09 HOUSING

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"Affordable and safe housing is a basic prerequisite for every family. A stable safe shelter is conducive for the members to be industrious and cohesive in society," Housing fulfills the basic human need for shelter and performs a social function by contributing to the wellness of a household.

9.1 DEFINITION

The term "shelter," which is often used to define housing, has a strong connection to the ultimate purpose of housing throughout the world. The mental image of a shelter is of a safe, secure place that provides both privacy and protection from the elements and the temperature extremes of the outside world. Homes should be built for sustainability and ease of future modification. Health, home construction, and home maintenance are inseparable because of their overlapping goals.

Access to adequate and satisfactory housing has long been viewed as a basic human right and is considered to be an integral factor for the enjoyment of other economic, social, and cultural rights. Satisfactory housing consists of; legal security of tenure; availability of accessible services, facilities, and infrastructure; habitability and access to employment, health services, schools, etc.

It is commonly accepted that the well-being of both individuals and families is grossly impacted when the need for satisfactory housing is not met. Unsatisfactory fulfilment of housing needs may cause poor health outcomes resulting in an increased financial burden on the healthcare system. It also typically results in significantly reduced

educational opportunities while other less essential activities including cultural, recreational, and leisure activities, are dramatically suppressed or cut back altogether.

Housing ensures that members of society have a place to live, whether it is a home or some kind of physical structure for a dwelling, lodging, or shelter and it includes a range of options from apartments and houses to temporary shelters and emergency accommodations. Access to safe, affordable, and stable housing is essential for a person's health, safety, and well-being. Housing can also impact a person's economic, social, and cultural opportunities, as it influences their access to education, employment, healthcare, and social networks. In many countries, housing policies and programs have been developed to address issues related to affordability, quality, and availability, and to ensure that everyone has access to decent housing. Some have one or more housing authorities, sometimes also called a housing ministry or housing department.

9.1.1 Need and Importance of Housing

Dwelling for all family members. The house is a haven where its members live together and perform various household duties collectively. It should provide safety, security, and identity and be spacious for its members. A place where all the family members gather for various purposes and to spend time with each other is an adequate home. To make a home from a house requires the care, dedication, and involvement of all the family members.

Housing is a location for business and provides other intangible emotional and cultural benefits. As in the developed world, housing activities in developing countries have economic benefits beyond the housing sector. According to studies, people with appropriate housing are known to perform better and have a higher order of protection against health hazards and pandemics as compared to those without housing. Housing is known to reduce pressure on healthcare services by senior citizens when having access to affordable housing with supportive services; as against those who don’t have access to housing with the same amenities.

Housing quality remains vital for the rational growth and orderly development of a society. Housing quality is closely linked to the quality of prevailing physical conditions and, the quality of the social and physical environment in which the home is located besides the quality of air, home safety, available space per occupant, and housing design, which are considered vital for human growth and development.

Housing essentially provides quality and valuable space for the family to be together, interact, play, study, entertain, and learn about family culture and traditions besides learning behavioural patterns and sleeping.

‘Housing for all,’ remains the agenda and priority for all governments known to be people-centric and committed to promoting general welfare. Housing remains critically linked to productivity, operational efficiency, and economic development and is known to significantly impact national and local economies in several ways besides making a major contribution to annual GDP.

9.1.2 Functions of Housing

A house performs multiple functions today and its importance cannot be undermined. The main functions include protective, economic, emotional, social, psychological, cultural, religious, and self-expressive functions.

- **Physiological Function: As**almost two-thirds of one's life span (mainly childhood and old age) is spent in the home, the **protective function** of the house is of utmost priority. Also, the house provides safety from the natural elements and a safety source from the outside world. Every person returns home after a hard day at work and he seeks rest in the home.
- **Psychological Function:** The family members living in a home are attached through bonds of affection therefore; they have a feeling of courtesy, affection, and sacrifice for one another. Therefore, in the home, they get solace from all the worries and tensions of the world.
- **Economic Function:** A house has the economic function of being a value-added asset to the family in the long run. Productive activities could be conducted to supplement the family income within one's premises. Also, each family member utilizes common rooms like the kitchen, dining area, living room, and bathrooms which save money.
- **Practical Function:** The home should be functional with adequate spaces created for effective management of various household activities, and there should be good circulation within the house.
- **Emotional Function:**When the emotional aspects are considered, the love and affection between the family members contribute to each member's overall well-being emotionally, mentally, physically, and spiritually. It also contributes to rest and privacy within the house which in turn heightens one's sense of peace and reflectivity.
- **Educational Function:** The home is the institution where a person gets his preliminary education. The child learns his first few words from the parents and other family members and also inculcates the approved qualities that are considered appropriate for his gender.
- **Socio-cultural Function:**On the socio-cultural façade, the house significantly enhances the family members' interaction with each other (grandparents and other relatives) as well as with other community and professional persons. Good living conditions promote cultural feelings and enhance one's unique interests like hobbies and other leisure time activities. Also, the satisfaction gained from home recreational activities is a plus point.
- **Religious Function:**The home is associated with being the venue for religious activities for the family members with each member joining in with these activities. Children learn from a young age the religious rituals associated with religion, and it provides a strong moral base for them to tackle the outside world. Spirituality and peace for all the members are enhanced by spaces allotted for prayers, meditation, and other religious activities.
- **Creative Function:** Self-expression is provided for within the walls of one's home e.g. space for creative or expressive arts and crafts, without impinging on the other members' living spaces. Special provisions could be organized in one's home to promote leisure activities based on the family's requirements and income. It should enhance social contact within the family members and the outside world too.
- **Investment Function:** A house not only serves the current need for a family's dwelling, but it also generates expenditure to the real estate sector and provides livelihood for construction workers too. It also serves as a strong motivator for the family to save for their future home. It also plays a significant role in the national GDP (Gross Domestic Product).

  Apart from performing all the above functions, housing has also become a defining economic issue in today's scenario with the rapid escalation of real estate and the demand for housing in major metros and urban cities.

Besides, it enhances the social status of the family depending on the house they own. Investment in real estate also promotes the economy and employment in any urban area.

9.1.3 History of Housing

Shelter plays a vital role in everyone's life as a major chunk of one's time is spent in the house. Housing can be traced back to when people stayed in caves, huts, and temporary shelters. With the major developments in housing and building structural features, it has evolved tremendously with modern housing facilities. There is a wider scope for specifications in housing now compared to earlier decades.

Indian architecture and design have evolved from the Harappan era to the modern technological era. From the astounding minarets of the Taj Mahal to the strategic beauty of the Red Fort, from the intelligence in the planning of the Harappa civilization to the towering townships in the new age; Indian architecture and housing havetraveled on a dynamic journey from the ancient to modern. It is said that what we leave behind is something that we take forward; a strong foothold of culture, heritage, and community is what Indian architecture has retained and fine-tuned over the years. The earliest housing was from the Harappan civilization.

