

## Contents

1. Introduction .....	3
2. Why High Rise Residential Tower? .....	3
3. Statement of the problems.....	4
4. Literature review .....	4
4.1 What is a HIGH RISE STRUCTURE? .....	4
4.2 History and aspects of high-rise buildings.....	5
4.3 Architectural aspects and urban development today .....	6
4.4 Infrastructural aspects.....	7
4.5 Economic aspects .....	7
4.6 Planning and Designing of high rise buildings.....	8
4.7 Maintenance and Administration .....	9
5. AIM .....	10
6. Objectives.....	10
7 Hypothesis.....	10
7.1 Research questions .....	10
7.2 Research Area.....	10
7.3 Case Studies .....	11
8. Methodology .....	13
8.1 Method of research .....	13
8.2 Conceptual frame work.....	13
8.3 Methods of data collection.....	14
8.4 Methods of data analysis and findings.....	14
9. The Chapter Scheme.....	14
10. Scope.....	14
11. Limitation .....	15
12. Conclusion .....	15
13. Recommendation .....	16
14. Glossary .....	16
15. Appendix .....	17

## **Table of figures**

Figure 1. High Rise Buildings.....	6
Figure 2. The Towers of San Gimignano .....	7
Figure 3. World One.....	11
Figure 4. Imperial Towers .....	12
Figure 5. 432 Park Avenue.....	12
Figure 6. Multidimensional Residential Environment .....	16

## **1. Introduction**

A **tower block, high-rise, apartment tower, residential tower, apartment block, block of flats, or office tower** is a tall building or structure used as a residential and/or office building. In some areas it may be referred to as an "MDU", standing for "Multi Dwelling Unit". In the United States, such a structure is referred to as an **apartment building** or **office building**, while a group of such buildings is called an **apartment complex** or **office complex**.

Buildings are becoming higher and higher nowadays in maximizing land use and investment return. Construction of residential developments are considered as focal point of the construction industry in view of its huge labour contents and turnovers evolved due to its own nature of works and investments involved from the investors. Investors tend to build everything possible in a small piece of land to increase their return from their investment in the quickest possible manner. Practitioners in the construction industry are looking for different means and methods in enhancing efficiency and meeting requirements from the statutory bodies and the users due to high construction costs and non-availability of land at preferred locations, people opt for apartments.

High-rise buildings became possible with the invention of the elevator (lift) and cheaper, more abundant building materials. The materials used for the structural system of high-rise buildings are reinforced concrete and steel. Most North American style skyscrapers have a steel frame, while residential blocks are usually constructed of concrete. There is no clear difference between a tower block and a skyscraper, although a building with fifty or more stories is generally considered a skyscraper.

Taking into consideration the thesis topic I would like to have a detailed study done on a HIGH-RISE RESIDENTIAL TOWER.

## **2. Why High Rise Residential Tower?**

High-rise Apartment buildings have technical and economic advantages in areas of high population density, and have become a distinctive feature of housing accommodation in virtually all densely populated urban areas around the world. In contrast with low-rise and single-family houses, apartment blocks accommodate more inhabitants per unit of area of land and decrease the cost of municipal infrastructure.

### **3. Statement of the problems**

Generally the high rise structures face the problems during power cut making it inconvenient for the user and affecting the efficiency and functionality of the structure. Other points to be considered are wind load, and seismic activity which should be designed accordingly. We can even find a number of problems in the present urban dwellings like the lack of proper planning of amenities and services stress related problems due to no proper neighbourhoods and high environmental impacts like pollution, noises and low quality of air etc. Hence the way the natural resources like ventilation and lightning and other amenities are planned for large number of people is of prime importance.

### **4. Literature review**

#### **4.1 What is a HIGH RISE STRUCTURE?**

High-rise is generally defined as "A multi-story structure between 35–100 meters tall, or a building of unknown height from 12–39 floors."

