LIGHTING SERVICES

(IN HOSPITAL)

DISSERTATION

SUBMITTEED BY

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ACKNOWLEDGEMENT

The success of any venture cannot be regarded as the end result of a single factor. It requires a harmonious unification of perseverance, inspiration and motivation; along with the right kind of guidance working on this dissertation in a truly different perspective.

At this level of understanding it is often difficult to comprehend and assimilate a wide spectrum of knowledge without proper guidance and advice. Hence, I take the opportunity to express my heart felt gratitude to my respected guide, Ar. Ms. Bushra Fatima ,for her unfailing guidance and constant encouragement, and support which has enabled me to successfully complete this task.

I kriti tiwari, sixth semester student of galgotias school of architecture, GU, would like to gratefully and sincerely thank my guide panel for this guidance, understanding, patience, and most importantly, her friendship during my dissertation research study. Which encouraged me to grow as an instructor and an independent thinker. I am not sure many graduate students are given the opportunity to develop their own individuality and self-sufficiency by being allowed to work with such independence.

The writing of this dissertation has been one of the most significant academic challenges I have ever taken. Though the following dissertation is an individual work, I could never have reached the heights or explored the depths without the help of books published by various authors, the e-books available on the internet, the research papers published by various authors and the various organizations and websites providing information related to my dissertation topic.

I express my sincere thanks to all the teachers who have helped me throughout this process, my parents and my friends for their kind cooperation and help at various stages, which has made my work possible.

GAURAV PANCHAL

16GSOA101014

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1.1 INTRODUCTION

Lighting or illumination is the deliberate use of light to achieve a practical or aesthetic effect. Lighting includes the use of both artificial light sources like lamps and light fixtures, as well as natural illumination by capturing daylight .

Enhanced aesthetics incorporated into fixture design, as well as the ability for the luminaire to light architecture details, are certainly important. But patient-perceived quality of light and the effects on a healing environment are a critical factor, too. Lighting can and does contribute to improved patient outcomes as well as improved facility safety
there are three basic types of lighting that work together
• ambient (general lighting)
provides an area with overall illumination. also known as general lighting, it radiates a comfortable level of brightness without glare
• task lighting
helps you perform specific tasks, such as reading, grooming, preparing and cooking food,
• accent lighting
adds drama to a room by creating visual interest. as part of an interior design scheme, it is used to draw the eye to houseplants, paintings, sculptures and other prized possessionstical factor, too. lighting can and does contribute to improved patient outcomes as well as improved facility safety.
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1.2 AIM

To study the lighting services in hospital.

1.3 OBJECTIVES

- to study the types of lights.
- to study the intensity of light used.
- to study the purpose of lights.
- to study the amount of lights required .

NEED AND SCOPE

- for proper treatment of the victim.
- to enable them to carry out their routine tasks
- lighting should create a cosy and pleasant atmosphere.
- the general lighting of procedure rooms should be at least 300 lux.

Scope of the study is that we can find or determine what kind of lighting fixture and in their intensity to use where in hospital.

Area – Activities	Type of Work	Recommended minimum Lux Level
Doctor's office	General lighting	150
	Working table	1000 – 500
Waiting areas		150
Bath room	General	200 – 100
	Mirror	400 – 200
Library		500 – 250
First aid ward	Localized	1000 – 500
	General	20000 – 10000
Corridors – staircases		150
Kitchen		500 – 250
Laboratory	Research area	500 – 250
	Working table	1000 – 500
Operating room	General	1000 – 500
	Working table	40000 – 20000
	X – ray ward	0 – 100 – 0 – 50
Dentistry	General	500 – 250
	Chair	10000 – 5000
Maternity ward	Delivery bed	10000 – 5000
	Delivery area	500 – 250
	Infant and waiting area	200 – 100
Patients room	General	150
	Localized lighting: bed	500 – 250

Illumination level for hospitals varies from 100 lux in patient's room to

1,00,000 lux in operation theatres

1.5 METHODOLOGY

Step 1:- Setting up of object: Innovation layout design that fosters meaningful community interaction while at the same promoting hygiene and safe living conditions.

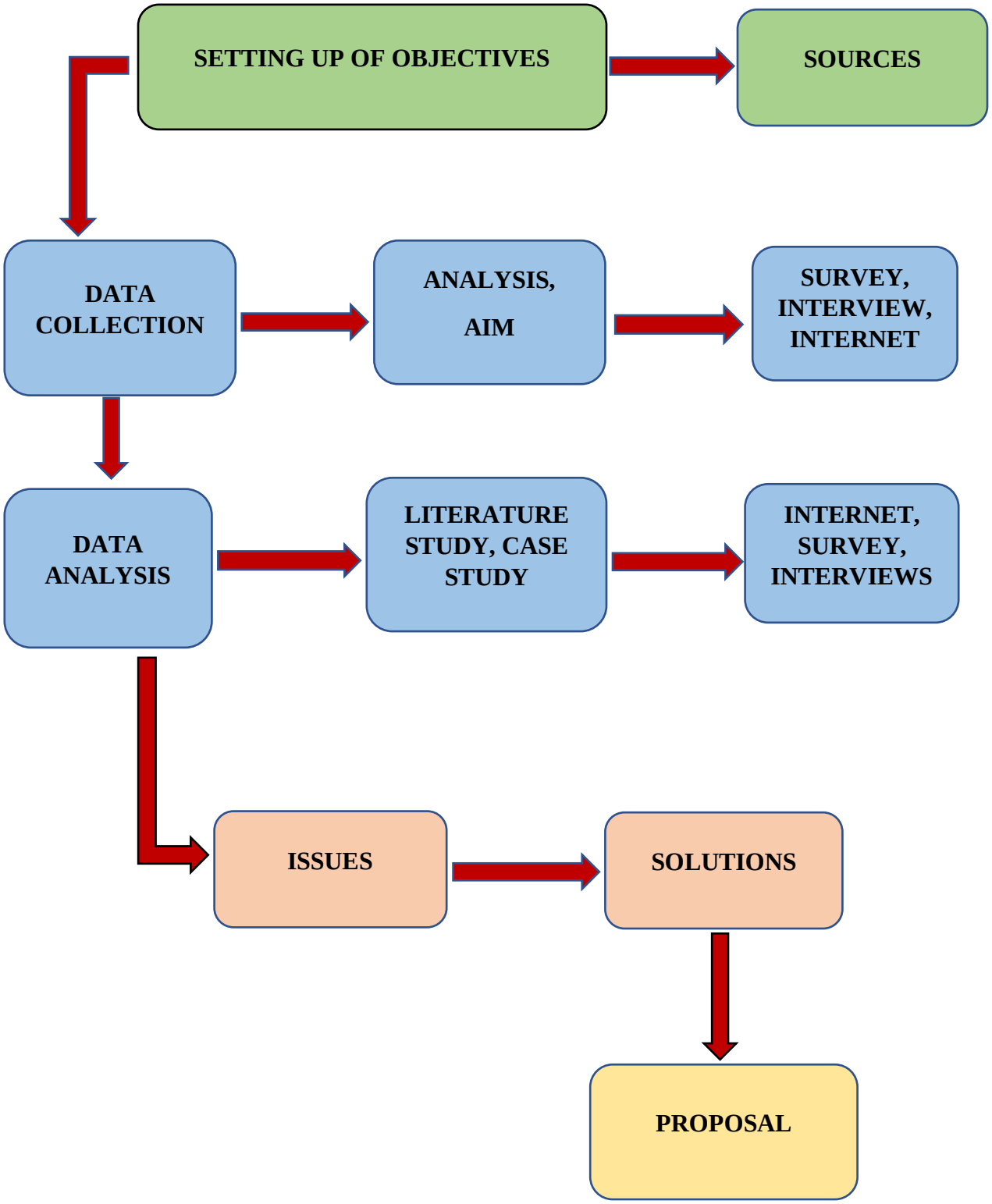
Step 2:- Literature review: To study about the housing from books. There are some norms which have to be followed and considered while design a housing.

