Specification
And
Infrastructure Parameters for Khorabar Residential Township & Medicity Proposal

1. Umbrella Guidelines

Design Population

The population for density calculations has been done as per the guidelines of U.P. Govt. and the prevailing Byelaws. The population assessed is as follows:

For design of various infrastructure facilities the design population has been calculated as approximately 50000 persons.

The population for commercial, residential, facility, recreational public/semi public areas has been assessed on the basis of UDPFI and other applicable guidelines and our practical experience on various projects.

Developer has to note that adjacent village population (including Khorabar & Jungle Sikri) needs to be taken into account while designing the detailed infrastructure of the township.

Necessary connections need to be made by the developer to existing village abadi services including Sewage, Drainage, Roads & Pavements, Telecommunication, Electrification& Water supply.

2. Water Supply

2.1. Water Supply System

The potable water supply of desired quality and purity shall be ensured by tapping underground water. The primary treatment facility shall be ensured before making it supplied to the use of people. The norms laid down by Uttar Pradesh Jal Nigam for providing potable water supply shall be ensured.

2.2. Water Consumption/ Demand

The rate of Water supply as per norms of U.P. Jal Nigam, Govt. of India (CPHEEO) has been adopted as follows:-

Total water demand shall be approximately 5.55 MLD. Water demand sheet is attached with the RFP.

2.3. Concept of Water Supply System in Township

The Township is made more reliant in respect of Water Supply System to ensure uninterrupted water supply. The conceptual framework set to achieve the said target is as follows:

- Water supply to the plotted development and to the properties having built up area less than 20,000 sqm that do not require separate environment clearance shall be ensured through centralized distribution network of the zone. For the purpose entire project area should be divided in zones for water supply.
- Water supply to bulk properties having built up area 20,000 sqm and above shall be ensured by providing the system within the property and shall be considered zone in itself.
- Each zone shall have its independent water works, battery of tube wells, distribution network, clear water reservoir, Over Head Tank of suitable capacity for storage of water.
- The water obtained from tube wells shall undergo disinfection such as chlorination by installing a chlorinating Plant of suitable capacity clubbed with Pump House before conveying it to storage tank by suitable size of Ring Main.
- The water from each zone shall be pumped to underground clear water reservoir from where it will be pumped to over Head Tank as storage reservoir of each zone for supply through distribution network.
- Provision of appurtenances such as Sluice valves, Air valves, Scour valves and Fire Hydrants shall be made at required points.
- A terminal pressure of 17 m at remote end shall be ensured by the height of Over Head Tank and by use of Boosters pumps.
- A reserve for Fire Fighting shall be kept as per recommendations of Manual on Water Supply GOI, and as per norms & specifications adopted by U.P. Jal Nigam in the storage capacity of reservoirs of each zone to meet out this demand.
- The treated effluent will be used for Horticulture.
- The maintenance staff will be deployed in required number for the purpose of effective O&M of water supply system.

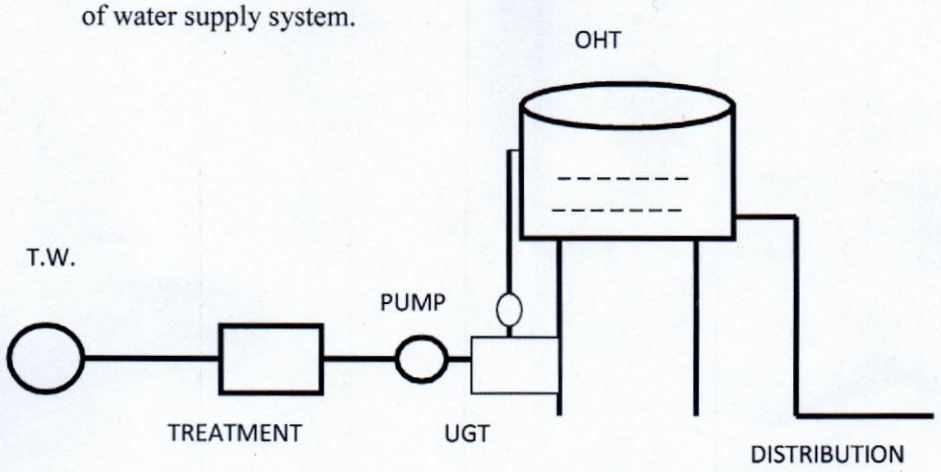

Fig: Schematic Drawing for Water Distribution System

2.4. Planning of Water Supply

Factors to be considered for water works in the development of Township are as follows:

- Contributory Population
- Peak Factor considered for optimum water supply required in peak hours is 3.0.
- Hours of Pumping to be considered for max 16 hrs a day

2.5. Zoning

For design, construction and efficient running and maintenance of water supply system, it is essential that the system is designed carefully. It is a known fact that the water supply system work on the principal of pressure flows. Keeping in view the topography and total demand conditions distribution network should be planned with caution.

