 3D model.

G. 4D BIM

4D BIM adds an extra dimension of information to a project information model in the form of scheduling data. This data is added to components which will build in detail as the project progresses. This information can be used to obtain accurate programme information and visualisations showing how your project will develop sequentially.

Time-related information for a particular element might include information on lead time, how long it takes to install/construct, the time needed to become operational/harden/cure, the sequence in which components should be installed, and dependencies on other areas of the project.

With time information federated in the shared information model planners should be able to develop an accurate project programme. With the data linked to the graphical representation of components/systems it becomes easy to understand and query project information and it is also possible to show how construction will develop, sequentially, over time showing how a structure will visually appear at each stage.

Primavera is used for making project management smooth. It is helpful in civil engineering for creating strategies, controlled the delay of project and determines the optimum use of resources. Primavera is used to complete the project within specified time and cost. It is the application of skills, tools and techniques to project activities in order to fulfill the demand of the owner. Primavera program is used to scheduling, controlling and estimating all types of projects. P6 EPPM is a completely online interface with the goal that venture group can get to the venture data at anyplace and whenever. P6 EPPM can give arranging, planning, cost and asset administration programming that empowers association to settle on educated choices and enhance their capacity to convey projects and tasks on time and on spending plan.

H. 5D BIM

Drawing on the components of the information model being able to extract accurate cost information is what's at the heart of 5D BIM. Considerations might include capital costs (the costs of purchasing and installing a component), its associated running costs and the cost of renewal/replacement down the line. These calculations can be made on the basis of the data and associated information linked to particular components within the graphical model. This information allows cost managers to easily extrapolate the quantities of a given component on a project, applying rates to those quantities, thereby reaching an overall cost for the development. The benefits of a costing approach linked to a model include the ability to easily see costs in 3D form, get notifications when changes are made, and the automatic counting of components/systems attached to a project. However, it's not just cost managers who stand to benefit from considering cost as part of your BIM process. Assuming the presence of 4D programme data and a clear understanding of the value of a contract, you can easily track predicted and actual spend over the course of a project. This allows for regular cost reporting and budgeting to ensure efficiencies are realised and the project itself stays within budget tolerances.

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I. 6D BIM

The construction industry has traditionally been focussed on the upfront capital costs of construction. Shifting this focus to better understand the whole-life cost of assets, where most money is proportionately spent, should make for better decisions upfront in terms of both cost and sustainability. This is where 6D BIM comes in.Sometimes referred to as integrated BIM or iBIM, 6D BIM involves the inclusion of information to support facilities management and operation to drive better business outcomes. This data might include information on the manufacturer of a component, its installation date, required maintenance and details of how the item should be configured and operated for optimal performance, energy performance, along with lifespan and decommissioning data. Adding this kind of detail to your information model allows decisions to be made during the design process - a boiler with a lifespan of 5 years could be substituted with one expected to last 10, for example, if it makes economic or operational sense to do so. In effect, designers can explore a whole range of permutations across the lifecycle of a built assets and quickly get an understanding of impacts including costs. However, it is at handover, that this kind of information really adds value as it is passed on to the end-user.

J. 7D BIM

BIM (seventh-dimensional building information modelling) is used by managers in the operation and maintenance of the facility throughout its life cycle. Integrating BIM with 7D simulation models optimizes asset management from design to demolition. Integrating BIM with 7D simulation models optimizes asset management from design to demolition.
7D = 3D + TIME SCHEDULE + COST + SUSTAINABILITY

II. METHODOLOGY

Building Information Modeling (BIM) is a digital representation of physical and functional characteristics of a facility. A BIM is a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life-cycle; defined as existing from earliest conception to demolition.
Building Information Modeling (BIM) is an intelligent 3D model-based process that gives architecture, engineering, and construction (AEC) professionals the insight and tools to more efficiently plan, design, construct, and manage buildings and infrastructure.

1) Study Of Bim (Building Information Modeling)
2) Data Collection
   - Detailed Literature Review
   - Online Survey
3) Drafting G+2 Building
4) Analysis 3D BIM
   - Drafting A Model In Revit
5) Analysis 4D BIM
   - Making Proper Time Schedule in Primavera P6
6) Analysis 5D BIM
   - Estimation Of Model By Using Excel & Revit
7) Analysis 6D BIM
   - Identify Sustainability Of Model
8) Analysis 7D BIM
   - Identify Maintenance Of Model

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III. ANALYSUS OF BIM

A. Drafting OF G+2 Building

Plot Area : 354.83 sq m
Ground Floor Built Area : 107.03 sq m
First Floor Built Area : 93.84 sq m
Secound Floor Built Area : 23.49 sq m
Total Built Up Area : 224.36 sq m

Figure 2 Ground floor plan

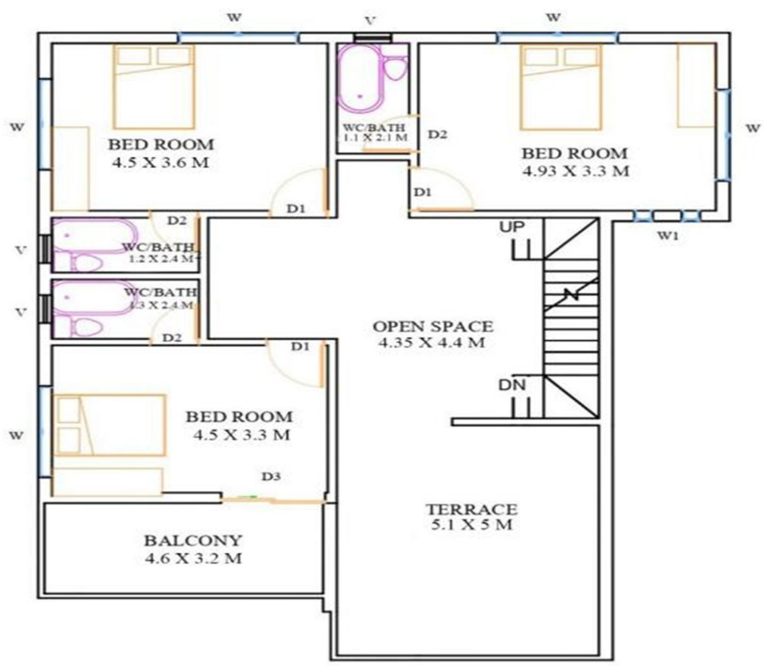

Figure 3 First Floor Plan

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Figure 4 Second Floor Plan

B. 3D BIM – REVIT Model

Improved visualization of the project, communication of design intent.
Improved multidisciplinary collaboration. Reduced rework.

Figure 5 3D Front View

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Figure 6 Side View (a)

Figure 7 Side View (b)

C. 4D BIM – Using Primavera P6

Integrating BIM with 4D simulation models bring benefits to participants in terms of planning optimization. Builders and manufacturers can optimize their construction activities and team coordination.

4D = 3D + TIME SCHEDULE

1) By using Primavera we know that time period required for complition of work.
2) The working time is 8 hr per day.
3) The total days requried for is 284 days.

BIM — Classic Schedule Layout — 24-May-21 07:21 PM

Activity ID	Activity Name	Original Duration	Start	Finish	Predecessor Details
PROJECT 1 BIM		284.0d	01-Mar-21 08:00 AM	25-Jan-22 05:00 PM	
PROJECT 1.1 PLINTH		26.0d	01-Mar-21 08:00 AM	30-Mar-21 05:00 PM	
A1000	EXCAVATION	3.0d	01-Mar-21 08:00 AM	03-Mar-21 05:00 PM	
A1010	PCC CLOUMN- C1 TO C16	5.0d	04-Mar-21 08:00 AM	09-Mar-21 05:00 PM	A1000: FS
A1020	BOX FOOTING - C1 TO C16	3.0d	10-Mar-21 08:00 AM	12-Mar-21 05:00 PM	A1010: FS
A1030	COLUMN STRATER - C1 TO C16	1.0d	13-Mar-21 08:00 AM	13-Mar-21 04:00 PM	A1020: FS
A1040	CLOLUMN UPTO PLINTH- C1 TO C16	3.0d	15-Mar-21 08:00 AM	17-Mar-21 05:00 PM	A1030: FS
A1050	GROUND BEAM - C1 TO C16	4.0d	18-Mar-21 08:00 AM	22-Mar-21 05:00 PM	A1040: FS
A1060	PLINTH FILLING & COMPACTION	3.0d	23-Mar-21 08:00 AM	25-Mar-21 05:00 PM	A1050: FS
A1070	PLINTH BEAM- C1 TO C16	4.0d	26-Mar-21 08:00 AM	30-Mar-21 05:00 PM	A1060: FS
PROJECT 1.2 GROUND FLOOR R.C.C WORK		40.0d	31-Mar-21 08:00 AM	15-May-21 05:00 PM	
A1080	COLUMN STRATER & COLUMN UPTO FIRST FLOOR-C1 TO (	5.0d	31-Mar-21 08:00 AM	05-Apr-21 05:00 PM	A1070: FS
A1090	COLUMN CASTING	2.0d	14-Apr-21 08:00 AM	15-Apr-21 05:00 PM	A1080: FS 7.0d
A1100	SLAB CASTING	3.0d	11-May-21 08:00 AM	13-May-21 05:00 PM	A1090: FS 21.0d
A1110	STAIRCASE REINFORCEMENT	1.0d	14-May-21 08:00 AM	14-May-21 05:00 PM	A1100: FS
A1120	STAIRCASE CASTING	1.0d	15-May-21 08:00 AM	15-May-21 05:00 PM	A1110: FS
PROJECT 1.3 FIRST FLOOR R.C.C WORLK		40.0d	17-May-21 08:00 AM	01-Jul-21 05:00 PM	
A1130	COLUMN STRATER & COLUMN UPTO SECOND FLOOR-C16	5.0d	17-May-21 08:00 AM	21-May-21 05:00 PM	A1120: FS
A1140	COLUMN CASTING	2.0d	31-May-21 08:00 AM	01-Jun-21 05:00 PM	A1130: FS 7.0d
A1150	SLAB CASTING	3.0d	26-Jun-21 08:00 AM	29-Jun-21 05:00 PM	A1140: FS 21.0d
A1160	STAIRCASE REINFORCEMENT	1.0d	30-Jun-21 08:00 AM	30-Jun-21 05:00 PM	A1150: FS
A1170	STAIRCASE CASTING	1.0d	01-Jul-21 08:00 AM	01-Jul-21 05:00 PM	A1160: FS
PROJECT 1.4 SECOND FLOOR R.C.C WORLK		37.0d	02-Jul-21 08:00 AM	13-Aug-21 05:00 PM	
A1180	COLUMN STRATER & COLUMN UPTO THIED FLOOR-C32 TO	3.0d	02-Jul-21 08:00 AM	05-Jul-21 05:00 PM	A1170: FS
A1190	COLUMN CASTING	1.0d	14-Jul-21 08:00 AM	14-Jul-21 05:00 PM	A1180: FS 7.0d

