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Study on 4d Applications of GIS in Construction Management

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Abstract:*The current day demand of the construction industry requires mainlyplanning, scheduling and management process. They include different set of activities which are executed as per the foremost important software issued for scheduling is PRIMAVERA P6 PROFESSIONAL and MICROSOFT PROJECT (MSP). In earlier days clarifying the status of venture to the customer in AutoCAD was very difficult and tedious. The recently advanced technology 10.6 plays a serious role within the software. They incorporate with the mix of 3D Design and planning PRIMAVERA can be done in which reduce the time management for the project.*

Keywords: *2D DESIGN, 3D VISUALIZATION, PRIMAVERA P6, ARCGIS 10.1.*

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I. Introduction

GENERAL: The second largest industry of India contributing significantly to the economy system and developing the infrastructure. Success or failureof any task generally relies upon the worth adequacy; time bound conveyance, quality and measure of assets accessible for development.Development assets are the significant of the material, time, labor and worth. The term management covers two principles, material administration and time the executives. Since the initial 1990 the developing enthusiasm for 4-dimensional pc supported structure (3D CAD) for construction project.

BENEFITS OF GIS:

1. They're used in soil investigation, earth excavation, super structure, monitoring a tracking system.

2. An automatic site layout to pick suitable location for temporary structure and material storage were developed by using ARCMAP.

3. ARCMAPcan deal with both spatial and property information, spatial information identify with the geometry of the highlights while trait information depicts the qualities of different highlights and put away inside the forbidden structure.

4. (CPIS) Construction Project Information System was created for putting away keeping up and refreshing assets information of task.

5. For increasing the work productivity and safety in work place, efficient space management is essential which may be done by 4D management and with the assistance of GIS.

ROLE OF GIS:

GIS stands for geographic information system which collect the information and stories the dates of the disseminates geographic information for the sleek deciding making in highways project or development project of government.

GIS help in identifying the impact of natural human effects on earth. GIS resource is employed to seek out the floods, landslides, soil erosions, earthquake etc.

4D GIS MODELLIG:

A four –dimensional geographic framework (4D-GIS). 4D GIS is an integrates, manages, analyzes spatial and non-spatial information provide quality visualization, simulation, and communication details. Italso can increase the understandability of the scheduling of a project ricks while the work progress on the location.

II. Methodology And Medol Development

Methodologies aredeveloped for integration of GIS and PRIMAVERA P6 for arrangement of 4D construction planning. Methodology flow charts are placed below as figure 1.

Collection of 2D designs. All quite residential construction design collected various construction activity will be improved by scheduling and planning the activities in ARCGIS but those design are generated by AutoCAD software.