2.6. Sources of Water Supply

The availability of the ground water in Gorakhpur and especially in the vicinity of the project area has been studied through the available reports and the Master Plan. The conclusion has been drawn that sufficient quantity of potable underground water is available inside the project area. Therefore, the fresh water requirement of the township will be met by tapping the underground water and the bulk requirement for flushing in group housings, commercial area and watering green areas will be met from treated effluent from STPs.

2.7. Tube wells

On the basis of hydro-geological survey conducted in the project area, the anticipated yield from the tube wells varies from 20,000 -35,000 lph for 16 hours of pumping. However to assess the number of tube wells required to meet the total water demand of the township average value of 25,000 lph has been adopted. All tube wells within the zone shall be connected with each other through CI pipe and each tube well will include separate pumping plants.

2.8. Water Treatment

The ground water quality in the site is found to be potable type and can be used for drinking purpose after giving primary treatment. It is proposed that each pumping plants will have automated chlorinating plant setup. This setup will add up the required quantity of chlorine in the flowing out water to have

primary treatment of water before supply. Therefore, total numbers of primary treatment plants for, chlorination, required are approximately 02 nos. These primary treatment plants shall be installed within pump house of each water work.

Keeping in view the gradual depletion of ground water table which may lead to the requirement of surface water to fulfill the water requirement of township, sufficient space for Water Treatment Plants should be earmarked and reserved in the Master Plan of township.

2.9. Water Storage Capacities

The capacity of the Over Head Tanks has been decided on the balancing pattern of demand and supply and pumping system has been designed accordingly. The zones have been divided in such a manner that the water demand is almost same so that water tanks of similar capacity and shape are constructed throughout the township. For more reliability as per concept underground tank of same capacity has been provided at the water works.

The recommended shapes of water supply storage is

- Over head Tank is of circular RCC type
- Under ground water reservoir should be of rectangular type

2.10. Water Supply Distribution System

Economical size of rising mains for tube wells and OHT shall be designed as per guide lines of CPHEEO given in the manual of water supply. Rising mains 200mm dia to 350mm dia of DI (K-9) has been proposed. For distribution system CI pipe has been proposed.

2.11. Valves & Fittings

A. Sluice Valves

Sluice valves of standard make (IVC/ Kirloskar, L&T Sant and advance) as per IS: 14846 and Non Return Valves of standard makes (IVC/ Kirloskar, L&T Sant and advance) as per IS: 5312 are proposed/ provided at different locations as per the requirements to control the flow or to segregate a portion for maintenance.

B. Air Release Valves

Air release valves of standard make (Leader, H sarkar, Indian Valves) are proposed to be installed in the rising mains to protect the line from negative pressure and over loads due to the trapping of the air. At

least one air valve shall be provided in each main. Standard quality will reduce the chances of any leakage and failure.

C. Scour Valves/ Drain Valves

Drain valves are of standard make (Leader, H sarkar, Indian Valves, Kirloskar) are proposed to be installed in the rising mains and distribution system at lower points in the line to drain silt and water from the line whenever required.

D. Standby Power Supply Source

All Tubewells and water supply system will be provided with 100% Power Backup.

2.12. Water supply for Greenery

It is proposed that watering of green covers will be done by using the recycled water from STP. The water demand estimated for maintenance of green covers in the Township is approx. 500 MLD. It is calculated by assuming that 5 liters of water is required to water a sqm of green land. The salient features for the water supply for green covers are as

- Separate network for supply of treated water shall be provided.
- Garden hydrants at required locations and suitable spacing shall be provided.

3. SEWAGE SYSTEM

The Sewage System is the essential part of human settlement to maintain the cleanliness and to avoid unhygienic conditions in the Township. It is found by experience that combined sewerage system suffers from the main disadvantage of sluggish flow during most period of the year leading to deposition of sewage solids creating foul & offensive conditions. These developments are experienced due to considering higher value of quantity in designing which take place in some days of rainy season only. It involves high construction cost as well as creates unhealthy conditions. Hence sewage and drainage systems have been proposed separately.