The residential tower block with its typical concrete construction are a familiar feature of Modernist architecture. Influential examples include Le Corbusier's "housing unit" his Unité d'Habitation, repeated in various European cities starting with his Cité radieuse in Marseille (1947–52), constructed of béton brut, rough-cast concrete, as steel for framework was unavailable in post-war France. Residential tower blocks became standard in housing urban populations displaced by slum clearances and "urban renewal".

High-rise projects after World War II typically rejected the classical designs of the early skyscrapers, instead embracing the uniform international style; many older skyscrapers were redesigned to suit contemporary tastes or even got demolished - such as New York's Singer Building, once the world's tallest skyscraper. However, with the movements of Postmodernism, New Urbanism and New Classical Architecture, that established since the 1980s, a more classical approach came back to global skyscraper design that is popular today.

Other contemporary styles and movements in high-rise design include organic, sustainable, neo-futurist, structuralist, high-tech, deconstructivist, blob, digital, streamline, novelty, critical regionalist, vernacular, Neo Art Deco and neo-historist, also known as revivalist.

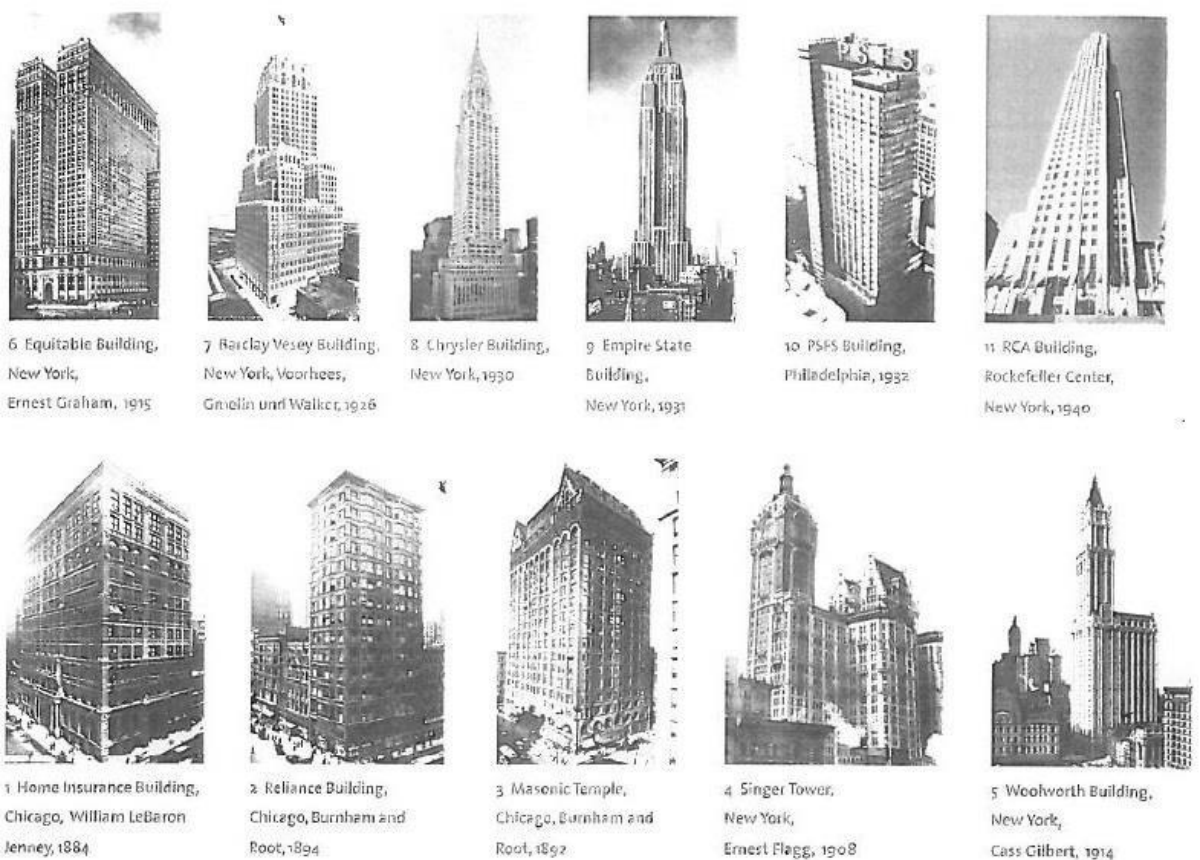
## **4.2 History and aspects of high-rise buildings**