Step 3:- Case studies: to select and carry out the series of case studies. The studies were conducted i.e. to find out the purpose of concepts and planning principles, building material used, structure system used to guide the design of shelter.

Step 4:- Discussion: The result from the literature review and the case studies are discussed in relation to the thesis aims and objectives.

Step 5:- Recommendations: Based on the findings of this study recommendations are made on how and where changes can be adopted.

METHODOLOGY



2. LITERATURE STUDY

LIGHTING IN DIFFERENT AREAS OF HOSPITALS

ENTRANCE

First impressions count, so here's the perfect opportunity to create a great first impression with a welcoming ambience. Attractive lighting in the entrance area can make a hospital more inviting

CORRIDORS

1. **For a hospital, which is often open 24 hours a day, corridors and circulation areas are the arteries of the building. They link the different areas togetherlogistically.**
2. **Patients and visitors who are on their way to a doctor or specific department will naturally benefit from a brightly illuminated corridor rather than a dark one and specific lighting can be used to optimize guidance.**
3. **Appropriate lighting levels – 150/200 Lux is recommended for corridors and circulation areas**
4. **using diffused homogeneous lighting and avoiding dark spots.**

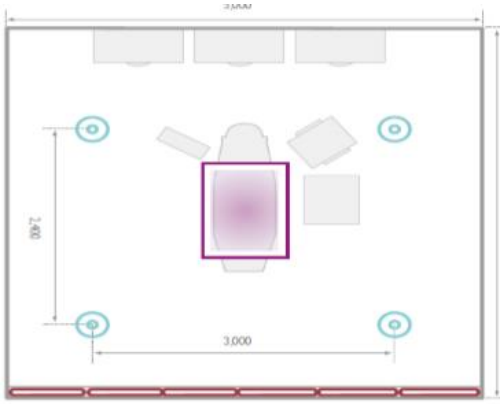
EXAMINATION ROOM

Patient evaluation and medical procedures begin in the examination room. Visibility, visual comfort and visual appeal must all be addressed in the lighting design process.

Examination light

• Illuminance, Low Level: 25,000 lux (2323 fc) at 18″ (46 cm)

• Illuminance, High Level: 50,000 lux (4645 fc) at 18″ (46 cm) • 4600 K color temperature



Patient's Ward Light

- **Required Lux level for patient's Ward luminaire is 150 to 200 Lux (maximum) and 20 to 50 Lux (minimum)**
- **Conditions for Patient's Ward Luminaire Installation**
- **Lux level varies patient to patient**
- **CCT must be 4000 K**
- **Smooth or cool light color**
- **No glare**
- **Uniform lumen distribution**

Lights used in patient's wards are FTL, CFL, and LED Lamps etc

- **Ambient light: LED based colored light line in cove opposite the bed, that can also provide orientation light at night.**
- **Reading light.**
- **Patient control: providing choice for the patients of 3 pre-set light colors for the cove, as well as reading light dimming control.**

OPERATION ROOMS

- **Surgical theatre and operating room environment needs the right kind of lighting, which should be neither dim nor bright.**
- **the doctors to maintain focus on the task at hand, and to prevent errors.**
- **Proper lighting in surgical theatres also helps extend the amount of time required to complete a procedure.**
- **Hence, we advise doctors to use high-quality operating room lights so as to save time and cost.**
- **One of the most common fixtures for operating rooms is the ceiling mounted style of lighting accompanied with switches near the base.**
- **Generally, a true white light is used instead of any other color such as blue or yellow since it provides a better visual image.**
- **Yellow or blue lights in surgery rooms make it difficult to detect changes in tissue color but white light will provide true color.**
- **It is recommended that the illumination level for lighting the operating area should be between 2 000 and 10 000 lux.**
- **• Each lighting fitting should be capable of separate switching**

IMAGING

Magnetic Resonance Imaging (MRI), open MRI and Computer Assisted Tomography (CAT) scanning presents unique lighting demands. MRI suites, due to the intense magnetic polarity created by the diagnostic equipment, demand that luminaires be constructed of non-ferrous materials such as aluminum, brass, certain types of stainless steel and polymers preventing possible injury to the patient and healthcare technician

1.A ceiling projector displays videos or animations chosen by the patient from a library of themes, distracting them from the equipment and procedure

2.Rounded corners suggest additional space and discourage clutter
3.Soothing audio is added to create a relaxing ambience
4.Colored LED spotlights neutralize the harsh glare of institutional lighting, while encouraging a sense of wellbeing
5.Integrated cabinets provide easy access to coils and accessories, freeing the room from clutter

DIFFERENT OPTIONS FOR LIGHTING

CLEANROOM TROFFERS **SURGICAL TROFFERS**

VISUAL THERAPY LUMINAIRE

CV-2VRGC

- **Recessed fl uorescent luminaire**
- **Available in 2x2 and 2x4 confi gurations**
- **Offered in (3) or (4) T8 lamping for optimal illumination**
- **High quality, acrylic photographic lens included**
- **Dimming option available**
- **Includes (4) torx screws to ensure lens security**

THE BENEFI TS OF VISUAL THERAPY LUMINAIRES

- **Nature imagery, when incorporated into treatment environments, can reduce patient stress and anxiety.**
- **Images provide a focal point for patients - assisting them in getting through uncomfortable or painful procedures.**
- **Creates a tranquil working environment which contributes to increased staff satisfaction.**
-

Ceiling Shadowless Surgical Operating Lamp

Features of Seven and Four Reflector Theater Light
Diameter: 500 mm (Nominal) 500 mm+/- 50 mm
Field size 150-200 mm, 1600 mm (Nominal)
Action radius 1500 mm (Nominal), 1,75,000 Lux (max)
Light output 1,30,000 Lux (Max)
Color temperature: 4200 +/- 300º K

Halogen bulb 1 no., 7 nos. 12V,50 W each / 24V 70 W 4 nos. 12 V, 50 W
Low voltage unit with CVT 230 V AC +/- 10% 230 V AC +/- 10%
Input supply: 50 Hz +/-
2% 50 Hz +/- 2%

Ceiling Shadowless Surgical Operating Lamp Code : CS3010
High intensity lamp having single dome with seven reflectors is the best choice for all types of major surgery. The multi-facet reflection technique of the lamps create an excellent shadowless effect with a clean laminar flow.