Salient features of sewage system development in Township considered are as

- Efficient collection and its disposal.
- Economically viable Design and feasible on ground
- Easy cleaning, maintenance and operation
- Modern and efficient treatment system.
- Recycling of treated effluent.

- Properties having built-up area of 20,000 sqm and above shall have their own Sewerage and Recycling system within the property.

3.1. Norms and Concept Adopted

The following norms and concepts shall be adopted for planning and design of sewerage system:

- The water supply as per Table
- Factor for arriving at anticipated sewage contribution shall be taken as 0.8.
- Peak Factor for contributory population shall be taken as 3.0 for arriving at the anticipated peak sewage contribution.
- The Sewage generated from houses will be collected in the 'House connecting chamber'. Then, it will be conveyed through branch sewer lines to nearest sub laterals. Finally, sewage will be transported to the STP.
- The lanes/ roads up to 12 m wide sewers lines will be laid on one side and on wider than 12m, sewer lines will be provided on both sides or in center of the road.
- Size and spacing of the manholes shall be kept as per norms.

3.2. Sewage Generation in Township

Anticipated sewage contribution from the township is approx. 4.44MLD assuming that 80% of water supplied will reach the sewer as sewage. Properties having built up area of 20,000 sqm and above shall have independent sewerage and recycling system within the property.

3.3. Appurtenances and Materials

A. Pipes

Sewer line pipes will range from 250 mm to 1200 mm in size fitted as per requirement in sewage system.

- **R.C.C. Pipes Class NP2:** For dia 250mm and upto 600mm dia as per IS: 458, for normal slopes and good soil conditions.
- **R.C.C. Pipes Class NP3:** For dia above 600mm and above as per IS: 458 for heavy loading and bad soil condition.

All RCC pipes to be laid as per I.S: 873 – 1985 and as stipulated in Manual on Sewerage and Sewage Treatment

B. Manholes

Manholes will be provided at space of 30-60 m along the lines, depending on dia of pipe and plot sizes. Three sizes are identified as per the quantity of sewage carried by the line i.e. (The final dimensions shall depend on detailed engineering done by the concessioner.)

- For depths above 0.90 m and up to 1.65m, 900mm diameter
- For depths above 1.65 m and up to 2.30m, 1200mm diameter
- For depths above 2.30 m and up to 9.00m, 1500mm diameter

C. Manholes Covers

- Medium duty for manholes on service roads, having approximate total weight of frame and cover as 116 kg
- Heavy duty for manholes on main roads, having frequent heavy traffic, with approximate total weight of frame and cover 170-208 kg

3.4. Drop Connections

Drop connections for branch sewer lines upto 300mm dia, to be provided for difference of invert levels of 600mm in main sewer lines and branch sewer lines. For pipes above 300mm dia, the drop can be avoided by giving steps/ramps in the successive manholes.

3.5. Laying & Jointing of Pipe

The Pipe shall be laid as stipulated in I.S: 783 – 1983. After setting out the pipes the collars shall be centered over the joint and filled in with tarred gaskin, so that sufficient space is left on either side of the collar to receive the mortar. The space shall then be filled with cement mortar 1:2 (1 cement: 2 fine sand) and caulked by means of proper tools. All joints shall be finished at an angle of 45 degree to the longitudinal axis of the pipe on both sides of the collars neatly.

3.6. Pipe Bedding

All pipes laid in underground trenches shall be provided with proper bedding. The bedding shall be decided on site conditions such as type of soil and its extent of water contents, super imposed load etc.

Sewage Treatment Plant and Intermediate Pumping Station (IPS)

It is proposed that the treatment plant will be constructed using SBR and MBBR technology as this technology is efficient in treatment and easy in installing. Two intermediate pumping stations (IPS) and one lift station has been proposed to pump the sewage.

3.7. Effluent Disposal

To reduce the fresh water demand treated effluent will be used:

1. For Horticulture
2. For Flushing in Group Housings, Commercial areas etc.
3. In cooling towers/AC Plants (PSP Areas to be considered only)

Makeup water for cooling towers most of the treated effluent will be utilized and remaining treated water is proposed to be disposed in the existing drain in the project area.

4. DRAINAGE SYSTEM

Introduction

A separate piped storm water drainage network apart from sewerage system has been proposed in the development area. The design criteria to be followed for design of Storm Water Drainage network should be broadly based on the recommendations as laid down in the CPHEEO Manual of Sewerage and Sewage Treatment issued by Ministry of Urban Development, Government of India and as per provisions laid down in the relevant I.S. codes.