Actual Level of Effort — Remaining Work — Actual Work — Critical Remaining W... | Page 1 of 6 | TASK filter: All Activities | © Oracle Corporation

Figure 8 Primavera Schedule layout 1

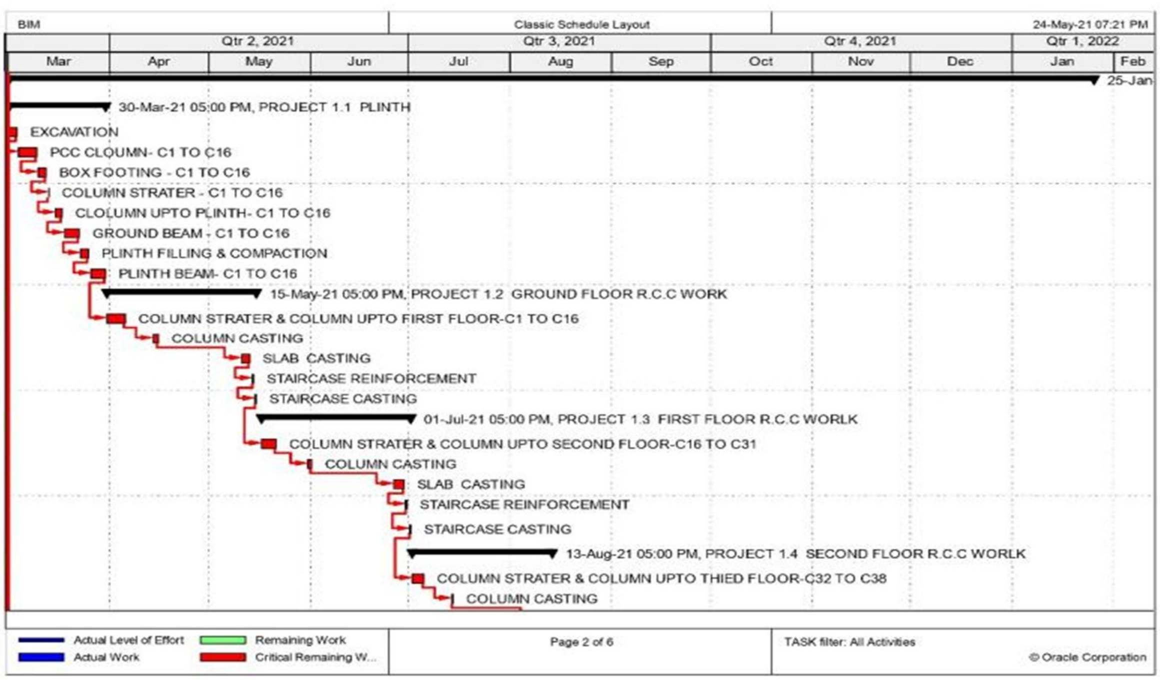

Figure 9 Primavera Bar Chart 1

BIM | Classic Schedule Layout | 24-May-21 07:21 PM

Activity ID	Activity Name	Original Duration	Start	Finish	Predecessor Details
A1200	SLAB CASTING	3.0d	09-Aug-21 08:00 AM	11-Aug-21 05:00 PM	A1190: FS 21.0d
A1210	STAIRCASE REINFORCEMENT	1.0d	12-Aug-21 08:00 AM	12-Aug-21 05:00 PM	A1200: FS
A1220	STAIRCASE CASTING	1.0d	13-Aug-21 08:00 AM	13-Aug-21 05:00 PM	A1210: FS
PROJECT 1.5 THIRD FLOOR R.C.C WORLK		2.0d	08-Sep-21 08:00 AM	09-Sep-21 05:00 PM	
A1230	SLAB	2.0d	08-Sep-21 08:00 AM	09-Sep-21 05:00 PM	A1220: FS 21.0d
PROJECT 1.6 GROUND FLOOR BIRCK WORK		16.0d	10-Sep-21 08:00 AM	28-Sep-21 05:00 PM	
A1240	BIRCK WORK UPTO SILL LEVEL	6.0d	10-Sep-21 08:00 AM	16-Sep-21 05:00 PM	A1230: FS
A1250	BIRCK WORK SILL LEVEL TO LINTEL LEVEL	4.0d	17-Sep-21 08:00 AM	21-Sep-21 05:00 PM	A1240: FS
A1260	BIRCK WORK LINTEL LEVEVL TO FIRST LEVEL	6.0d	22-Sep-21 08:00 AM	28-Sep-21 05:00 PM	A1250: FS
A1270	DOOR & WINDOW	2.0d	22-Sep-21 08:00 AM	23-Sep-21 05:00 PM	A1250: FS
PROJECT 1.7 FIRST FLOOR BIRCK WORK		16.0d	24-Sep-21 08:00 AM	12-Oct-21 05:00 PM	
A1280	BIRCK WORK UPTO SILL LEVEL	6.0d	24-Sep-21 08:00 AM	30-Sep-21 05:00 PM	A1270: FS
A1290	BIRCK WORK SILL LEVEL TO LINTEL LEVEL	4.0d	01-Oct-21 08:00 AM	05-Oct-21 05:00 PM	A1280: FS
A1300	BIRCK WORK LINTEL LEVEVL TO FIRST LEVEL	6.0d	06-Oct-21 08:00 AM	12-Oct-21 05:00 PM	A1290: FS
A1310	DOOR & WINDOW	2.0d	06-Oct-21 08:00 AM	07-Oct-21 05:00 PM	A1290: FS
PROJECT 1.8 SECOND FLOOR BIRCK WORK		8.0d	13-Oct-21 08:00 AM	21-Oct-21 05:00 PM	
A1320	BIRCK WORK UPTO SILL LEVEL	3.0d	13-Oct-21 08:00 AM	15-Oct-21 05:00 PM	A1300: FS
A1330	BIRCK WORK SILL LEVEL TO LINTEL LEVEL	2.0d	16-Oct-21 08:00 AM	18-Oct-21 05:00 PM	A1320: FS
A1340	BIRCK WORK LINTEL LEVEVL TO FIRST LEVEL	3.0d	19-Oct-21 08:00 AM	21-Oct-21 05:00 PM	A1330: FS
A1350	DOOR & WINDOW	1.0d	19-Oct-21 08:00 AM	19-Oct-21 05:00 PM	A1330: FS
PROJECT 1.9 INTERNAL PLASTER GORUND FLOOR		10.0d	22-Oct-21 08:00 AM	02-Nov-21 05:00 PM	
A1360	INTERNAL PLASTER GROUND FLOOR	10.0d	22-Oct-21 08:00 AM	02-Nov-21 05:00 PM	A1340: FS
PROJECT 1.10 INTERNAL PLASTER FIRST FLOOR		10.0d	03-Nov-21 08:00 AM	13-Nov-21 05:00 PM	
A1370	INTERNAL PLASTER FIRST FLOOR	10.0d	03-Nov-21 08:00 AM	13-Nov-21 05:00 PM	A1360: FS
PROJECT 1.11 INTERNAL PLASTER SECOND FLOOR		2.0d	15-Nov-21 08:00 AM	16-Nov-21 05:00 PM	