Adams Street, a witness of its times. It has twelve floors – there were originally ten, but two were subsequently added – and was built in roughly eighteen months. The architect W. L. B. Jenney used an uncommon new method for the construction of his building: the weight of the walls was borne by a framework of cast-iron columns and rolled I-sections which were bolted together via L-bars and the entire “skeleton” embedded in the masonry. The early Equitable Life Building in New York, which was completed in 1872, also contributed towards the development of high-rise buildings, for it was the first tall building to have an elevator. Although it only had six floors, the edge of the roof was no less than 130 feet (roughly 38 m) above the road surface. Due to its elevator, the upper floors were in greater demand than the lower floors. Following completion of the “Equitable” building, it was the thing done to reside on one of the “top” floors. Burnham and Root’s Monadnock building, which was completed in Chicago in 1891, must also be mentioned as one of the last witnesses of a whole generation of solid masonry high-rise buildings. Sixteen floors of robust brick masonry rise skywards in stern, clear lines: an astonishing sight to eyes accustomed to the frills and fancies of the late 19th century. Standing on an oblong base measuring 59 m \_ 20 m, the building is reminiscent of a thin slice and not only recalls the industrial brick buildings of the late 19th century, but also anticipates the formal simplification of the later 1920s.

The buildings rose higher and higher with the spread of pioneering construction methods – such as the steel skeleton or reliable deep foundation methods – as well as the invention and development of the elevator. The highly spectacular skylines of North American cities, particularly Chicago and New York, originated in the early years of the 20th century. Glancing over Manhattan’s stony profile, the silhouettes dotting the first 12 km of the 22-km-long island bear vociferous testimony to this dynamic development:

- The World Trade Center, currently the tallest building in New York, 417 m high,
- The legendary Empire State Building, built in 1931, 381 m,

- The United Nations building erected in 1953, 215 m,
- The Chrysler Building dated 1930, 320 m,
- The former Pan Am Building completed in 1963, 246 m,
- The Rockefeller Center (1931–1940), a complex of 19 buildings,
- The Citicorp Center built in 1978, 279 m, and
- The AT&T Building opened in 1984, a pioneering building by the post-modern architect Philip Johnson, with an overall height of 197 m.



**Figure 1. High Rise Buildings**

### **4.3 Architectural aspects and urban development today**

As the historical development of high-rise buildings has already shown, the construction of edifices reaching higher and higher into the sky was – and to a certain extent still is – an expression of power and strength. This is equally true of both ecclesiastical and secular buildings: the power, strength and influence of entire families – i.e.

their standing in society – is mirrored in the erection of ever taller buildings culminating in a battle to build. The towers of San Gimignano are one of the best preserved examples of this development. In many North African cities, too, this attitude has moulded the townscape for many centuries and will no doubt continue to do so in the future.



**Figure 2.** The Towers of San Gimignano

#### **4.4 Infrastructural aspects**

A jungle of political, economic and investment difficulties must be overcome for such prospective planning because the owner of the high-rise complex bears no direct responsibility for the large majority of these far-reaching infrastructural measures. The project's progress is consequently controlled by the municipal authorities, as well as by supply and operating companies and not by the owner of the complex.