High-intensity discharge lamps (HID lamps) are a type of electrical gas-discharge lamp which produces light by means of an electric arc between tungsten electrodes housed inside a translucent or transparent fused quartz or fused alumina arc tube. This tube is filled with noble gas and often also contains suitable metal or metal salts

Varieties of HID lamp include:

Mercury-vapor lamps.
Metal-halide (MH) lamps.
Ceramic MH lamps.
Sodium-vapor lamps.
Xenon short-arc lamps

HOSPITALLIGHTENING COMPANIES

INDIAN COMPANIES

§ opal overseas pvt ltd . new delhi
§ avni energy solutions pvt ltd.bengaluru
§ jainsons electronics . new delhi
§ goldwyn ltd. noida
§ canara lighting. manglore
§ legero solutions, vizag

MULTINATIONAL COMPANIES

§ o.m.t. srl portalampade, italy
§ cavicchioli renato s r ltd, italy
§ palace lighting co.ltd. china
§ luminaires tief, france
§ rolando luci limited, usa
§ lido light fixture manufacture ltd, greece
§ vast lighting manufacture, shangha

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- **http://www.moderncancerhospital.com/cancer-treatments/photodynamic-therapy/**
- **http://www.aliexpress.com/item/C022-Dia-63cm-colorful-LED-luxury-crystal-ceiling-light-modernhospital-super-market-coffee-shop-ceiling/32347333140.html**

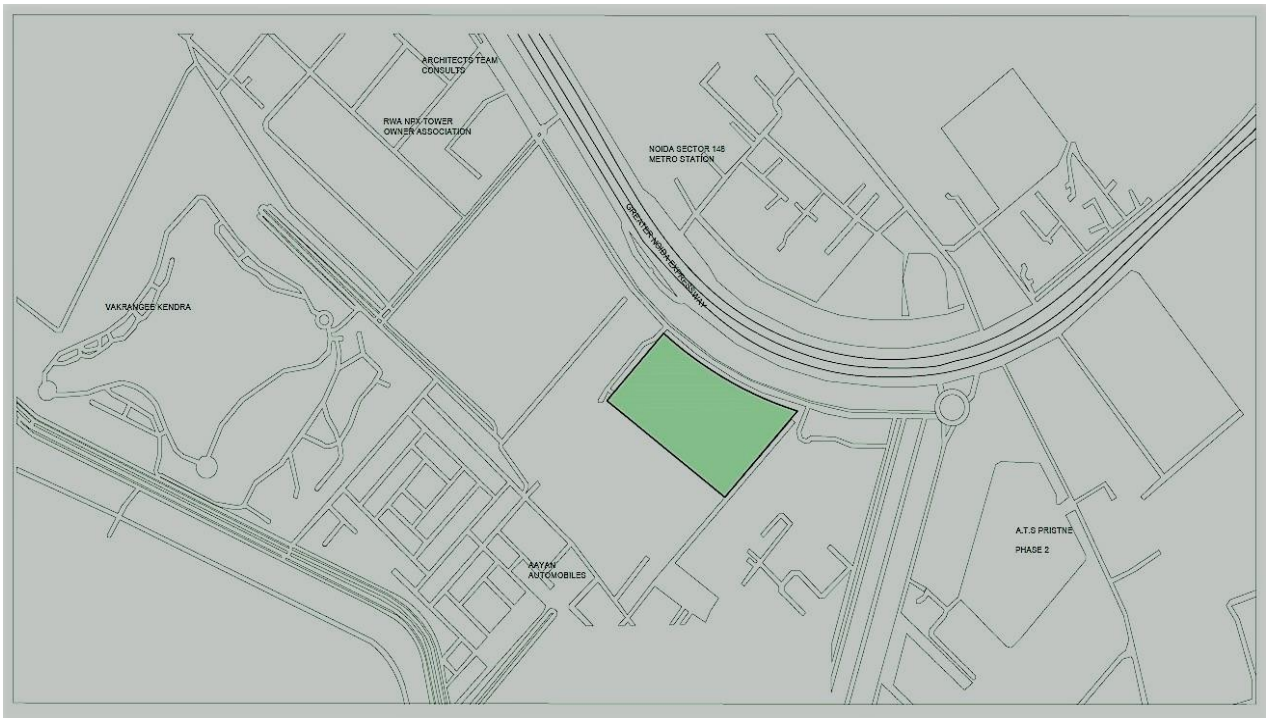

Figure 1:Site map

- Location of the site: sector 145, noida, Uttar pradesh
  Adjacent to the noida – greater noida expressway
- Landmarks: A.T.S pristine society, advent, pari chowk
- Road connectivity to botanical sector 37
- Nearest metro station: sector 145
- Site area: 17 acre or 68796 sqm
- Floor area ratio (FAR): 2.75
- Ground coverage area: 30% of total area
- Site setbacks: 16m front and 12m rest sides