Actual Level of Effort | Remaining Work | Actual Work | Critical Remaining W... | Page 3 of 6 | TASK filter: All Activities | © Oracle Corporation

Figure 10 Primavera Schedule Layout 2

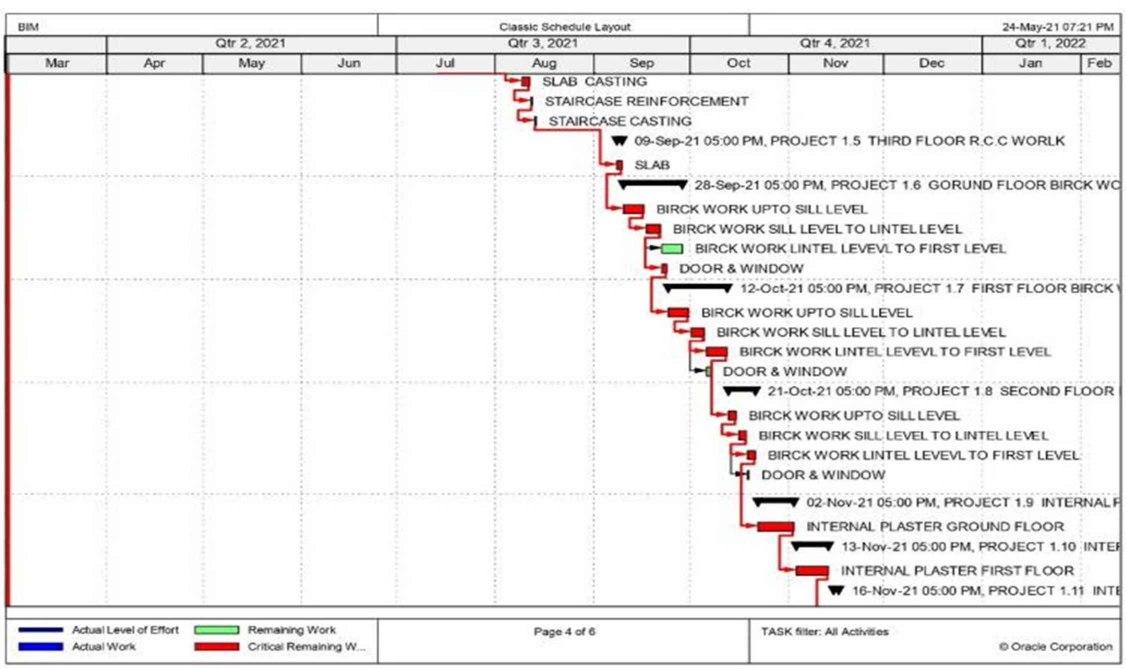

Figure 11 Primavera Bar Chart 2

BIM — Classic Schedule Layout — 24-May-21 07:21 PM

Activity ID	Activity Name	Original Duration	Start	Finish	Predecessor Details
A1380	INTERNAL PLASTER SECOND FLOOR	2.0d	15-Nov-21 08:00 AM	16-Nov-21 05:00 PM	A1370: FS
PROJECT 1.12 EXTERNAL PLASTER		8.0d	17-Nov-21 08:00 AM	25-Nov-21 05:00 PM	
A1390	EXTERNAL PLASTER FOR BUILDING	8.0d	17-Nov-21 08:00 AM	25-Nov-21 05:00 PM	A1380: FS
PROJECT 1.13 ELECTRIFICATION & PLUMBING		10.0d	26-Nov-21 08:00 AM	07-Dec-21 05:00 PM	
A1400	GROUND FLOOR	4.0d	26-Nov-21 08:00 AM	30-Nov-21 05:00 PM	A1390: FS
A1410	FIRST FLOOR	4.0d	01-Dec-21 08:00 AM	04-Dec-21 05:00 PM	A1400: FS
A1420	SECOND FLOOR	2.0d	06-Dec-21 08:00 AM	07-Dec-21 05:00 PM	A1410: FS
PROJECT 1.14 FLOORING & TILES WORK		6.0d	08-Dec-21 08:00 AM	14-Dec-21 05:00 PM	
A1430	GROUND FLOOR	3.0d	08-Dec-21 08:00 AM	10-Dec-21 05:00 PM	A1420: FS
A1440	FIRST FLOOR	3.0d	11-Dec-21 08:00 AM	14-Dec-21 05:00 PM	A1430: FS
A1450	SECOND FLOOR	2.0d	11-Dec-21 08:00 AM	13-Dec-21 05:00 PM	A1430: FS
PROJECT 1.15 INTERNAL PUTTY		8.0d	14-Dec-21 08:00 AM	22-Dec-21 05:00 PM	
A1460	GROUND FLOOR	3.0d	14-Dec-21 08:00 AM	16-Dec-21 05:00 PM	A1450: FS
A1470	FIRST FLOOR	3.0d	17-Dec-21 08:00 AM	20-Dec-21 05:00 PM	A1460: FS
A1480	SECOND FLOOR	2.0d	21-Dec-21 08:00 AM	22-Dec-21 05:00 PM	A1470: FS
PROJECT 1.16 INTERNAL COLOR		13.0d	23-Dec-21 08:00 AM	06-Jan-22 05:00 PM	
A1490	GROUND FLOOR	5.0d	23-Dec-21 08:00 AM	28-Dec-21 05:00 PM	A1480: FS
A1500	FIRST FLOOR	5.0d	29-Dec-21 08:00 AM	03-Jan-22 05:00 PM	A1490: FS
A1510	SECOND FLOOR	3.0d	04-Jan-22 08:00 AM	06-Jan-22 05:00 PM	A1500: FS
PROJECT 1.17 EXTERNAL COLOR		6.0d	07-Jan-22 08:00 AM	13-Jan-22 05:00 PM	
A1520	EXTERNAL COLOR FOR BUILDING	6.0d	07-Jan-22 08:00 AM	13-Jan-22 05:00 PM	A1510: FS
PROJECT 1.18 MISCELLANIOUS WORK		10.0d	14-Jan-22 08:00 AM	25-Jan-22 05:00 PM	
A1530	MISCELLANIOUS WORL	10.0d	14-Jan-22 08:00 AM	25-Jan-22 05:00 PM	A1520: FS

Actual Level of Effort — Remaining Work — Actual Work — Critical Remaining W... | Page 5 of 6 | TASK filter: All Activities | © Oracle Corporation

Figure 12 Primavera Schedule layout 3

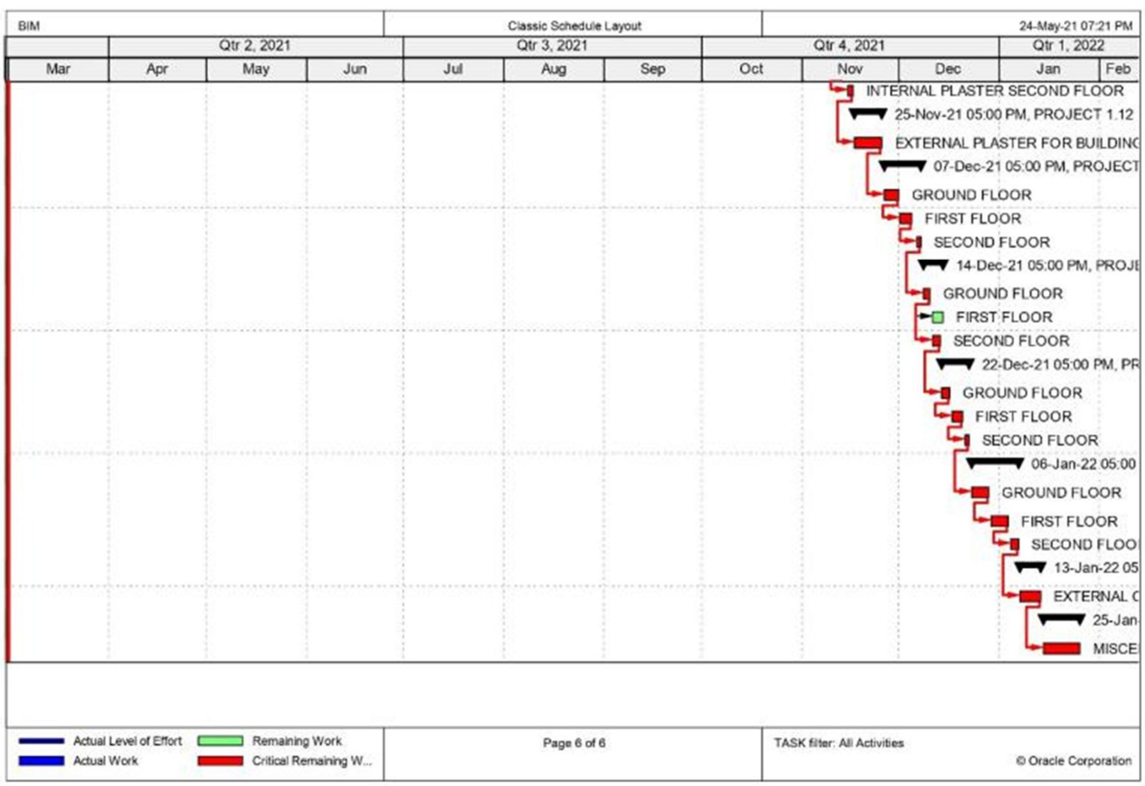

Figure 13 Primavera Bar Chart 3

D. 5D BIM – Estimate & Costing By Revit & Excel

Integrating BIM with 5D simulation models enables the development of more efficient, cost-effective.