- **Heading Back to the Harappan Civilization:** Dating back to 3300 BCE, the Harappan Civilization played a pivotal role in shaping the new-age architecture. With its well-planned grids, road hierarchy, impeccable drainage systems, use of traditional materials, multi-storeyed homes, and clearly defined layouts, the city is no less than a work of art.With cities like Mohenjodaro and Harappa exemplifying the use of every system as a functional element; serving a specific purpose, it became an epitome of reference for the coming years in the architectural journey for India. Therefore, it is still considered one of the most progressive cities in the history of architecture.
- **The Sculptural Finesse of Rock-Cut Architecture:** Discovered around the 3rd century BC, monoliths became a standard of glorifying the prowess of a kingdom. Rock-cut architecture is a reference to the structures, buildings, or sculptures that are carved out from a single piece of solid rock, right in the location where it stands. Indian architecture has a lineage of such historic rock-cut architecture in the form of detail-oriented sculptures, structures, and entire buildings. Many Indian architectural rock-cut elements are under UNESCO World Heritage Sites.The Ellora caves in Maharashtra, the Shore temple in Tamil Nadu, PanchRathas in Mahabalipuram, and Masrur temple in Kangra Valley, are a few examples of the astounding rock-cut heritage that the ancient architecture of India beholds.
- **The Evolution of Architecture through Temples:** The history of Indian Architecture is incomplete without its iconic temples. They form an important aspect since they developed in almost all regions of ancient India. However, temple architecture has seen a diverse set of architectural styles accounting for the changing geographical conditions, climate, ethnicity, history, and diversity. The Dravida and Vesara style was seen in the south, whereas the Nagara style became a Northern staple. Apart from this several regional styles in the Kerala, Himalayan, and Bengal regions developed due to their dynamic geographical and cultural symbolism.

In the Northern style, the sikhara (rising tower in the Hindu temples) remained the prominent feature whereas, in the Southern style, the Gopurams (huge gateways that form the enclosure of the temple complex) were the highlight. The Kandariya Mahadev Temple and Khajuraho in Madhya Pradesh are examples of the Nagara Style of temple architecture. The towering Gopurams and the extensive Mandapas (porches) of the famous Thanjavur temple in Tamil Nadu are some of the finest examples of the Dravidian style of Architecture.

The Badami Cave temple in northern Karnataka and the Group of Monuments in Pattadakal comprising the Virupaksha temple are some of the iconic temples dating back to 500 CE. The Jagannath temple in Puri and the Sun temple of Konark reflect the Kalinga style of temple architecture.

- **Indo-Islamic Architecture and the Medieval Period:** The medieval period in the evolution of architecture in India saw an eccentric growth in detail-oriented design with massive scales. With the entry of Muslims into the Indian context, several new elements and features, as well as techniques, were introduced. This created a blend of traditional Indian architecture merging with Islamic design elements forming Indo-Islamic Architecture.

This architecture brought in two prominent styles namely - the Imperial Style and the Mughal Architecture. The imperial style was derived from the Sultans of Delhi with astounding palaces having humongous domes and decorated arches with embellishments. Mughal Architecture was a merger between Hindu and Islamic Architecture prominently from Central Asia, Islamic, Arabic, Persian, and Turkish architectural styles.

The Qutab Complex in Delhi, the Quwaat-ul-Islam Mosque, the Taj Mahal in Agra, along with the Red Fort, and Jama Masjid are some of the exquisite marvels of Indo-Islamic Architecture.

- **A Tradition Retained: British Indo-Saracenic Architecture:** The British Indo-Saracenic Architecture in the 18th Century was a strategic way of turning the rich Indian architectural heritage towards the service of the Raj. The British looked upon the Indian architectural heritage and targeted it to be a culmination of showcasing their prowess by placing themselves in the line of the heritage empires in India. However, the Indo-Saracenic architecture took major cues from the ancient Indian architecture for its appearance and took references from Western architecture for its function. This blend of Indian forms merged with the functionality of Western architecture formed an iconic set of state-of-the-art structures.

The architecture further grew when it took references from the Gothic style; surface decoration, arches as gateways, ornate forms, vaulted roofs, scalloped arches, overhanging eaves, open pavilions, and pierced arcades were some of the staple elements of this style.

His style continued till the early 20th century for several colonial-style buildings in India, some of the early examples are the New Palace of Kolhapur (1881), the Victoria Memorial Hall in Kolkata, and the Chhatrapati Shivaji Terminus in Mumbai.

- **Evolution of Architecture - Ancient to Modern:** The advent of the 20th century saw a growth in the economy as well as the population, this, in turn, created a high demand for housing. Globalization and a migratory population led to a shift in Indian architecture from a holistic point of view. The free Indian population saw a sore

in architecture in the 1950s. A country that was entangled in the British raj saw a surge in opportunities, the architecture thus became a reflection of that emotion.

The Art Deco style played a crucial role in defining the modern exterior and interior architecture. Free from the imposed expertise of the British colonial architects, the commission of designing a modern India was given to the Swiss-French architect Le Corbusier, who played a core role in creating a monumental set of architecture with his masterworks. He brought in a stark, massive, and minimal set of architecture in the city of Chandigarh. Corbusier positioned modern Indian architecture on a global map. By the mid-1950s, modern architecture started flourishing in its prime.

In the 1970s, Indian architecture worked closely with a modernist design language. The works of Richard Neutra, Louis Kahn, Pierre Jeanneret, Maxwell Fry, Buckminster Fuller, Charles Eames, and Jane B Drew found their way toward India in the 20th Century. Balkrishna Doshi's work with Louis Kahn to develop the Indian Institute of Management in Ahmedabad created a new role for architecture that was based on pure inherent order and geometry.

Charles Correa started developing his works with structures like Kanchanjunga apartments in the 1970s, the art centre in Jaipur in the 1980s, and several other prominent works during the later decade. Architects like Anant Raje, Raj Rewal, Laurie Baker, and many more played a pivotal role in the evolution of architecture by taking cues from the ancient to define the modern.

- **The decade of 'Going Green:** The CII-Sohrabji Godrej Green Business Centre in Hyderabad initiated a calling for sustainable architecture in India. With the 2004 draft ofthe National Environmental Policy receiving several criticisms, the matters of environmental concerns became a highlight. Even the consumers understood the vitality of having habitable green surroundings that ensured sustenance.

This gave rise to a new style of architecture that placed the environment right at the centre. Several architects like BV Doshi, Charles Correa, Nari Gandhi, and Laurie Baker, worked towards a common goal of orienting structures that thrive on sustainability allowing conscious innovations. Futuristic and sustainable architecture developed in the city of Auroville started receiving global applause, which accounted for the growth of awareness towards nature.

Green building certifications like IGBC (Indian Green Building Council), LEED (Leadership in Energy and Environmental Design), and Griha, helped in taking this message of 'Going green' to a diverse user group, right from the designers to the inhabitants.

Even today, several architectural firms and studios like Biome Environmental Solutions, Hunnarshala Foundation, Made in Earth, and Trupti Doshi Architects are working towards practicing sustainable architecture as a way of life. Structures like Suzlon One Earth, Pune (Platinum certification of LEED), Patni (i-GATE) Knowledge Center, Noida (LEED Platinum rating), Infinity Benchmark, and Kolkata (LEED Platinum level certified green building) are a few examples that highlight the eccentric possibilities of sustainable architecture in the Indian context.

- **Envisioning a Futuristic New Age Architecture:**'Parametric Architecture' is said to be the next revolution after the Industrial revolution. Computational design methods, robotics, and automation have become a crucial part of

architecture in the new age. With the 3d printing industry planning to build an interplanetary architecture, the new age is all about going digital.

On a global scale, this growth is in an uproar, however, Indian architecture has seen a blend between the past and the future forming a unique school of thought. Architects and designers are closely embracing cutting-edge technology but are forming traditionalist interpretations of the same.

Architectural firms like PMA Madhushala, Cadence Architects, NUDES studio by Nuru Karim, and many more are constantly exploring dynamic forms that are deeply embedded in biomimicry with an environmentally conscious approach.

