PLANNING AND SCHEDULING OF RESIDENTIAL BUILDING USING MS PROJECT AND BIM

SHAIK MOHAMMED FAZIL[1], CHUKKALURU RUKMUNNISA SULTANA[2], P. NAVEEN KUMAR[3]

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ABSTRACT: *Arranging and planning of development projects has turned into a significant piece of any venture for the ideal and efficient achievement of the task. A fitting development timetable can be utilized for different purposes. Through development plan forecast can be made with respect to project culmination, workers for hire can modify group size, movements or gear to speed or slow the advancement. All the construction activities will contrast from one another in size. Each undertaking is time limited*

A decent development plan is the reason for fostering the financial plan and the timetable for work. Advancement of the development plan is a basic errand in the administration of development, assuming the arrangement isn't composed or in any case correctly documented. Notwithstanding these parts of development arranging, it is additionally important to settle on authoritative choices of the connections between project members and even which associations to remember for a task.

The goal of this work is to concentrate on the booking techniques and development arrangement of work for multistorey structures and is to achieve the utilization of Microsoft project programming in arranging and planning of a multistorey RCC building development and cost of conformance for the task. To finish the above targets a contextual analysis RCC private G+5 building is thought of. The total preparation and booking of this structure is examined by current programming procedure. For this methodology Microsoft project programming is utilized for arranging and planning the RCC building. Furthermore BIM is utilized to additional improvement of the booking system.

The plan and correspondence has bit by bit changed from 2D based to incorporated 3D advanced connection point recently. Building Information Modeling (BIM) is a cycle for making and overseeing data on a development project for the duration of its life all things considered its computerized change in the AEC (Architecture, Engineering, and Construction) industry. BIM is the coordinated course of making and overseeing data for fabricated resources. It fortifies the communication between the plan and execution group. There's still a lot to be found out with regards to the chances and ramifications of this device. In this venture concentrating on the application BIM is conveyed out on arranged building.Project arranging and booking is ready from MS project. The aftereffects of the venture plan is are archived, the timetable is connected with a 3D model in Naviswork programming to make a 4D model that recreates reality and conflict location is finished. The 3D model is made utilizing REVIT software.Finally Cost examination preformed with 4D model and conflicts are recognized. Conflict discovery helps in early recognition of deferrals and clashes and it results limits cost overwhelm.

Current work presents significant data about the utilization of Microsoft project programming for the preparation and booking of building development.

1. Introduction

Development arranging isimportant and confounding movement in the administration and execution of the development projects. It incorporates the decision of innovation, meaning of work undertakings, the assessment of the fundamental assets and spans for individual assignments, and the recognizable proof of any cooperations among the different work errands. A decent development plan is the root for fostering the financial plan and the plan for getting work done. Advancement of the development plan is a desperate errand in the administration of development. Notwithstanding these specialized parts of development arranging, it might isessential to settle on hierarchical choices about connections between project members and even which associations to contain in an undertaking.

Building Information Modeling (BIM) is an arising innovation all through the world in the Architecture, Engineering, and Construction (AEC) businesses. BIM innovation gives clients exact and steady structure information and data, obliges the capacities expected to display the structure and gives a virtual perspective on the structure model. Building Information models are likewise progressively utilized by different partners during the undertaking lifecycle like Owners, Designers, Contractors and Engineers. As a critical part in the undertaking lifecycle, workers for hire assume a significant part in ensuring the task will be followed through on schedule and reasonably affordable. This theory can show how BIM innovation will help AEC for timetable and cost controls. It starts with an overall presentation of BIM innovation and the various ways it works contrasted and customary CAD (Computer Aided Design) technique, and proceeds with assessment of BIM devices. It then, at that point, clarifies the employments of Scheduling and Cost Estimating in BIM separately and gives a contextual investigation to show how BIM can function for cost assessing and project planning with the accessible BIM model. In the last part, the proposition

will furnish spaces of possible improvement with BIM innovation in the predicted future.

Figure 1 Lifecycle of a building.