#### **4.5 Economic aspects**

Hundreds of companies and thousands of people depend on the smooth operation of a high-rise building, from the one-man business of a newspaper vendor or shoe shiner and corporations with thousands of employees, such as banks, brokers or global players

with a daily turnover in the order of several billions to radio, television and telecommunications companies which use the roofs and tops of high-rise buildings for the transmission and receiving installations. In addition, there are innumerable other businesses and workers with their families whose economic situation is directly or indirectly linked with the high-rise building. These range from transport companies and catering firms to tradesmen under long-term contract in the building. Nor should it be overlooked that even the municipal authorities and the service companies are also affected by the “failure” of a high-rise building and that its effects can be felt nationwide or even worldwide in the worst case.

#### **4.6 Planning and Designing of high rise buildings**

These activities concerned for any high-rise project has many stages right from the planning of the project to completion, maintenance and administration. The complexity of the trades to be coordinated has become several times greater since many disciplines and different experts are involved solely planning the high-rise housing.

- Architects
- Planning engineers for the supporting structures (engineering design and structural analyses)
- Construction and site management (resident engineer)
- Planning of the technical building services (particularly heating, ventilation, sanitation, cooling and air conditioning)
- Interior designers
- Construction physics and construction biology
- Planning and site management for data networks
- Planning of the lighting and materials handling
- Planning of the electrical and electronic systems
- Planning of the facades
- Surveying engineers
- Geo-technology, hydrogeology and environmental protection
- Design of outdoor facilities and vegetation



- Surveying of the actual situation in surrounding buildings

If we were to include all the contractors and specialists involved in the project as well, the list would probably be ten times longer. And if we then consider that bankers, construction authorities, legal advisers and even advertising agencies or brokers must also be coordinated in the course of the entire planning and construction of a high-rise housing project, it soon becomes clear that highly professional management is essential for such a project. Project management companies have come to play an increasingly important role in recent years as they take over the entire organization, structurization and coordination of construction projects. They act as professional representatives for the client and embody the frequently voiced desire for the entire project to be coordinated by a single partner.

#### **4.7 Maintenance and Administration**

Costs are continuously incurred during this time for maintenance and care of the building, these costs can have a significant effect on the financial result of the building's operator. He must decide whether to employ his own staff to deal with the problems (e.g. cleaning, maintenance, security, administration) or whether to assign intrinsic functions to external service-providers. Both alternatives require an efficient building management capable of taking over the following responsibilities, particularly in the case of high-rise buildings:

##### **a) Technical building management**

- Energy supply
- Disposal
- Equipment operation – System communication

##### **b) Commercial building management**

- Cost accounting
- Property accounting
- Rentals
- Contract management

##### **c) Infrastructural building management**

- Cleaning services

- Caretaker services
- Security services
- Secretarial and postal services

A new market segment known as “facility management” has developed in recent years and caters to the needs of users in larger properties in particular. It differs from classic building management in that it is not limited solely to the occupancy phase, but is already in action during the planning phase and therefore covers the entire life cycle of the building right up to its demolition.

## **5.AIM**

The aim is to design High-rise Residential Tower so as to effectively tackle the issue of high density population by accommodating good amount of apartments with maximum functionality.

## **6. Objectives**

1. To study the prevailing structures and gathering of data.
2. To identify the provisions and requirements for designing of High-rise tower.
3. To study new types and techniques for construction of a high rise tower.
4. Data collection and data analysis of current structures.

## **7 Hypothesis**

### **7.1 Research questions**

- i. What are the advantages and the disadvantages of High Rise Residential Tower?
- ii. What are the factors that are to be considered while designing a High Rise Building?
- iii. What are the factors that affect a high rise structure?
- iv. What are the special services to be taken care of other than that of basic low rise structure?

### **7.2 Research Area**

With the provision of high rise towers there comes many aspects which have to be taken care of like Security, Amenities, Services, Light-Ventilation, Parking and many more.