5D = 3D + TIME SCHEDULE + COST

In Revit we can calculate approxinately estimate, after that we can take the file of revit estimate to excel for modification as per requirement.

1) The total Estimate of the project by using Revit is = Rs 4193953.74 /-
2) The total Estimate of the project by using Excel is = Rs 4124275 /-

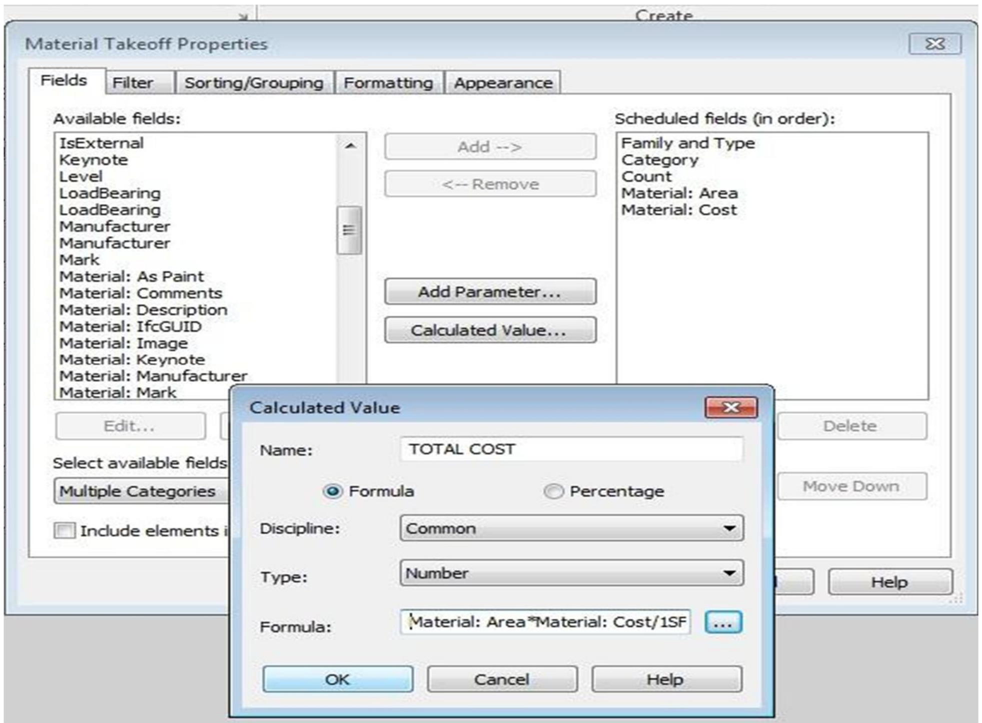

Figure 14 Revit Material Takeoff Properties

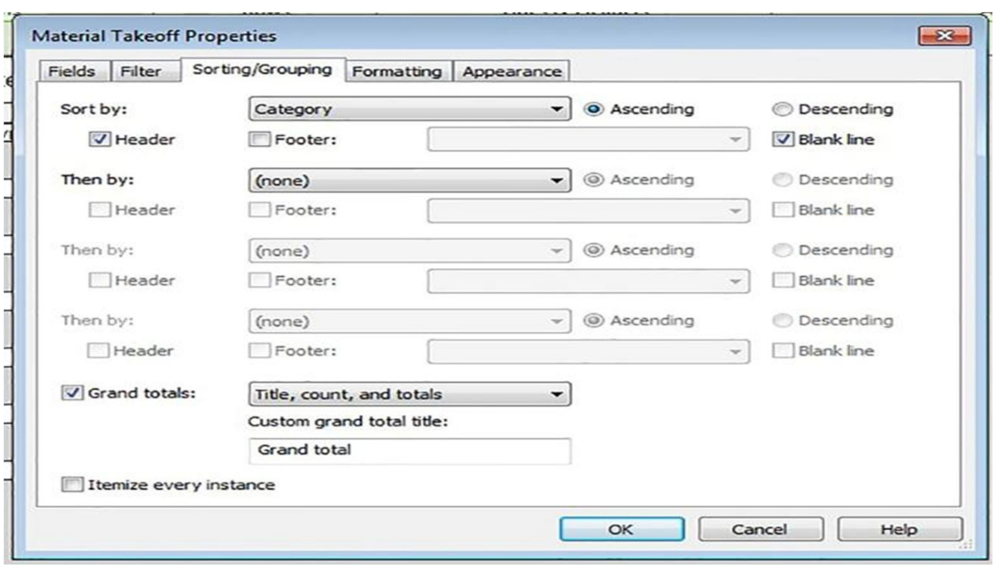

Figure 15 Revit Material Takeoff Properties (Sorting & Grouping)

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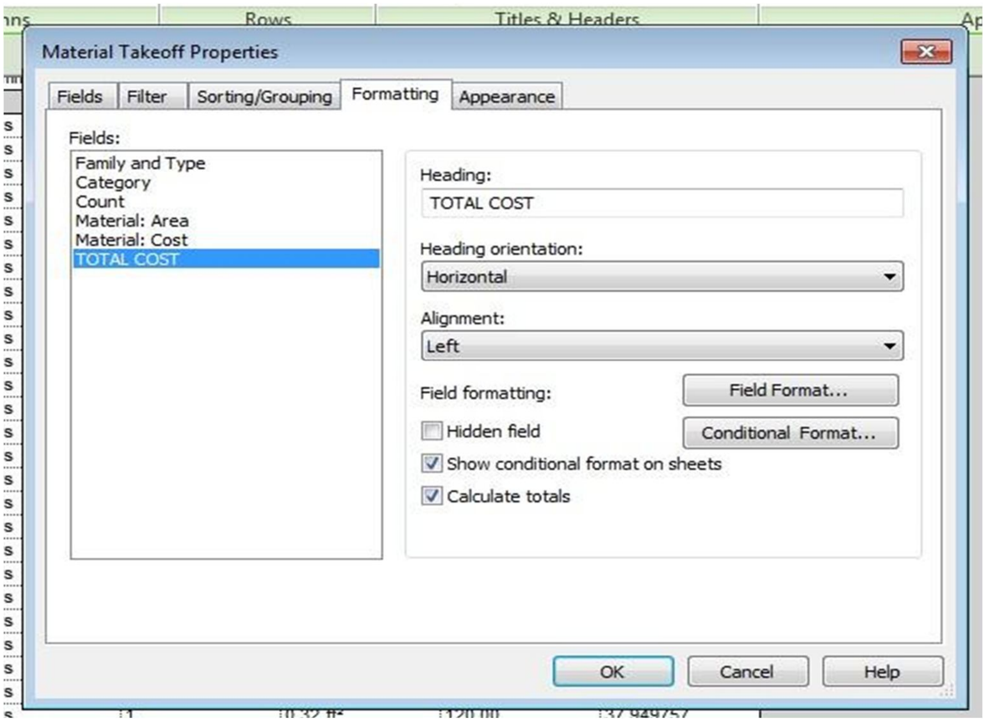

Figure 16 Revit Material Takeoff Properties (Formatting)