2.1 LITERATURE STUDY

CLEO COUNTY

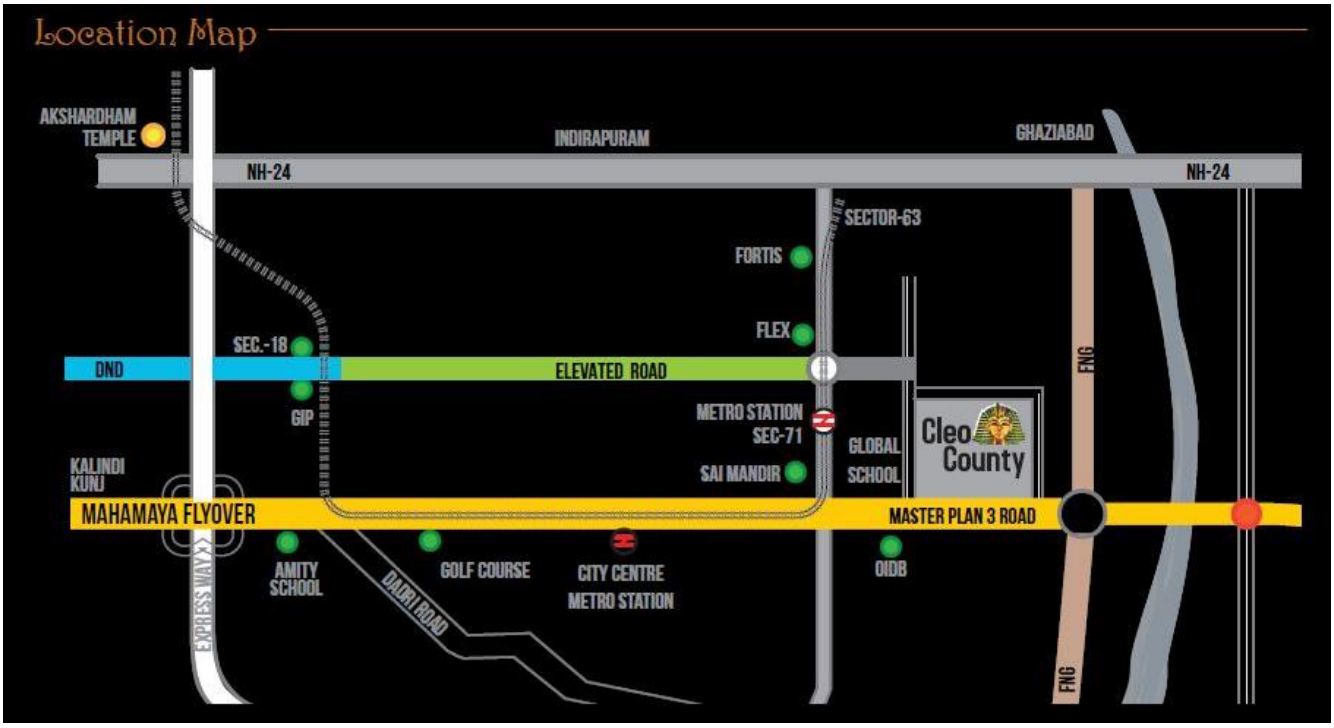

Figure 2: Cleo county location map

2.1.1 LOCATION ADVANTAGES

- 10 min drive from DND via elevated road
- Situated at one of the most prime location of noida
- On 70 m wide and straight road from kalindi Kunj
- Four side open plot with road on all four sides
- Green belt on two sides
- All essential services like schools, hospitals, etc. nearby
- 33km from IGI airport
- 23 km from Connaught place
- Located amidst industrial, IT hub and fully inhabited residential area

- ❖ Proposed metro station in sector 121
- ❖ 17 km from akshardham temple

2.1.2 SITE PLAN

Figure 3: Cleo county site plan

2.1.3 SPECIFICATIONS

STRUCTURE - Earthquake Resistant RCC Framed Structure (with latest Seismic Code)

FLOORING - Drawing/dining/kitchen – vitrified tiles

All bedrooms – laminated wooden flooring

Balconies – designer anti-skid tiles

Toilets – granite stones

ELECTRICAL – Internal - Fire Resistant Copper wiring in concealed PVC conduits
Modular Switches & Sockets in adequate numbers

T.V. & Telephone points – in all rooms
Exhaust Fan – in kitchen and toilets
Split Air Conditioner – in all bedrooms
Provision for A/C – in drawing/dining
Geysers – in toilets
Light Fixtures & Fans – in drawing room and bedrooms

External -Adequate lighting in common areas, staircase, lobby, parking space, garden etc.

WOOD WORK - Wardrobe (Laminated Particle Board) - In all Bed rooms

KITCHEN - Working Counter - Granite Counter with Stainless Steel Sink fitted with R.O.
Woodwork - Modular Cabinets
Wall Tile - Designer Ceramic Tiles up to 2 ft. above working counter

DOORS & WINDOWS – Internal - Designer flush doors in polish/deco paint fixed in hard wood
External - UPVC Sliding doors & windows

WALL FINISH - External Finish - Most Modern and Elegant Permanent Finish with High quality texture paint
Internal Finish - All internal walls of the room & Drawing Dining will be painted using O.B.D.

RAILING - Balcony – stainless steel
Staircases – mild steel

P.O.P WORK – Internal - P.O.P. work of punning will be done in all the rooms including drawing & dining

SANITARY WORK – For internal piping - Corrosion free PPR/UPVC Pipes & Fittings
Bath fitting & ware - All Taps and Fittings of reputed brands in C.P.
Wash Basins, Wall mounted W/C of reputed brands in appropriate shades matching with ceramic tiles.

2.1.4 AMENITIES

2.1.4.1 CLUB & RECREATION

- Swimming pool (outdoor) – India's first five level cascading swimming pool
- Swimming pool (indoor) – temperature controlled all weather swimming pool
- Fitness Centre with spa, gym, steam, sauna and jacuzzi
- Yoga and aerobics hall
- Mini home theatre
- Basketball court
- Banquet halls
- Restaurant and coffee lounges
- Table tennis, lawn tennis, cricket net practice
- Business Centre
- Cards room, reading room
- Snooker and billiard room

Figure 4: 5 level cascading swimming pool

Figure 5 : waiting lounge at club cascade

Figure 8: mini home theatre

Figure 9: cafe cascade restaurant

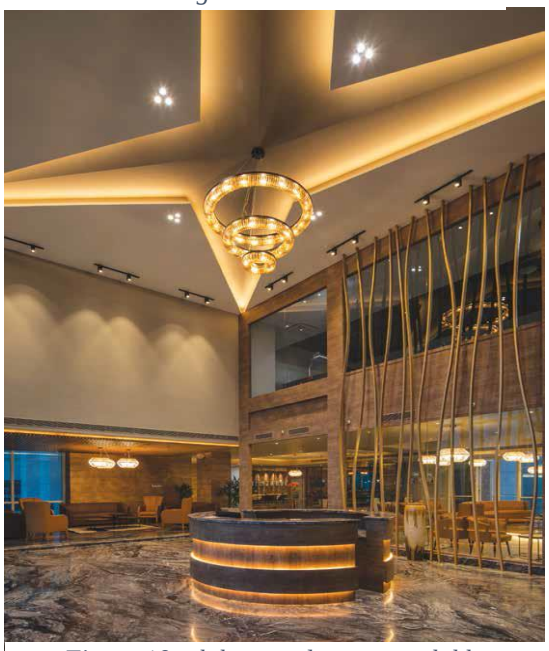

Figure 10: club cascade entrance lobby

2.1.4.2 GENERAL

- Gold certified green building
- Spread over 25 acres
- Approved leasehold property
- Egyptian theme-based project
- Resort style living
- Golf carts for ferrying
- Rain water harvesting
- Hi-tech security with touch panel system
- Optical fibre technology in complex
- Grand double height lobby
- Stainless steel railing in balcony
- Use of solar panels
- Separate play area for toddlers and kids
- Earthquake resistant structure

Figure 11: site view1

Figure 12: site view2

Figure 13: site view3

Figure 14: kids play area

Figure 15: putting golf

2.1.4.3 LANDSCAPING

- Palm court – surrounded by palm trees
- Island court – sitting area with water on all four sides
- Giza court – pyramid shaped huts
- Mist garden – artificial mist created to keep the temperature down
- Putting golf
- 5-acre little pharaoh land
- Wet play area
- Open air amphitheater