The above points are carefully taken into consideration and skilfully designed by an Architect and are later co-ordinated with other professionals for the final completion of the project.

Research Area mainly includes:-

- Bye Laws for High Rise Structure
- Services
- Special Requirements
- Parking
- Advanced Construction Techniques
- Material used for Construction

### **7.3 Case Studies**

- 1) World One, Lower Parel, Mumbai.



**Figure 3. World One**

2) Imperial Towers, Mumbai Central, Mumbai.



**Figure 4. Imperial Towers**

3) 432 Park Avenue, Manhattan, New York City.



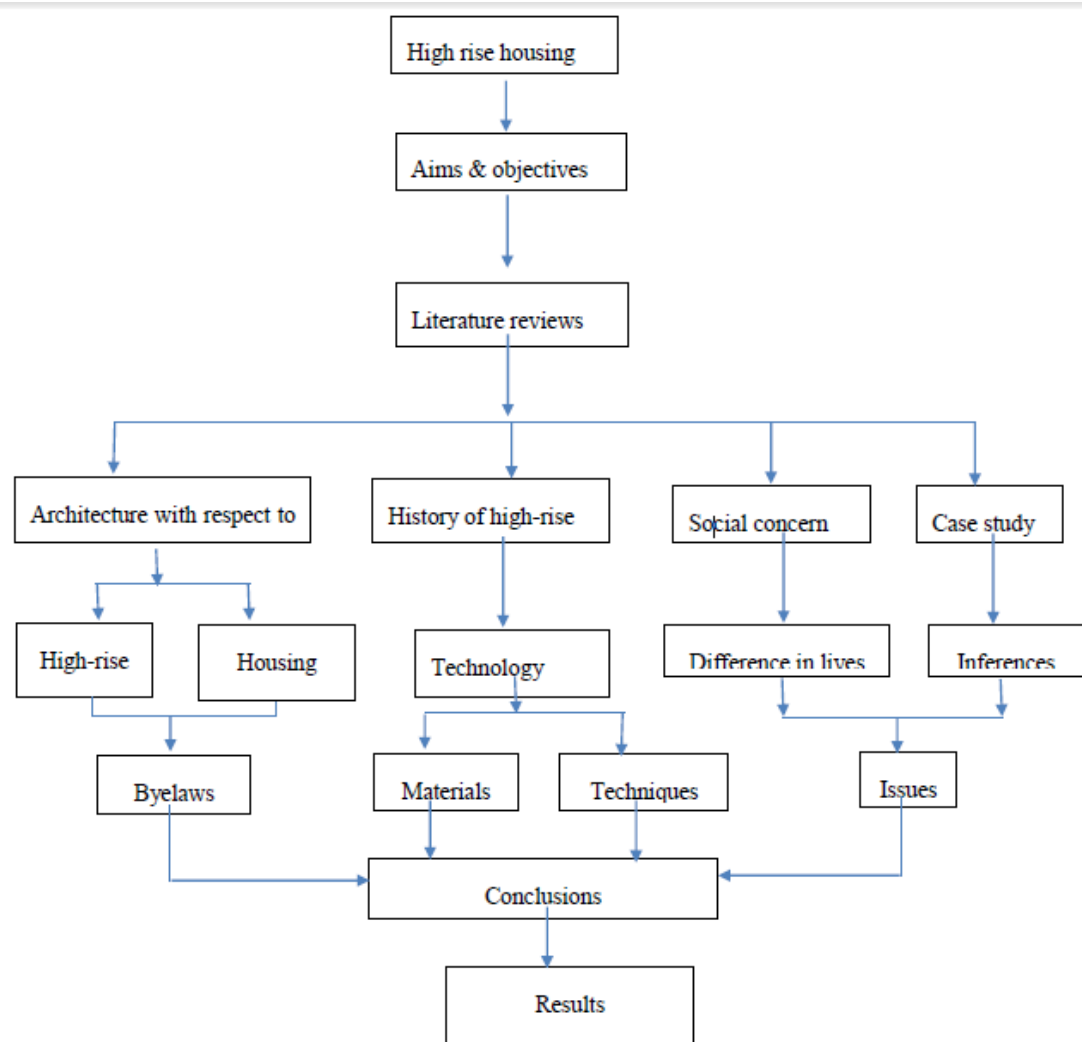
**Figure 5. 432 Park Avenue**

## 8. Methodology

### 8.1 Method of research

- i. Studying existing High Rise Structures
- ii. Observing the activities taking place throughout the day in the structure.
- iii. Interviewing people already residing in a high rise building and people living in bungalows and other housing residences and comparing each of them to derive conclusion.
- iv. Part case study of amenities to be provided in the site like, Gym, Children's Play Area, Jogging Track for residents, etc.

### 8.2 Conceptual frame work



### **8.3 Methods of data collection**

- i. INTERVIEWS
- ii. QUESTIONNAIRES AND SURVEYS
- iii. OBSERVATION
- iv. ETHNOGRAPHIES, ORAL HISTORY AND CASESTUDIES
- v. DOCUMENT AND RECORDS

### **8.4 Methods of data analysis and findings**

1. Comparing all the case studies.
2. Pie charts showing the result of questionnaires.

## **9. The Chapter Scheme**

- Chapter-1 INTRODUCTION
- Chapter-2 HISTORY AND ASPECTS OF HIGH RISE BUILDINGS