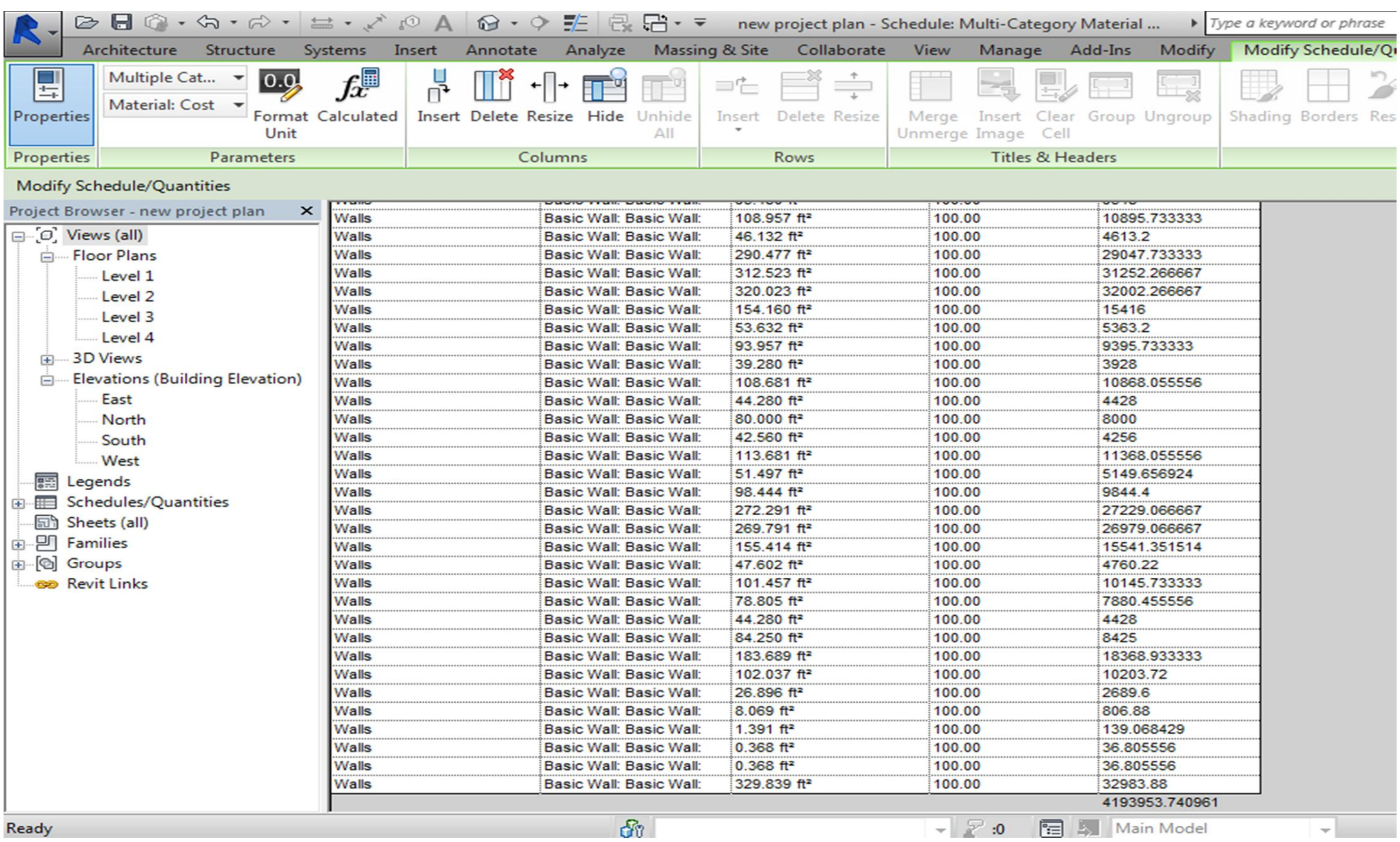

Figure 17 Revit Material Takeoff Properties (Total Cost Schedule)

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NO	DISCRIPTION	NO	L	W	H	UNIT	TOTAL QTY	RATE	TOTAL RATE
	INCLUDING PLINTH AND GROUND FLOOR								
1	Line out	1	1325.314	1	1	SQ FT	1325.314	5	6626.57
2	Excavation for footing	16	4.5	5	8	CU FT	2880	12	34560
3	P.C.C. 1:4:8 for footing	16	4.5	5	0.42	CU FT	151.2	70	10584
4	R.C.C. Footing	16	4	4.5	1.5	CU FT	432	250	108000
5	R.C.C. Plinth beam (ring)	1	285.736	0.75	1.08	CU FT	231.44616	270	62490.4632
6	P.C.C. for flooring	1	1325	1	1	CU FT	1325	75	99375
7	R.C.C. Column 1:2:4(UPTO plinth)	16	0.75	1.25	9	CU FT	135	250	33750
8	R.C.C. Column 1:2:4(above plinth)	16	0.75	1.25	10	CU FT	150	250	37500
9	R.C.C.. Lintel	1	165.9	0.75	0.42	CU FT	52.2585	295	15416.2575
10	9" Thk. B.B. Masonry(upto plinth)	1	165.9	1	3	SQ FT	497.7	98	48774.6
11	9" Thk. B.B. Masonry(upto slab)	1	165.9	1	8.92	SQ FT	1479.828	80	118386.24
12	4" THK. B.B. Masonry	1	63	1	8.92	SQ FT	561.96	98	55072.08
13	Main door	1	3.5	1	7	SQ FT	24.5	370	9065
14	Door	2	3	1	7	SQ FT	42	370	15540
15	PVC door for wc	3	2.5	1	7	SQ FT	52.5	300	15750
16	Allu. Sliding window with M.S. grill	8	4	1	5	SQ FT	160	310	49600
17	ventilator with M.S. grill	3	2	1	2	SQ FT	12	200	2400
18	marbonite tiles for flooring & staircase	1		1003		SQ FT	1003	135	135405
19	antiskid tiles flooring for bath	1	96.6	1	1	SQ FT	96.6	125	12075
20	Glazed tiles for bath,W.C. etc	1	452.06	1	1	SQ FT	452.06	135	61028.1
21	R.C.C. Slab 1:2:4	1	1325.314	0.42	1	CU FT	556.63188	270	150290.608
22	R.C.C. beam	1	285.736	0.75	1.08	CU FT	231.44616	270	62490.4632
23	RCC STARICASE FOR ALL THREE FLOOR	1						L/S	500000
24	R.C.C. Railing	1	12.28	1	1	RFT	12.28	270	3315.6
25	Double coat plastering outside & inside	1	457.8	1	8.92	SQFT	4083.576	35	142925.16
26	plumbing			LUMPSUM 3%					100000
27	electrification			L/S 5%					150000
28	steel	1	1325.314	1	3.5	KG	4638.599	62	287593.138
								TOTAL	2328013.28
	FIRST FLOOR								
1	RCC COLUMN WITH 1 :2:4	16	0.75	1.25	10	CU FT	150	270	40500
2	9" THK WALL	1	165.9	1	8.92	SQ FT	1479.828	98	145023.144
3	4" THK WALL	1	63	1	8.92	SQ FT	561.96	80	44956.8
4	R.C.C.. Lintel	1	228.9	0.75	0.42	CU FT	72.1035	295	21270.5325
5	Main door	1	3.5	1	7	SQ FT	24.5	370	9065
6	Door	2	3	1	7	sq ft	42	370	15540
7	PVC door for wc	3	2.5	1	7	SQ FT	52.5	300	15750
8	Allu. Sliding window with M.S.	8	4	1	5	SQ FT	160	310	49600
9	ventilator with M.S. grill	3	2	1	2	SQ FT	12	200	2400
10	marbonite tiles for flooring & staircase	1			767.87		767.87	135	103662.45
11	antiskid tiles flooring for bath	1	96.6	1	1	SQ FT	96.6	125	12075

Figure 18 Excel Sheet Of Estimate & Costing (a)

12	Glazed tiles for bath,W.C. etc	1	452.06	1	1	SQ FT	452.06	135	61028.1
13	R.C.C. Slab 1:2:4	1	1325.314	0.42	1	CU FT	556.63188	270	150290.608
14	R.C.C. beam	1	285.736	0.75	1.08	CU FT	231.44616	270	62490.4632
15	R.C.C. Railing	1	12.28	1	1	RFT	12.28	270	3315.6
16	Double coat plastering outside & inside	1	457.8	1	8.92	SQFT	4083.576	35	142925.16
17	plumbing	LUMPSUM 3%							100000
18	electrification	L/S 5%							150000
19	steel	1	1325.314	1	2.5	KG	3313.285	62	205423.67
								TOTAL	1335316.53

SECOND FLOOR

1	RCC COLUMN WITH 1 :2:4	16	0.75	1.25	3	CU FT	45	270	12150
2	9" THK WALL	1	71.18	1	8.92	SQ FT	634.9256	98	62222.7088
3	9"THK WALL FOR PARAPET	1	98	1	3	SQ FT	294	80	23520
4	R.C.C.. Lintel	1	71.18	0.75	0.42	CU FT	22.4217	295	6614.4015
5	Main door	1	3	1	7	SQ FT	21	370	7770
6	Door	1	3	1	7	sq ft	21	370	7770
7	PVC door for wc	1	2.5	1	7	SQ FT	17.5	300	5250
8	Allu. Sliding window with M.S.	3	4	1	5	SQ FT	60	310	18600
9	ventilator with M.S. grill	1	2	1	2	SQ FT	4	200	800
10	marbonite tiles for flooring & staircase	1	194.04				194.04	135	26195.4
11	antiskid tiles flooring for bath	1	31.16	1	1	SQ FT	31.16	125	3895
12	Glazed tiles for bath,W.C. etc	1	200.65	1	1	SQ FT	200.65	135	27087.75
13	R.C.C. Slab 1:2:4	1	300	0.42	1	CU FT	126	270	34020
14	R.C.C. beam	1	68.2	0.75	1.5	CU FT	76.725	270	20715.75
15	R.C.C. Railing	1	12.28	1	1	RFT	12.28	270	3315.6
16	Double coat plastering outside & inside	1	169.18	1	3	SQFT	507.54	35	17763.9
17	plumbing	LUMPSUM 3%							20000
18	electrification	L/S 5%							40000
19	steel	1	1325.314	1	1.5	KG	1987.971	62	123254.202
								TOTAL	460944.712

ESTIMATED COST OF

GROUND FLOOR AND FOUNDATION	2E+06
FIRST FLOOR	1E+06
SECOND FLOOR	5E+05
TOTAL ESTIMATED COST	4E+06

AMOUNT IN WORDS	FOURTY ONE LACS TWENTY FOUR THOUSAND TWO HUNDRED SEVENTY FIVE

Figure 19 Excel Sheet Of Estimate & Costing(b)

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E. 6D BIM – Sustainability

6D building information modeling helps to analyze the energy consumption of a building and come out with energy estimates at initial design stages. Accounting for various life stages of a structure, 6D BIM ensures accurate prediction of energy consumption requirements.