As indicated by National Institute of Building Sciences (NIBS), BIM is a calculable portrayal of the multitude of physical and utilitarian qualities of a structure and its connected venture/lifecycle data, which is planned to be a store of data for the structure proprietor/administrator to utilize and keep up with all through the lifecycle of a structure (NIBS 2007). As a computerized portrayal, BIM gives a virtual perspective on the items in the structure with actual math (2D or 3D) and other utilitarian boundaries, like materials, spatial relationship, and so on Planners make these BIM protests characterize a structure model, and this model consolidates both physical and practical data put away in the BIM objects. When the structure model is finished, all the data can be created by clients for manufacturing, breaking down, development booking (4D BIM) and cost assessing (5D BIM), and in the long run, for office the board during activity period of the structure lifecycle.

2. Technique

To sum up, Construction Management is the discipline that handles the structure during the last period of the venture prior to surrendering to the proprietor. This suggests orchestrating material timetables, development tasks, and succession of exercises, team association, wellbeing and security, building site planning, and using time productively, check of establishments, update documentation cost, and that large number of practices that make conceivable the actual acknowledgment of structures.

This implies that CM is the thing that is important to change a plan into a genuine design, and here and there the exercises of a development administrator start significantly sooner than anticipated, possibly even from pre-plan. Among the exercises and apparatuses of the development supervisor, there are the extremely known and valuable supposed 'breakdown structures': these constructions help partition and deconstruct the task in more modest, reasonable bundles. The principle

illustration of breakdown structure is the WBS, specifically the Work Breakdown Structure: it is a various leveled structure wherein greater components, for example, large scale classes, primary structure teaches, or significant expectations, are isolated into more modest ones, in an iterative interaction, until rudimentary parts or exercises are covered. Different instances of comparable designs are Cost Breakdown Structure and Organization Breakdown Structure.

Besides, since the CM will in all likelihood need to manage time and cost administration, another exceptionally valuable Project Management instrument that will help them managing the plan and development periods of a venture is the Gantt graph. This specific kind of chart shows every one of the exercises of a venture, very much like a WBS, however addressing them as flat bars put along a course of events, so one can see simultaneously the actual action, its length, its beginning and finish date, and every one of the material and HR (that can be composed over the bar) required for the culmination of each errand. This kind of portrayal permits the PM (or, for this situation, the CM) to keep hint of the expenses of every movement and errand along the existence of the venture, since assets can be relegated to undertakings, and cost can be allocated to every asset utilized.

2.2 Use of Microsoft Project in Construction Management

Microsoft Project programming is utilized in this venture. Anactual startand end time a venture need to have. Inside the doled out assets and assets the venture should be finished and inside the dispensed time the undertaking should be directed by satisfying this a task can be finished not really set in stone period.

In this Software arranging of the development, the programming and the advancement of the assets are finished. The technique utilized for the venture were the exercises were characterized first, to set up a programming report the few exercises were utilized with the distinctive consistent relations and lengths. Then, at that point, social affair of accessibility of assets and appointing were gotten by the basic way, the evening out and investigation will be completed and the outcomes will be finished up. The action are portrayed in the accompanying advances.

1. Planning

- Data Collections
- Quantity Surveying

2. Scheduling

3. Resource Optimization

- Resource Allocation
- Resource Levelling

4. Cost Benefit Analysis

Cost Benefit Analysis: A Cost Benefit analysis is a systematic process used to analyze which decision to make and which to refrain. The primary advantage of achieving quality necessities are:

- Stakeholder's satisfaction
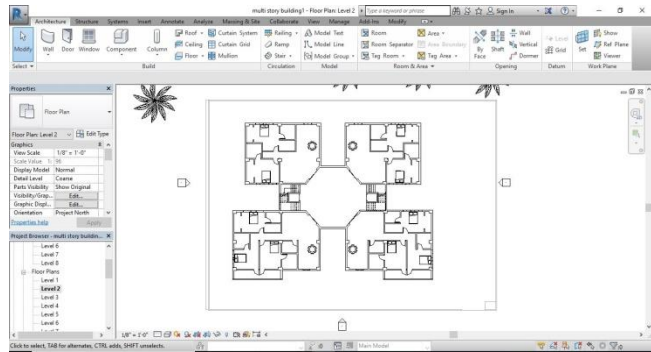- Costs are lower
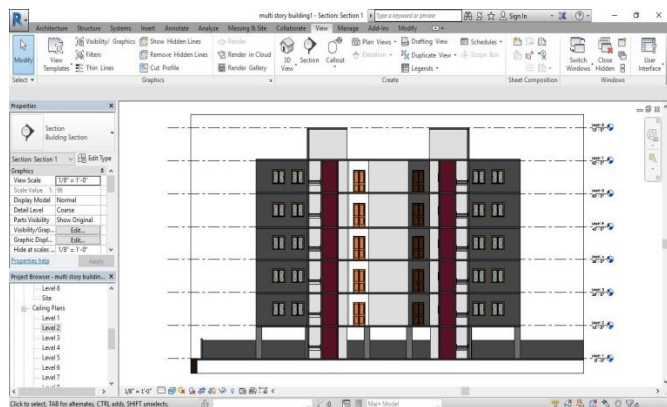- Productivity is higher