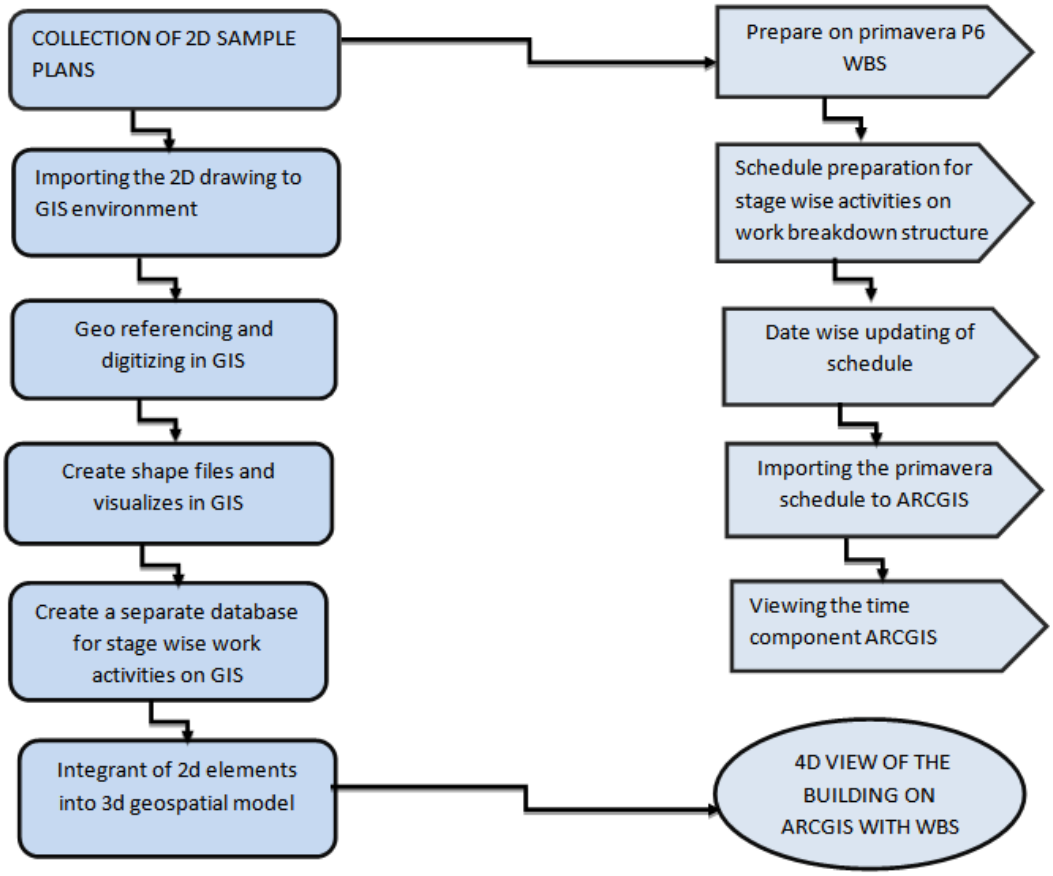

Figure 1 flow chart of the method development of 4D GIS.

Create breakdown structure. Supported the positioning condition the activities of the development may various. Workbreakdown structure (WBS) or created by the PRIMAVERA P6 PROFESSIONAL are been prepared for an outline activities preparation of activities has it unique work activities on the positioning figure 2 WBS.

Importingof drawing to GIS. Gathered advanced structures records are sent out to ACRGIS programming condition. The topological structure of the layer might be made in ARCGISprogramming to spot inside the drawing.

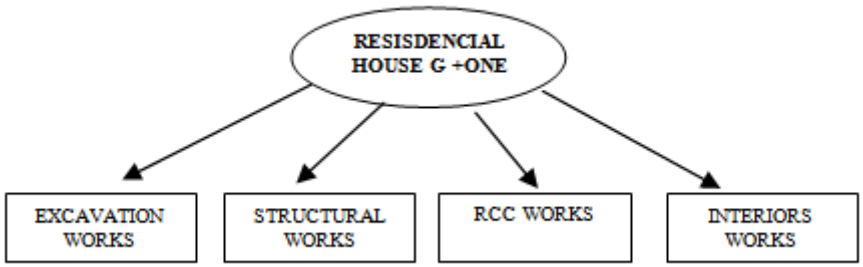

Figure 2 work breakdown structure for residential building.

III. Model Development And Application

The proposed technique of incorporation of PRIMAVERA P6 and ARCGIS are for the most part use for planning and checking the work progress on the undertaking is applied on a private multistory development. The 2D structure of the improvement at various degrees of the advancement work various exercises from WBS are imported to ARCGIS programming.

This softwareis often easy to progress the management program on the development site and reach the activities on the location progress.

ARCGIS software is highly used on surveying program to search out the geography to manage the inputs and its details to be used for tracking.
ARCGIS are often used for the geographicalprogramming system on the management side and it can help to schedule the work progress and activities on the development site.
Those things are wont to plan and to clarify about the project and therefore the material requirement on the development site.
Using of AutoCAD and PRIMAVERA P6 PROFESSIONAL we are able to use ARCGIS software to scheduling and planning the constructio0n site activities in straightforward manner.
PRIMAVERA P6 Scheduling are often wont to plan the activities on the development site. That software are helpful for site engineers to regulate the activities on the location and to complete the project on or off the date.
Once the AutoCAD 2D design areplanned and finalized scheduling on the PRIMAVEA P6 or MS PROJECT preparation work are often started and scheduling are often done as per the design of the construction project.
ARCGIS 3D design and PRIMAVERA P6 PROFESSIONA scheduling have done as per the collected drawing of the construction site and it been attached below as figure 3, 4& figure 5.

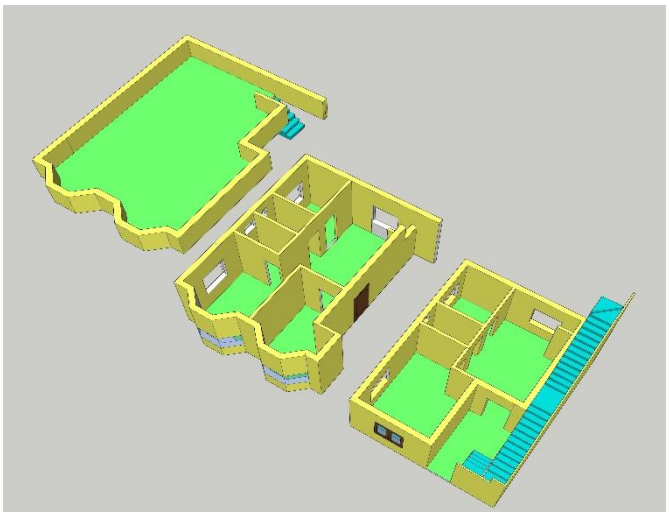

Figure 3 3D design of the residential building.