6D = 3D + TIME SCHEDULE + COST + SUSTAINABILITY

A sustainable building is a building that can maintain or improve:

- The quality of life and harmonize within the local climate, tradition, culture.
- The environment in the region.
- Conserve energy, resources and recycling materials.
- Reduce the amount hazardous substances to which human and other organisms are (or may be) exposed.
- The local and global ecosystem throughout the entire building life-cycle.

1) *Definitions of Sustainable Building:* A sustainable building, is an outcome of a design philosophy which focuses on increasing the efficiency of resource use energy, water, and materials while reducing building impacts on human health and the environment during the building's lifecycle, through better siting, design, construction, operation, maintenance, and removal. Though green building is interpreted in many different ways, a common view is that they should be designed and operated to reduce the overall impact of the built environment on human health and the natural environment by

a) Efficiently using energy, water, and other resources.
b) Protecting occupant health and improving employee productivity.
c) Reducing waste, pollution and environmental degradation.

- A building designed to be ecologically correct by using resources efficiently, using internal recycling, renewable energy sources, recyclable or biodegradable construction materials, and blending in with the local environment, particularly in out of town locations. The aims are to reduce to a minimum the environmental impact, and to take human health factors into consideration.
- A comprehensive process of design and construction that employs techniques to minimize adverse environmental impacts and reduce the energy consumption of a building, while contributing to the health and productivity of its occupants.
- A movement in architectural and building circles aimed at creating structures that are occupant and environmentally friendly. Criteria such as sustainability, energy efficiency and healthfulness are considered.
- Sustainable building is the practice of creating healthier and more resource efficient models of construction, renovation, operation, maintenance, and demolition.

A property designated as holding particular status as “environmentally friendly”. The term “sustainable” is often applied interchangeably with the green building designation. Sustainable design refers to such characteristics as a lowering of demands on the environment as a result of certain building characteristics low energy usage, reduced water usage,carbon neutral (i.e. no carbon dioxide emissions result from property operations either directly, or indirectly).

No generally accepted standard has yet been established defining what specifically is required to attain green building status. Several factors are defined under the United States Green Building Council’s Leadership In Energy and Environmental Design (LEED) program which awards ratings (silver, gold, and platinum) under its format, but no clear definition of “Green” has been established to inform which characteristics must be included in a property to qualify for the definition. Instead there is a relatively substantial list of possible elements which can contribute to a development receiving “Green” designation.

- Conversion of a prior Brownfields site.
- Building site positioning to take advantage of energy efficiencies.
- Materials selection – Sensitivity to indoor air quality conditions, avoidance of use of volatile, organic compounds.
- Use of renewable energy sources – Solar electric, wind generated electric, geothermal, or solar thermal heating.
- Carbon neutral – the property’s operations will not result in carbon dioxide emissions released into the atmosphere, either incurred directly by the building, or indirectly by suppliers of energy to the building.
- Energy efficiency – Materials providing isolative qualities in roofing, walls, windows, or energy absorption in extreme climates; reflective coatings in warm climates.
- Sharing of parking structures with other uses (i.e. as in a mixed-use development).
- Low energy usage – High SEER rated air conditioning, energy efficient lighting, and appliances.
- Building Design – Making use of daylight to illuminate interiors, use of natural ventilation.

- Water Use Reduction – Rainwater retention systems, drought tolerant plantings, low water usage showerheads and toilets.
- Public Transportation Proximity – Public transit-served locations allowing residents to travel by public transportation to and from their occupation or entertainment venues without need for automobile travel.
- While it is expected that a generally accepted Green definition will evolve, currently green-building status is more frequently conferred by municipalities under locally defined guidelines.

2) *Sustainable Architecture's 5 Foundational Principles:* At the foundation of sustainable design are five basic principles as outlined by the National Building Museum in Washington, D.C. Needless to say that sustainable architecture is about more than just saving energy and improving insulation. It is about making the best use of our resources without needless waste or environmental damage.
3) *Here are the five foundational principles of sustainable architecture and design*

a) *Taking Full Advantage of the Sun:* Sustainability is most often associated with energy use. This is no coincidence. Our current energy infrastructure is built on the use of fossil fuels such as coal, oil, and natural gas. But these energy sources will not last forever. We use both active and passive strategies to harness solar energy. For example, we may install photovoltaic panels to convert sunlight into electricity. That would be an active strategy. In terms of passive strategies, we may orient a new building to take full advantage of the sun throughout the year. In Revit by using sun path option we can get a idea of how we can take full advantage sun light. We can also see shadows at different time & position also.

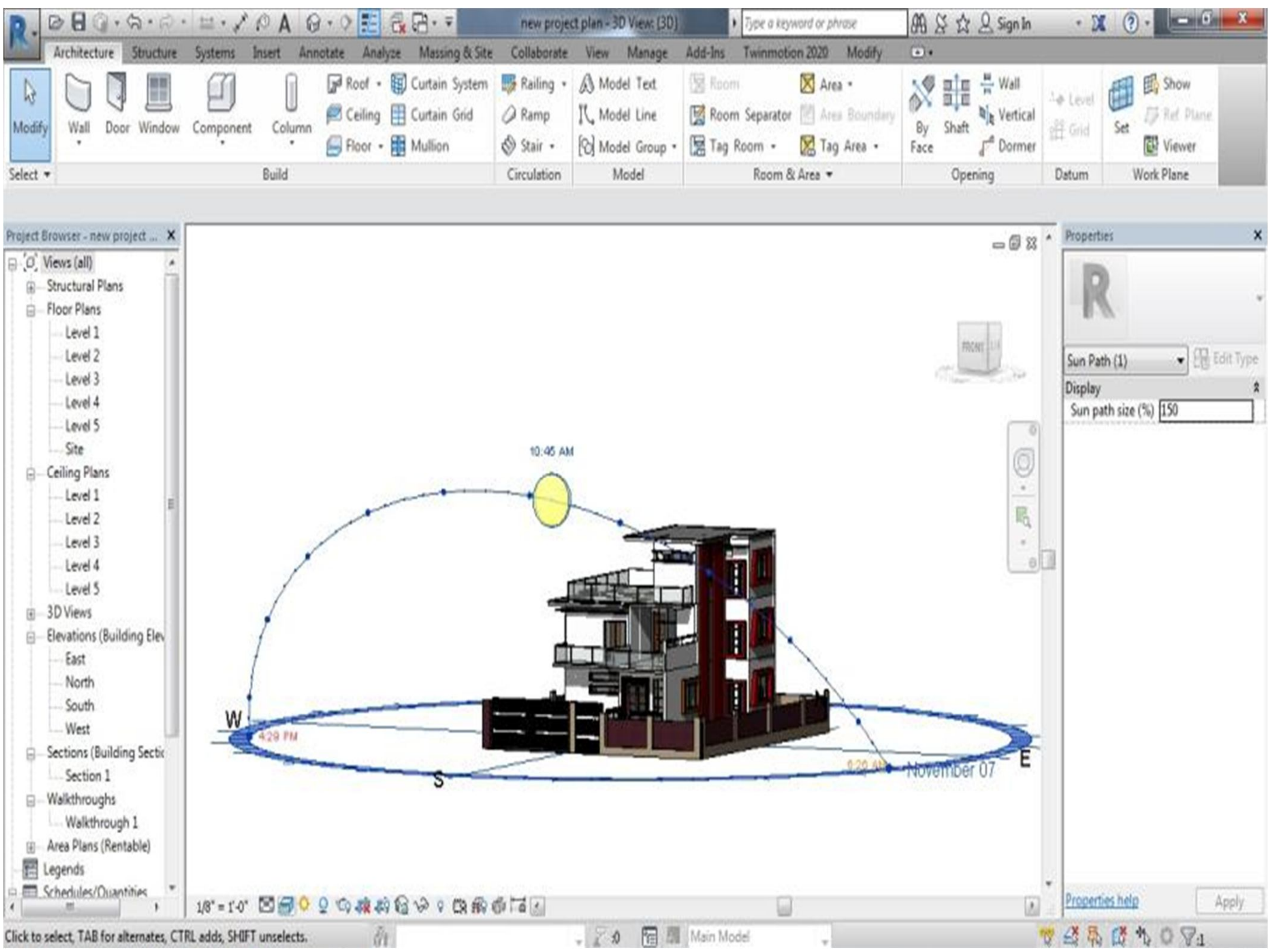

Figure 20 Revit Sun Path (a)