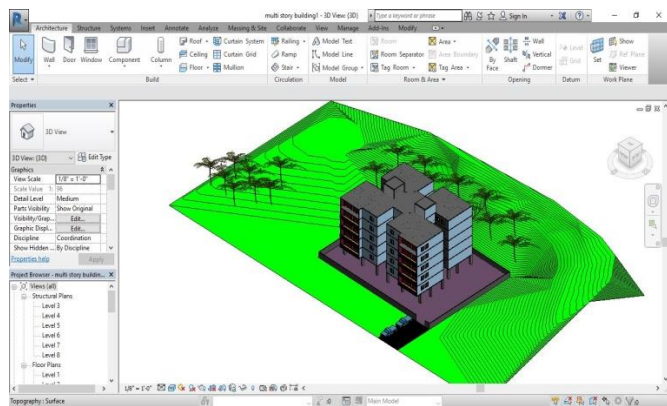Fig 1: Building Plan.

Fig 2: Elevation.

Fig 3: Isometric view of building.

3. Creating 4D BIM Model using Navisworks

The 3D model that was created in Revit Software 2020 to the time schedule that was created in Microsoft Project through:

a) Export the 3D model from the Revit Software 2020 to Navisworks Manage 2017 through Add-Ins and External tools, and choose the Navisworks 2017 Software, and export the model in Navisworks Cache (NWC) format as shown in Fig.
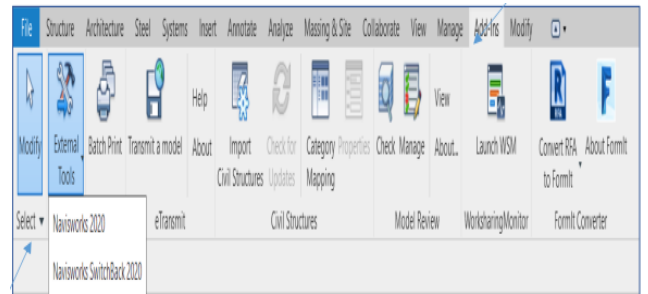

Fig 4: Export 3D Model from Revit to Naviswork Manage (2017)

b) Navisworks Cache (NWC) file was (appended) into a master Navisworks file and saved as a Navisworks (working file) (NWF) as shown in Fig.
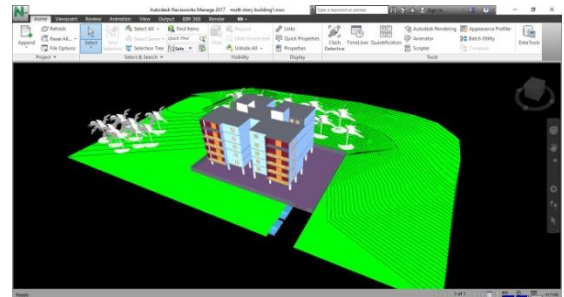

Fig 5: Imported BIM model in Navisworks Manage

c) Import Time Schedule from Microsoft Project (M.S Project) and link the 3D Model with Time Schedule to create 4D Model as shown in Fig

Fig 6: Importing Time Schedule Information from M.S Project.

