

Important Landmarks in the Planned City of Chandigarh using Remote Sensing and GIS

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Abstract: *Landmark is a geographic feature. Anything which is easily recognizable is called a landmark. Landmark is used to designate places that might be of interest to tourists. Landmarks are often buildings such as hotels, museums, monument, heritage building and natural points of interest that have a special historic interest and value as part of development. Webster dictionary describes landmark as “Any prominent feature of the landscape, as a tree or building, serving to identify a particular locality.” In the present study, using of remote sensing and GIS in the planned city of Chandigarh. Chandigarh city has many landmarks include heritage buildings such as the High Court, Legislative Assembly, and Civil Secretariat. Some landmarks include tourist attraction such as Rock Garden, Sukhna Lake, Zakir Rose Garden, International Dolls Museum, Open Hand Monument, and Leisure Valley etc.*

Keywords: Remote Sensing (RS), Geographical Information Systems (GIS), Global Positioning System (GPS), Spatial Analysis like Query Building & Buffering.

1. Introduction

Landmark is a geographic feature. Anything which is easily recognizable is called a landmark. Landmark is used to designate places that might be of interest to tourists. Landmarks are often buildings such as hotels, museums, monument, heritage building and natural points of interest that have a special historic interest and value as part of development. Webster dictionary describes landmark as “Any prominent feature of the landscape, as a tree or building, serving to identify a particular locality.” Landmarks may be divided into two categories – (a) Natural Landmarks – Physical features such as valleys, waterfalls, mountains are called Natural Landmarks. The second category of Landmarks is Man – Made Landmarks. (b) Man – Made Landmarks – These are features like buildings, bridges, monument and public squares.

Chandigarh is the first planned modern city of India designed by the French Architect Le – Corbusier. It describes the birth of the city of Chandigarh, which was conceived immediately after India's Independence in 1947. Chandigarh City has many landmarks. But in this project report describes only 18 important landmarks. Landmarks include heritage buildings such as the High Court, Legislative Assembly, and Civil Secretariat. Some landmarks include tourist attraction such as Rock Garden, Sukhna Lake, Zakir Rose Garden, International Dolls Museum, Open Hand Monument, and Leisure Valley etc.

2. Objectives

The objectives of the study are as follows:-

1. To study the spatial distribution of Landmarks in Chandigarh city.

2. To create a Database of Landmarks in Chandigarh city for different attributes like location, physical dimensions, facilities provided etc.
3. Mapping of above said attribute in the GIS environment. With these objectives the present study purports to answer the following research questions.

3. Data Sources

Various types of data have been used in this project report as per the requirement of the study. The sources of data have been used as per the requirement of the objectives of the study. The sources of data collected can be put under the following two categories:-

3.1 Primary Sources

The primary data was collected from the field survey during July - November 2009 through observation. Field survey was undertaken to collect information on attribute regarding the location, purpose, area, year of construction, aim of construction and dimension of Landmarks (size, shape, and direction). The GARMIN GPS (Global Positioning System) was also used to measure the latitude, longitude and elevation of the Landmarks in Chandigarh City.

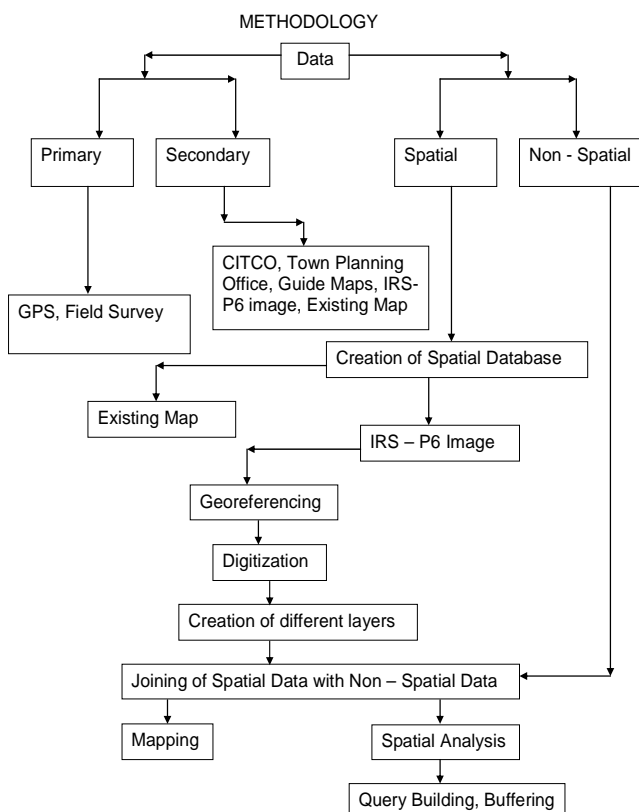
3.2 Secondary Sources

The secondary sources encompass town plan, topographic map, guide maps of Chandigarh, CITCO, Atlas on the location of the landmarks information about the location and year of construction. The maps of some Landmarks are taken from Town Planning Offices in Sector 9 (D) and Chief Architecture Sector 9 (D).

4. Methodology

- The entire work has been done by using GIS and Remote Sensing software Arc View 3.2 version and ERDAS IMAGINE 8.4 used to accomplish the study. The remotely sensed data has been interpreted visually.
- The interpretation was aided by ground truth and local knowledge.
- Base map of Chandigarh was georeferenced using GCPs (Ground Control Points) on ERDAS IMAGINE 8.4 software.
- Digitization was done in Arc View 3.2 version software.
- Showing location of Landmarks from satellite imagery IRS-P6 LISS IV and also Google image.
- Various cartographic techniques were used for mapping various attributes or mapping of various attributes with Arc View 3.2 version software.
- Use of tools of Spatial Analysis like Query Building, buffering and area analysis.

Chart 1:

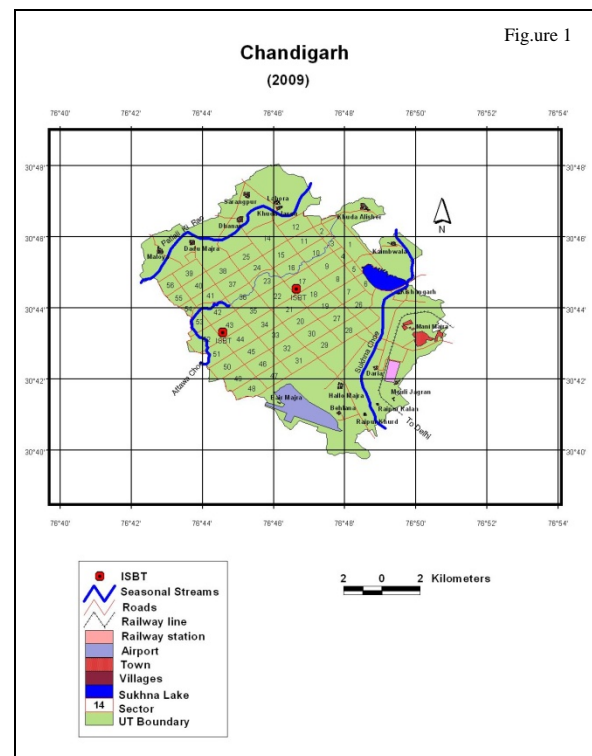


5. Study Area

Chandigarh City is one of the three planned capital towns of independent India, the other two being Bhubaneshwar and Gandhinagar in Orissa and Gujrat respectively. Chandigarh derives its name from a temple Chandimandir in the vicinity of the site selected for the city deity Chandi, the goddess of power and a fort or 'garh' beyond the temple, called Chandigarh. Chandigarh was conceived as the capital of Punjab, in lieu of the lost capital at Lahore. But Punjab was divided a second time in 1966, consequently than Punjab was reorganized into Hindi speaking Haryana and Punjabi