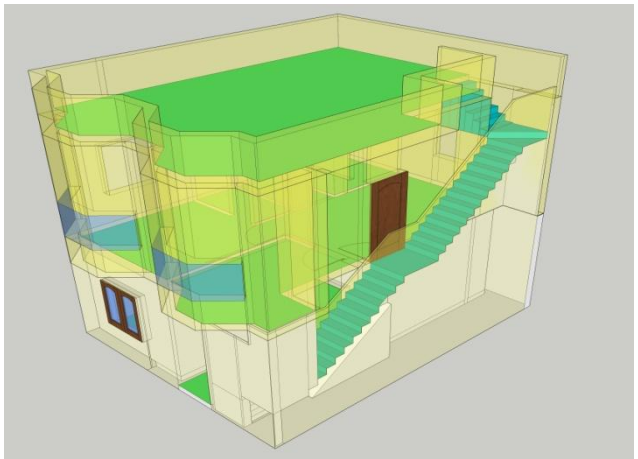

Figure 4 complete residential building view in 3D

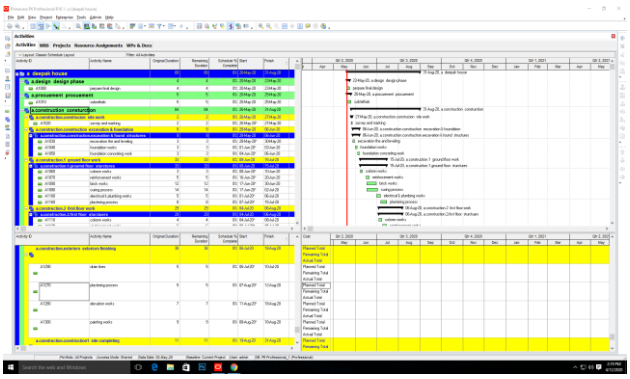

Figure 4 PRIMAVERA P6 scheduling the residential building.

STAGING OF 4D VIEW ON INTERGARTOF SCHEDULING AND DESIGN This process bring out a serious step after once importing the ARCGIS 3D design and PRIMAVERA P6 PEROFESSIONAL scheduling reports have be attached on the ARCGIS to bring the 4D out placed on the project. Every activities on the construction site have been provided are given the time component. Importing the design data and three dimension design are going to be completed on condition that this layer IDs and name should be same because the project tile. After the interlink step of both the three dimension and non-three-dimension data of the residential building we'll getting the output in 4 dimensional view of the residential building and therefore the 3D parts of the residential building are elevated. Those links will prepare schedule on the element of the building. Final, once the figure provide a complete details of a residential building and its show the development work drawing board details to the last stage of the work on the development project and it activates on the projects together with the 3D +1D view as scheduling and threedimensional. Which get a correct visualization of the residential building project. Four dimension view output have be showed as figure 5.

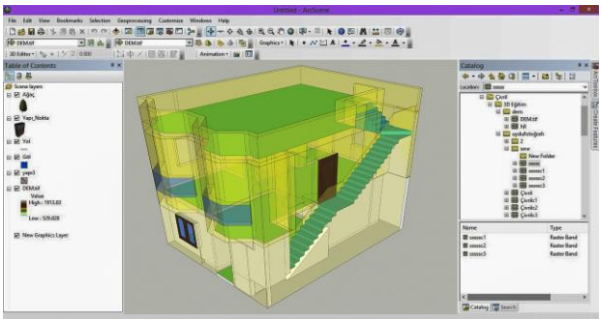

Figure 5 output of 4 dimensional on ARCGIS

IV. Literature

AHMED AL-GAHZARI (2013)- To demonstrate that GIS may be integrated with Project management software for construction progress visualization and an integrated data system.

The project management is defined as "the application of data, skill, tools and techniques to project activities for project requirements"(PMBOK). The project management process for initiating recognizing of project or phase should begin and committing. Planning process for maintaining the workable scheme for the aim or accomplish the business project people coordinating for other resources to hold out the plan as executing.

YADHUKRISHNAN A.(2015) - The development activities that would be grouped for GIS based 4D modeling for project management also called building information. The planet Builder is an initial attempt for the event of representation language for cooperative engineering design and construction. They developed a procedure forchoosing and creating subsurface profiles from the info upon the fundamental geometric and hydraulic data for MOD FLOW. Exploiting even more of the automation capabilities in 2000 made use of an automatic schedule monitoring system for precast building construction.