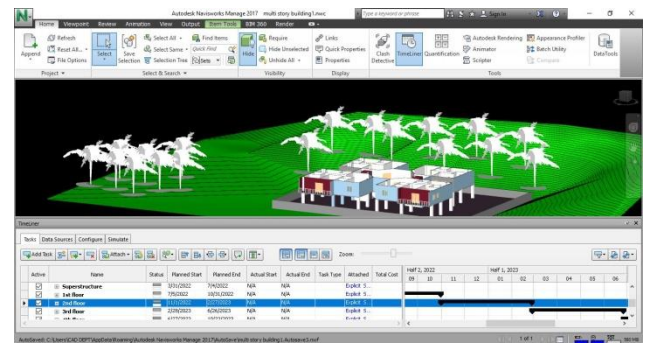Fig 7: Imported Time Schedule Information in Navisworks Manage

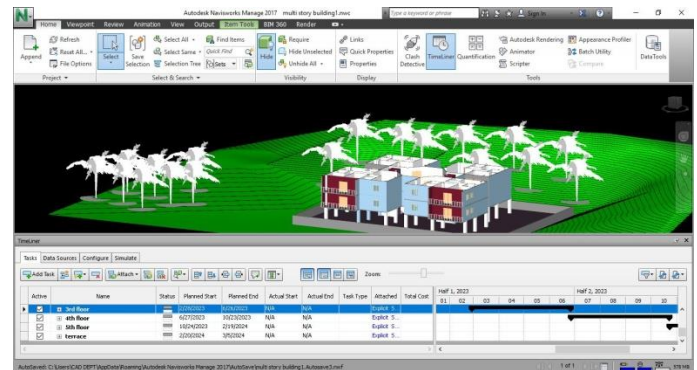d) The assignment of tasks to a set of chosen elements is followed by the simulation process as shown in

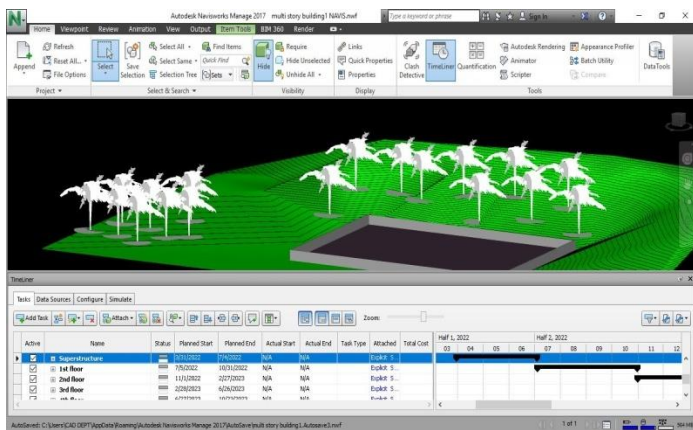Fig 8: 4D Construction Simulation for Soil work in Navisworks Manage.

Fig 9: 4D Construction Simulation Up to column work in Navisworks Manage.

Fig 10: 4D Construction Simulation Up to 1St floor in Navisworks Manage.

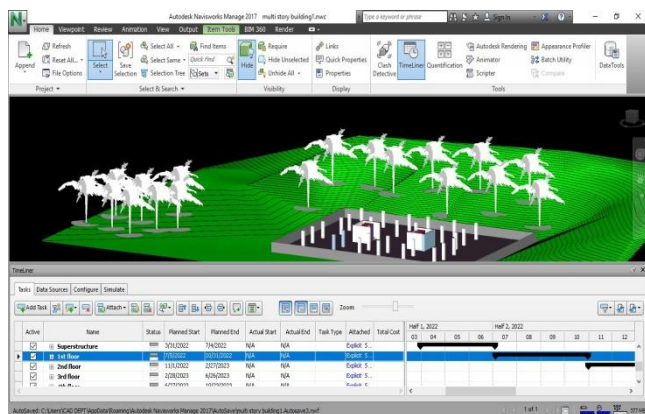Fig 11: 4D Construction Simulation Up to 2nd floor in Navisworks Manage.

Fig 12: 4D Construction Simulation Up to 3rd floor in Navisworks Manage.

Fig 13: 4D Construction Simulation Up to 4th floor in Navisworks Manage.

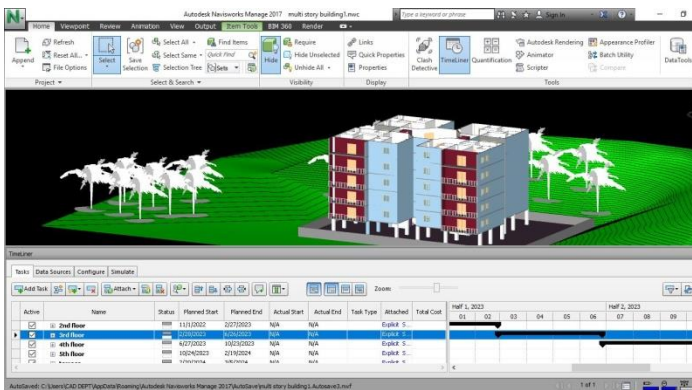Fig 14: 4D Construction Simulation Up to 5th floor in Navisworks Manage.