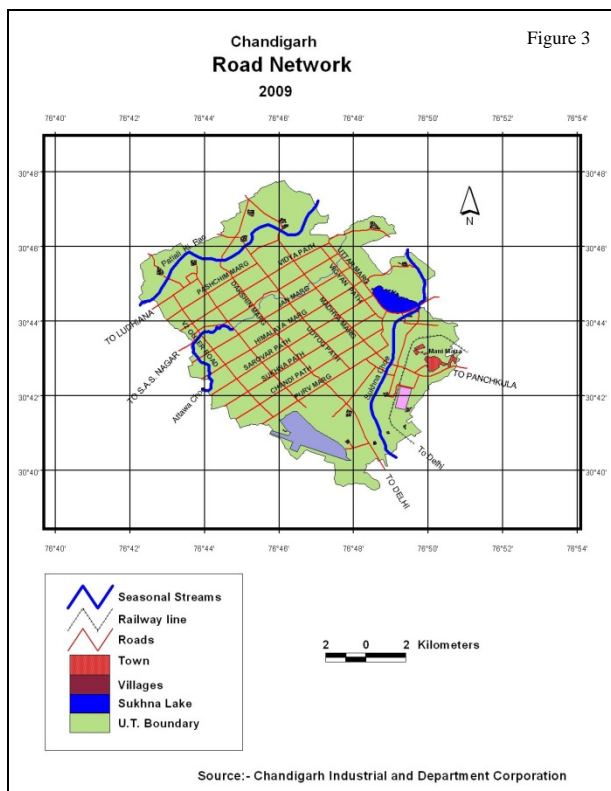
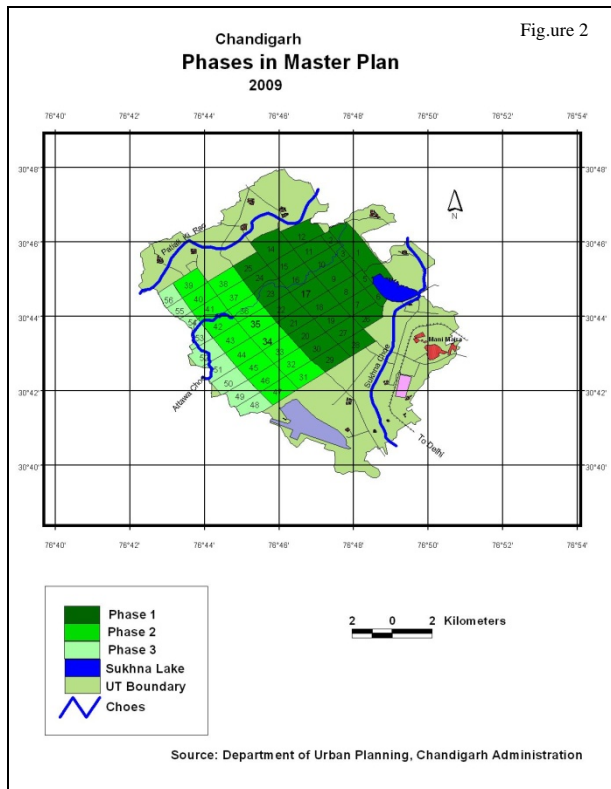
speaking Punjab on 40:60 ratio. And Chandigarh is today the capital of the states of both Punjab and Haryana. Chandigarh is a Union Territory, administered by the Government of India. Chandigarh became a triple headquarters of Punjab, Haryana and Union Territory Chandigarh.

Prior to the emergence, there were fifty four villages in the area that is now known as Chandigarh Union Territory. The Government of Punjab appointed a committee in 1948 under the chairmanship of P.L.Verma, Chief Engineer approved a 114.59 sq. km tract of land at the foothills of Shivaliks as the site for the new capital. Chandigarh city is spread over sectors 1 to 56 and also encompassing Industrial area Phase1 and Phase 2. The area like Burail, Attawa and Manimajra that are also the urban settlements in the union territory of Chandigarh. The Chandigarh city lies between two major seasonal rivers, the Patiali Rao Choe and the Sukhna Choe in the North- West and the South –East respectively and extending in the North- East right up to the foot- hills of the Shivaliks. (Figure1)



Chandigarh was developed in phases for a total population of 7.5 lacs. The first phase with 30 Sectors extended upto Dakshin Marg and was meant to provide for a population of 1.5 lacs. The second phase for which the construction began is 1967, had an additional seventeen sectors and extends from Sector 31 to 47, meant to accommodate 3.5 lacs peoples. At present, the third phase that commenced in 1997 is under development which encompasses another nine sectors, from Sector 48 to Sector 56. (Figure 2) Le Corbuiser's grid of roads created the 'sector'. Each sector measures 800 metres by 1200 metres, or 250 acres.

Chandigarh is drained by streams called choes and the rivers Patiali Rao Choe, Attawa Choe, Sukhna Choe and Kansal Nadi and Sukhna Nadi respectively. Patiali Rao Choe drain in



northwest part, Attawa Choe drains the central part and Sukhna Choe drains southern part of Chandigarh. Kansal River and Sukhna River drain some part of Chandigarh. (Figure 2) Chandigarh is well served by an excellent network of roads, National Highways 21 and 22 are the chief roads arteries linking Chandigarh with the rest of the country. New sectors developed in Chandigarh are from Sector 39 to Sector 56 and new roads within these sectors are also newly

developed in the city. There are two ISBT (Inter - State Bus Terminus) in the Chandigarh City, one in Sector 17 and the other in Sector 43. The local bus stand is in Sector 17. (Figure 1)

The first master plan was prepared in 1949 by the American Firm of Mayer, Whittlesley and Glass in association with a young brilliant Architect, Mathew Nowicki. However, Nowicki died in an air crash in 1950 while returning to United States and the town had its first set- back. Planner Albert Mayer was heartbroken and reticent to continue. Le Corbusier took charge of developing the master plan, designing the capital complex and establishing architectural control. Le Corbusier conceived the master plan of Chandigarh analogous to human body, with a clearly defined head (the Capital Complex, Sector 1), heart (the City Centre Sector- 17), lungs (the Leisure Valley, innumerable open spaces and sector greens), the intellect (the cultural and education institutions), the circulatory system (the network of roads, the 7vs), and the viscera (the Industrial Area). The concept of the city is based on four major functions: living, working, care of body and spirit and circulation.

Le Corbusier's land use plan of Chandigarh city indicates that the city was planned to provide ideal living conditions for body, mind and spirit. It also indicated that provision for healthy environment was given full fledged consideration by keeping about 18 percent of total city area for open spaces. Chandigarh City has many important Landmarks include Sukhna Lake which is situated at the foothills of Shivaliks range and designed by Le Corbusier. Leisure Valley which is the most beautiful and the Rock Garden is another attraction for pleasure.

The most unique aspect of the gardens is that thousand of animals and human like figure made of discarded materials which stand in rigid rows like mute stationary armies. The Open Hand Monument is one of the most beautiful monuments of the city. This is the city's official symbol. The Capitol Complex is the seat of Government designed by Le Corbusier.

The City Museum was established in 1997. The Government museum and Art Gallery has a good collection of paintings and sculptures. International Dolls Museum has a good collection of dolls from all over the world and it is one of the best museums in India. The museum of Evolution of Life in Chandigarh explains history of various painting depicting origin of life and the variety and diversity of plants and animal life and extinct races of man. Mr. Pierre Jeanneret was the architect of Gandhi Bhavan. Student Centre, City Centre (Sector 17), Mountview Hotel, Taj Hotel, Judicial academy.

Most of the landmarks were designed by Le Corbusier. For example, Sukhna Lake, Leisure Valley, Rajendra Park, The Capitol Complex (the High Court, the Legislative Assembly and the Secretariat). These three building (the High Court, the Legislative Assembly, the Secretariat) are heritage building. The Rock Garden was constructed by Nek Chand. The Rock Garden is one of the finest venues for sightseeing in Chandigarh. The Rock Garden is consists of of art objects,

industrial and urban waste, broken bangles, plugs etc. In this garden, waste material is used. And there is no flower or plants in this garden. The Open Hand Monument is also designed by Le Corbusier. It is one of the finest and significant monuments of the city. Le Corbusier defined the Open Hand as “a hand to give and a hand to receive”.

Leisure Valley was designed by Le Corbusier and Leisure Valley is the bed of a seasonal rivulet used as stream water drain and sculpted it into a linear park, and it is 8 kms long and about 400 meters broad at its widths. Leisure valley is a garland of Gardens.

Zakir Rose Garden is another important landmark. Zakir Rose Garden is the largest Rose Garden in Asia. 17000 plants in it and in Zakir Rose Garden found 1600 varieties of roses. International Dolls museum is one of the best museums in India. International Dolls Museum is collection of dolls and puppets from the world covering the variant art of more than 25 countries. In the museum about 250 different kinds of dolls collected from countries like Denmark, Germany, Netherlands, Spain, Russia and Korea etc.

6. Spatial Distribution

There are 18 landmarks in Chandigarh City as per data of Town Planning Office, Chandigarh which will be described in this report. These are located in Sector 1, 3, 10, 14, 16, 17, 23, 36, 42, 43. Important Landmarks are Sukhna Lake, The Rock Garden, The Open Hand Monument, Leisure Valley, Zakir Rose Garden, The High Court, Legislative Assembly (Vidhan Sabha), The Secretariat, Gandhi Bhavan, Student Centre, Mountview Hotel, Taj Hotel, Government Museum and Art Gallery, City museum, Museum of Science / Evolution of Life, International Dolls Museum, The City Centre and Judicial Academy. (Fig 4 and 6)