Figure 17: cascading swimming pool & club cascade

Figure 16: island court

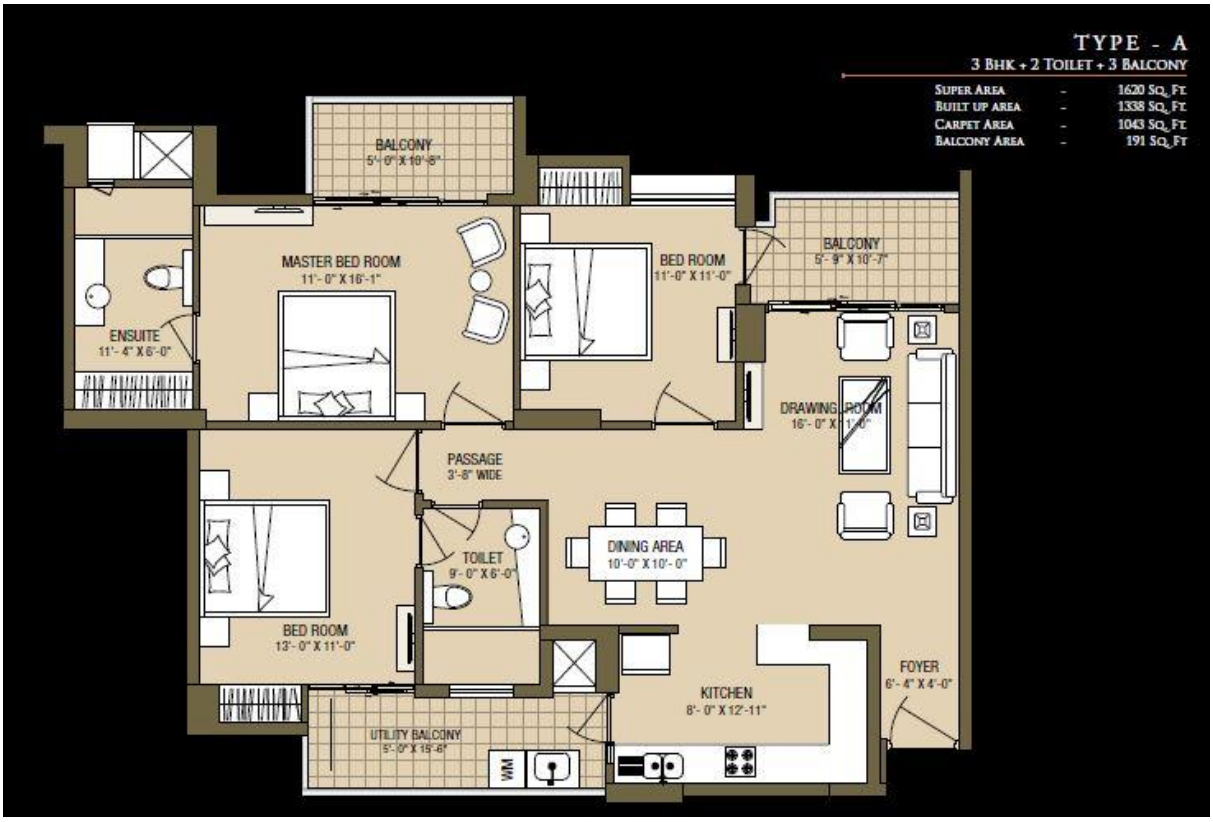

Figure 18: 3bhk+2t+3b

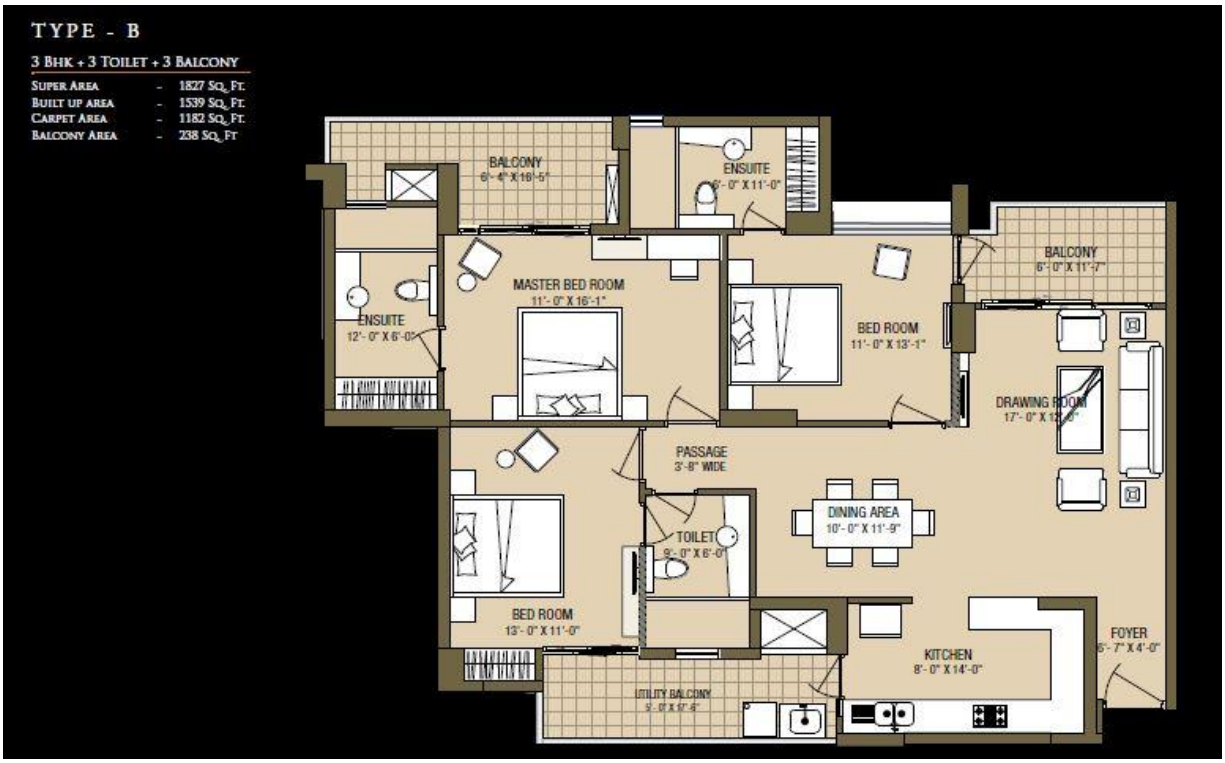

Figure19: 3bhk+3t+3b

2.1.5 UNIT PLANS

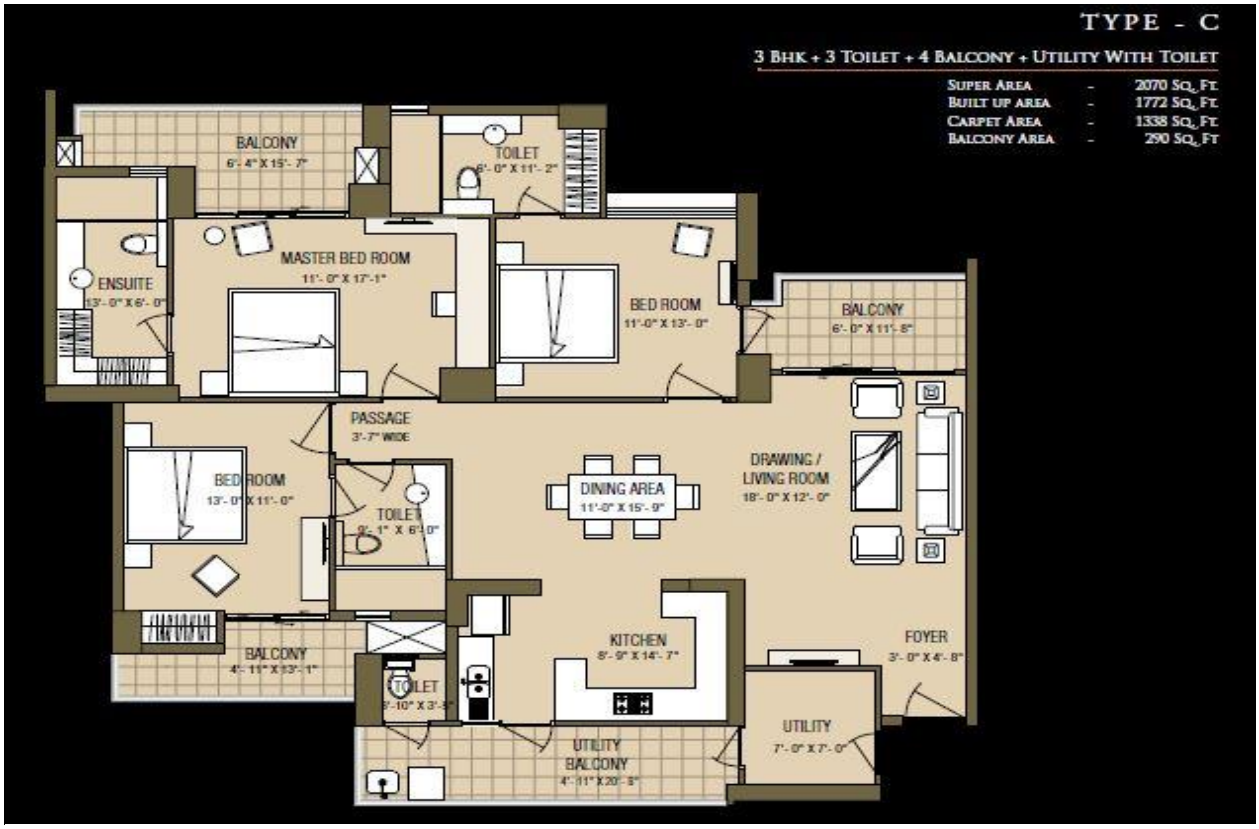

Figure 20:3bhk+3t+4b+utility+t

Figure 21: 4bhk+4t+4b+utility+t

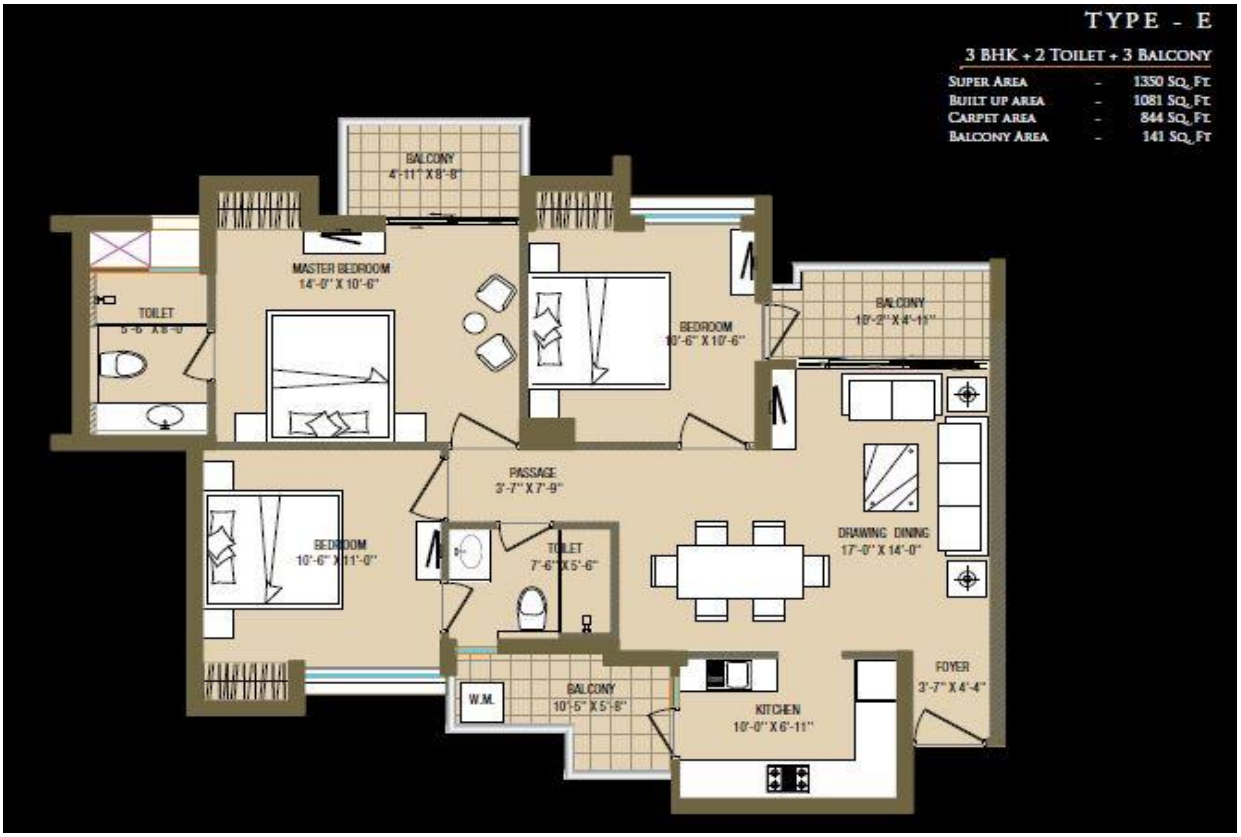

Figure 22: 3bhk+2t+3b

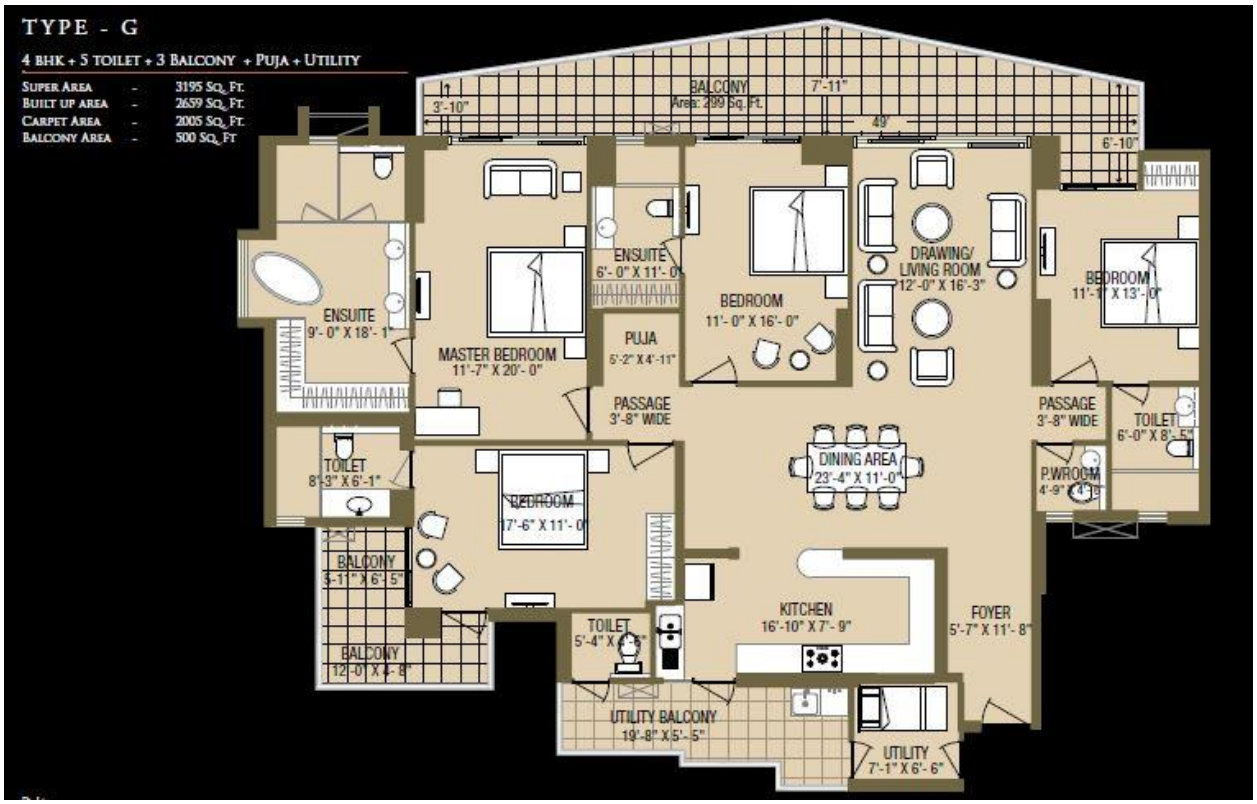

Figure 23: 4bhk+5t+3b+puja+utility

3.1 CASE STUDY

SUPERTECH CZAR

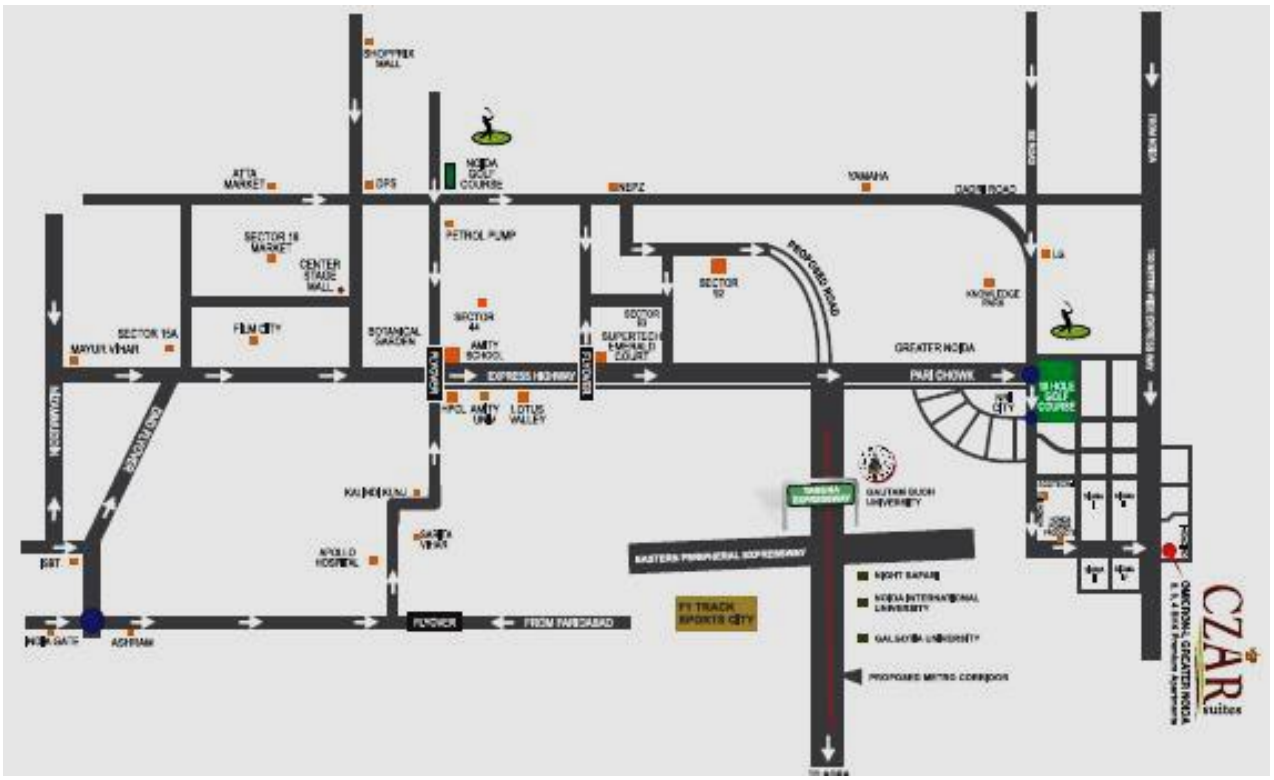

Figure 24: Route to supertech czar

3.1.1 LOCATION ADVANTAGES

- Just 15 mins drive from delhi via 6m lane expressway, 40 mins from india gate, 55 mins from IGI airport, 5 mins from Yamuna expressway
- Pollution free environment, 45 meter to 130 meter wide road network with broad, tree-lined avenues, 25% of total area under green cover
- 225 acre PGA-standard golf course 5 mins away
- Huge corporate sector within a radius of 5 kms like LG, Honda , Yamaha , Wipro, Moserbaer, ST micro, IT parks
- CNG filling stations and greater noida bus terminal 4 mins away
- Operational 5 star hotel 5 mins away
- Reputed schools and management institutes 10 mins away

Figure 25: site plan

3.1.2 FEATURES

- 20 acres of lush green environs
- Two side open plot on 130 meter wide road along with 100 meter green belt, 85% open landscaped area
- Well designed complex with beautiful landscape, 6 acre central park, man-made lakes and gardens within the complex
- In house club with exclusive facilities like swimming pool, health club, badminton court, tennis court, sauna & jacuzzi
- 24 hours water & power supply
- Security system with intercom, CCTV and separate electronic security lock with camera and access control
- International PGA standard 18 hole golf course nearby
- Upcoming night safari, motor racing track, metro corridor and international airport adjacent to site