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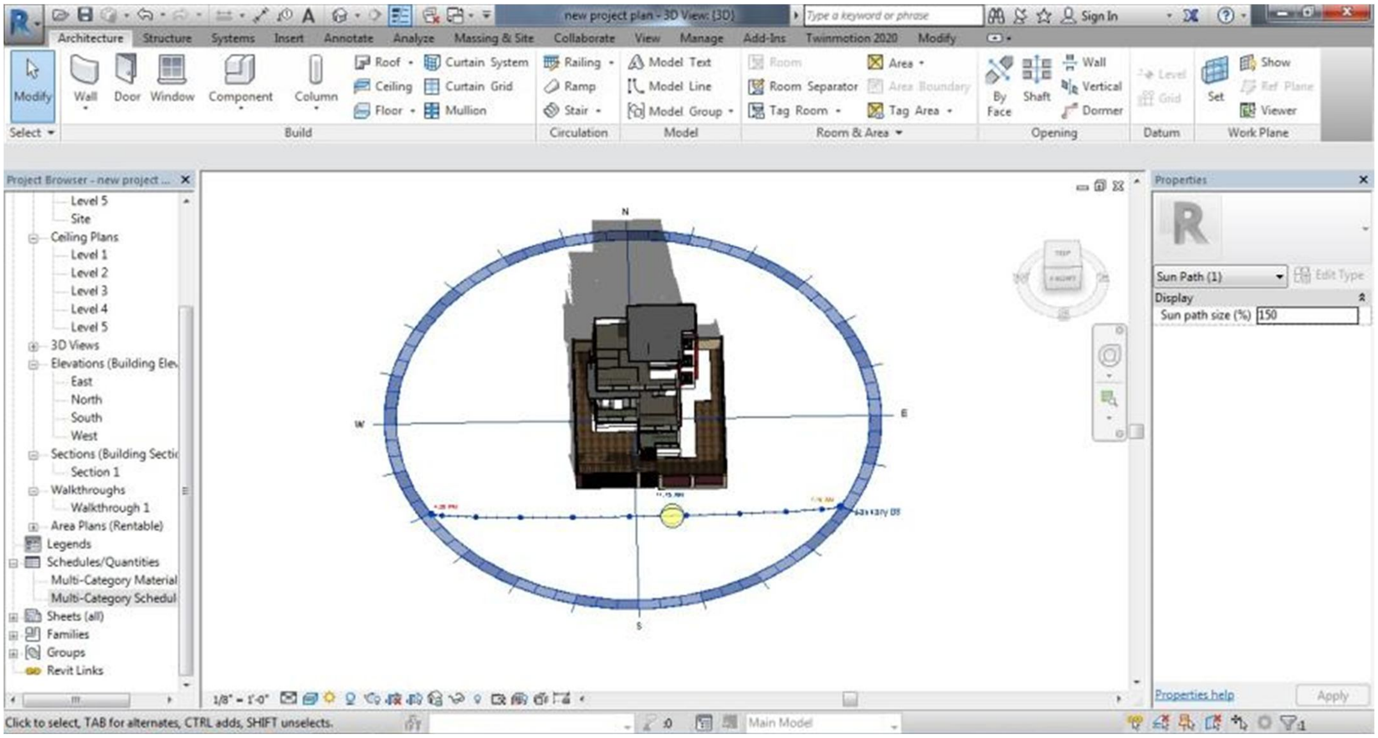

Figure 21 Revit Sun Path (b)

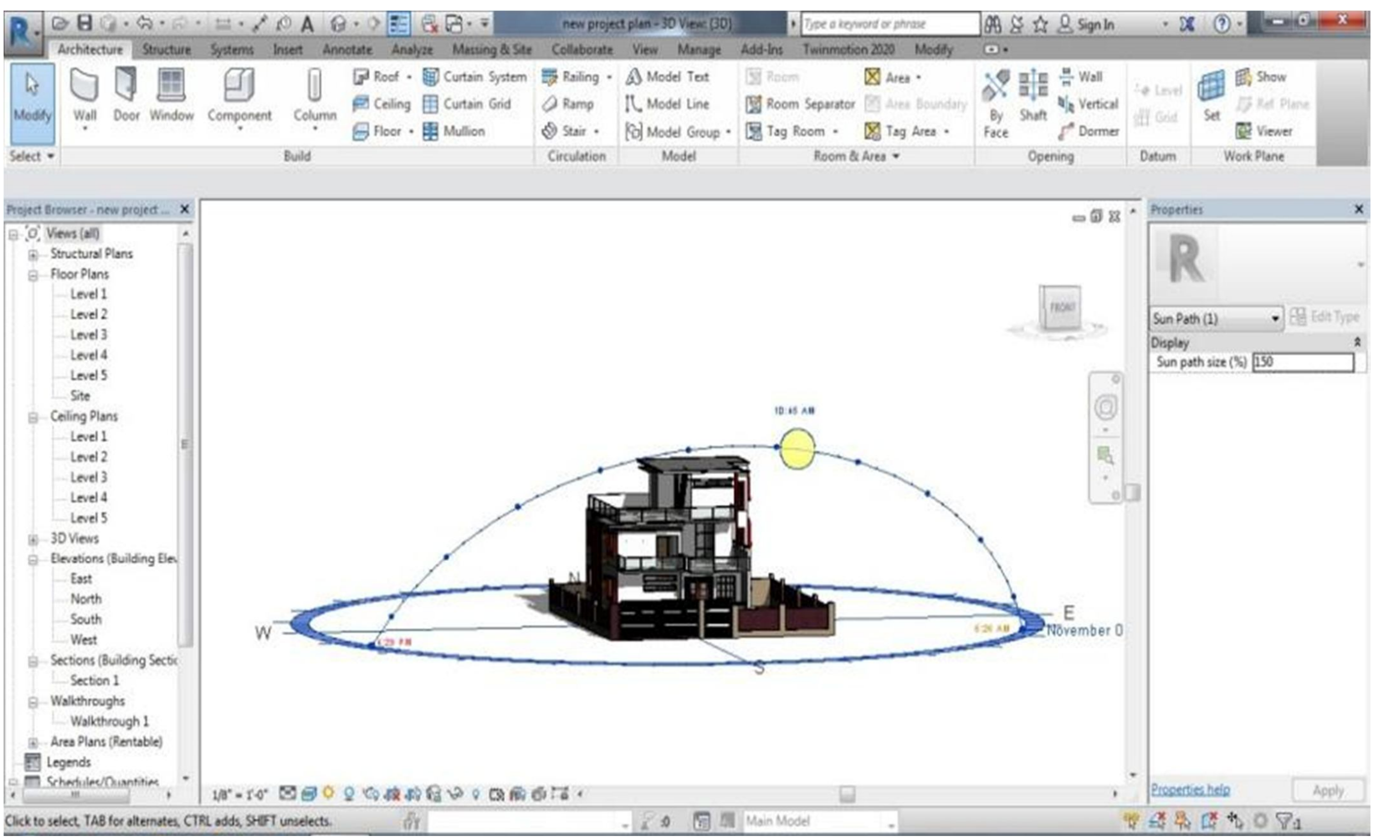

Figure 22 Revit Sun Path (c)

a) *Indoor Air Quality Improvement:* Unbeknownst to many, indoor air can be even more polluted than outdoor air. Therefore, the second foundational principle of sustainable design is to improve indoor air quality. We do this through the use of ventilation and filtering technologies designed to remove as many pollutants and toxins as possible.
b) *Responsible Land-Use:* Sustainability is as much about protecting the land as it is conserving energy and improving air quality. A sound strategy for sustainability looks to work with the land in the architectural design rather than against it. Such a strategy involves a number of things including utilizing less land for construction, leaving more land open for recreational purposes, and minimizing the environmental impact of any construction project.
c) *High-Performance Architectural Design:* It goes hand-in-hand with designing high-performance structures that waste as little as possible. Most homes and commercial buildings compete internally to find the right balance between comfort and conservation. High-performance architectural design improves the "internal envelope", as the National Building Museum to describes it, to maintain comfort with less waste.
d) *Use of Natural Resources:* Another foundational principle of sustainable architecture is the wise use of natural resources for building purposes. Our supply of natural resources is finite, so building indiscriminately without regard to how quickly we use such resources is anything but sustainable. The wise use of natural resources includes timber management, use of recycled materials, and the development of new synthetics that can be safely used without harming the environment. We believe sustainability is unquestionably essential to maintaining a bright future for our children and grandchildren. We find great satisfaction in knowing that we are creating beautiful buildings in a way that is environmentally responsible yet still structurally and aesthetically sound.

F. 7D BIM –Maintenance

Building repairs and maintenance services mainly includes works undertaken for maintaining proper condition of buildings, its services and works in ordinary use. The use for which buildings are designed is the main factor in determining the required standard of maintenance.

Excessive building maintenance should be avoided. At the same time, building maintenance should ensure safety to the occupant or the public and should comply with the statutory requirements. The need also depends upon intensity of usage.