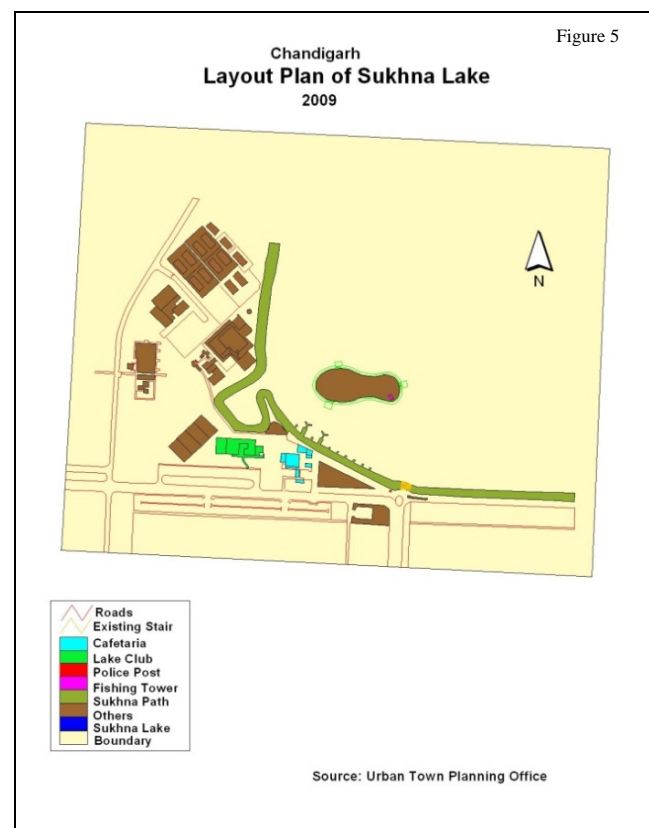
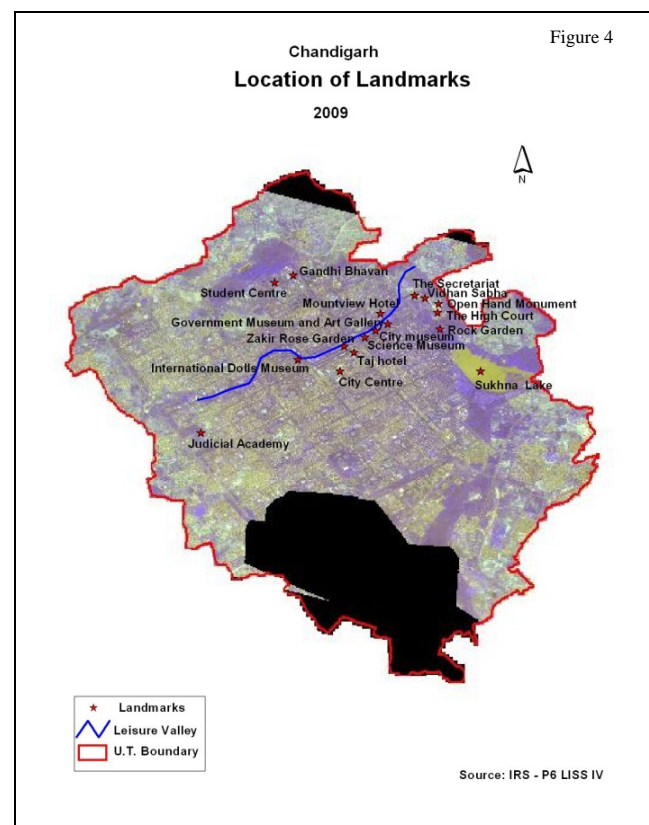
6.1 Sukhna Lake

Sukhna Lake is a rainfed lake created in 1958 by damming the Sukhna Choe, a seasonal stream coming down from the Shivalik Hills. Roughly kidney shaped, Sukhna Lake is located at 30 degree 44 minute North latitude and 76 degree 48 minute East longitude and elevation 380 meter with its concavity facing the Shivalik Hills (Figure 6). It is an artificial lake at the foothills of the Shivalik range and it's about 3 sq. km. This lake is situated in Sector 1. This lake is 1.52 meter long and 1.49 km. wide. The creation of the lake was one of the greatest gifts from Le- Corbusier. The city planners were deeply attached to the lake. So much so that Pierre Jeanneret's ashes were immersed in the lake in 1970 as per his wishes by his niece. The Lake become host in November for many exotic migratory birds like the Siberian duck, Storks, Canes, teals, pintails, brahiminy, spot bills, bar headed geese, cormorants, coots.

6.2 The Open Hand Monument

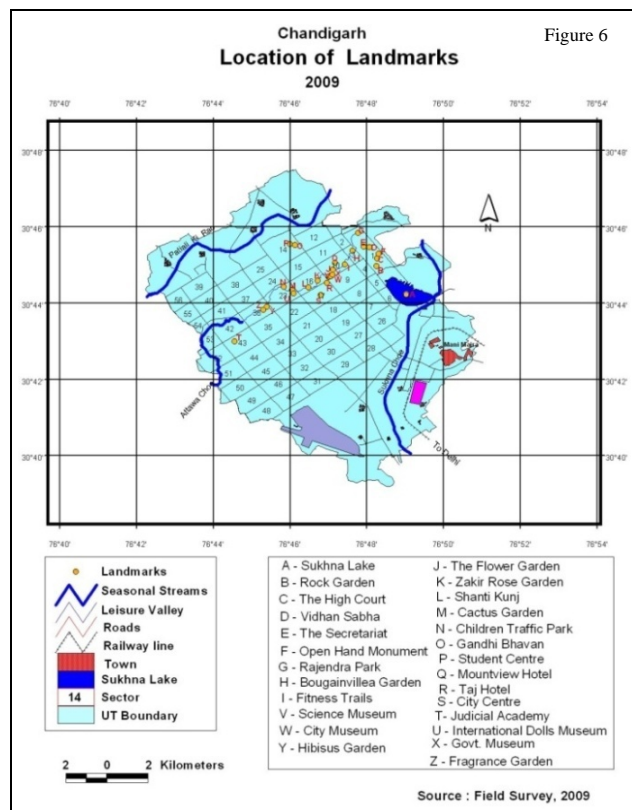
The Open Hand Monument is located at 30 degree 45 minute North latitude and 76 degree 48 minute East longitude and elevation 363 meter. It is one of the finest and a significant monument of the city. It is located in amidst of the popular

Capitol Complex houses three magnificent edifices namely the Secretariat, the High Court and the Legislative Assembly.



(Figure 4 and 6) It was constructed by Le Corbusier. The Open Hand is the symbol of peace and reconciliation. It was designed in the forms of a huge or giant hand made from

metal sheets. This monument rotates like weathercock which wonderfully indicates the direction of the winds from a high pedestal. Le Corbusier defined the Open Hand as “a hand to give and a hand to receive”. This giant hand is 14 meters high and weighs around 50 tonnes and rising 85 feet high from a Sukhen trench. Chandigarh capitol complex houses the seat of Government. Initially, it served as the seat only for the Govt. of Punjab, but now it has the headquarters of both, the Govt. of Punjab and Haryana. The credit for the designing of the Capitol complex goes to Le Corbusier and it is located in Sector. Capitol complex in Chandigarh consists of three main edifices, namely, the Secretariat, the Legislative Assembly (Vidhan Sabha) and the High Court.



6.3 The High Court

The High Court is a classic work of modern architecture. Its building is L-Shaped with the long facade facing the Capitol Plaza. The law interpreting monument was the first building in the Capitol Complex during 1951 – 57 and was completed in 1962. The Punjab and Haryana High Court has also been playing an active role in protecting and enforcing the rights of the people. The High Court is a temple of justice and a symbol of faith of people of the region.

6.4 The Legislative Assembly

The Assembly building was completed in 1962 and conceived as a horizontal rectilinear structure square in plan with a monumental portico facing the main plaza. The two legislative chambers conceived as free standing, curvilinear forms enclosed within a rectilinear shell, carrying on one side the entrance portico and on the opposite side of band of offices. Similarly, the smaller Council Chamber (Haryana

Assembly) conceived in a rectilinear frame is crowned by a pyramidal roof, provided with a north light.

6.5 The Secretariat

The secretariat building is the headquarters of both Punjab and Haryana and the largest building in the Capitol Complex. The structure resembles the shape of an eight-storied concrete slab. The Secretariat is the longest and the tallest of all the structures in the Capital Complex. It was constructed during 1953-59. It was designed by Le- Corbusier.

6.6 Gandhi Bhavan

The Gandhi Bhavan is a lotus shaped building and located in Sector 14 in Panjab University. The Department of Gandhian Studies came into existence in 1965. Initially a one year certificate course in Gandhian Philosophy was started. In 1972, the certificate course was converted into a post-graduate diploma course in Gandhian Philosophy. In 1977-78, the department also started offering an M.Phil. degree in Gandhian Studies. Pierre Jeanneret was the architect of this building. The Gandhi Bhavan was opened on December 1, 1962, by late Dr. S. Radhakrishnan, the President of India. (Figure 6) The department has primarily concentrated on research in different aspects of Gandhi's life, work and thought.

6.7 The Student Centre

Student Centre is known as Stu-C. It is one of favourite eating joint inside Panjab University campus and also one of the most happening places for the youth of entire Chandigarh city. The office of the Panjab University students' council is located in the student centre. The student centre is the hub of students' activities – academic, cultural, social and political; besides being a favorite eating and hanging out zone for students. (Figure 6)

6.8 Zakir Rose Garden

Zakir Rose Garden was named after India's Former President Dr. Zakir Hussain. The garden was established in 1967 under the guidance of Chandigarh's first Chief Commissioner, late Dr. M. S. Randhawa. (Figure 7) The Garden is located in Sector 16(B). This is the largest rose garden in Asia and is spread over an area of 27 acres and has more than 17000 plants representing some 1600 varieties of roses.