Globalization is also leading to an increased verticality in the cosmopolitans with towering skyscrapers and multi-use buildings, the future is in buildings that have 'tech' as a keyword in them.

It has indeed been a journey, starting from the Harappan civilization to the monolithic architecture, that seemingly floated into the Indo-Islamic language followed by the British era, the changing dynamics of modern India to the foothold of sustainability and now heading towards the future; it has indeed been quite a journey for India and its Architecture.

This dynamic path over centuries is a testimonial of the eccentricity and eclectic architecture that India has to offer. Being adaptive as well as resilient to many new architectural styles, the evolution of Indian architecture and design has always been a blend between the past heritage with the current dynamics; this is one phenomenon that has never changed.

9.1.4 Classification of Housing

Housing, or more generally, 'living spaces', refers to the construction and assigned usage of the houses or buildings individually or collectively, for shelter. Housing is a basic human need, and it plays a critical role in shaping the quality of life for individuals, families, and communities.

Types of Houses in India: India's architecture reflects the country's diverse cultures and the social status of people. The types of houses in the country vary across regions, climatic conditions, and local customs. Some of the familiar house types are independent houses, farmhouses, apartments, and villas, among others. While the modern school of architecture has introduced innovative building materials as well as styles, conventional houses are still regarded by people.

The definition of the house is different for each one of us. For some, a house is a mere shelter whereas for others a symbol of status and lifestyle. Conventionally, a house is where we make memories irrespective of its size. Over the years, house structures have undergone a massive transformation. Varied types of housing to suit everyone's needs and preferences are found in India.

A few of these are:

i. **Flats or Apartments:** Flats or apartments are located in multi-storied buildings designed to house families or individuals. These apartments are generally located in urban areas and offer amenities such as elevators, power

backups, clubs, and 24x7 security. These are convenient and affordable housing options for those who love their privacy.

ii. **Studio Apartment:**A studio apartment is suited for a bachelor or a couple who does not want a large space. It comprises a single room that serves the purpose of all living rooms, a bedroom, and an open kitchen. These simple apartments offer low maintenance and are usually less expensive.

iii. **Independent House:**An independent house is constructed over a piece of land. The owner of the land has the authority to construct a house based on his choice and preference.

iv. **Builder Floor:**Generally, a builder floor is an apartment in a multi-storeyed building that occupies a single floor. Spread over a complete floor, these typically have more space than a regular apartment. A builder floor is perfect for families who seek more space but cannot invest in a villa or bungalow.

v. **Service Apartment:**A serviced apartment is a temporary living space rented out for a fixed period. Builders and developers offer these fully furnished flats to travelers or tourists. These apartments are equipped with all facilities such as laundry, and housekeeping for comfortable living.

vi. **Penthouse:** A penthouse is typically located on the top floor of a multi-story building. These units are highly spacious as compared to regular apartments. The penthouse receives abundant natural lighting and an expansive view.

vii. **Villa:**It is an independent luxury unit with unique architecture and amenities. Mostly, it is a low-rise construction and cannot be built on more than two floors.

viii. **Bungalow:** Bungalows are also known as retirement or vacation homes offering a casual and relaxed living experience. Its structure usually features a single-storey house accompanied by a veranda, garden, and a parking area. With its sprawling space, bungalows are ideal for those who love to enjoy outdoor space.

ix. **Condominium:** A condominium is an independent housing unit owned by an individual and managed by an association. It is different from an apartment, as one has to share the amenities such as a terrace, swimming pool, and clubhouse, among others. Residents have to pay monthly maintenance charges for these amenities.

x. **Row House:**Row houses are referred to by this name, as they are independent houses attached in a row. These identical houses are built inside a gated community and offer heightened security for the dwellers. A row house blends the functionality of both flats and bungalows**.**

xi. **Cottage:** A cottage is a small and cozy housing unit perfect for a single family. These asymmetrical houses are usually located in rural areas for a countryside experience. They feature a large front peak and a small landing at the front. A cottage is generally not very expensive and has a vast scope of customization.

xii. **Duplex:** A duplex means a living space where two housing units are attached. Both the units of the duplex are managed and owned by a single individual. A duplex is popular in an urban setting due to ample space and affordable pricing.

9.1.5 Factors Affecting the Selection of Housing

Various factors contribute to deciding when selecting the appropriate housing for a family. Some of these include the following:

i. **Income**: Financial availability plays a major role when considering the type of housing to be either purchased or rented. People with larger incomes have a wider choice in selecting housing.
ii. **Orientation:** The house should have access to natural elements like sunlight and ample ventilation without being dominated by nearby buildings.
iii. **Locality:** Some families might prefer certain localities when selecting housing like particular areas having well-developed residential layouts as these have more resale value when they need to be sold off. Also, the potential for further infrastructural development should be seen too.
iv. **Public Utilities:** Civic amenities like proper sewage and sanitation, electrical layouts without extra cost, and well-developed infrastructure play a vital role in house selection. Most families with employed occupants would prefer to select housing nearer to the city limits with proximity to major utility centres like schools, colleges, market facilities, hospitals, and adequate transport facilities nearby.
v. **Comfort:** This is very important when selecting the house as it will be utilized by the family for a longer period being an immovable commodity. The rooms of the house should be suitable for the functions it is needed for.
vi. **Weather Conditions:** The climatic conditions play a role in the selection of housing with some persons preferring cooler climates while others might like a tropical climate.
vii. **Age:** The ages of the occupants make a difference while selecting housing. Younger families might prefer housing nearer to city limits while retired persons might prefer a retirement community or housing away from the hub of the city.
viii. **Family Size:** A large family with more than six members has to go for a larger house than a small family with four members.
ix. **Family Type:** Families can be classified as nuclear, extended, or joint families. The size of the house will vary according to the type of family.
x. **Stage of Family Life Cycle:** The stage in which the family is, should be considered. A family in the expanding stage will need a larger house than a family in the beginning or contracting stage.
xi. **Family Structure:** This indicates the build-up of the family about the age, sex, and relationship of one member to another.
xii. **Family Values and Standards:** The standard of living that a family wants to maintain, the family values, and priorities in life should be considered while selecting a house.
xiii. **Personal Preferences:**Families might also consider some personal choices like mobility, pets being allowed, noise decibels, and community facilities when selecting their housing.
xiv. **Permanence of Residence:** There are two types of family in this regard. A Transient family has to move from place to place, because of occupational or other needs. A Permanent family is reasonably sure of staying in the same place for a long time. This factor should be considered whendeciding to rent or own a house.

9.1.6 Owning Or Renting A House

Most families have to seriously consider whether they would prefer to purchase their own house or opt for a rented one. For some families who are moving frequently due to their work conditions, they might prefer staying at a

rented place; while families with a sizable financial aspect might prefer to buy their place, whether an independent house or an apartment. Both aspects of owing and renting have their own merits and demerits.

Buying a house is every family's ultimate dream in their preferred location. Owing a house has major advantages like independence and choice in its infrastructure, but aspects like larger financial costs must be looked into in the immediate outlook and in the future too. Renting, on the other hand, offers more flexibility with shared costs of utilities and fewer responsibilities.