Buildings and structures are seriously damaged without proper and effective drainage system and the performance of the pavement can be seriously affected if adequate drainage measures are not taken to prevent accumulation of water on the pavement structure. The project falls under medium rain fall area and it experiences medium rainfall barring some exceptional periods. The intensity of rainfall in the area is not very high. Average annual rainfall is reported to be around 732 mm. 80% of this rainfall occurs in the July to September in approximately 27 days.

Since the drainage system is effectively used during three 3 months only, therefore the drainage system is proposed to be designed in such a way that it does not remain under-utilized during dry season and is also adequate to cater to optimum requirements.

4.1. Design Brief

The natural slope of site is towards the north western side. It is proposed to maintain and utilize the existing course of natural drainage system with only minor re-alignments, for the disposal of the storm

water runoff as per site conditions.

4.2. Approach for Planning

Considering the nature of activities to be conducted and the type of building to be developed within the area of Township, efforts in the approach for the planning of various systems, shall include the following considerations:

- Quick disposal of rainwater without flooding.
- To plan the systems in such a way as to minimize the energy requirements.
- To make the entire system efficient and cost effective.
- To have proper operation and maintenance system, which could be controlled centrally and efficiently
- To create minimum nuisance and disturbance to the environment.
- To assist in the development and aesthetic value of the environment and landscaping of the project.
- To recycle and reuse the runoff as maximum as possible, i.e. recharging the underground water sources.

4.3. Concept of Rain water Disposal

Underground pipe drains are proposed for the drainage system.

The surface runoff from the roads, open spaces and areas other than roof tops will be transported through the system to the nearest existing water body for harvesting and the overflow from the water bodies will be disposed of in the existing drain.

4.4. Runoff Generated

The total estimated runoff to be generated from the various parts of the township is 20cumec (approx). The Runoff coefficients given in Manual for Sewerage & Sewage Treatment (CPHEEO) and Manual on Rain Water Harvesting Govt. Of India should be adopted.

Norms Adopted

S.No.	Description	Norm Used
1.	Type of collection System	Separate System
2.	Design Period	- 30 Years for Sewers and appurtenances
3	Type of Drainage System	Piped with catch basins and manholes.
4	Design Intensity of rainfall	20 mm per hour
5.	Self cleansing Velocity	0.60 m/ sec
6.	Flow conditions in pipe	Running 90 % full
7.	Minimum size of pipe	200 mm
8.	Minimum depth of Sewer	0.6 M from ground
9.	Hydraulic Formula for calculation for design of sewer lines	Manning's formula $V= 1/n (R^{2/3} S^{1/2})$ V = Velocity R = Hydraulic mean depth = A/P S = Slope
10.	Manning's Co- efficient 'n'	0.011
11.	Shape of storm water sewers	Circular - RCC NP_2. Pipes shall be used wherever the depth of sewer is less than 4 m. For the stretches where the depth of the sewer is more than 4.0 m or where the sewer cross the trunk roads, RCC NP3 pipes shall be used.
12	Catch Basins and Manholes	Recatngular (500x450, 1200X900) and Circular Manholes shall be provided as per guidelines of CPHEEO Manual on Sewerage and Sewage Treatment.

5. RAIN WATER HARVESTING SYSTEM

Introduction

Due to urbanization of the land and sharp growth in population and thus increase in water demand of various uses, the water is becoming scarce in most regions of the area. In certain areas due to almost total dependency on the underground water, the wells and bore wells are getting deeper and deeper. Also due to increase in paved surface/roof areas, the amount of percolation of rain water is reducing drastically. It is estimated that millions liter of water flow out to the sea through streams and river which is of no use. Therefore, it has become very necessary to harvest the rain water as maximum as possible by turning the runoff inside the ground with suitable mechanism so that the ground water availability would enhance. The drainage system needs to be planned and designed keeping in view incorporation of rain water harvesting in the project area.

5.1. Systems of Rainwater Harvesting

Rainwater harvesting is essentially an old technology, which is gaining popularity in a new way. Out of the various techniques adopted in India, and approved by the Central Ground Water Authority, the following are the three main classes of the Rain Water Harvesting system

1. System that collect direct roof runoff for storage and then reusing for various purposes.
2. System that use in field or adjoining surface catchments to collect run-off and then impounded for irrigation, horticultural, recreational & domestic purposes, after treatment.
3. System that utilize the rain water run-off from various surfaces including Terrace and Roads and Green areas etc. for recharging of the underground aquifer, through various measures. In this system, the runoff from roof/ terrace areas is further segregated for direct recharging of aquifer through filter media.