6.9 Government Museum and Art Gallery

The Government Museum and Art Gallery is located in Sector 10-C near the Zakir Rose Garden. It was designed by Le Corbusier and inaugurated on 1968. The museum is known for its collection of Gandhara sculptures, Pahari and Sikh miniature paintings and contemporary Indian paintings and sculptures. Its visiting time is 10:00 a.m. to 4:30 p.m. It opens all days except on Monday and gazetted holidays. (Figure 8)

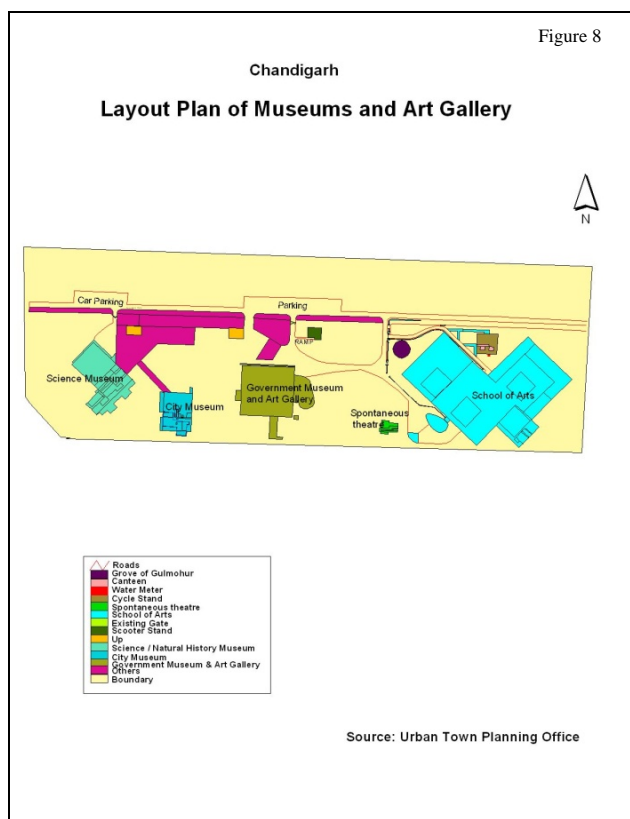
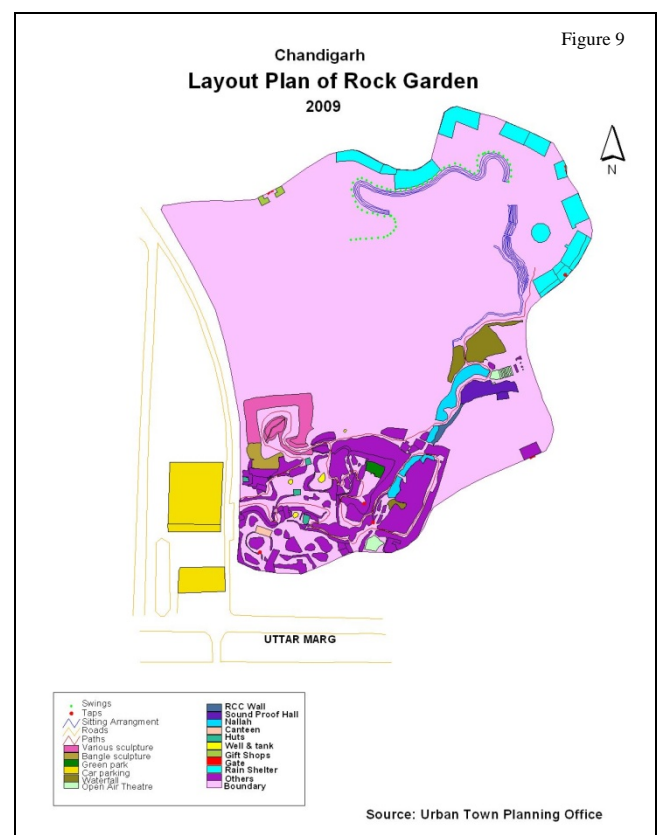
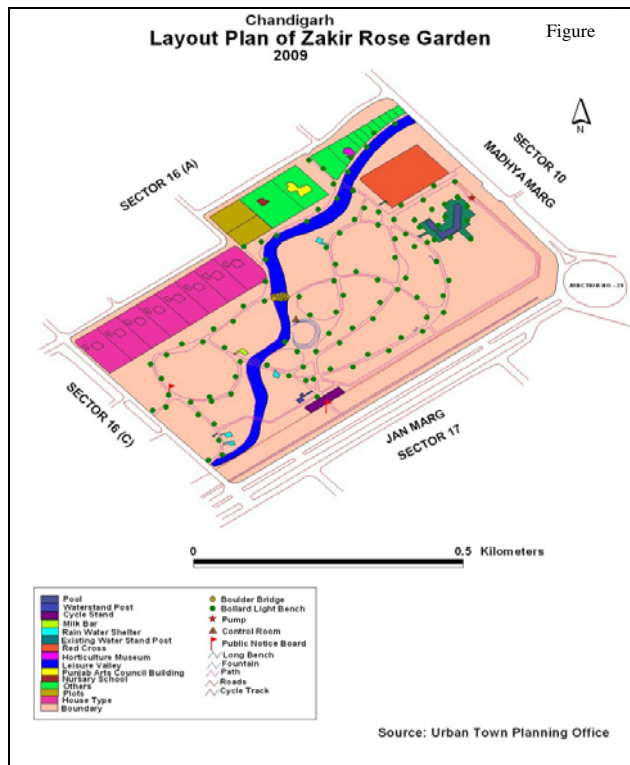
6.10 Natural History Museum or Science Museum

The Natural History Museum traces the evolution of life with special focus on the 'Dinosaurs of India' and 'Evolution of Man'. The museum also has sections on 'Nature in Art', Cyclorama of Evolution of Life' and 'Manuscripts'. It opened to public on 13th August, 1973. The paintings exhibit the origin of evolution of life, the variety and diversity of plants

and animals including different extinct races of man, their inter-relationship in nature and the fundamentals of evolutionary process. Its visiting time is 10:00 a.m. to 4:45 p.m. It opens all days except on Monday and gazetted holidays. (Figure 8)

6.11 The Rock Garden

The Rock Garden is located at 30 degree 45 minute North latitude and 76 degree 48 minute East longitude and elevation 355 meter. It is situated between the Capitol Complex and Sukhna Lake in Sector 1. The popular sculpture Rock Garden covers an area of about 64 acres. It was constructed by Nek Chand using varieties of multi colored stones. It was first open for public viewing in the year 1976. Nek Chand's Rock Garden consists of art objects, fashioned from industrial, urban waste and throw – away items. The object to be seen, there are the figures



made of raw cement resembling human animals. These figures have been decorated with broken but colorful odds and ends of China clay. The Rock Garden has fourteen different chambers like the forecourt, housing natural rock-forms, a royal poet's and a musician's chamber complete with a pond a hut, the main court (Durbar) where the kings throne adorns the place with natural stone. The Rock Garden has three phases: - (i) The first phase of the Rock Garden consists of small canyon, rock forms and also blends of broken ceramic fixtures, coal slag and pebbles. (ii) In the second phase, a large waterfall, a canal, an open air theatre, a miniature village situated was also included. (iii) The third phase of development life size horses and camels are being made again out of waste. (Figure 9)

6.12 International Dolls Museum

International Dolls Museum in Chandigarh is one of the best museums of our country. It is located in Bal Bhavan in Sector 23 (Figure 6). It has interesting collection of dolls and puppets from the world covering the variant art of more than 25 countries. The Museum was established in the year 1985 by Chandigarh administration in collaboration with the Rotary Club of Chandigarh. It was set up for the purpose of entertaining the kids. It serves like an amusement park for children. In the Museum about 250 different kinds of dolls collected from countries like Denmark, Germany, Netherlands, Spain, Russia and Korea etc.

6.13 The City Museum

The Chandigarh Architecture Museum was one of the greatest urban experiments of the 20th Century. It is one of the several activities pursued by the UT Administration during the fiftieth anniversary of India's independence. The city Museum was opened in December, 1997 and located in Sector 10 (C). The objective was to document and display the sequential planning that went into this unique urban experiment, and to bring out the distinctive and significant aspects of its layout and design. It houses original sketches, photographs, plans, models and documents reflecting the evolution of the City from the drawing board state to its realization. (Figure 8)

6.14 Mount view Hotel

Mount View Hotel is one of the best luxury 5 star hotels in Chandigarh. It is centrally located in Sector 10 of the administrative city of Chandigarh. It is well connected with all the major tourist and commercial centers of the city, and easily accessible from the airport and railway station. It is located amidst lush green lawns and majestic trees. It sprawls over seven acres of landscaped environs.

6.15 Taj Hotel

Taj Hotel is the city's finest property and is well suited to both business and leisure travelers to Chandigarh. It is located in Sector 17-A, Block 9, the city's prime business and shopping area. Taj Hotel has 152 rooms equipped with the latest technology, ergonomic furniture and contemporary amenities. (Figure 6)

6.16 The City Centre, Sector 17

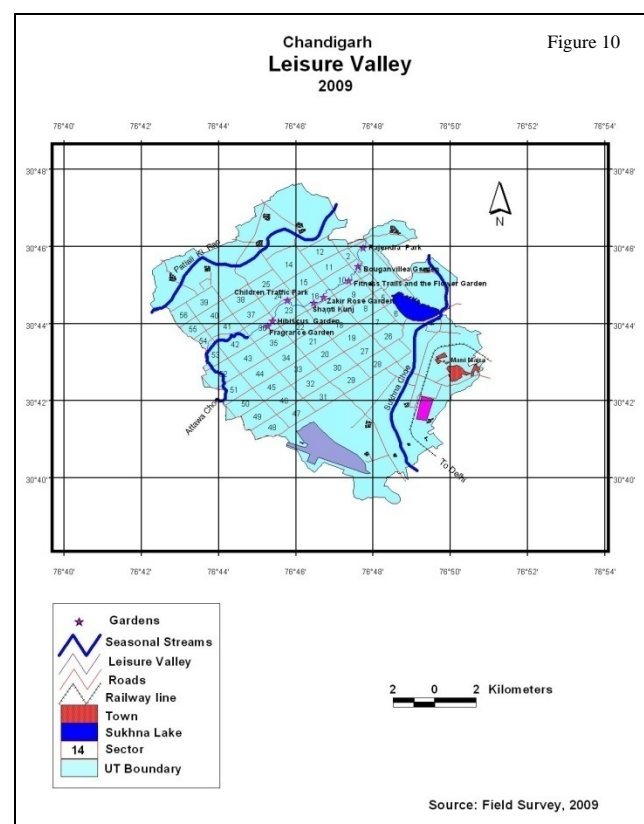
The City Centre is the heart of the city and one of the most enjoyable places. Four pedestrians concourses meeting at a Central Chowk (intersection). The Sector 17 of Chandigarh is a pedestrian paradise dotted with fountains, sculptures and groves of trees. There are many government and private offices also big showrooms and excellent departmental stores cater to the needs of shoppers.