3.1.3 SPECIFICATIONS

LIVING ROOM

Floor: ceramic tiles

External door and windows: powder coated aluminium with double rebate

Electrical fittings: sheet and switches

Wall: oil bound distemper

Internal door: flush shutter with wooden frame

Ceilings: oil bound distemper

DINING

Floor: ceramic tiles

External door and windows: powder coated aluminium with double rebate

Electrical fittings: sheet and switches

Wall: oil bound distemper

Internal door: flush shutter with wooden frame

Ceilings: oil bound distemper

BEDROOM

Floor: ceramic tiles

External door and windows: powder coated aluminium with double rebate

Electrical fittings: sheet and switches

Wall: oil bound distemper

Internal door: flush shutter with wooden frame

Ceilings: oil bound distemper

KITCHEN

Floor: ceramic tiles

External door and windows: powder coated aluminium with double rebate

Electrical fittings: sheet and switches

Wall: granite platform

Fittings: stainless steel sink with C.P. fittings

Internal door: open

Ceilings: oil bound distemper

TOILETS

Floor: ceramic tiles

Electrical fittings: sheet and switches

Wall: ceramic tiles of 7” height

Fittings: washbasin WC and & C.P. fittings

Internal door: flush shutter

Ceilings: false ceiling

BALCONIES

Floor: ceramic tiles

Electrical fittings: sheet and switches

Wall: oil bound dispenser

Ceilings: permanent paint finish

LIFT

Floor: P.V.C flooring

Electrical fittings: sheet and switches

LOBBIES & CORRIDOR

Floor: ceramic tiles/ kota stone

Walls: oil bound distemper

EXTERIOR FINISH

Walls: texture paint

3.1.4 UNIT PLANS


DN
TP
LOBBY
TP
DN
LIFT
16 PASS
LIFT
16 PASS


1525
WIDE BALCONY
SHAFT
TOILET
1675X2445
MASTER BEDROOM
3650X4565
DRESS
1675X1525
TOILET
1525X
2125
BEDROOM
3955X3550
1525
WIDE BALCONY
BEDROOM
4065X3200
1375
WIDE BALCONY
TOILET
1680X2185
DINING
3155X3065
DRAWING ROOM
3660X5175
KITCHEN
3040X2575


BALCONY
1000 WD.
TOILET
1525x2125
BEDROOM
3955X3550
BALCONY
1000 WD.
MASTER BEDROOM
3650x4565
TOILET
1675x2445
DRESS
1675x1525
DINING
3155X3065
DRAWING ROOM
3660X5175
BEDROOM
4365x3200
1000 WIDE
BALCONY
TOILET
1680x2185
KITCHEN
3040x2461
UTILITY
2158x1835
TOILET
1225x925


BEDROOM
3213x4249
LOBBY
1865x2150
DINING
3260x2579
KITCHEN
3370x2483
TOILET
1530X
2125
BEDROOM
3925x3360
LIVING RM
3657x5942
TOI.
1533x
2585
TOILET
1524X
2125
BEDROOM
3349X3950
1500 WD
BALCONY
BEDROOM
3950X5380
DRESS
1840X1525
TOILET
1840X2610
1500 WIDE
BALCONY


1000
WIDE BALCONY
SHAFT
MASTER
BEDROOM
3650 X4550
TOILET
1675X2430
DRESS
1675X1405
BEDROOM
3265X3950
1000
WIDE BALCONY
1000
WIDE BALCONY
BEDROOM
4225X3350
DINING
3040X3065
DRAWING ROOM
3360X5190
TOILET
1555X2125
KITCHEN
3040X2440
FHC
1217X905


UP
TERRACE
BALCONY
CUT-OUT
DN
MASTER BED ROOM
LOBBY
STORE
TOILET
BED ROOM-3
SB
BALCONY
DRESS
TOILET


TERRACE
TERRACE
TOILET
5'-5"X7'-11"
BED ROOM-1
11'-11"X14'-11"
DRESS
5'-5"X5'-0"
DRAWING ROOM
(14'-3"X15'-3")
C3
BED ROOM-2
(13'-2"X10'-5")
TOILET
KITCHEN
(13'-4"X8'-7")
BALCONY
ENTRY
LOWER FLOOR PLAN


UP
TERRACE
DN
BALCONY
LOBBY
14'-6"x7'-3"
MASTER BED ROOM
13' X 19'-2"
CB
BED ROOM-2
10'-11"x10'-5"
TOILET
5'-6"x7'
STORE
9'x3'6"
TOILET
6'-11"x8'-5"
DRESS
3'-11"x8'5"
CB


BALCONY
TERRACE
MASTER
BED ROOM
10'-11"x14'
TOILET
6'-9"X11'2"
UP
WARDROBE
DINING
10' x 8'-7"
CB
BED ROOM-2
11'x10'-5"
DRAWING ROOM
12'x18'
TOILET
5'-4"x7'
KITCHEN
9'-8"x8'-10"
SERVANT
TOILET
4'-5"X3'-5"


UP
BALCONY
DN
LOBBY
14'-5 1/2"X7'-5 1/2"
BED ROOM-2
10'-11"X10'-5"
CB
STORE
8'-11 1/2"X3'-8"
TOILET
5'-3"X7'-0"
MASTER BED ROOM
13'-0"X18'-0"
DRESS
3'-11"X8'-5"
TOILET
6'-11"X8'-5"
CB


BALCONY
TERRACE
UP
MASTER BED ROOM
10'-7 1/2"X14'-0"
TOILET
6'-9"X11'-3"
WARDROBE
DRAWING ROOM
11'-11"X18'-0"
BED ROOM-2
10'-11"X10'-5"
CB
DINING
10'-1"X8'-10"
TOILET
5'-11"X7'-0"
KITCHEN
9'-8"X8'-11"


TERRACE
(13'-2"X14'-9")
BALCONY
UP
DN
BEDROOM-2
(13'-9"X11'-2")
BALCONY
STORE
(5'-8"X8'-0")
TOILET
(5-2"X7-1")
TOILET
(5-6½"X7-9½")
MASTER
BED ROOM
(10'-7"X17'-5")
DRESS
(3'-5"X7'-9")


BALCONY
TERRACE
TOILET
(6'-1"X8'-4½")
MATER BED ROOM
(12'-8"X15'-3")
DRESS
(6'-1"X4'-5")
UP
DINING
(10'-1"X8'-9")
BEDROOM-2
(13'-8 ½"X11'-2")
DRAWING ROOM
(10'-9"X18'-0")
BALCONY
TOILET
KITCHEN
(9'-4½"X8'-2½")


MASTER BED ROOM
DRESS
TOILET
STORE
TOILET
BEDROOM-2
BALCONY
UP
DN
BALCONY 1275 WD
TERRACE


DRAWING ROOM
KITCHEN
TOILET
BEDROOM
BALCONY
DINING ROOM
MASTER BEDROOM
TERRACE
TOILET
BALCONY

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