V.K.BANSAL (2006) –Determinedthat the potential of GIS environment in developing a construction (PIS) for rate analysis safety and quality. The failure of managing construction safety may end up in the financial loss, human conflicts and penalties. The sub objectives also achieved in developing of the

1) Data base in GIS environment.
2) GIS functionality to switch the knowledge of information of base
3) Integrate safety and internal control for various construction activities.

After the protection function is performed, selecting a record within the destination table will automatically select the record or records associated with the source table.

MOHAMED REFAAT (2019) -Focused on the urban field for the integration of your time factor for (4D) and therefore the GIS fir the fast planning for using of recent techniques within the international coastal road. The concept of 4D helps in representing of aggregate schematic data in an exceedingly way that are apace with time and provides them a perception of the changes in pattern over time. Planners should know the force which influences the expansion trend of every individual use and urban mobility.

CHANG CHEN (2016) - Study on the metabolism of urban building by 4D-GIS within the china for construction leads for top consumption and high emission. During this situation, sustainable development which plans to balance the economic development and environment protection. The rising of the economic ecology concept, material flow analysis had been applied. This technology hasbeen penetrated into few field like as land management, electricity, traffic, water conservation, fire protection.

K.RUIKAR (2009) -The use of 4D simulations for the development are finishing up the collaborative planning tool for integral and initial construction. In most cases, construction projects for a collaborative effort for the development of a construction is not any exception for creating the contributions from multiple planners.

Although 4D CAD has demonstrated feasibility for construction it's still less incorporated into a whole planning process. Reinforcing the aspects will enhance the tactic to robust plan for 4D collaborative for construction.

ZULKEPLI MAJID (2018) - Studied on the complex of the massive number of individual and documentation of the building construction for various kinds of format to gather and share. The BIM presents geometrical and semantic information of the building and GIS application to manage the project information. The project information and documentation not a systematic way to give an effect on the information sharing system. BIM elements are the most emphasis to interactive of 3D graphical modeling to serve the needs of the automated drafting and attributing linking with features.

ANAYA S (2018) -In India construction industry is that the largest economy the new software is introduced within the market on daily basis. The construction could be a concept of the ideas and execution. There's a pressure on the project managers for current scheduling and progress reporting for substantial improvement in quality and efficiency. BIM represents physical and functional facility. Thanks' to the complexity of projects, it's very difficult for project managers to monitor the progress of varied construction activities.

A. CHAITANYA KUMAR(2017)- Project monitoring act as safety step in construction projects which alerts and advice the organization about the occurrence of construction failure and delays for the higher understanding of construction sequence and for better visualization of the construction progress, planner makes use of 2D drawing and integrates it with their components schedules in GIS software. The 3D co-ordinate system must be projected properly from geographic co-ordinate system.

V. Conclusion

This research paper can provide that ARCGIS has been successfully applied within the Construction industry. It proved the flexiblenessof GIS within the managing of construction projects. It acts as another alternative for the conventional 4D view of the construction project on the correct visualization on the project on 4 dimension. Construction industry has always been concerned all range of the project, from small scale industry to large scale construction projects like highways project, flyover project etc. Per se high range projects are going to be involves the ARCGIS to seek out the activities on the construction area and to finish the project before the date so ARCGIS are so useful for all the sort of action on the construction site.

Reference

[1]. **AHMED AL-GAHZARI,** Prof Dr. Baqer Al- Ramadan (2013): CRP (54) – Application of GIS in construction Project Management.
[2]. **YADHUKRISHNAN A.**, Amba Shetty (2015) – ISSN (2393 -8021) "A Review on GIS based Construction Project Management.
[3]. **V.K. BANSAL,** M.Pal (2006)- GIS based Project Information System for CM.
[4]. **MOHAMED REFAAT,** Prof Mohamed El Barmelgy (2019) – Model for Analyzing urban Dynamics using 4D-GIS Analyzed.
[5]. **CHANG CHEN,** Feng Shi, Keijin Okuoka (2016) – The metabolism analysis of urban method for new building in China.
[6]. **K. RUIKAR,** S. Emmitt (2009) - An Interactive approach to collaborative 4D construction.
[7]. **ZULKEPLI MAJID,** Uznir Ujang(2018) - Integration of GIS and BIM techniques in construction project.
[8]. **ANAYA S. (2018) –**Visualization of construction using 4D Geographical Information System.
[9]. **A. CHAITANYA KUMAR,** T. Reshma (2017) - 4D Application of GIS in (CM).

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