6.17 Leisure Valley

Leisure Valley is also an important Landmark in Chandigarh City which is spread in Sector 1, 3, 10, 16, 23, 36, 42. Le Corbusier saw the bed of a seasonal rivulet used as a stream water drain and sculpted it into a linear park, now over 8 kms long, about 400 meters broad at its widest point oriented north east to south west. (Figure 10)

Sections of the Leisure Valley are known by separate names as:-

- Rajendra Park
- Bougainvillea Garden
- Fitness trails and the Flower Garden
- Zakir Rose Garden
- Shanti Kunj
- Children Traffic Park
- Hibiscus Garden
- Fragrance Garden

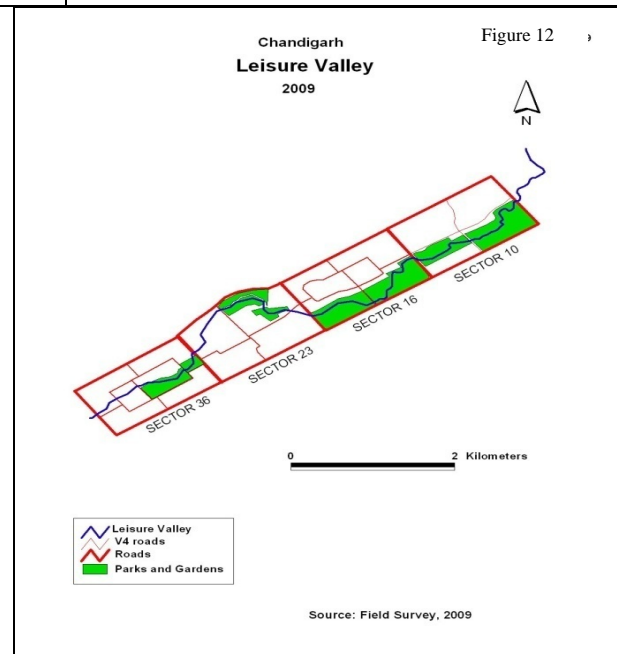
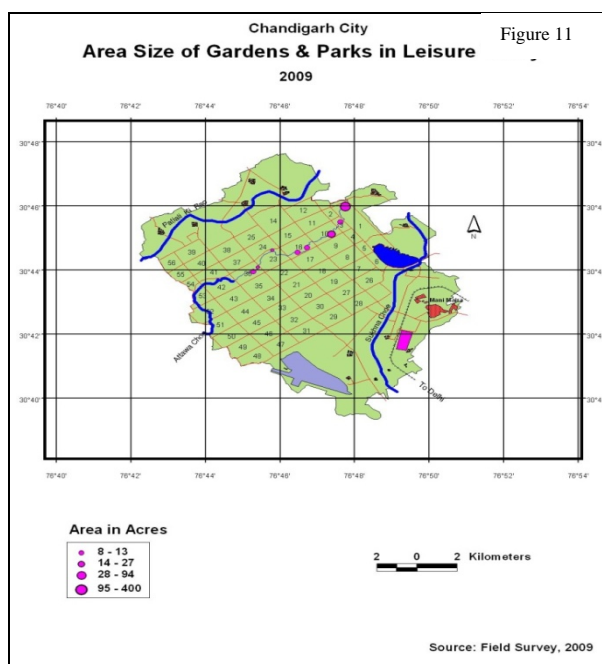


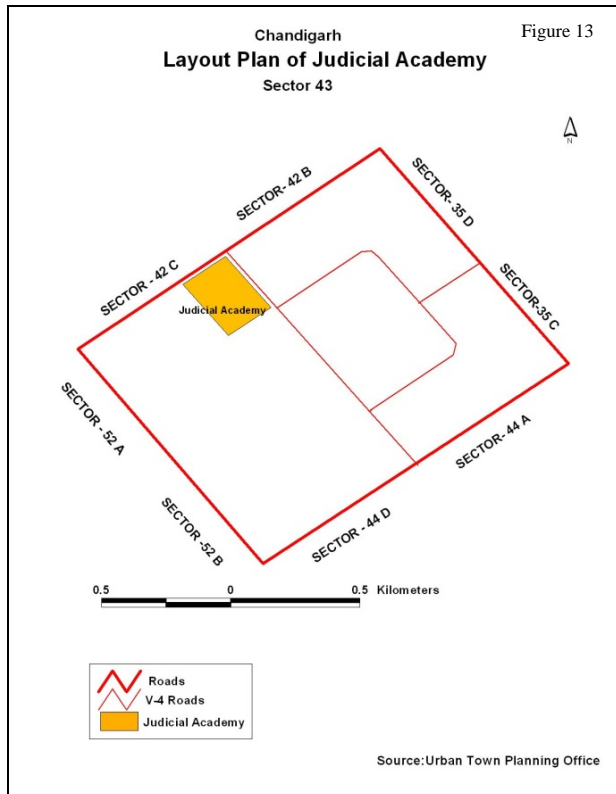
Rajendra Park has been designed by the famous designer Le Corbusier. It is located in Sector 1. It was started in 1954 and spread over an area of 400 acres abutting the Secretariat building on its eastern side. The Bougainvillea garden is located in Sector 3. It spreads over an area of 20 acres. The natural Choe running through the valley starts from here. The Garden has hundreds of varieties of bougainvillea. Fitness Trails and the Flower Garden were opened in 1976. It was started in 1965 and then redeveloped in 1985. The Flower Garden is located in Sector 10 stretch of the Leisure Valley. The total area of this garden is 94 acres out of which 52 acres are under seasonal flowers. Named after India's Former President Dr. Zakir Hussain, the Zakir Rose Garden was established in 1967 under the guidance of Chandigarh's first Chief Commissioner, late Dr. M. S. Randhawa. This is the largest rose garden in Asia and is

spread over an area of 27 acres and has more than 17000 plants representing some 1600 varieties of roses.

Table 1: List of Gardens of Leisure Valley

Sr. No.	Gardens	Location (In Sectors)	Area (In Acres)	Year of Opening	Visiting Time	Main Attraction
1.	Rajendra Park	1	400	1954	Open all days	Trees with round canopies and evergreen foliage have been planted here.
2.	Bougainvillea Garden	3	20	1976	Open all days	Variety of bougainvilleas
3.	Fitness trails and the Flower Garden	10	94	1965	Open all days	For long walks and physical workout
4.	Zakir Rose Garden	16	27	1967	Open all days	Variety of roses and Rose Festival
5.	Shanti Kunj	16	18	1997	Open all days	Noise free garden, natural stream running in center of garden
6.	Children Traffic Park	23	12.5	-	Open all days	To make children aware of the traffic regulation and rules.
7.	Hibiscus Garden	36	8	1974	Open all days	Varieties of Hibiscus shrubs
8.	Fragrance Garden	36	-	1998	Open all days	Varieties of fragrant plants





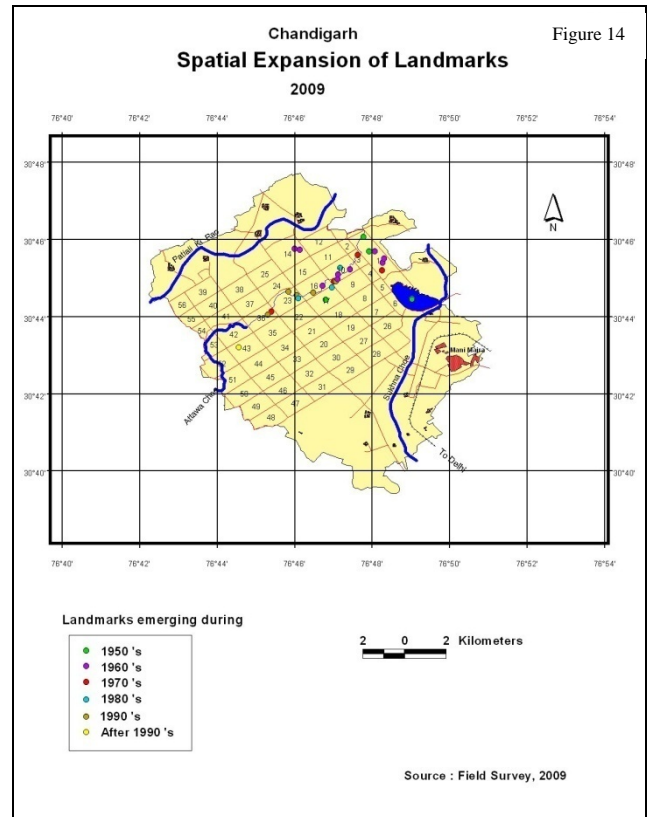
The Shanti Kunj Garden is started in 1996-97 and the total area of the garden is 18 acres. Shanti Kunj (Abode of Peace) in Sector 16 (C). It is situated between the Zakir Rose Garden and the Cricket Stadium. This park has a completely noise free area. Another parks and Gardens come in Leisure Valley are Children Traffic Park, Hibisus Garden and Fragrance Garden (Figure 12).