Merits of Renting

- Whether one chooses to rent or buy a home depends on their financial situation, lifestyle, and personal goals.
- Both provide a place to live and require regular income to make the payments.
- Renting offers flexibility, predictable monthly expenses, and someone to handle repairs.
- Homeownership brings intangible benefits, such as a sense of stability and pride of ownership, along with the tangible ones of tax deductions and equity.
- When a person rents a house, he knows exactly the housing costs each month. This amount is indicated on the Lease so it can be planned accordingly. In some cases, the landlord may also include other costs within that amount, such as utilities, storage, and Home Owner Association (HOA) fees if it is a condominium.
- As a renter, the person may face rent increases each time the Lease is up for renewal.
- Renting means a person can move whenever the lease ends. However, it also means the person might have to move suddenly if their landlord decides to sell the property or turn the house into an apartment complex.

Merits of House Ownership

Homeownership brings both tangible and intangible benefits. Not only does a person own the property, but he can also make decisions about the look and design of the space, and it also creates a sense of stability and pride of ownership.

The overall cost of homeownership tends to be higher than renting especially if the person has taken a housing loan or mortgage which has to be paid in monthly or otherwise stated installments.

Here are some expenses that will be spent by the homeowner that are not generally paid by a renter:

- Property taxes
- Trash pickup
- Water and sewer service
- Pest control
- Tree trimming
- Homeowners Insurance
- Pool cleaning (if there is one)
- Earthquake Insurance (in some areas)

The housing loan or mortgage can take up a sizable amount of one's income so it has to be carefully considered before investing in house ownership. Also, the house will require repairs and maintenance from time to time, especially in older houses; which can be very costly.

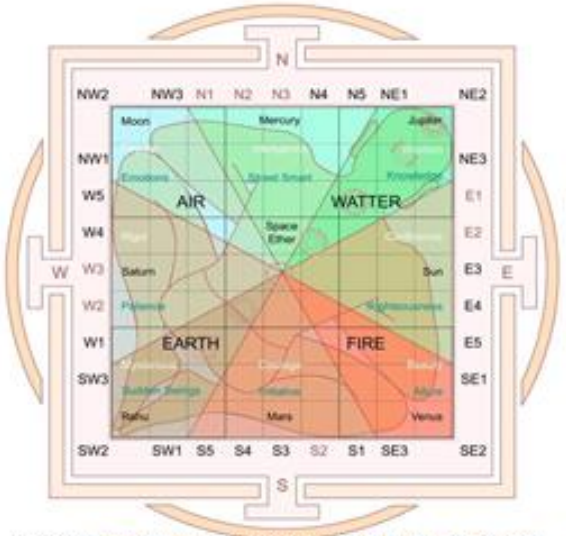
9.2 ANCIENT SCIENCE OF HOUSE DESIGN

9.2.1 Meaning and Origin of Vaastu Shastra

For a house to become a dream home, it needs to radiate the right kind of energy that can bring prosperity. According to Vaastu Shastra, every home receives some amount of cosmic energy whether good or bad. These energies influence in one way or another, thus impacting the life of its occupants; therefore, it's essential to understand the link between this art of science Vaastu and our homes.

The term Vaastu is composed of two Sanskrit words 'Vastu' and 'Shastra' where Vastu means house, habitation, building on land or ground and Shastra means teaching or doctrine; hence Vaastu Shastra is the doctrine of designing houses.

Vaastu Shastra is an ancient term that translates to "the science of architecture". It incorporates the constituents of design, layout, measurements, ground preparation, arrangement, and spatial geometry, which are then applied in the construction of buildings to promote the peace, well-being, and prosperity of the inhabitants. It unifies science, art, astronomy, and astrology, providing ideas and concepts for making a living space harmonious with nature while integrating geometric patterns, symmetry, and directional alignments.



Source: https://www.squareyards.com/blog/vastu-shastra-vastuart

- **Origin of Vaastu Shastra:** The origin of Vaastu Shastra evolved during Vedic times in India. The art of Vaastu originates in Sthapatyaveda, a part of the Atharvaveda, which emerged as a system of knowledge involving the connection between man and his buildings – in other words – architecture. Here, Vaastu Shastra arises to teach the art of living, designing, building in harmony with nature, and stimulating positive energy. Sthapatyavedacould be the theory while Vaastu Shastra is the application of this knowledge, the "science of architecture".
  Vaastu Shastra is an old scientific theory that is over 5000 years old. The texts on Vaastu Shastra can be found back in 1500-1000 BCE. The initial archives of the account of VaastuShastra lie within the Vedas, (oldest scriptures of Hinduism). Among the four Vedas, the Rig Veda explains about the Vaastu Shastra and mentions Vastospati as the protector of the house
- **Five Elements of Vaastu Shastra:** Vaastu Shastra is based on the five essential elements – Prithvi (earth), Agni (fire), Tej (light), Vayu (wind) and Akash (ether), which are known as panchabhutas. The whole universe including the earth and the human body is considered to be made out of these five elements that affect the cosmic forces and the forms of energies. According to the Vaastu Purush Mandal, the cosmos is full of beneficial energies and all these elements combined with ideal directions create a balanced and harmonious living environment.
- **Directions of Vaastu Shastra:** The importance of the orientation of the building is to have a better house design, implying positive energy and nullifying negativity, creating an environment conducive to total success, harmony, tranquility, and good health.

Directions	Effect	Function
North	Wealth & prosperity	Living room, seating, office, entrance
North-East	Religion & trinity	Puja room, well, underground water tank
East	Progress & growth	Entrance, guestroom, veranda, bathroom
South-East	Energy, vigour & strength	Kitchen, generator, power supply
South	Poor	Backyard and kitchen garden
South-west	Purity & cleanliness	Toilet/ washing area
West	Water	Overhead tank, study room
North-west	Air	Bedroom

- **Vaastu Principles for the Home:** According to the Vaastu Shastra, the human body is the combination of PanchaTatwa (five elements) namely; fire, earth, water, air, and sky). The principles of Vaastu Shastra say that if these five elements are positioned appropriately in a home, they will release positive energies from all directions.For instance,
- Air signifies satisfaction, joy, and happiness which controls the eastern direction.
- Earth gives constancy and stability which remains at the centre of the house.
- Water connotes new thoughts, the stream of new chances, and good well-being which rules the North direction.
- Fire signifies heat and light and provides self-reliance, zeal, confidence, and power which exists in the southern direction of a house.
- Sky helps in receiving new prospects and considerate new artistic thinking.

These five elements are somehow linked with the five senses of taste, touch, smell, hearing, and sight and any kind of imbalance affects the well-being of humans. Therefore, the architecture of a town, city, or house of people has to be in synchronization with these five elements and the five senses for their well-being. Further, it is also believed that the movement of the magnetic currents and the magnetic fields, gravitational effects of Earth, the direction and the velocity of winds, and light and heat of the Sun affect the well-being of humans as well.

Vaastu Shastra in modern times is similar to the one that was practiced in the ancient period. However, the process and the approach have been modified, according to the present-day needs. Nevertheless, the central idea of the Vaastu-compliant buildings remains the same, which has descended from the Vedic sagas. The two important components of the updated Vaastu are the shape of structures and directions.

The Vaastu for the home is the conglomerate of proper orientation and placement of spaces for activities that relate to the cardinal directions (**north, south, east, and west).** A building and its design are the cruces of Vaastu Shastra architecture. The exterior of a home can help channel the positive vibes and prevent any negative forthcomings.

Symmetrical or right-angled-shaped plots, such as rectangles or squares, work well according to the Vaastu principles. These plot shapes are highly beneficial and lead to prosperity, well-being, and happiness for the homeowners.