- Chapter-3 PLANNING AND DESIGNING OF HIGH-RISE BUILDINGS
- Chapter-4 MODERN CONSTRUCTION TECHNIQUES AND TECHNOLOGY
- Chapter-5 LIVEABILITY OF PRESENT HIGH RISE DEVELOPMENTS
- Chapter-6 RESULTS AND CONCLUSIONS

## **10. Scope**

- In the history construction of the high-rise buildings started as an expression of strength and power, but the purpose or the need for the high-rise has changed to the socioeconomic aspects and in dealing with the urban population in the modern times.
- The main amenities that which increases the attractiveness or the value that contribute of the comfort or convenience has to be incorporated in the design process like the sky gardens etc.
- The modern construction materials and methods, the technology available like the:-
  - Prefabricated construction process

- Using robotics in construction and other equipment
- The internal cladding which serves for the functions of weather pollution, thermal and sound insulation, aesthetics, stability etc.
- All the services like the security safety, water supply, mechanical, sewage, electricity and the way they are planned for large number of people in high rise housing developments with respecting their needs and satisfying the government bylaws is also included.
- Design of large high rise housing projects needs careful understanding urban design principles and bylaws.
- Issues related to the urban environment like the liveability, noises, dirt, lack of neighbourhoods, etc.

## **11. Limitation**

- Work is limited to urban and semi urban development projects and does not take into consideration of low income groups.