6.18 Chandigarh Judicial Academy

The academy is situated near the ISBT, Sector 43. It has constructed by engineering department of the administration at a cost of Rs 63 crore. It covers an area of 8.5 acre in time of 22 months. Judicial Academy is under the High Court (Figure 13). The Academy is under training institute to train the employees of High Court under their judiciary.

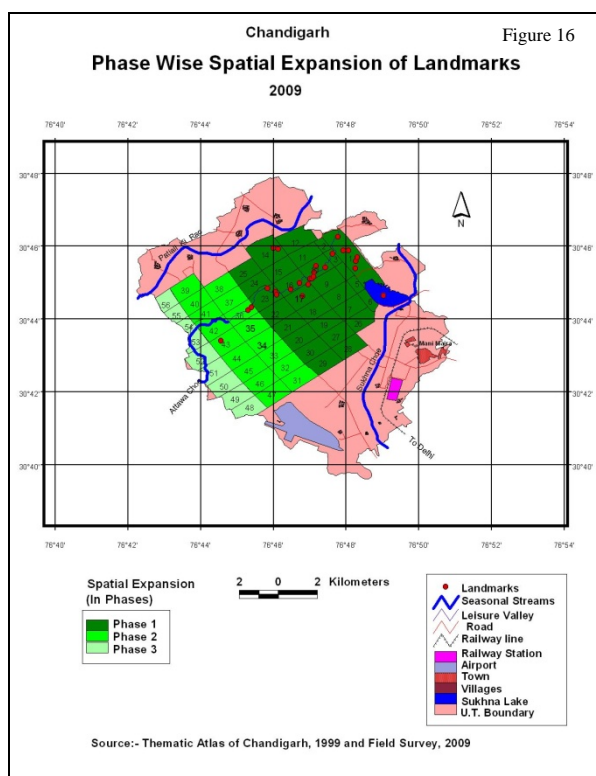
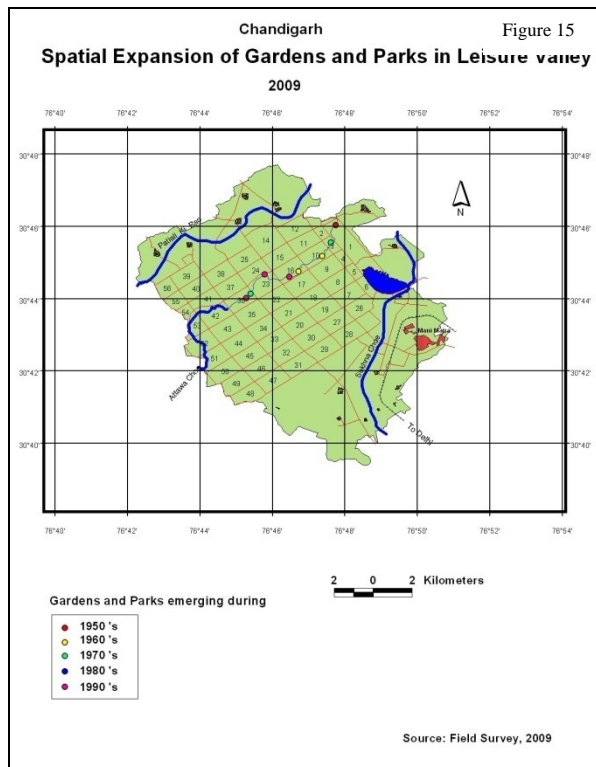
7. Spatial Expansion of Landmarks

Spatial expansion of landmarks means temporal development of landmarks on the space. In this chapter, we have made an attempt has been made to study the temporal development of landmarks in Chandigarh. There are total 18 landmarks in Chandigarh. The oldest Landmark is located in Sector 1 (Rajendra Park) which was built in the year 1954. Sukhna Lake is an old landmark which was built in 1958. During 1950's decade three landmarks evolved in the city. These are Sukhna Lake, The Secretariat (1953 -1959), and Rajendra Park in Leisure Valley constructed in this decade. (Figure 14)



During 1960's seven landmarks evolved in the City. These were the High Court (1962). Vidhan Sabha (1962), the Open Hand Monument (1962), Gandhi Bhavan (1 December, 1962), Student Centre (1962), Government Museum and Art Gallery (1968), Zakir Rose Garden (1967), Fitness Trails and the Flower Garden (1965). (Figure 14) The High Court was the first building in the Capitol Complex during 1951 – 57. But it was completed in 1962.

Most of the Landmarks were constructed during 1960s. Moreover 1970's two important landmarks evolved. These were Rock Garden (1976) and Science Museum (1973) and two gardens Bougainvillea Garden and Hibiscus Garden also came of during this decade. (Figure 15) During the 1980s three landmarks evolved. These were Taj Hotel, Mountview Hotel, International Dolls Museum (1985).



During 1990's, one landmark evolved. The City Museum and three Gardens and parks in Leisure valley also evolved. These were Shanti Kunj, Children Traffic Park and Fragrance Garden. (Fig. 15) After 1990's, one landmark evolved. The most recently evolved landmark is Chandigarh Judicial Academy. It is being constructing till May 2009.

Most of the important landmarks were constructed in First Phase Sectors of Chandigarh City. These are Sukhna Lake, The Rock Garden, The Open Hand Monument, The High

Court, Vidhan Sabha, The Secretariat, Rajendra Park, Bougainvillea Garden, Fitness Trails and The Flower Garden, the Mountview Hotel, The City Museum, Science Museum, Government Museum and Art Gallery, Gandhi Bhavan, Student Centre, Zakir Rose Garden, Shanti Kunj, Taj Hotel, City Centre, International Dolls Museum, Children Traffic Park. (Fig. 16) Very few Landmarks were constructed in Second Phase Sector of Chandigarh City. There are only three landmarks in Chandigarh City, e.g. Hibiscus Garden, Fragrance Garden and Chandigarh Judicial Academy. There is no landmark in Third Phase Sector of Chandigarh constructed recently. (Figure 16)

8. Facilities and Services provided by Landmarks

Landmarks provide a vast range of services and facilities. Landmark is an enterprise for the production of goods and services, intended to be sold for a profit to remunerate the administration and the capitol involved. There are many facilities and services provided by the landmarks in Chandigarh City which are discussed one by one.

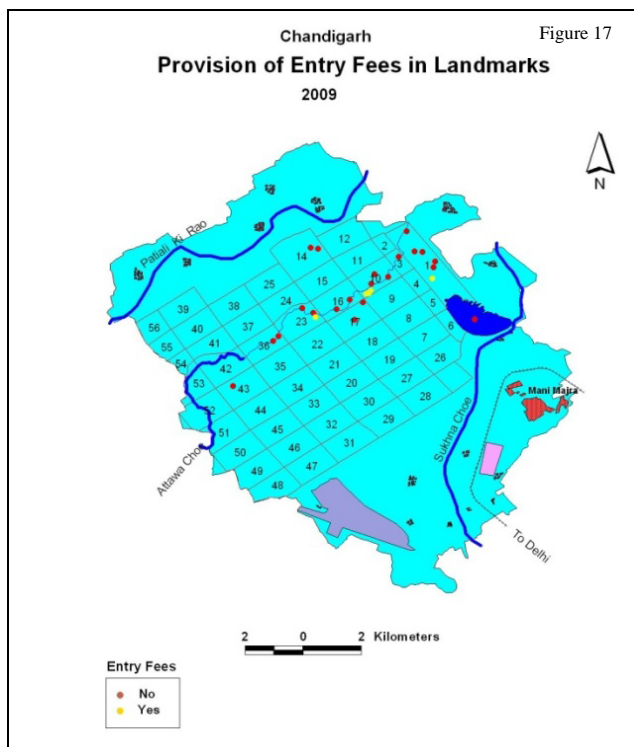
8.1 Sukhna Lake

Sukhna Lake with its boating facilities swings for children, most popular picnic spots of Chandigarh. Sukhna Lake become host for many exotic migratory bird like Siberian duck, storks, canes, spot bills etc in November. It has a membership based club with lawn, a gym, indoor games, swimming pool and tennis court with both synthetic and grass courts. Boating, sculling, kayaking can be enjoyed throughout the year. The Lake consists of an eating place, Children Park. People come for jogging and to savour the fresh air.

The Lake is the venue for many festive celebrations. Mango festival held during the monsoon season. It has many facilities for water sports like rowing, sailing and water skating. Two international tournaments, the Senior Asian Rowing Championship in 1989 and the Junior Asian Rowing Championship in 1974 have been held at the Lake club. Every year functions are held to encourage participation in the water sports. Other facilities of Sukhna Lake are Shikara, Funcity Kid Zone, Chandigarh Emporium shops, Lake Studio – Kodak (Films – batteies – Digital photography, shop, cold drink, coffee houses, ice cream's shops, toilet, restaurant and State Bank of India – ATM.

