

Township Planning of hilly Region in Vidarbha

Asst. Prof. Prajwalita A.Thamke¹, Kajal S. Dankhade²,
Dhanashri A. Gedam³, Gouri H. Wagh⁴

¹(Asst. Prof. Civil Department, JDIET Yavatmal/ Amaravati University, India)

¹(Civil Department, JDIET Yavatmal/ Amaravati University, India)

¹(Civil Department, JDIET Yavatmal/ Amaravati University, India)

¹(Civil Department, JDIET Yavatmal/ Amaravati University, India)

Abstract: Migration of people from rural areas to developing cities is one of the common matters of question seen nowadays. In such cases how one can utilize the land of hilly regions is the Main concept of this report. The report spotlights on planning, designing and advanced construction in hilly regions. Problem statement during understanding the fundamental cause of planning we come to know that, in a number of cases due to inappropriate construction planning there occur numerous complications within a year or two. So, to rectify it this concept of well-planned designing is introduced. The planning includes the plotting of layouts, Drafting and modeling, Analysis & design. It seems quite easy to construct these buildings and other facilities around the hilly areas but in reality, it is not that simple. Due to high altitude, difficult terrain, steep gradient, adverse climatic conditions, rich flora, and proneness to natural hazards, this task becomes even more challenging. So, as to have the finest construction, qualitative research methods along with systematic details and analysis of data have been mentioned in this report. In this report we have aimed to plan a township that provide healthy atmosphere and that is connected with all other city facilities. Also, that it provides Aesthetics that doesn't harm nature and reduce risks of landslides.

Keywords: Design, Hilly region, Township planning

I. INTRODUCTION

The high demands of people for land for residential and commercial use have drawn down our attention to the area of topic like this. The concentration of activities has gathered in and around large and medium settlement the cities are more than the municipal limits they have extended to the agglomeration so there's more scope of planning townships with high efficiency. This project deals with town planning i.e. Layout, design, and analysis of structures in the hilly region while discussing the establishment of a town in any hilly region we need to understand that there are going to be pros as well as cons such challenges needs to be faced and overcome some of the challenges being Problems of soil erosion and landslides, Suitable orientation on the hill slopes. Existence of tall shoddy trees and dense forest area, which obstruct the winter sun required for the buildings. Limitations on the height of the building due to earthquake risk. High cost involved in the site development due to the cutting and the filling process. Non-availability and transportation, problems of construction materials, surface/subsurface water earthquake risks, Frequent and Seismic Tremors. But also, there are many pros for conducting this project like the need of urbanization due to Rapid growth and development establishing towns in hilly regions instead of cutting out heavy Flora (deforestation) and disturbing forest fauna, and keeping people in touch with the city facilities at the same time including aesthetic factors. Also, the analysis of buildings to be constructed in such areas will be done using analytical and designing software STAAD-Pro. The reason for choosing this software is that, it gives an accuracy of solution, versatile nature of solving of problems, confirmation of IS codes and the drafting will be completed in Drafting software AutoCAD.

II. NEEDS AND NECESSITY

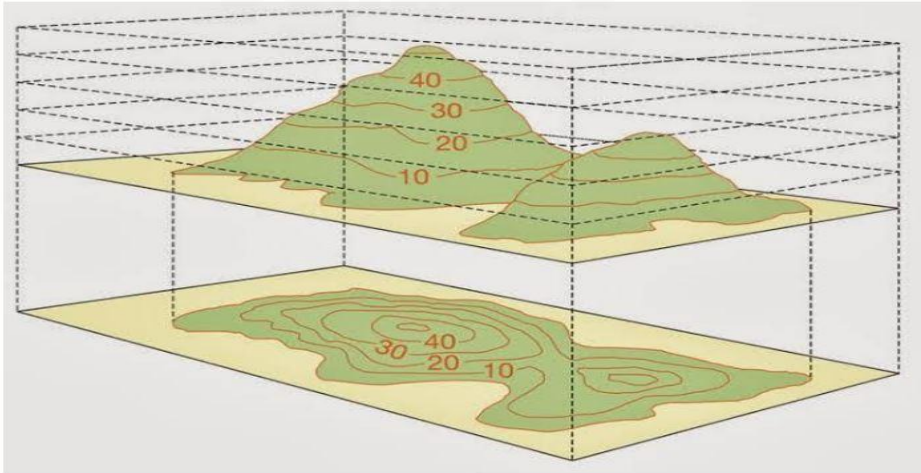
Rapid population growth and increasing construction demand, Proposing non-conventional & effective approach of building in sloping sites.