5.2. Concept adopted for Rain Water Harvesting

As per the guidelines of U.P. Govt. the rainwater harvesting technique has been adopted in the township to recharge the ground water with the rooftop runoff.

1. A separate network has been laid for collective recharge of the rooftop runoff generated from the plot size greater than 100 sqm and less than 300 sqm. Rainwater from the rooftop will be brought to the recharge pit for harvesting (having capacity to hold 15 min of rainfall) and the overflow from the recharge pit has been diverted to the drainage system. As shown in the drawing.

2. For plot size greater than 300 sqm, group housing, commercials, public semi public buildings the rainwater harvesting technique shall be adopted within the plot.
3. Existing natural collectors of water like ponds, lakes etc will be conserved
4. The open spaces have been utilized for constructing collective recharge pit.

5.3. Recharge structures

The proposed Rainwater Harvesting Scheme should be designed to harvest the total average annual rain fall considering 20% losses due to Evaporation, spillage and first flush.

The depth of recharge pits should be 4.0 – 5.5 m and the diameter 3.0 - 5.0 m.

6. SOLID WASTE MANAGEMENT

Introduction

Solid Waste Management is an integral part of the environment management of each city and in new development areas and in their inherent activities. Due to rapid growth of urban population, as well as constraint in resources, the management of solid waste poses a difficult and complex problem for the society and its improper management greatly affects the public health and degrades environment. The disposal of solid waste requires land fill area, primary treatment or incineration as per the type of solid waste and their source of generation. Now days, it is tried to decompose the organic waste by composting technique and then send it to enhance the fertility of green fields. The evaluation of the Solid Waste Management in proposed Township is worked out on the basis of Gorakhpur Master Plan-2021.

In India, Solid Waste in urban agglomerations is a heterogeneous mixture of paper, plastic, cloth, metal, glass, earth, demolition matter, organic matter, bio-medical waste etc. generated from household, industries, hospitals, commercial institutions and contains solid waste generated in cities depending on its size, moisture content, density etc.

Proper disposal of the urban wastes is not only essential for reducing its adverse human health and environmental impacts, but also presents a large potential for resource recovery. Waste management systems include onsite-handling, storage, collection, transportation, processing and recovery and final disposal. With regard to the experience in India, there are many challenges in this area including analysis of quality and quantity of wastes, as well as appropriate institutional mechanisms.

6.1. Composition and Characteristics of Solid waste in Township

The composition of Solid Waste in Township could be categorized into the following broad categories

- **Organic waste:** kitchen waste, vegetables, flowers, leaves, fruits
- **Toxic waste:** old medicines, paints, chemicals, bulbs, spray cans, fertilizer and pesticide containers, batteries, shoe polish
- **Recyclable:** paper, glass, metals, plastics
- **Soiled:** hospital waste such as cloth soiled with blood and other body fluids

For Gorakhpur, it is found that rate of generation of Municipal Solid Waste is 0.554 kg/ capita/ day as. According to general survey, the composition of Municipal solid waste of Gorakhpur found that 55% of total waste can be compost and 13% of waste is Recyclable. The ratio of compost to non-compost solid waste is 21.56 and the calorific value is found out to 520 Kcal/kg with moisture content of 33-40%.

6.2. STP & ETP

Proper and necessary management of waste has to be initiated by the developer. It has to be ensured that optimal SEWAGE TREATMENT PLANT (STP) and EFFLUENT TREATMENT PLAT (ETP) has to be designed and installed by the developer in the township. Developer can take the concept of ESTP into consideration subject to approval from GDA.

7. PAVEMENT DESIGN

The crest of the pavement is primarily governed by intensity of loading to which it is subjected.

The surface of the roadway should be stable and non-yielding to allow the heavy wheel loads of traffic to move with least possible rolling resistance. Therefore, in order to provide stable and even surface for the traffic the roadway is provided with a suitably designed and constructed paved structure. Thus the pavement consists of required layers. These layers are constructed over a well-compacted soil base called sub grade. The pavement layers resist the wheel loads and transfer the load stresses through a wider area on sub grade and ultimately to a more wider area of the ground flexible pavement i.e. those which have low or negligible flexible strength and are flexible in their structural action under the roads, are designed as per IRC-37-1984.

7.1. Accident &Signage

Developer will take special care for resolution of accidents in the township with traffic safety mirrors, table tops, red light installations, radium strips, safety bollards, first aid installations and proper street

signage for every location in the township.