8.2 Rock Garden

In the Rock Garden landmark's facilities are swings, taps, sitting arrangements, roads, paths, car parking, waterfall, open air theatre, sound proof hall, canteen, well and tanks, gift shops, rain shelter. Rock Garden has many performances of plays; dance and music performances are hold. Teej Festivals holds a special attraction for tourist the young damsels partake in the fun and frolic by swaying on the giant swings while other adorn their hands with traditional Mehendi (henna), amidst joyful songs and dances. In the Rock Garden's entry fee is 10 rupees for adults and 5 rupees for children. (Figure 17)



8.3 The Capitol Complex

One of the popular Landmark of Chandigarh City, which has attracted traveler from all over the world, is the Capitol Complex. Capitol Complex shelters the seat of government. Formerly this popular complex served as the seat for the government of Panjab only. But now a day it served as the headquarters of both, the government of Panjab as well as Haryana.

8.4 Leisure Valley

Rajendra Park in Leisure Valley has many facilities for long walks, outdoor yoga, learning to device and horse riding. Sporting events such as horse shows are held here time to time, washrooms are also available. The southern side of the park is the place where the official residence of the chief ministers and other ministers are situated. Bougainvillea Garden holds fitness tracks which provide a good walk and morning exercise field amid a colorful brigade. There are many other facilities in Bougainvillea Garden like roads, toilets, benches, hut etc. Fitness trail has organizing different cultural activities etc. A physical fitness Train Park has also been developed here with a view to combining physical exercise with the beauty of nature. Fitness trail is ideal place for long walks and physical workouts. Shanti kunj has many facilities of noise free area, has a good path way for walking under shades and through grassland. In Shanti kunj, different kind of trees like medicinal plants, vertical, shaped trees etc. Children Traffic Park is to make the children aware of the traffic regulation and rules that are to be obeyed while they are on the road. The Children Traffic Park has many facilities like one exhibition hall, a lecture – cum- cinema hall which has a capacity of accommodating 120 persons verdant lawns, plants, flower beds, drinking water ect. Zakir Rose Garden

has many facilities like small fountain, seasonal flowers. Rose festival held in Zakir rose Garden and several competitions are also held including rose quiz, Antakshri, cultural performances of music and dance both classical and folk events for children, exhibition by local artists, photographers and crafts many Bollyhood musical shows etc. are organized. There are lots of competitions, celebration and many other events.

8.5 Gandhi Bhavan

Gandhi Bhavan has many facilities like a reading area, stack for books, seats for readers and research scholars, two more rooms, one for the office and another for the Director of the Gandhi Bhavan, Lecture Hall, a committee / seminar room and Library.

8.6 The Student Centre

Student Centre is the hub of student activities like academic, cultural, social, political and besides being a favorite eating and hanging out zone for students. The student council consists of the departmental representatives and other office bearers, i.e. president, vice president, secretary and joint secretary directly elected by the students from the various teaching department of campus every year. And the student council organizes youth festivals both national and international, academic literary and cultural events and educational tours.

8.7 Mountview Hotel

In Mountview hotel, the production of goods consists primarily in the transportation of food and stuff into dishes and meals served to clients. The hotel is also a unit of sales trade when it sells alcohol, drinks, cigarettes, post cards etc. rental of rooms include a whole services of accessory services like hall, lounges, swimming pools, gardens, sporting installations for children, banquet, and conference hall. The complexity of hotel activities demands direct collaboration between the different services. The seller man must be ready to provided for wine for the restaurant on the bar, the laundry must give clean sheets and laundry for the rooms, the accounts must be at all ties records, what the guest has spent in restaurant, the bar, room etc.

Table 2: Access to Mount view Hotel, Sector 10

Sr. No.	Important Distance	Distance	Time
1.	From the Airport	14 Kms.	25 minutes
2.	From the Railway Station	08 Kms.	20 minutes
3.	From Hotel to City Centre	02 Kms.	03 minutes

The services vary according to the location, type, size and grade of the hotel. Generally the following are important facilities and services of Mount View Hotel:- (i) roof top (ii) Chinese restaurant with bar (iii) multi cuisine restaurant with bar(iv) coffee shop (v) executive lounge (vi) business center (vii) conference (viii) banquet facilities (ix) swimming pool (x) health club (xi) satellite cable TV (xii) money changer (xiii) shopping arcade (xiv) travel agent (xv) tourist (xvi) laundry (xvii) Doctor on call.

Table 3: Room Amenities of Mount view Hotel

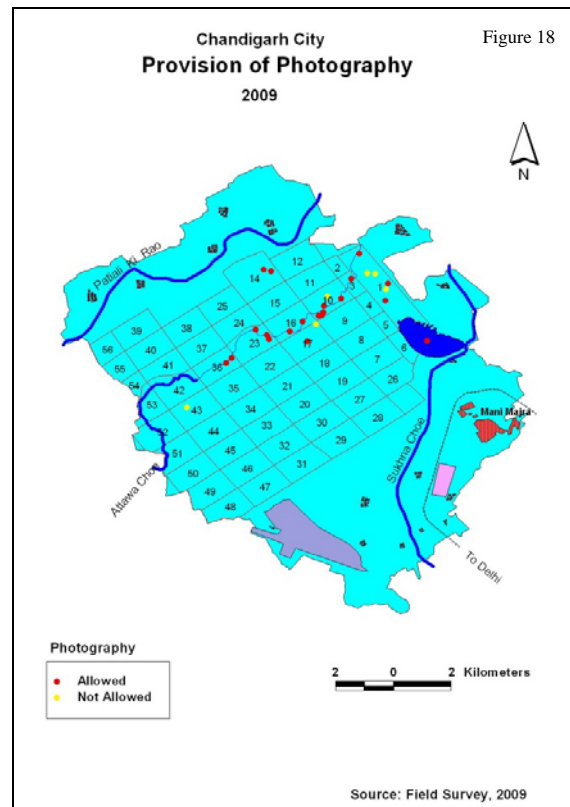
Sr. No.	Continental Plan	Single Occupancy	Double Occupancy
1.	Deluxe Room	Rs. 5500	Rs. 6200
2.	Deluxe Suite		Rs. 8500
3.	Royal Suite		Rs. 12000
4.	Extra Bed or Person		Rs. 900

8.8 Taj Hotel

There are many facilities and services of Taj Hotel Landmark's like room facilities – (i) colour T.V. (ii) ensuite (iii) private bathroom (iv) internet access (v) mini bar (vi) tea and coffee (vii) making facilities (viii) telephone and other facilities of Taj Hotel's are like (ix) banquet facilities (x) bar/ lounge (xi) business centre (xii) beauty salon (xiii) café (xiv) conference facilities (xv) doctor on call (xvi) garden (xvii) gym, (xviii) fitness facilities (xix) internet access (xx) high speed (xxi) laundry facilities (xxii) library (xxiii) parking (xxiv) pets allowed (xxv) reception (xxvi) restaurant (xxvii) room service shopping arcade (xxviii) swimming pool – outdoor (xxix) tour desk. There are many business facilities in the Taj Hotel like – wi – fi internet access throughout the hotel, 24 – hour fully equipped business centre, workstation availability, two meeting rooms, secretariat assistance, audio – visual equipment, law library choice of news papers and periodicals.

8.9 The City Centre, Sector 17

The City Centre has many facilities outdoor club, many government and private offices, big showrooms, excellent departmental stores cater to the needs of shoppers, banks, corporations, travel agencies and big offices complexes like Udyog Bhavan, Central income tax building, 30 bay building, Batra building, Jeevan deep building, Chandigarh medical centre, eating shops like hamburgers, pizzas, sandwiches, ice cream, noodles, popcorn and soft drinks, Dusshera and Ramlila celebration, all sorts of shops like Booksellers, Jewellery, Cloth Shops, General merchants, Stationers, Shoe merchants, Tailors, Electrical applications, shop selling like jewellery and readymade garments. For children, shops selling toys and confectionery are very favourite.



8.10 Museum and Art Gallery

Government Museum and Art Gallery has a reception hall, reserve collection, laboratory cafeteria, temporary exhibition hall and auditorium, The museum's entry fee is Rs.2 / - and Camera fee is Rs. 5/-. There is no entry fee for children below five years. City Museum's entry fee is free and Camera fee is Rs. 5/-. Science Museum's and Dolls museum's entry fee is Rs.2 / - and Camera fee is Rs. 5/-. (Figure 17 & 18) There is no entry fee for children below five years. There are facilities of taps, photography allowed etc. Government Museum and Art Gallery contains a modest collection of Indian stone sculptures, miniature paintings, Mughal, Rajasthani, kangra.

8.11 Judicial Academy

Judicial Academy has facilities with lecture halls, conference room, tea room, computer room, research wing, and printing and stationery wing. There are additional facilities like a gymnasium, cafeteria, and recreational block, reading room and dining hall.