1) Types of Building Repair and Maintenance Services

The types of building repair and maintenance service works are:

In addition to above, additions and alterations Works in the buildings, Supply & maintenance of furniture & furnishing articles should also be done.

a) *Day to Day Repairs:* Day to day repairs include service repairs which arises from time to time in the services of the buildings such as in plumbing works, water supply, etc. Examples for such repairs are removing chokage of drainage pipes, manholes, restoration of water supply, replacement of blown fuses, repairs to faulty switches, watering of plants, lawn mowing, hedge cutting, sweeping of leaf falls etc. The purpose of this maintenance service is to ensure satisfactory continuous functioning of various services in the buildings.
b) *Annual Repairs:* This maintenance service is carried out to maintain the aesthetics of buildings and services as well as to preserve their life, some works like white washing, distempering, painting, cleaning of lines, tanks etc. are carried out periodically. These works are planned on year to year basis.
c) *Special Repairs:* Special repairs of building are undertaken to replace the existing parts of buildings and services which get deteriorated on ageing of buildings. It is necessary to prevent the structure & services from deterioration and restore it back to its original conditions to the extent possible.
d) *Additions and Alterations:* The works of additions/alterations are carried out in buildings to suit the special requirements of occupants for functional efficiency. The facilities in buildings are updated by carrying out such works.
e) *Preventive Maintenance:* Preventive maintenance is carried out to avoid breakdown of machinery and occurrence of maintenance problems in buildings and services. Works of preventive maintenance are carried out on the basis of regular inspection survey. Preventive maintenance includes works to prevent deterioration of building parts (which depends on climatic conditions), pollution, fungi, the insect attack, subsidence, flooding, intensity of usage, careless usage, seepage etc. Building maintenance is work undertaken to keep, restore or improve every part of a building, its services to a currently acceptable standard and to sustain the utility and value of the facility.

2) *The Objectives Of Building Maintenance Works Are*

a) To preserve machinery, building and services, in good operating condition.

b) To restore it back to its original standards.

c) To improve the facilities depending upon the development that is taking place in the building engineering.

All the buildings deteriorate from the time they are completed. The rate of deterioration depends on a number of factors. Not all the factors can be controlled by the occupants of the building.

3) *During The Design And Construction Stages, The Following Points Shall Be Kept In Mind*

a) Right choice of building materials.

b) Selection of suitable construction techniques.

c) Adequate specifications for construction and installation work.

d) Effective supervision throughout construction and rectification of defects prior to final certification.

e) Provision of adequate space for landscaping with proper design.

Depending upon the nature of the work, immediately after the date of completion, building shall be maintained for initial period of 3 to 6 months as there can be teething troubles in any new construction. If these are taken care of, the maintenance pressure will be reduced.

When there is any inherent defects both in design and construction the maintenance cost rises disproportionately to a higher level and the anticipated life of building is reduced.

Maintenance of building aims at effective and economic method of keeping the building and services fully utilizable. It involves numerous skills as influenced by occupancy and the performance level expected of a building.

Planning of works to be carried out to keep the building in a good condition calls for high skills. Feedback from maintenance should also be a continuous process to improve upon the design and construction stages.

4) *Building Maintenance Checklist:* Keeping up with building maintenance is a lot of work. Neglect, however, can lead to expensive repairs, frustrated tenants or decreased business. Don’t let important upkeep tasks get away from you.

a) *Year-Round Building Maintenance*

Establish a regular service interval for these maintenance tasks:

- Replace burned-out interior and exterior light bulbs
- Clean window glass, tracks and hardware
- Check the batteries in your smoke and carbon monoxide detectors
- Replace the HVAC air filters
- Inspect the property for signs of rodent or pest damage
- Check the building for visible signs of leaks
- Test the fire alarm
- Replace the water filters
- Have the fire alarm and fire suppression system serviced
- Have the fire extinguishers inspected
- Have all OSHA fall prevention devices and equipment inspected
- Ask your tenants if there is anything they want to have addressed
- Inspect door closers, latches, hinges and locks for proper operation

IV. FUTURE SCOPE

The future scope of Building info Modeling (BIM) is powerful and exciting. The scope of BIM services is equally extensive. It’s simply a matter of time, as BIM becomes necessary for a serious portion of the development projects.

Various BIM processes from planning, analysis, evaluation, and planning maintenance operations have completely changed the AEC industry. In the digital future, every project must use BIM to plan, design, build and manage buildings in a common environment. BIM is a technology-driven process. Technology enables BIM coordination and collaboration for various projects such as healthcare facilities, airports, schools, monuments, etc.

BIM not only enhances technology, it also changes the planning and construction process. In the near future, BIM managers and support engineers may work directly in the facilities department or construction management department, allowing the owner to lead the project team. Transfer from RFP to project.

The future of BIM is to use the model at all stages to improve collaboration. Ultimately, the future of BIM is about creating connections. Often referred to as "Connected BIM", this means using more end-to-end modeling through cloud technology.

V. CONCLUSION

BIM improves the productivity, value, and quality of infrastructure. Generate information and design architectural models in the integrated database, and help establish a continuous system in the concept and creation of the model by presenting 3D information.

Using BIM as a tool to update the flow of information during a project is just as important as it was the first time. BIM tools will evolve in their ability to optimize, but current processes allow a BIM-enabled site manager to complete tasks with relatively good efficiency.

The BIM project helps the design team develop a detailed plan for its project. These plans describe the goals, processes, communications, and infrastructure of BIM implementation. By developing and following these plans, the team can change the title significantly. Successfully implemented BIM. This process requires time and resources, especially if the organization is starting this level of planning for the first time, but the benefits of developing a detailed plan far outweigh the resources consumed.

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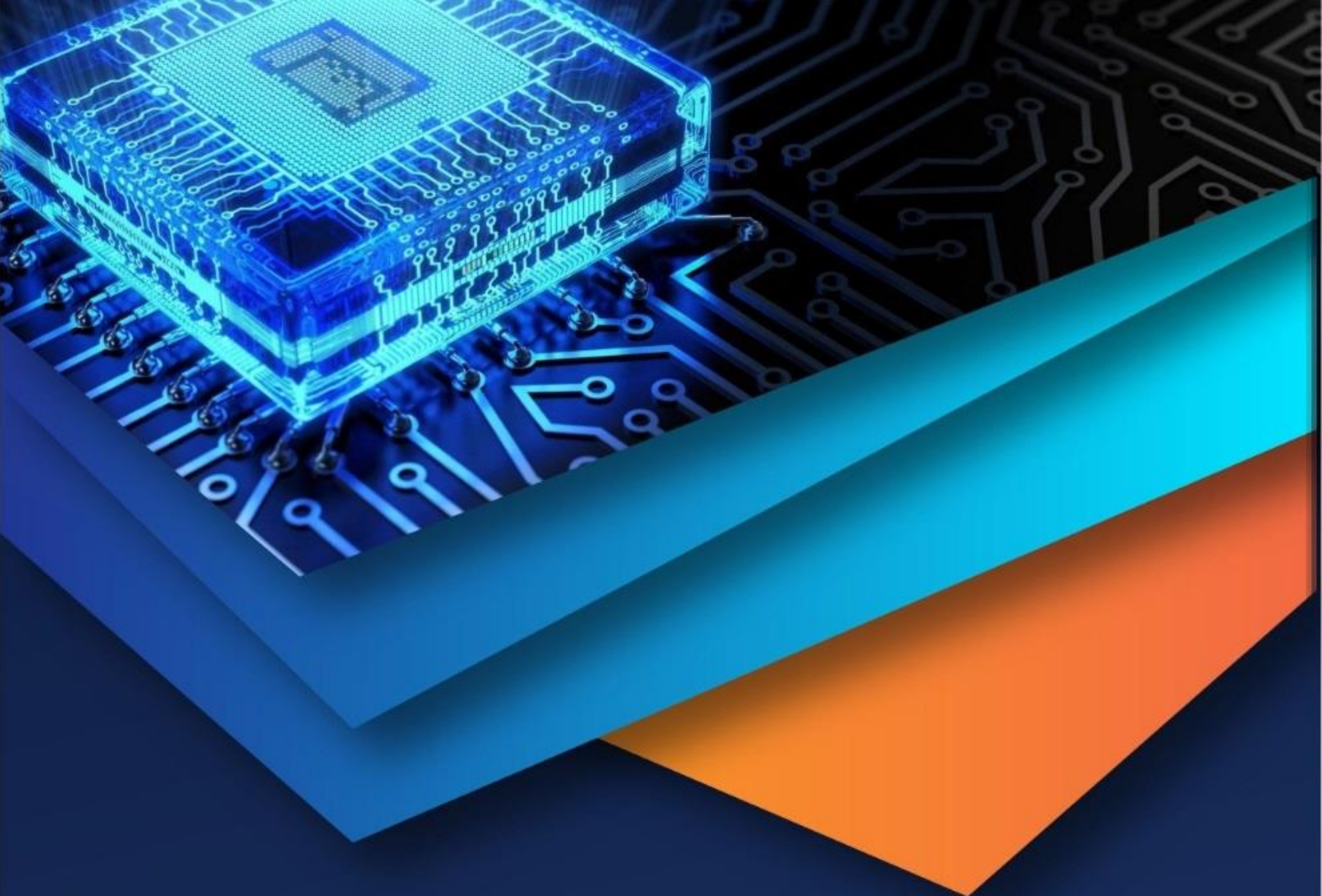

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