

Planning of Smart Urban City by Using Revit & Lumion Software

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Abstract— Construction activity is known to have a major impact on the environment. In this paper we described the ecosystem for a town and then map out of an integrated design procedure with the help of Revit and Lumion Software for planning and building a town. This town provides the services including construction, farming, electricity, healthcare, water, retail, manufacturing and logistics, etc. This project will be helpful to achieve the goals of future growth. Human society is developing day by day and the aim to achieve various successes for making its livelihood better. These components will be helpful to convert Nandoshi into a smart town.

Keywords: Smart Urban City, Revit & Lumion Software

I. INTRODUCTION

Town planning is a process of managing land resources. It involves the control of existing and new development as well as strategy preparation to manage future requirement. It improves the efficiency of city services and enhance the quality of life for all. To execute proper planning of urban smart city we required modern town planning for proper zoning of areas. Urban sprawl refers to migration of population from towns to low density residential development for safe surrounding, affordable housing, job opportunities and amenities, etc.

It is the requirement of increasing population. Hence, it is necessary to develop proper management system for population concentration. Problem of slums is the major issue of population growth control in cities. The main focus of this project is to plan smart urban city for Nandoshi area to make better infrastructure for development of area. The prime requirement of such a planning process can be done by using design software that is Revit and Lumion.

“Revit is a Building Information Modeling Software (BIMS) used by architects, engineers, designers and contractors. The software allows user to design a building and structure and its component in 3D, annotate the model with 2D drafting element, and access building information from the building models database.”

“Lumion is architectural rendering software that make it is to convey how your projects will look into real-life experience.

Lumion fits seamlessly in any design workflow, making rendering a more satisfying and enjoyable experience.”

II. AIM AND OBJECTIVE

- To Provide Low-Cost Housing it includes housing which is deemed affordable to those with a household income at or below the median as rated by the national government or by a recognized housing affordability index.
- Need of Industries for employment with the limited amount of capital resources the small- scale industrial sector holds promise of creating greater employment

opportunities. This is so because the cottage and small-scale industries are more labour intensive i.e., they employ more labour per units of capital than the large-scale industries.

- Planning for Future growth & demand- It is a chain management process of forecasting or predicting the demand for products to ensure they can be delivered and satisfy future growth of people.
- For overall Area Acquisition-It refers to the process of gaining ownership or rights over a real estate property. The rules of acquisition of any given property may vary from country to country.
- Development of healthy & wealthy Environment-Environmental health can be integrated into sustainable development by improving quality for the poorest population with greatest burden of environmental diseases by reducing exposures to air pollution in homes and villages from biomass burning, providing clean water and sanitation.
- Planning of the Resources - It is a process of identifying, forecasting and allocating various types of business resources to the projects at the right time and cost. It also ensures the efficient & effective utilization of resources across the Enterprises.
- To protect environment Aspects by proper town planning, to make better infrastructure for development of area by using right purpose of zoning.
- Urban development is societal development. Planning and managing the development of contemporary cities is one of the major societal challenges all over the world today.

III. METHODOLOGY

A. Survey

It includes data collection for the area and provides data on which the plan can be based and aim in examining problem in details. It gives in depth perception of issue pertaining to any town aiding the planer in division of right way of survey.

1) Functional Survey-

It includes information collection of roads including history roads, traffic survey, details of width of roads and tree planting, railways with position of level crossing, passenger stations and good sheds, airports and seaports Waterways, canals, mines and their location and Conditions of commercial activity.

2) Social Survey-

It includes information collection of ancient ruins, architectural character of the locality including local usages History of growth from the study of old maps, Conditions favorable for preservation of wild life and spots of natural beauty Residential Areas, Types of Building, Slums & Suburban Development and Public Services comprising of water.

3) Territorial Survey-

It includes information collection of Geology showing Arrangements of underlying rocks and method responsible for formation of topography, Contours of the land surface showing both the actual heights and variations of surface. Climatic condition including temperature range rainfall and direction and intensity of winds, Types of soil including areas of fine class agricultural soil. Forests and other natural vegetation Areas which are low lying and are likely to submerge

4) Vital Survey –

It includes information collection of History of the past growth of population Characteristics of the preset population Density of population only up to this.

B. Analysis-

The land use analysis has an aspect of density which is quite important in the planning process. General density can be defined as $\text{Density} = \frac{\text{Population of Area}}{\text{Total Gross Area}}$

Land Use Classification	Area of Percentages of Unplanned Nandoshi Gaon	Area Percentage Required of Urban/Smart City
Residential	50%	45%
Commercial	3-4%	4-5%
Industrial	10%	10%
Recreational	8%	15%
Public & Semi-Public	8%	10%
Transport Related	12-15%	12%
Utilities	4%	5%
Vacant Land		

Table 1:

C. Planning

How much of the land will be required for the town planning in 20 years it. The planner has to scan and survey the area to find out the direction in which the town got the tendency to grow. Planning of town growth, depend on the topography of the town.

1) Location of Industries area-

Planner has to identify the location of industries area. These are land extensive activities, generally located in low value land. It requires effective transportation. It should be located opposite of wind direction. Location of industries should not cause any harm to the people in society.

2) Location of Commercial Area-

Location should be decided in reference to its consumers. They give high returns to the small surrounding area & require a central positioning.

3) Recreational Area -

Planner has to identify regions for recreation. Major areas are located along natural features.

4) Residential Area -

This area is identified after the allotment for industrial, commercial and recreation area has been done Marshy area should be avoided. Low lying area should not be utilized for residential purposes.

D. Zoning

Zoning is the way the government control the physical development of land & the kinds of use to each individual property may be put. Zoning laws typically specify the area in which residential, industrial, recreational or commercial activities may take place.