Table 4: Facilities provided by Landmarks

Sr. No.	Facilities	Landmarks
1.	Eating (Restaurant and canteen)	Sukhna Lake, Rock Garden, Capitol Complex, Taj Hotel, Mountview Hotel, Judicial Academy, City Centre, Student Centre, Museums and Art Gallery, Dolls Museum
2.	Boating	Sukhna Lake
3.	Kids zone	Sukhna Lake
4.	Gifts shops	Rock Garden, Sukhna Lake, City Centre

5.	State Bank of India-ATM	Sukhna Lake
6.	Fitness Trails	Leisure Valley
7.	Toilet/Washroom	Sukhna Lake, Leisure Valley, Rock Garden, Mountview Hotel, Taj Hotel, City Centre, Capitol Complex, Dolls Museum, Museums and Art Gallery, Judicial Academy, Gandhi Bhavan, Student Centre.
8.	Ice Creams Shops	Sukhna Lake, Rock Garden, Student Centre, City Centre
9.	Car Parking	Sukhna Lake, Rock Garden, Capitol Complex, Mountview Hotel, Taj Hotel, Dolls Museum, Museums and Art Gallery, Student Centre, Gandhi Bhavan, City Centre,
10.	Fountains	Zakir Rose Garden, City Centre
11.	Clubs	Sukhna Lake, City Centre

Landmarks provide many facilities and services. Landmarks generate employment opportunities for people by means of different facilities and service.

9. Query Building

Query is a functioning GIS containing geographic information. In Query we ask questions. Query Building is an important technique for data analysis in GIS environment. In this chapter, we will discuss how we applied query. We can perform a number of queries in Arc View ranging from pointing features on a map to identify them. To find which locations meet certain selection criteria. These help in analyzing spatial relationships between different phenomena and finding out how they influence each other.

9.1 Identifying feature on a map:-

The first step in Query Building is to select or identify a feature on a map. Each theme in a view has a table storing attribute about the geographic features; it contains one record for each feature in the theme. Then we look at its attribute table. The attribute table is help to discover where particular feature is located or which feature meet particular criteria. The only themes that do not have attribute tables are themes representing image data.

9.1.1 To display the attribute of the particular features in a theme

The Identify tool lets we display the attributes of features on a theme by clicking on them with the mouse. We choose the Identify tool and click on any feature in the active theme on our view to display its attributes. Active theme means the theme is active which is highlighted in the table of contents. Attributes of all features located at the same point are displayed.

9.1.2 To display the attribute of the selected features in a theme

The identity tool lets display the attributes table and we see the selected records of the features are highlighted; the selected records remain highlighted until a different selection is made or until they are deselected. Selected features highlighted in yellow colour.

9.2 Finding a feature in a view

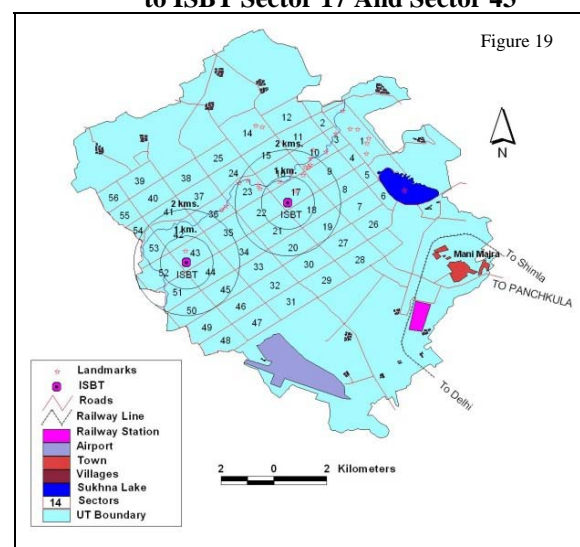
The second step for query building is to find features with particular attributes. We select feature on a map according to their attribute than we build query expression with Arc View Query Builder.

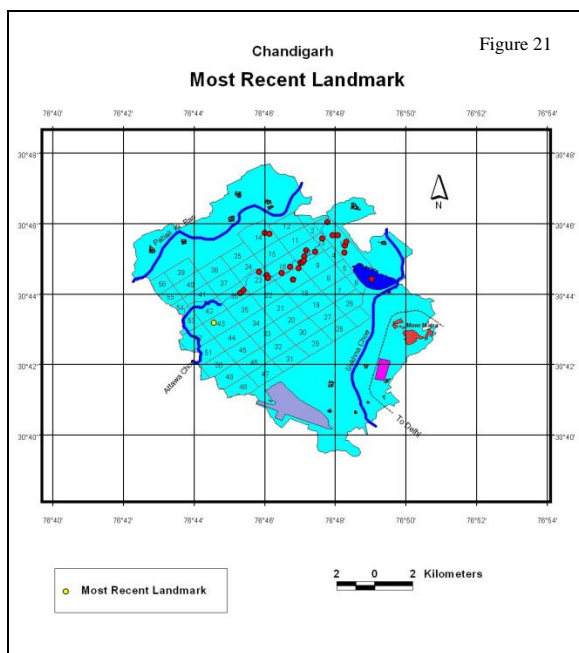
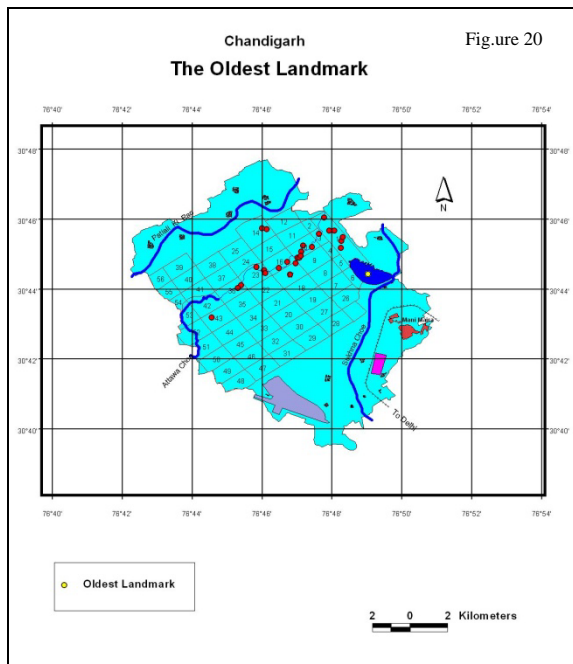
9.3 Use the find option to find a particular feature in a view

Find searches the active themes in the view until it finds a feature with the particular attribute value we specify. When a feature is found, Arc View selects it and pans the view so that the feature is in the center of the view. Find does not search in numeric fields.

Further we can refine Query Building. In Arc View 3.2 we use Query Builder to select a set of feature on our map. We can also use the Query Building to refine a set of feature we have already selected with the Query Builder or one of the other selection methods Arc View offers. In this way, we can narrow down the selected set add additional feature to it. How our query expression is applied depends on which of the three buttons in the lower, right corner of the Query Builder, we use to execute the query. Now set makes a new set containing the feature selected in our Query expression. Any currently selected feature in our query expression. Any currently selected features not in this set are deselected.

Chandigarh Location of Landmarks with respect to ISBT Sector 17 And Sector 43





With the help of GIS tool (Arc View 3.2) application of Database as decision Supports is possible by putting queries and creating buffer zones. These queries are following:-

Question 1: Find out the concentration of Landmarks in the areal distance of one, two kms with respect to ISBT Sector 17 and ISBT Sector 43. (Figure 19)

Question 2: Find out the oldest landmark. (Figure 20)

Question 3: Find out the most recent landmark. (Figure 21)

10. Summary and Conclusion

A creation of database and mapping of landmarks in the planned city of Chandigarh with an application of GIS and Remote Sensing has been accomplished in this project report. Efforts were also made to put this database in GIS as a decision supporting tool so that various trends of analysis

as well as answers to our queries could be derived conveniently, quickly and precisely. The objectives of the project report were to study the spatial distribution, spatial expansion, facilities and services of the landmarks in Chandigarh City.

The study aimed at providing answers to the following questions:

1. What is the spatial distribution of Landmarks in Chandigarh city?
2. How the spatial expansion of the Landmarks took place in the planned city of Chandigarh?
3. How do facilities and services locationally vary by Landmarks in the planned city of Chandigarh?

For comprehending such a research theme, a variety of methodological tools and techniques were adopted, keeping in viewing the nature of the issue under reference, nevertheless the maps has been the basic tool, as the study is geographical in nature. In this project report various types of data were used. The source of data can be put under the following to categories:-

- a) The primary data was collected from the field survey during July to September 2009 through observation. The G.P.S. (Global Positioning System) was also used to measure the latitude, longitude and elevation.
- b) The secondary sources included town plan, guide maps of Chandigarh, CITCO, Atlas on the location of the landmarks information about the location and year of construction. The maps of some landmarks were taken from Town Planning Offices in Sector 9 (D) and Chief Architecture Sector 9 (D).

Following are some of the major highlights of the study:-

- Chandigarh is a planned city having strict land use zoning. In Chandigarh city, there are 18 landmarks. Spatial Distribution of landmarks finds a tendency to concentrate in northern and central part of the city. In contrast, northern part of the city which is essentially administrative and institutional respectively finds the more concentration of landmarks. There are sectors in the city like Sector 1, 10, 16, 17 where more landmarks are located. These landmarks are along Uttar Marg, Jan Marg, Vigyan Path, Madhya Marg roads.
- The spatial expansion of landmarks was not uniform. The maximum landmarks evolved during 1960's. And mostly landmarks are constructed in First Phase Sectors of Chandigarh. Very few landmarks are constructed in Second Phase Sectors of the City. However there is no landmark in Third Phase Sectors of the city.

Landmarks provide a vast range of services and facilities. Landmark is an enterprise for the production of goods and services as well as provides income to the people like eating, kids zone, gifts shops, State Bank of India – ATM, fitness trial, fountains, club etc. These services intend to remunerate the administration.

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