

Design of Duplex Building and Terrace Garden

Shubham Kumar¹, Shishir¹, Sharad Gautam¹

¹Department of Civil Engineering, BBDNITM, Lucknow, India.

Corresponding Author: shubhamkumar585366@gmail.com.

Abstract: - In the present urban life where we have reserved space for our nurseries, terrace or yard, garden idea gives an ideal answer for green up your home. A terrace garden makes your space look great as well as causes it to feel great. We give inventive ideas to your nursery which include components like vertical nurseries, kitchen gardens, indoor temperature control arrangements and so on. In the present urban condition high structures system of streets have gained major urban land. In such blocked condition terrace garden concept bring back the missing link between man and nature. The elements which make terrace gardens significant piece of design all through the world is full utilization of terrace and they give extra insulation to building.

Key Words— Urban, garden, terrace, nursery, nature.

I. INTRODUCTION

A duplex house is a private unit for a family based on two stories, yet with single kitchen and eating territory. Its looks and configuration are equivalent to that of a manor, yet the size is little. Generally, a duplex house is described by independent section focuses to both the floors. In urban arranging, the term duplex is utilized all the more explicitly. Significant Canadian urban communities now and then utilize the term duplex clearly to a structure with one unit worked over another.



Fig.1. Terrace Garden

“Terrace Garden” refers to the garden which are established on the rooftop of a building. One can utilize these spaces in one way or the other. These are very much common in urban areas. As in the present scenario the link between humans and nature is missing, so this Terrace garden concept provides them the opportunity to bridge this gap. Now a day, humans are missing with fresh and healthy fruits and vegetables, but this terrace garden concept will help them to fulfill this desire

because one can grow fresh herb, fruits and vegetables on their rooftop of a duplex building. In the other sense, a terrace garden can be utilized as a fancy finishing highlight. It not only helpful in growing and fancy purpose but also used as a thermal insulator, since it can reduce the internal building temperature by 0.5°C.

II. LITERATURE SURVEY

There are mainly two type of green roof system, namely:

1. Intensive (Deep)
2. Extensive (Shallow)

Intensive Green Roof:

- Overall depth: 150 – 1500 mm
- Weight max: 200 kg/sq.m

Extensive Green Roof:

- Overall depth: 70 – 120 mm
- Weight max.: 80 – 125 kg/sq.m

Duplex Building: In the UK, the term 'duplex' refers to an apartment (not a house) that includes two stories of accommodation, joined by an internal staircase. Truly, this would have been referred to as a marionette, however the term duplex has become progressively well known in view of its perceived Americanism, and is commonly applied to

apartments with a more modern design, whereas a marionette might be more traditional.



Fig.2. Duplex Building Terrace Garden

An apartment with three stories can be referred to as a triplex. There is some dispute about whether an apartment with a mezzanine level should be referred to as a duplex. Where a duplex is on the highest floor of a tall structure, it might also be referred to as a *penthouse*. However confusingly in the USA, a 'duplex' is a dwelling comprising two apartments with separate entrances, whether the apartments are side by side, or one above the other.



Fig.3. Open-air Garden

Terrace Garden: Terrace Garden are nothing new in urban setting. In any case, today, rather than being surrounded by modern equipment and utilitarian surfaces, rooftops can offer a cooling green condition, offering a genuine relief. As a little something extra, these stylish islands additionally give storm water the executives and support cooling and warming expenses. Individuals have been planting rooftops since the beginning of recorded history.

The soonest records return to the ancient ziggurats of Mesopotamia, worked somewhere in the range of 4,000 and 600 B.C. The hanging garden of Babylon are likely the most famous ancient plantings, with landscape terraces trailing

plants reaching a planted roof that was 75 feet above the ground. This living mountain in the desert was a designing wonder.

One of the primary structured scenes was a rooftop garden authorized by Pope Pius II in Pienza, Italy, in 1463. In the U.S., housetop gardens got famous in New York City during the 1890s. Indeed, that is the place Madison Square Nursery got its name. Quick forward to the late 20th century, despite the fact that rooftop gardens were planted and delighted in fundamentally as a curiosity for the well off, in the mid-1970s another framework was created in Germany. "The advancement of green rooftops started in the mid -1970s in Germany when the principal green rooftop frameworks were created and showcased for an enormous scope," says Paul Kephart, leader of Rana Rivulet, Monterey, California.

"The second enormous advance was the improvement of extensive green rooftops in the late 1980s."The objective was to make lighter and less expensive frameworks that could be applied to huge, level rooftops. The principle inspiration for extensive green rooftops was the reclamation of nature and security of the rooftop films from the components and temperature variances.

Extensive rooftops are lighter with a slenderer layer of developing medium, for example, exceptionally figured manure. "They are intended for constrained support and may just require once yearly weeding and a moderate discharge compost."

III. METHODOLOGY

A. Design of Duplex Building:

The primary Aim of our current examination is to analyze and design the duplex house by using the software STRUDS in order to create different detailing like, BMD, SFD, BBS, Quantities of Steel and Concrete and so on.