As per Vaastu Shastra, any direction that a home faces - East, West, North, or South is considered good, provided they adhere to some principles. According to Vaastu, there are 32 gates or padas out of which nine **(Mukhaya, Bhallat, Soma, Jayant, Indra, Vithatha, Grihrakshita, Sugriva, Pushpdanta)** are considered to be auspicious for the home entrance.

Benefits of using Vaastu Shastra

- Vaastu-compliant homes built following the natural elements balance the cosmic energies and ensure prosperity and overall success.
- The perfect Vaastu settings let positive energies flow into the house, enhance inner peace, and harmonize human relations.
- Living spaces designed according to the principles of Vaastu Shastra can promote physical and mental health, reduce stress, and improve overall well-being.
- **Vaastu house plan** keeps designs, colours, and materials in mind that is beneficial for both the physical and emotional health of dwellers.
- Vastu Shastra helps create a harmonious environment that fosters good relationships with family, friends, and colleagues.

Vaastu Shastra combines the concept of variants of energies that influence the lives of inhabitants. Vaastu Shastra principles harmonize life with energies present around. While designing the structure take into consideration these Vaastu tips for the main entrance, master bedroom, kitchen, etc. for healthy and better living. In addition to more recommendations and Vaastu remedies contact our experts at Square Yards for a Vaastu-compliant home.

9.3 MODERN METHODS OF CONSTRUCTION

When it comes to building construction techniques, many of today's methods have remained unchanged for hundreds of years. But as technology advances and job site demands evolve, new techniques are needed to solve contemporary building problems. Leveraging the power of digital design, cutting-edge software, advanced automation, and precision robotics, modern building techniques have rapidly revolutionized the construction industry.

Modern methods of construction (MMC) are innovative building construction techniques used by construction professionals that streamline the construction process. From comprehensive digital design to prefabricated building components, modern construction methods help lower costs and reduce construction time while driving sustainability.

Modern construction methods involve both onsite and offsite techniques, and the specific MMCs used by a construction company will vary depending on the nature of the project. There is a wide variety of innovative modern construction techniques being used by construction professionals today which constitutes the following.

- **Pre-Engineered/Precast Flat Panel System:**In a precast flat panel system, floor and wall units are produced off-site in a specialized facility. The pre-engineered panels are then installed on-site to create structures with minimal construction time. This method is especially useful for projects that involve a repetitive cellular design.
- **Insulating Concrete Formwork (ICF) Technique:**With an insulating concrete formwork (ICF) approach, builders use double-walled polystyrene panels as the basis for the walls of a building. The empty panels are filled with construction-grade ready-mixed concrete to ensure a strong, durable structure. Airtight ICF systems provide excellent insulation for both heat and sound and help buildings maintain steady thermal mass energy.
- **Augmented Reality-Assisted Building:**Augmented reality (AR) has been touted as one of the most innovative technologies adopted in the construction industry, and for good reason. Leveraging building information modeling (BIM) and wearable AR equipment, developers can explore fully-rendered and completely accurate 3D renderings of particular structures. This is incredibly useful for pre-construction planning as well as determining specific materials required for construction in a new building system.
- **Raised Access Flooring:**Raised access flooring is a modular construction method that uses modular floor panels installed over an existing floor surface. The raised floor panels are suspended over the existing floor to create space that can be used to channel plumbing, electrical wiring, or HVAC systems rather than installing them in ceiling space. Repairs and maintenance can be much more easily performed through raised access floor panels compared to overhead systems.
- **3D Volumetric Construction:**In 3D volumetric construction, three-dimensional units are produced in a specialized facility and then transported to relevant job sites for assembly. 3D modules can be made with varying degrees of complexity. Some units may be a bare structure while others can come with external finishes and internal features already installed.
- **Hybrid Concrete Construction:**As the name suggests, hybrid concrete construction is a combination of construction methods. Specifically, hybrid concrete construction uses cast-in-place concrete with other precast materials like steel or concrete units. A hybrid method using both in-situ construction and precast materials helps

to accelerate facility construction and lower project costs while controlling the overall quality of the building process.

- **Thin Joint Masonry:**The thin joint masonry building technique helps to reduce build times by lowering the amount of mortar needed to construct structural walls. Using a special adhesive mortar, large-format concrete blocks can be layered much faster while lowering waste and cutting costs for required construction materials.
- **Precast Concrete Foundation:**Every building needs a solid foundation but constructing a traditional concrete foundation can be an exhaustive process. With precast concrete foundations, the building components are produced in a specialized facility and then assembled on-site. This method mainly involves the use of concrete piles connected to form a cohesive foundation system. Precast concrete foundations are ideal for extreme climates or other hazardous construction situations where speed and efficiency are crucial.
- **Twin-Wall Technology:**Twin-wall technology allows for streamlined construction using both precast and in-situ concrete. Two concrete slabs are separated by cast-in lattice girders and then joined through reinforcement techniques. The space between the twin walls is filled with concrete to ensure structural integrity. This construction method is most often used in combination with precast flooring.
- **Timber Frames:**Using wood or timber frames is an indispensable modern building method thanks to advances in the manufacturing of engineered wood products. Engineered wood products (EWP) such as plywood panels are attached to the studs framed walls to provide surgical support and surface area. Besides wood panels, there are also EWP posts and beams, which are designed to be stronger than similar components made from raw timber.
- **Flat Slab Construction:**This method uses flat slabs of concrete reinforced with concrete columns. Flat slab construction is a method that eliminates the need for support beams and offers flexibility in the layout of the structure since there are no restrictions on height between floors. As with many modern building techniques, flat slab construction reduces the overall time needed for installation and construction.

Challenges with Modern Methods of Construction:Modern methods of construction offer tremendous benefits for construction professionals and their clients. But that's not to say that there aren't some challenges with current MMCs.Material availability and labor shortages can impact the progress of construction, but with a reputable homebuilding company, these potential problems are not usually a concern.

Benefits of Modern Construction Techniques:As seen from the examples provided above, modern building techniques accelerate project timelines and help to reduce construction costs. However, there are other tangible benefits of using modern building methods.

These include:

- **Eco-friendly:** MMCs generally have less environmental impact than traditional construction methods. The MMC production process generates lower emissions compared to conventional material manufacturing, assembly, and installation. Also, the energy-saving insulation of many MMCs can help to reduce carbon footprints.

- **Energy-efficient:** New construction techniques leverage ultra-efficient insulation, and less energy is required to heat or cool interior space. As energy costs rise around the world, MMCs offer more sustainable energy solutions built into every construction project.
- **Less risk:** Because MMCs are produced in a controlled manufacturing environment and pre-planned using advanced software, there is far less risk in the construction process. Builders don't usually need to work from elevated positions, so the risk of falls and injury is greatly reduced. Hazards like live construction vehicles are also eliminated.
- **Higher quality:** Traditional construction is subject to delays and unforeseen complications. MMC products made in off-site facilities are standardized and consistent, resulting in higher-quality construction on a shorter timeline.
- **Comfortable:** Most of all, buildings constructed using MMCs are comfortable and structurally sound. With airtight insulation, indoor temperatures stay cooler in the summer and warmer in the winter.

9.3.1 Low-Cost Buildings And Fabrication Techniques

Shelter is the basic need of human beings. But this may be out of the means of the low-income householder. The construction of low-cost housing is possible with the use of low-cost building materials and planning.

Low-cost housing construction is based on three factors which are structural design, method of budgeting cost-cutting, and materials used. So, all these three factors must be considered for low-cost construction.