## **12. Conclusion**

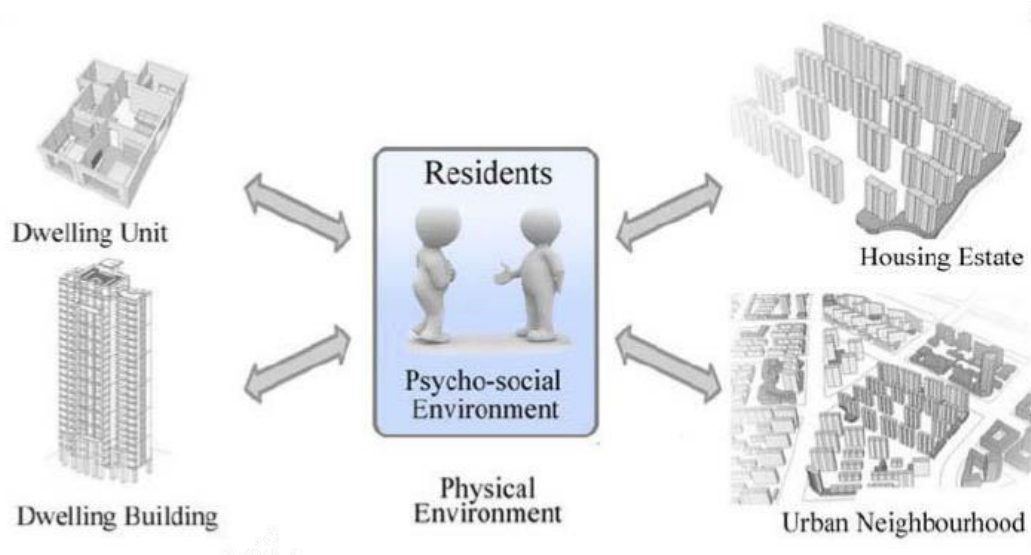
The high-rise housing developments should not only construct more comfortable and multiform physical environment, but also produces more harmonious social environment by providing diversified housing choices for various social groups to achieve a greater degree of social mix. Finally, the concentration of high-rise buildings can change the micro-climate of urban neighbourhood and urban landscape, and result in the rise of the environmental temperature (Heat island effect), the deterioration of wind environment (Wind tunnel effect), and the decline of air quality. These negative outcomes should be fully studied in order to find the methods to improve the high-rise housing developments.

From the perspective of residents, high-rise housing should not only includes the physical environment where the residents are living in, but also includes the psychological and social environment which satisfies the resident's non-material needs, such as safety, comfort, social interaction, a multi-level residential environment that includes: the private family spaces, the collective residential building of shared

ownership, the semi-public gated community, and the public urban neighbourhood.

### **13. Recommendation**

High-rise housing should be a resident-centered and multidimensional residential environment that is composed of the psycho-social environment and the physical environment, where the resident is placed at the centre of a series of spatial dimensions, which starts with the 'Dwelling Unit' and enlarges, layer by layer, from 'Dwelling Building', 'Housing Estate', to 'Urban Neighbourhood'.



**Figure 6. Multidimensional Residential Environment**

### **14. Glossary**

1. **Sustainable architecture-** It is architecture that seeks to minimize the negative environmental impact of buildings by efficiency and moderation in the use of materials, energy, and development space and the ecosystem at large.
2. **Revivalism-** In architecture, it is the use of visual styles that consciously echo the style of a previous architectural era. Modern-day revival styles can be summarized within New



Classical Architecture, and sometimes under the umbrella term traditional architecture.

3. **Skyscraper**- It is a tall, continuously habitable building having multiple floors. When the term was originally used in the 1880s it described a building of 10 to 20 floors but now describes one of at least 40–50 floors.
4. **Multi Dwelling Unit** - Multifamily residential (also known as multi-dwelling unit or MDU) is a classification of housing where multiple separate housing units for residential inhabitants are contained within one building or several buildings within one complex. A common form is an apartment building.
5. **Residential** area- It is a land use in which housing predominates, as opposed to industrial and commercial areas. Housing may vary significantly between, and through, residential areas. These include single-family housing, multi-family residential, or mobile homes.

## **15. Appendix**

HIGHRISE BUILDING COMPRISES OF FOLLOWING SERVICES:-

- COURT / ATRIUM
- LIFT LOBBY
- CAPSULE LIFT
- DUCTS
- FIRE ESCAPE
- ELEVATOR SHAFTS (elevator cars & equipments inside them)
- ELEVATOR LOBBY

- STAIRCASES
- FIRE PROTECTED LOBBIES
- AHU
- TOILETS
- ANCILLARY ROOMS (pantry, space for cleaning materials, etc.)
- MECHANICAL VERTICAL SERVICES RISER DUCTS (electrical power & lighting distribution, water distribution, sewerage pipes)
- ELECTRICAL VERTICAL SERVICE RISER