Fig 15: 4D Construction Simulation Up to 5th floor and roof in Navisworks Manage.

4. Navisworks TimeLiner:

TimeLiner apparatus permits you to connect your model to an outside development plan for visual time and cost based preparation. TimeLInerr imports plans from different sources. You would then be able to associate undertakings in schedue with objects in the model to make reproduction. Thos will permit you to see the impacts of the shedule on the model, and think about arranged dates against real dates. TimeLiner naturally refreshes the recreation on the off chance that the model or timetable changes. One can join the usefulness of TimeLiner with other Autodesk Navisworks instruments like Clash Detective and Object Animation.

4.1 Clash Detection with Navisworks

"Conflict Detection" instrument in navisworks functions as an investigator for example this instrument distinguishes the conflicts among the timetable in the structure model.

Conflict Detection is the strategy for distinguishing and reviewing the different structure plan and development process. Conflict Detection resembles a survey cycle that guarantees all structure componenets are in fit to-be introduced position producing no struggles with one another.

Sorts of conflicts:

Conflicts happen when various exchanges consume a similar space. The contention can be mathematical, plan based or the progressions are not refreshed in the drawings.

There are basically three sorts of conflicts:

1.   Hard Clash

A hard conflict happens when the two parts of a structure meet or pass through one another.

2.   Soft Clash

Delicate Clash happens when one component isn't given spatial or mathematical tolerence and in light of which its cushion zone is penetrated.

3.   Workflow/4D Clash:

Work process conflicts are course of events clashes. They really addresses a confuse in the booking of workers for hire or when there is a contention of timetable with gear or material conveyance. It is referred to as 4D conflict as it resukts from booking conflicts that influence the proficiency of the whole firm.

Advantages of Navisworks in conflict location:

1.   Enhanced coordination to effortlessly recognize conflicts.

2.   3D visulaization to determine conflicts.

3.   Accurate crash recognition.

4.   Detecting time sensitive conflicts in 4D plan projects.

5.   Reduced blunders utilizing conflict discovery apparatus.

6.   Reduction in generally speaking expenses, material waste and moderated hazard.

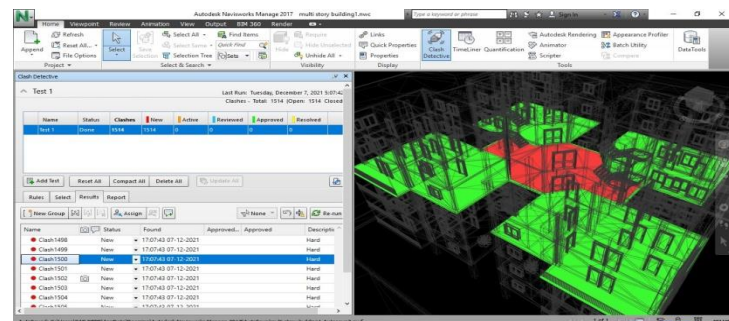7.   Improvement in planning and sequencing.

Fig 16: Clash checking in Navisworks.

How conflicts can be settled?

Running a conflict recognition check (for this situation by Navisworks) will raise many copy cases in a similar issue. Checking on and dropping these conflicts is a significant undertaking to keep away from delay in the task conveyance and keep away from adjust and material watse as this contributes upto expansion in 30% of generally cost of development.

Navisworks distinguishes the mark of time when two components will consume a similar space during work and spot conflicts in time succession, this will assist you with identifying and resolve the conflict in advance to stay away from deferral and cost overwhelm.

5. Results and Discussion

The agreement of development was granted to a development organization. Starting actives, for example, drawing, plan, compositional drawing and preparation work happen. In the benchmark plan the term of development is 586 days. The length of every movement was assessed from different information accumulated from the task and from the information on experienced faculty of the venture.