- **Building Materials Used in Low-cost Housing Construction:** The construction aspect requires adequate foundations and structures.

  The five groups of building materials are given below for the construction of low-cost housing:

  - Bamboo and Timber
  - Compressed earth bricks and blocks
  - Adobe blocks
  - Interlocking blocks of recycled materials
  - Improved concrete panels

  All the materials discussed above have a lot of potential as a building material for low-cost housing construction. These materials are easily and locally available in the market. These are economical and also environment-friendly in nature.

- **Low-Cost Housing Construction Techniques for Rural Areas:** Selection of Load Bearing structures: It is the first area of concern for any type of construction, and preference is for the Load Bearing Structure instead of the Framed Structure.

  The Load Bearing Structure has various advantages:

  - It is cheaper than the framed structure. The cost of the construction is low because a lesser amount of concrete and steel rods are required.

- It is easy for construction and it also needs less time in its construction.
- It is very flexible in nature.
- Use of Hollow concrete blocks for Load Bearing Walls

The use of hollow concrete blocks for load-bearing walls has many advantages such as:

- These blocks are cheaper than stone and bricks.
- They are light in weight; they are very easy to handle and to work on.
- There is a special advantage of insulation for spacing air voids.
- The mortar consumed in this is very less amount.
- These blocks are environment-friendly in nature.

Foundation for Low-Cost Housing Construction: The Foundation is the main basic aspect of the project. It involves 10-15% of the total building cost.The depth of the building is usually 3-4 feet deep in the soil, but we can also make it up to 2 feet in depth in the case of normal soils. This used to save a large amount of cost. In other soft soils, such a cost reduction cannot be executed very well.For avoiding the cracks in the foundation of the building it is advised to use cement mortar in appropriate ratios.

- **Staircase for Low-Cost Housing Construction:** An effective and efficient method also known as Precast Staircase System can be used which has the following advantages:

  - Its construction is quick and cheap.
  - No laborious form of work is required for the construction of it.
  - This type of staircase can be simply supported or can be supported with a cantilever.

  Filler Slabs for Ceilings in Low-Cost Housing Construction: These slabs are the normal RCC Slabs where the bottom concrete is replaced with filler materials such as bricks, tiles, cellular blocks, etc. but in this, we have not to compromise with the strength. They are also economical and safe to use. They also help us in providing various types of pleasing patterns as per the choice.

  Prefabrication of the Structural Elements

  - In this, all the essential elements of construction are readymade and bought. It helps in saving time and also helps in concentrating on the durability of the work.
  - Examples of various prefabricated materials that can be used are:
  - Materials for walls
  - Roof and floor slabs
  - Doors and windows
  - Doors and Windows in Low-Cost Housing Construction
  - Replace burnt bricks with soil-cement blocks as they are energy-efficient materials.
  - Environmentally friendly materials are considered as a substitute for conventional building components like the usage of R.C.C. door and window frames in place of wooden frames.

Building Cost for Low-Cost Housing

- The building construction cost can be divided into two parts which are as follows:
- Building material cost which is 65 to 70%.
- Labour cost which is also 65 to 70%.
- Now in the case of low-cost housing; for building materials, the cost is less because the locally available materials in the market or nearby places are used; also, the labour cost can be reduced up to a certain extent by making a proper schedule for the construction work. The cost reduction is achieved by making the selection of more efficient materials that are economical or by an improved design.

- **Safety of Low-Cost Houses:** There is a myth in the minds of people that the construction that takes place with low-cost materials might be of low-grade quality. Well, this should not be the situation, as it depends on the intellect of the architect or the civil engineer. The concerned professional must have adequate knowledge for taking such decisions which will help cut the cost of the whole project.

9.3.2 Eco-Friendly House Design

Human beings share an important relationship with the environment while coexisting in the ecosystem, therefore it is only natural that the built integrates with the environment. Eco-friendly homes value sustainability and are emphasized by the usage of environmentally friendly materials and appliances in their design.

It supports the use of building materials that are non-toxic, ethical, and sustainable coupled with the usage of renewable energy, such as solar energy. Efficient use of water– such as harvesting rainwater for irrigation and other household purposes also helps. Pollution and waste reduction measures that enable re-use and recycling are necessary too.For a home to become eco-friendly, it can be anything from using energy-efficient light bulbs and low-flow water fixtures to using paints made from soy or installing large windows to let in more natural light. Some other features include solar power, rainwater harvesting, recycling features, and kitchen gardens.An eco-friendly building is a building that uses fewer natural resources and produces fewer emissions and waste. Some green buildings even create a positive impact on the environment around them and contribute to improving the global climate. These homes are energy efficient, becoming an important investment in the current urban landscape as well as offering a way forward in architecture and construction with the increasing intensity of climate change. Some of the features that define a building as eco-friendly:

- **Energy Efficiency and Conservation:** measures to reduce energy consumption and maximize the efficiency of the energy used.
- **Renewable Energy:** using renewable energy like solar and wind power to meet the needs of the building in whole or in part.
- **Effective use of water:** water use reduction efficiency and greywater recycling.
- **Effective Waste and Emissions Management:** use of measures to reduce waste generation and facilitate reuse and recycling. Implementation of measures to minimize or offset emissions and pollution, especially air and water pollution.

- **Sustainable Construction Materials:** the building is built with materials that are non-toxic, ethically, and sustainably sourced from suppliers with the least environmental impact.
- **Environmentally Conscious Construction Methods:** the use of construction techniques that focus on reducing the impact of construction on the surrounding natural environment by reducing noise and light pollution and protecting local flora and fauna from harm during the construction phase.
- **Harmonious Design:** buildings designed to make the most of features like natural lighting and ventilation for heating/cooling. Designed to fit harmoniously into the surrounding natural environment and contribute to the preservation of local ecology.
- **Socially Responsible Design:** buildings designed to be beneficial to their human occupants and improve their health and well-being.
- **Circular Life-cycle Design:** buildings are designed with their full life-cycle in mind, from conception to operation, and from renovation and adaptation to eventual demolition.

Green or sustainable buildings are designed to be eco-friendly and can include any number of the features above. The features chosen will depend on the type of building, its location, and its intended use. Different countries and cities also have different building regulations and those need to be met in conjunction with the building and the city's green objectives.Eco-friendly buildings are also designed to be beneficial to the people within those spaces. Improved ventilation, insulation, and natural lighting have a positive effect on the occupants of the building and lead to improved health, productivity, and overall quality of life.

The primary aim of any eco-friendly building is to 'minimize the building's negative impacts and maximize its positive contribution' to the natural environment. How this is achieved and how it ties into other objectives, such as improved occupant health and reduced maintenance costs, will depend on the type of structure, the location, and the intended use of the building.

When it comes to eco-friendly construction techniques, the key areas to consider are resource use and waste generation:

- Use resources and materials that are renewable, sustainable, and ethically sourced
- Make use of reclaimed and recycled materials as far as possible
- Limit the waste generated by construction, reuse as many materials as possible, and dispose of any unusable materials as responsibly as possible
- Make use of methods and techniques that produce the least emissions and pollution
- Use locally sourced materials and labour
- Focus on energy and water conservation during and after the build

With the above in mind, eco-friendly building techniques often focus on temperature control and energy reduction through insulation, wall thickness, double glazing of windows, and other design measures to maximize the efficiency of the building.Environmentally conscious builders will often make use of renewable energy during construction. A few examples of eco-friendly building materials include reclaimed timber, biocomposites,Tesla Solar

Roof Shingles, and insulated concrete forms. These also focus on water conservation and recovery, using non-toxic materials and using materials that have been reclaimed or recycled.