A large portion of the work totally dependent on programming and it is fundamental to know the details regarding this software's. List of software's used are-

- STRUDS
- AUTO CAD

"STRUDS" condensed as "Basic ANALYSIS DESIGN AND DETAILING SOFTWARE" according to IS code standards. This product performs basic examination for vertical just as even [seismic/wind] loads for RC encircled structures and performs plan according to IS standards. The motivation behind utilizing the product is that it is easy to use and has

special highlights like it plans the basic segments exclusively alongside their examination and results. Another helpful component of this software is that we can see the Shear force, Bending moment, Torsion diagram at each level of the structure. This product can be utilized to convey RCC, steel structures, bridges, trusses etc., as indicated by different nation codes.

"AUTOCAD" is a powerful software which is used for drawing different layouts, details, plans, elevation, sections etc. It is very useful software for civil engineer since it can be used to show the reinforcement details and design details of a staircase

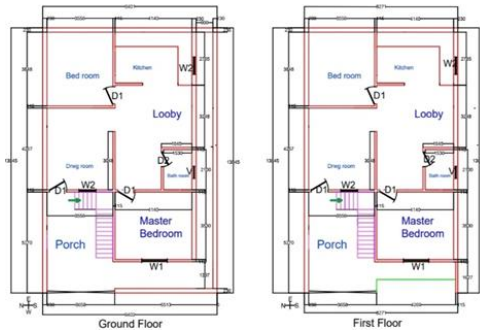


Fig.4. The Design Layout of Duplex building

Terrace garden development should be possible by three techniques:

First strategy is to make a holder garden on terrace, second one is to make a lot of of raised beds to grow plants, either made of concrete or wooden. The last and third strategy is to make your entire terrace, a vegetation ground like a regular garden.

This educative article depends on this third strategy: It has five layered structure; you'll see underneath in step by step guide.

Step1: Waterproofing Layer

Terrace must be waterproofed, in case you're developing plants on it, regardless of whether you will develop plants on holders, raised beds or on the rooftop itself, terrace waterproofing is must in order to protect the roof from leaking.

Step2: Insulation Layer

Protection layer makes a terrace garden impervious to dampness and temperature fluctuation and gives it adequate mechanical quality. It is made mostly of XPS extruded polystyrene sheets, PIR panels or polyurethane foam.

Step3: Drainage Layer

Drainage layer on the terrace garden is utilized to rapidly release the water from the vegetation layer into the waste framework, just as to gather excess water.

Step4: Geotextile Layer

Geotextile texture layer is used as a medium to separate drainage layer and plants developing in soil. It prevents deposition of soil and other fine particles that obstructs the drainage system. It also maintains the moisture level.

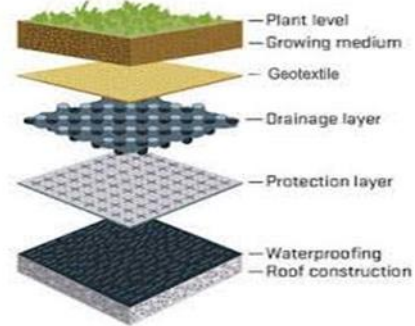


Fig.5. Graphical Representation of step-step Layers

Step5: The vegetation Layer

Vegetation layer implies the growing media layer, the surface where you'll develop plants and greenery. Growing media should be provided with good air circulation and moisture content. As soil preparation is done as per the plants growing in them, it should be more fertile and slightly acidic.

IV. CONCLUSION

As the world is going towards the exhaustion of natural resources and the loss of forest/garden region because of urbanization, there is a desperate need of terrace gardens. Because of the population blast with a house for each resident in the nation, all the open regions are consumed by solid structures. This has made the biological unevenness, which can make huge damage to our people in the future.

At the point when we can't withdraw from using open spaces on the ground for the development of structures and different utilities, at that point at any rate the open spaces available over these structures can be used for plantations and gardens to minimize the ecological imbalance. There are numerous advantages of these terrace gardens, for example, waste recycling, environmental advantages, energy conservation, water conservation, decorative enhancement of building, occupant's health benefits and attracting birds and insects.

REFERENCES

- [1]. Bhuvana. S et al., B. Constraints Faced by Urban Dwellers in the Adoption of Terrace Gardening Practices. *International Journal of Agricultural Science and Research*. 2019;9(3):143-146.
- [2]. Byrd R. Condensation in terrace housing: causes and cures. *Building Services Engineering Research and Technology*. 1985;6(3):109-116.
- [3]. Che Ani A, Mohd Tawil N, Johar S, Abd Razak M, Yahaya H. Building Condition Assessment for New Houses: A Case Study in Terrace Houses. *Journal Teknologi*. 2014;70(1).
- [4]. Cowley D. Building community ties through gardening. *Nursing and Residential Care*. 2004;6(7):321-321.
- [5]. Ismail I, Che Ani A, Abd Razak M, Mohd Tawil N, Johar S. Common Building Defects in New Terrace Houses. *Journal Teknologi*. 2015;75(9).
- [6]. Ryan W. Sustainable Gardening and Service Learning at The University of Redlands. *Journal of Green Building*. 2015;10(2):64-78.