The work breakdown design of loft is fundamentally isolated into 11 sections. The WBS was finished by the floors that are to be built i.e., 5 stories and the excess 6 sections are Preparation of site, Sub design, Preparation of pontoon establishment, Plinth work, Superstructure and Terrace. This is a development of a private structure and has redundant timetable followed. It has four squares and comprises, ground floor, and 5 stories giving convenience of 20 pads altogether. Each square in each floor has 4 pads. The pads here are 2BHK twenty in number inside the structure region. What's more each part is sub isolated into various exercises, for example, looking over, power and water course of action, uncovering, design stamping, covering, cementing, brickwork, bar-twisting, segment raising, de-covering, putting, painting, etc. The really basic exercises in each parts are pontoon establishment, development, segments and shear dividers of cellar, workmanship works, electrical conduiting and inside putting and the sections of each floor.

There are a few conflicts distinguished in the timetable utilizing the Navisworks programming and these are ought to be stayed away from as they present danger to consummation of venture for example delay in fulfillment and cost overwhelm.

6. Ends

▢   The work on use of 4D model of G+5 multi-story building is concentrated in this work. The outline of end is clarified beneath.

▢   The recorded time plan for the mode is done through 4D BIM model which is created in Naviswork programming related with M.S project.

▢   The reproduction of the work is done in 4D model and bit by bit reenactment is done from the beginning of the task to its final.The all out floor region is 6000Sqft. There are four pads in each floor which are 2BHK. The preparation and booking of worked are customized from beginning day till conveying the pads to the particular clients.

▢   The time needed for absolute structure development is 586 days and complete exercises are in basic way. Inside apportioned time, these exercises ought to be finished without missing the finish of day. To complete the task, 2.09 crores of cash is required.

▢   From the complete expense, the greatest sum is left for the works. In MS project programming, the particular asset working hour material expecting information for step by step are accounted for.

▢   By utilizing this preparation and booking structure, the sum expected to designate for laborers and material will assist with finishing the undertaking in time.Since labor and materials are two primary rules' in development, which includes 60% of the venture cost for future extent of work material and labor the board procedures in decrease of time and cost.

▢   Revit programming is utilized to make a 3D model of the structure to plan it in Navisworks programming.

▢   By bringing in Revit and MS Project documents to Autodesk Navisworks programming we can reproduce the 4D model of the structure this aided in conflict location in the timetable.

▢   With conflict identification utilizing Autodesk Navisworks programming conflicts in the timetable not really settled and move can be made ahead of time and opportune changes can be made in the timetable. By conflict discovery delay in the task and over use can be checked.

▢   Chipping away at this undertaking has compensated insight.

▢   It empowered me to practice what I realized in my undertaking the executives educational plan on a training level and acquire new abilities and new advancements also.

▢   I found through this review that Microsoft Project programming is exceptionally incredible stage for the preparation and booking of development project and the advantages of BIM in development arranging

and planning particularly conflict location and reenactment utilizing Autodesk Navisworks.

◻ Through this incorporated venture conveyance strategy, I figured out how to dissect the structure data and it assisted me with acquiring information in regards to various perspectives project the board like booking, asset distribution, and through BIM I figured out how to make a structure model to work on the course of task the executives.

◻ Conflict identification was another subject for me to chip away at, it caused me to comprehend the conflicts and made me to look for the arrangements to keep away from these struggles

◻ This supported me to fathom the ramifications of conflicts in timetable and how it impacts the general venture.

◻ What's more helped me gain information in regards to the BIM which has turned into a significant instrument to improve on Architectural, Engineering and Construction (AEC) processes

◻ As per the study of KPMG, it says that later thecompletion of the venture, the general expense of the undertaking 10% to 30% of the expense will over run. The above cost of conformance Graph it demonstrates that spending roughly 1% to 3% of complete assessed cost we will actually want to control the venture over run.

◻ In this way, with conflict identification over run cost can be limited and we can beat delays in project conveyance.

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AUTHORS

1. SHAIK MOHAMMED FAZIL
M.Tech Scholar
Dept. of Civil Engineering,
SSSISE, VADIYAMPET
Anantapur.

2. **CHUKKALURU RUKMUNNISA SULTANA,**
Assistant Professor,
Dept. of Civil Engineering,
SSSISE, VADIYAMPET
Anantapur.

3. **P. NAVEEN KUMAR,**
Assistant Professor,
Dept. of Civil Engineering,
SSSISE, VADIYAMPET
Anantapur.