Environmental Benefits of Eco-Friendly Buildings: Eco-friendly buildings are built with the natural environment in mind. They are designed and constructed to conserve natural resources, produce less waste and emissions, and utilize sustainable materials, that have been ethically sourced.

In some cases, they can even result in positive impacts on the environment through carbon capture, providing habitat for flora and fauna, and promoting local ecological health. They're also able to provide natural resources to the local area, such as solar power to supplement local energy needs.The environmental benefits of eco-friendly buildings contribute to slowing down climate change and reducing greenhouse gas and carbon emissions.

Buildings that meet green building requirements, such as LEED and Green Building Council (GBC) standards, use fewer resources by between 11% and 60% when compared to minimum industry standards, depending on the certification requirements of their local 'green authority'.

Economic Benefits of Eco-Friendly Buildings: There are many economic benefits of eco-friendly buildings. These benefits include:

- Reduces the carbon footprint, resulting in less carbon being sent out as around 40% of carbon emissions are from the construction industry.
- Reduced utility bills for tenants and owners as electricity and water resources are used more efficiently and supplemented with renewable energy
- Lower construction costs and higher property values
- Higher occupancy rates and increased productivity for businesses
- Lower operational and maintenance costs
- Contribute to the city and countrywide savings on electricity and water, as well as waste management
- Job creation for the growing sector of the green market of sustainable construction and maintenance
- Contribute to local economies when locally sourced materials are used to reduce environmental impacts from the manufacture and transportation of materials.

9.3.3 Building Bye Laws

While laws are important for any society or civilization to function, certain laws are directly impactful to our very existence. One such vital rule is the Building Bye Laws in India. For whatever type of property that is being constructed (residential or commercial), certain rules pertaining must be followed for the safety of its construction, the builder's workforce, as well as the people living in these buildings once, they are completed. These guidelines are beneficial to not only us as the citizens of the nation but also to the environment for construction in open spaces, health hazards, fire hazards, risk of life, pollution, and more. It is therefore vital for anyone – real estate developers, construction workers, and homebuyers alike – that we make ourselves familiar with what these building by-laws are, what their objectives are, as well as what aspects the guidelines cover to ensure the safe construction of buildings in India.

Every locality has its peculiarities in respect of weather conditions, availabilityof materials, and labor and thus adopts its methods of construction. The rulesand regulations covering the safety of the public through open spaces, the minimum sizeof rooms, and height and area limitations are known as 'building bye-laws'.

Objectives of Building Bye Laws: Building Bye-Laws are legal tools used to regulate coverage, height, building bulk, and architectural design and construction aspects of buildings to achieve orderly development of an area. They are mandatory in nature and serve to protect buildings against fire, earthquakes, noise, structural failures, and other hazards. In India, there are still many small and medium-sized towns that do not have building bye-laws and in the absence of any regulatory mechanism, such towns are confronted with excessive coverage, encroachment, and haphazard development resulting in chaotic conditions, inconvenience for the users, and disregard for building aesthetics, etc. It is in this context, that the TCPO(Transportation Plans and Control Officer) made an effort to prepare "Model Building Bye-Laws- 2016" for the guidance of the State Governments, Urban Local Bodies, and Urban Development Authorities which was an improvement over the previous Model Building Bye Laws brought out in 2004.

In 2003, the Ministry of Urban Development desired that Model Building ByeLaws be prepared, giventhe Bhuj Earthquake that occurred in 2001, to lay focus on the structural safety of buildings and for the guidance of the State Governments. Accordingly, the MBBL (Model Building Bye-Laws) 2004 incorporated the provisions of structural safety and other provisions like rainwater harvesting and wastewater recycling, solar-assisted heating, barrier-free public buildings, and fire safety. The Bye-Laws were circulated to all the State Governments and Union territories out of 36 States and UTs, wherein 22 States and UTs have undertaken a comprehensive revision of their respective Building Bye-Laws since 2004.

Additionally, other reasons for revising the bye-laws in 2016 were listed as: rising environmental worries, higher safety and security mechanisms, better technological innovations and developments, a higher focus on the nation's ease of doing business, and the government's Swachh Bharat Mission.

The building bye-laws are necessary to achieve the following objectives:

- Building bye-laws give guidelines to the architects or engineers and thus help in pre-planning the building activities.
- Building bye laws allows orderly growth and prevents haphazard development.
- Provisions ofbye–laws usually afford safety against fire, noise, health hazards, and structural failure.

Apart from the above objectives, these building bye-laws focused on the overall safety, security, and transparency of how buildings were constructed in India. Salient features of the 2016 bye-laws included the following provisions:

- **Safety and Security:** This included the structural safety, prevention measures, and disaster management related to a building's architectural design as well as mitigation of the effects of electromagnetic radiation on built spaces.
- **Accessible by all:** These provisions were to make all constructions suitable and safe for children, the elderly, and differently-abled persons.

- **Eco-friendliness:** This provision was to ensure all buildings incorporated green construction and sustainability mechanisms such as reuse of wastewater, rainwater harvesting, recycling, solar rooftop installations, and more.
- **Swachh Bharat Mission:** This was done to ensure hygienic sanitation facilities for women and the general public at large.
- **Adoption of Technology:** This provision was to ensure higher adoption of technologies that can increase efficiencies in structural safety, fire safety as well and disaster management.
- **Ease of doing business:** This was to ensure that commercial building plans were adequately adhering to compliance requirements and reporting the same regularly.

Functions of the Local Authority: A local authority is a body created by the Law, and it is created to carry out the duties of the local authority by framing suitable rules and regulations. The building bye-laws also provide suitable infrastructure for its successful implementation. The following important points should be remembered in connection with building byelaws:

- The bye-laws causing undue hardships to the public should either be removed or simplified.
- There should not be frequent changes in the basic requirements of the byelaws.
- There should be adequate staff for the effective implementation of the bye-laws.
- The professional institutions, engineers, and necessary staff should be consulted at the time of implementation.
- The building bye-laws should be given wide publicity to make the general public aware of them.

Principles underlying the Building bye-laws: The principles underlying the Building bye-laws encompass the following:

- Classifying the buildings with the family unit and mentioning their requirements.
- Classifying the rooms according to use and then specifying the minimum standard of each room concerningsize, height, floor area, ventilation, and light.
- Controlling the height of structures and laying the maximum limit of height in certain zones.
- Controlling projections in marginal spaces.
- Specifying suitable arrangements concerning drainage and water supply.
- Specifying materials and workmanship as per standard specifications for the construction of the buildings.
- Specifying light plane, setbacks, and marginal process.
- Specifying the minimum size of plots, their dimensions, and frontages.

Recent Development in Building Bye Laws

1. **Setbacks for Buildings:** The minimum setback required on all sides of a building, maximum plot coverage, maximum FAR (Floor Area Ratio), the maximum number of floors, the maximum height of the building that is permissible for different dimensions of sites, and width of roads are as follows:

   Note: The 'floor area ratio' (FAR)shall concern the width of the public road abutting the property and the FAR shall be calculated for the net area of the plot after deducting the area reserved for the parks, open spaces, and civic amenities in the plot; When car garage is proposed on the right side, the minimum setbacks shall be 3.0 m;

i. For residential, commercial, public, and semi-public, traffic and transportation, and public utility buildings, above 10 m in height, the setbacks shall be insisted.

ii. For residential sites up to 120 sq. m;

- Open staircase shall be permitted in the side setbacks, but there shall be a minimum open space of 0.50 m from the side boundary and 1.0 m from the front and rear boundary of the site.
- Toilets minimum of 1 m x 1.5 m and not exceeding 1.4 percent of the plot area permissible in rear set back only;
- When a minimum set back of 1.5 m is left on the right side, a scooter garage may be permitted at the back side limiting the depth of the garage to 3.0 m;

iii. The height of the stilt floor not exceeding 2.4m can be permitted without reckoning the same for the height of the building.