1) Aspect of Zoning

a) Density zoning-

In density zoning, the density of population in the residential areas is controlled by means of suitable rules and regulation. It is quite evident that it is not practicable to restrict the number of persons from occupying any residential unit. Hence following indirect measures are adopted to have effective density zoning.

- 1) The front, side and rear margin are specified from boundaries.
- 2) The maximum height of the building is specified.
- 3) Minimum size of allotment for each house is specified.
- 4) The number of houses per unit is limited.
- 5) The ratio of total size area to total built up area is specified.

b) Height zoning

It is controlling the height of building by considering following factors:

- There should be enough day light to the building
- Height of the building should be decided as per the factors of bulk content of building and street width and open spaces.
- Height of building should be equal to the width area.
- Surrounding location should be suitable for this zone.
- This zone should not lie in the earthquake zone.

E. Objective of Zoning

- The town planner gets ample opportunities for designing the future growth and development of the town due to zoning
- The zoning affords proper co-ordination of various public agencies such as transport facilities, water supply drainage, electric power etc.
- The zoning proves to be an effective instrument in the hands of the town planner for making any town planning scheme effective and successful

IV. CALCULATIONS

A. Current Population - 2000

- 1) Future Population 7000
- 2) Growth Rate -25%
- 3) Time 10 Year
- 4) Per Year Population 500 Average
- 5) Water Requirement:
135 Per person Day
For 7000 people water required / Day is 7000 135 9, 45,000 lit/ Day

B. Calculations for Residential Area:

- 1) Total No. of Residents-7000
- 2) No. of Residents/Society- 350 people (70 Families)

- 3) Type of Houses: -
 - 1BHK
 - 2BHK
 - Row House
 - Bungalows
- 4) Total No. of Societies = 20
- 5) Classification of Societies according to Financial Conditions -
 - Low Class - 05
 - Middle Class - 11
 - High Class - 04
- 6) Area per Society - 2 Acre
- 7) Total Area Required for 20 Society's (i.e., 40 Acre)

C. Calculation for IT Park:

- 1) Capacity of Employees = 10,000
- 2) No of Office Buildings = 12
- 3) Area of Buildings 0.8 - 1.2 Acre

D. Calculations for School Area:

- 1) Total No. of Students 2000 Avg
- 2) No of Floors = 04 - 05 Avg
- 3) Overall Area for School - 02 Acre Ground + Parking Area = 40% (i.e., 0.8 acres)
- 4) Area for Amenities = 2.5 - 3 Acre
- 5) Total Area for IT Park = 15-17 Acre



Fig. 1:



Fig. 2:



Fig. 3:



Fig. 4:



Fig. 5:

V. APPLICATION OF REVIT

- Automation- All information that is med to create a Revit model is housed in a single Database. This means that whenever you make a change in the model updated the changes are carried throughout the entire model making the building design process more efficient.
- Collaboration- One of the more distinct differences between Revit and AutoCAD is the ability to allow multiple users to work in the same Revit model at the same time, as opposed to AutoCAD, where only one user can make changes to a dwg file at a time.
- Scheduling- Scheduling in revit cuts down on the time traditional workflows demand. As changes are made in the revit model schedules that have been set up will instantly update as well with those changes. It can also be exported out of revit, modified, then imported back in with those changes.
- Rendering Presentation - It is a time-honored process in the design industry. It provides tools for 2D presentation and 3D visualizations deliverables using revit extensive materials libraries and rendering plug-ins.
- Construction Documentation - By utilizing the 3D modeling capabilities of revit and the coordination tools

at our disposal, users can quickly review clash detection and identify other coordination issues. The creation and use of revit project templates internally will maintain consistency across your team's construction documentation.

VI. APPLICATION OF LUMION

- Lumion is 3D rendering software made to help architects with two important things: 1) create beautiful renders and 2) create them quickly and easily. So, if you have 3D model that you want to bring to life, Lumion can help you convey the beauty of your design by unveiling it in its full, detail-rich context.
- Lumion empowers you to express your vision as an image, video or 360 panorama, and it renders the results faster than most other 3D rendering programs out there. Lumion is designed to be effortless, transparent and stress-free.
- Lumion compatibility and real-time rendering for Revit.
- Lumion rendering software is designed especially for architects who want to convey the beauty and the vision of their Revit projects. Even if you have zero 3D rendering experience, Lumion instantly creates a live connection to your Revit project.
- Rendering- Software rendering is the process of generating an image from a model by means of computer software.

VII. CONCLUSION

Improvement in existing amenities in nandoshi gaon must be upgraded. For modernization of the village public toilet, hospital, bank, biogas plant, post office, transportation system etc. must be provided.

Smart towns are the need of hour as the development is needed for both rural and urban areas for better livelihood and information technology will offer effective solution.

There are successful technologies available, which have been implemented in urban areas.

Smart town concept will have potential to uplift the grass-root level of the country, hence adding feather in the overall development of India.

Future to utilize information technology tools for rural development is because of lack strategy, unfocused planning and above all monitoring and execution of the activities.

Specially designed suitable frame work for rural areas on the grounds of Science Technology, Engineering, Regulations and management will play important role to build next generation smart town.

VIII. FUTURE SCOPE

The infrastructure facility is not good but the improvement was needed so to make town life more comfortable and increase economic profile. For economic profile increase we should plan for designing elegant surrounding so small business increase, educational e-learning and other modern techniques will increase the level of thinking and personal development.

Nandoshi will be converted into Smart Town as a result agriculture, businesses will help to improve economy. By providing solar system on houses can reduce dependency on electricity which saves electricity cost.

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