III. METHODOLOGY

3.1 Surveying-Surveying it is most initial and important part of any construction project. Surveying is the branch of civil engineering which deal with measurement of relative position of an object on earth's surface by measuring the horizontal, distance, elevations, direction and angle Initially there are two important motto to carryout surveying is To know slope of ground (that we are going to find out by contouring) and To divide entire area into layout for building and other amenities (for which we are going to conduct cadastral survey.

Preliminary survey- To collect adequate data to prepare plan or map of area to be used for planning and design

Contour -Contour survey is an imaginary line on the ground surface joining the point of equal elevation. In the slide you can see a hill along with its contour map. Generally, in hilly area the contour reading goes on increasing as we go uphill. As you can see in this image base is showing 100m contour line as we move to top it goes on increasing with 100m of contour interval.



Cadastral survey -This survey is carried to identify the boundary of land. It mainly depend upon the engineer and requirement of the structure For example: suppose there is land of 12000 sq.ft then engineer can divide it into 6 plots of 2000sqft or 2 plots of 6000sqft.

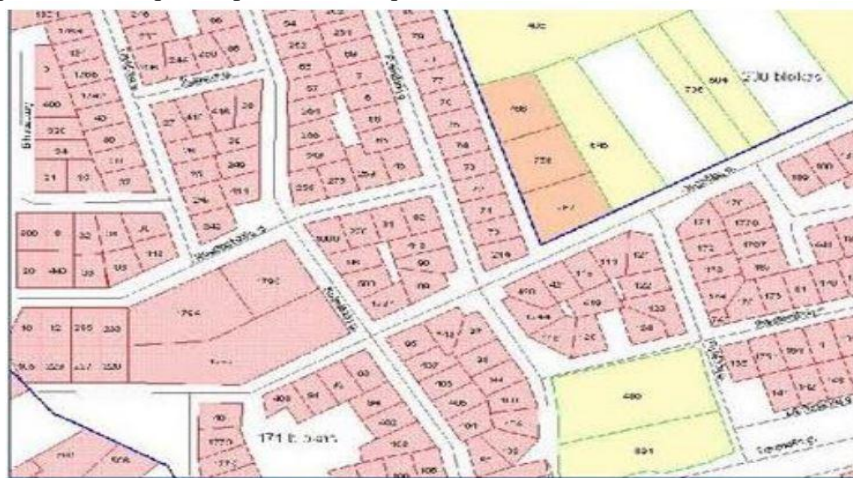


Fig. Cadastral survey

3.2 Materials to be Used in Overall Town Planning: -Cement: - (P.C.C), Sand: - (Fine Sand), Construction Aggregate:(Coarse), Steel: - (Fe:500), Brick: - (19x10x10) , Paving Block: -(Hexagonal)

3.3 Types of Soil:-1. Mountain Soil: -This type of soil is likely to have boulder at various depth. Hence stepped foundation should be provided due to which unnecessary cutting and filling will be avoided. Along with foundation R.C.C pile is driven at lowest base to avoid any kind of slipping.

2. Black Cotton Soil: -It is clayey or loose type of soil which swells and shrinks by variation in moisture content. If depth of black Soil is more than 1 -meter soil should be removed completely and then under -reamed piles should be provided

Tests to be Carried Out: -

a. Moisture Test -In this method samples are collected from the site and weighed before it is put on the oven before drying. After taking the weight it is out on the oven and dried at $110 \pm 5^\circ\text{C}$. After 24 hours it is taken out from the oven and again weighed. The difference between two weights is noted and the water or moisture content is determined from the difference in weight.

b. Shrinkage Limit Test -The shrinkage limit of cohesive soils is defined as the water content at which further loss of moisture will not cause a decrease in volume. The below formula is used to be done for shrinkage test on soil

3.4 Layout -Layout of building shows the plan of its foundation of the ground surface according to its drawing so that excavation is carried out exactly.