2. **Exterior Open Spaces:** Exterior open spaces/setbacks for residential, commercial, public and semipublic, traffic and transportation, and public utility buildings, above 10.00 meters in height:

Height of building (meters)	**Minimum Exterior open spaces/ setbacks to be left on all sides (meters)**
Above 10.0 up to 12.0	4.5
Above 12.0 up to 15.0	5.0
Above 15.0 up to 18.0	6.0
Above 18.0 up to 21.0	7.0
Above 21.0 up to 24.0	8.0
Above 24.0 up to 27.0	9.0
Above 27.0 up to 30.0	10.0
Above 30.0 up to 35.0	11.0
Above 35.0 up to 40.0	12.0
Above 40.0 up to 45.0	13.0
Above 45.0 up to 50.0	14.0
Above 50.0	16.0

3. **General Rules:**The following regulations shall be considered while enforcing the setbacks of all types ofbuildings:

i. The front and rear setbacks shall be concerningthe depth of the site.

ii. Left and right setbacks shall be concerningthe width of the site.

iii. No side setbacks shall be insisted upon only in the case of reconstruction of

iv. the existing building where traditional row housing type of development exists

v. and in areas specifically provided under the Zonal Regulations.

vi. The provision of setbacks should be read with tables prescribed for floor area ratio and coverage for different types of buildings.

vii. When the building lines are fixed, the front setback shall not be less than the building line fixed or the minimum front setback prescribed whichever is higher.

viii. In the case of corner sites both the sides facing the road shall be treated as the front side and regulations applied accordingly to maintain the building line on these two roads and to provide better visibility.

ix. In cases where the building line is not parallel to the property line, the front and rear setbacks shall not be less than the specified setbacks at any point.

x. In case of building sanctioned before coming into force of these rules which are abutting other properties on one, two, or more sides, upper floors may be permitted, to utilize the available FAR except in the front to enable road widening, if any.

xi. In the case of irregular plots setbacks are to be calculated according to the depth or width at the points where the depth or width are varying. In such cases, average setbacks should not be fixed as they may affect minimum setbacks at any point.

xii. The left and right setbacks may be interchanged by the authority in exceptional cases due to existing structures like open wellsand also considering the topography of the land.

xiii. For all the high-rise buildings, a 'No Objection Certificate' (NOC) from the following departments shall be obtained:

- Fire force department.
- State Urban Water Supply and Drainage Board
- State Power Transmission Corporation Limited
- Telecommunication department

- State Pollution Control Board

4. Building Utilities

i. **Lifts:** Lifts shall be provided for buildings with ground plus three floors and above.

ii. **Parking space:** Adequate space for car parking shall be provided on the premises as per standards.

iii. **Water supply:** Bore well shall be provided in all high-rise buildings to provide alternative sources of water supply where the Karnataka Urban Water Supply and Drainage Board so desires and the strata is capable of yielding water.

iv. **Height of building:** In the reckoning of the height of buildings, headroom, lift room, water tanks on terrace, and penthouse may be excluded.

v. **Corridor:** The minimum width of the corridor for different buildings or typesis as given.

vi. Restrictions of building activity in the vicinity of certain areas:

- No building/ development activity shall be allowed in the bed of water bodies like nala, and the Full Tank Level (FTL) of any lake, or pond.
- The above water bodies and courses shall be maintained as recreational/Green buffer zones, and no building activity other than recreational use shall be carried out within.
  - 30 meters from the boundary of Lakes of area 10 Ha and above;
  - 9 meters from the boundary la lakes of area less than 10 Ha.
  - 9 meters from the boundaries of the Canal.
  - 2 meters from the boundary of Nala as defined in the RS map/topo sheets.
  - The above shall be in addition to the mandatory setbacks. Unless otherwise stated, the area and the Full Tank Level (FTL) of a lake shall be reckoned as measured or given in the Survey of India topographical maps/Irrigation Dept.

vii. Rainwater harvesting is compulsory in all buildings with ground+2 floors or exceeding 400 sqm and above in plot area. (Schedule IV).

viii. Road width - Road width means distance between the boundaries of a road including footways and drains.

ix. Garages

- For garages, no side or rear setbacks are to be insisted. One upper floor not exceeding 3.0 meters. in height shall be permitted provided no openings are provided towards neighbouring buildings and at least one opening for light and ventilation is provided towards the owner's property.
- Garages shall be permitted in the rear right-hand corner of the plot. In cases of buildings constructed or sanctioned before the enforcement of these regulations, where space is not available on the right side, it may be permitted on the left side provided minimum setback exists in the adjoining property of the left side.
- In the case of corner plots, the garage shall be located at the rear corner diagonally opposite the road intersection.
- The maximum width of the garage shall not exceed 4 m and the depth should not be more than 6.0m or 1/3 the depth of the plot, whichever is lower.

5. **Distance of Building from Electrical Lines:** No building shall be erected below an electrical line, as well as within the horizontal distance from the electrical line indicated.The vertical distance below the level of the

electrical line and the topmost surface of the building corresponding to the minimum horizontal distance shall be as indicated. The minimum vertical clearance is not applicable if the horizontal distance exceeds the minimum prescribed.

6. **Schedule – IV: Rainwater Harvesting:** Rainwater harvesting in a building site includes storage or recharging into the ground of rainwater falling on the terrace or any paved or unpaved surface within the building site.

   The following systems may be adopted for harvesting the rainwater drawn from a terrace and the paved surface.

   i. Open well of a minimum of 1.00 m dia. and 6.00 m in depth into which rainwater may be channeled and allowed after filtration for removing silt and floating material. The well shall be provided with ventilating covers. The water from the open well may be used for non-potable domestic purposes such as washing, flushing, and watering the garden.

   ii. Rainwater harvesting for recharge of groundwater may be done through abore well around which a pit of onemeter width may be excavated up to adepth of at least 3.00 m and refilled with stone aggregate and sand. The filtered rainwater may be channeled to the refilled pit for recharging the borewell.

   iii. The surplus rainwater after storage may be recharged into the ground through percolation pits, trenches, or a combination of pits and trenches. Depending on the geomorphologic and topographical condition, the pits may be of the size of 1.20 m width x 1.20 m length x 2.00 m to 2.50 m depth. The trenches can be 0.60 m width x 2.00 m to 6.00 m length x 1.50 m to 2.00 depth. Terrace water shall be channeled to pits or trenches.

End of Chapter Exercise

1. Explain the importance and functions of housing.
2. Write about the history of housing in India from the ancient time to the modern scenario.
3. Enumerate the factors affecting the selection of housing.
4. Elucidate on the principles of Vaastu Shastra.
5. Discuss the modern methods of construction with their benefits.
6. Write about the low-cost buildings and fabrication techniques.
7. Elucidate on eco-friendly house design, its features, and benefits.
8. Explain the need, objectives, and principles of Building bye-laws.
9. Enumerate upon the recent development in building bye-laws

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