A] Offset Method B] Centre line Method

For any sort of proper development, a specific set of rules must be followed while carried out building construction that set known as building by laws. By using this rules and regulation we planned some buildings and essential components as follows

2] Types of building that we added

A] Residential Building: - The building in which sleeping accommodation is provided with or without cooking

B] Educational Building: - The building use for school, college and other training institution

C] Commercial Building: - The building use for shops, stores for display and sale

3] Components- Retaining wall, Water tank, Sewer line, Drainage, Water Supply, Roads.

3.5 Analysis & Design of Residential building and essential components for Reaction, Bending moment and Shear force results using STAAD-PRO software

3.6 Drafting & Modeling of Residential building and essential component using AutoCAD software

3.7 Approach of building in sloping sites: Generally, the buildings are constructed on a leveled, flat block of land. While considering the hilly region, this levelling and flattening of the land involves deep cutting and filling to artificially create a level site. This creates the need of embedding expensive retaining walls. This also results in steep drive way, a less attractive frontage and restricted backyard. It inhibits the flow of natural light and ventilation throughout the home and can cause potential drainage issues. Now, if we move with another unique and efficient technique, we will get a lot of advantages. Our sloping site building process will work with the natural gradient of the block. During the site preparation process, instead of digging deep into the land we follow natural contour of the land which means less excavation is required. The excavated soil is then utilized to flatten out certain areas to make way for the split-level slab. Before the Slab is poured, concrete piers maybe utilized to strengthen and stabilize the floor. The unique construction method and split slab system ensures strong foundation for the building. The natural contour of land is optimized and footprint working with the slope of block is created. Such buildings have many lasting benefits including, Better rear and front view, More stable without retaining walls, Natural contour is optimized for construction, Separate living areas on different levels, Less drainage issues, Abundant light & ventilation, Flatter drive way.

IV. CONCLUSION

This project mainly deals with the planning and designing of building in hilly regions efficiently. During the research, we studied the criteria of town planning and understood the challenges faced in construction and plotting layouts in hilly terrain. This concept of constructing buildings in hilly regions not only controls the unplanned and haphazard growth of cities and their peripheral areas but also spots the light on how all this process can be done without harming the environment. As of now, we have studied the entire relevant data which is needed for better implementation of the project. But this is not the ultimate outcome we are aiming for. Under completion of the project, we are aiming to plan an entire township which will include public buildings like schools, hospitals, and basic amenities needed to survive in town. Also, we are planning some essential elements like retaining wall which will help prevent risks of landslides. Along with that, the project will include designing and overall analysis of multi-storied buildings. This concept is a stepping stone towards the better implementation of construction in barely focused areas and the results would be eventually more fruitful.

REFERENCES

- [1]. ArboojGaurav, Khakhar Mona, Sustainable Development Imperatives for New Towns in Hilly Areas: A Case of India, *International Journal of Engineering Technology Science and Research*/Volume 4 (Issue 12), 2017.
- [2]. Ashwani Kumar, PushplataGarg, Building Regulations for Hill Towns If India, *HBRC Journal* 9(2)(2014), 18 June 2014
- [3]. InguvaSai Surya Prakash, A Study on Comparative Analysis of RCC Building Resting on Plain and Hilly Terrain, *International Journal for Scientific Research and Development*/Volume 6 (issue 1), 2018.
- [4]. SehbaSaleem, International Practices in Hilly Regions, *Journal of Architecture and Construction*/volume 2 (Issue 1), *SRYAHWA Publications*, 2019.
- [5]. VrushaliChawhan, Mohammad Arif Kamal, A Study of Planning Design and Construction of Buildings in Hilly Regions of India, *American Journal of Civil Engineering and Architecture*/volume 9 (No 1), *Science and Education an Open Access and Academic Publisher*, 2021.