7.2. California Bearing Ratio Method

The design of pavement thickness is based on CBR values of soaked and remolded specimens prepared by dynamic compaction. They should be prepared at approximately 98% of maximum dry density determined by IS 2720-Part 8. The specimens are soaked continually for 96 hours and tested in electrically operated load frame at Soil laboratory as per IS 2720 – Part 16.

The details of the expected traffic like commercial vehicles per day (CVPD), number of non-commercial vehicles per day, number of fast moving vehicles per day, number of slow moving vehicles per day, total traffic intensity in tons per day, total (EPCU) shall be as per the IRC & 'MOST' guidelines.

7.3. Crust Thickness

The design crest thickness is arrived at based on CBR, values and curves. The formula for predicting future traffic adopted is

$$A = [P(I+r)n+x] \times LDF$$

Where

A	=	Number of commercial vehicles per day for Design
P	=	Number of commercial vehicles per day at last count.
r	=	Annual growth rate of commercial traffic
n	=	Design life in year 3
x	=	Period between last count & completion of road in yrs.
LDF	=	Lane Distribution Factor = 2.0 (as per clause 3.2.4.2 for IRC-1984)

8. TELECOMMUNICATION

The convergence of telecommunication, computer, information and audio-visual services have a profound impact on society. Tremendous opportunities with growth oriented attitude in economy and business are continuously increasing for investment in telecommunication sector. It is expected that the telecommunication infrastructure in the near future shall open the doors of advancement of society with respect to spread of knowledge and motivator of economy of any city.

Telecom network has been proposed in such a way that the occupants of the house/ shops/ commercial places in the Township irrespective of their locations in the township will be provided with most advanced telecom facilities available in the world.

In the present age of telecommunication, every user wants swift connectivity as well as instant access to the internet to cut short precious time for these uses. Hence it has been planned to provide fixed live telephone connections, broad band communication by providing necessary infrastructure for this purpose. Mainly copper cable of sufficient size and capacity will be laid to provide the fixed telephone facility.

One length of PLB (Permanent Lubricated) HDPE pipe will be laid throughout the township on each roads and optical film cable of sufficient capacity will be pulled in this pipe.

Provisions have also been made to facilitate the users with the telecom facilities as per their requirement on the basis of different categories as mentioned follows:

- **Educational Institutions**
- **Commercial Complexes**
- **Residential Areas**

Broad Band facility shall also consist of

- **Voice telephony**
- **Data transfer facility (internet)**
- **Cable T.V.**

With the provision of this broadband facility the user shall be able to have access to all the above three facilities without any delay. Besides this, facility of intercom shall be provided for security process as well as to check the trespassers, with provision of video phone on request. (Copper cable shall be used for this purpose). The following are the length of different sizes of optical fibers in the township in three phases by each service provider:

S. No.	Particulars	Length Requirement(km)
i)	96 F Cable	4
ii)	48 F Cable	2
iii)	24 F Cable	3
iv)	12 F Cable	4
v)	6 F Cable	6

The Telecom Facility will be provided with the help of government and private parties like BSNL, AIRTEL, GIO, SIFY BROADBAND etc.

9. PROVISION OF CNG/LPG

The matter for the provision of CNG/LPG pipe network should be processed with the gas authorities and Torrent Gas Company. The development shall get the same after the detailed discussion with competent authority, so that the habitants get 24 hour uninterrupted gas supply.

10. POWER SUPPLY SYSTEM

General

The Electrical distribution network of the city shall be done through underground cable. Compact package units shall be installed for distribution of supply through feeder Pillars/ Sub Feeder Pillar/ Service Feeder Pillars. The DG Sets shall be installed for Essential Load.

10.1. Codes and Standards

Electrical equipment and system design, manufacture, installation, testing and commissioning shall comply with all latest applicable standards, regulations and codes.

BIS	Bureau of Indian Standards
IER	The Indian Electricity Rules
IEA	The Indian Electricity Act.

10.2. Basis of load Estimation

The load is estimated on following basis

Residential Plot	-	50W Per Sq. Mtrs.
Commercial Area	-	150W Per Sq. Mtrs.

General Hospital	-	150W PerSq. Mtrs.
Group Housing	-	50W Per Sq. Mtrs.

10.3. Diversity factor

The following diversity is considered on demand load.

a) For Residential Load - 0.50 on connected Load.

b) For Commercial Load - 0.75 on connected Load.

Transformer shall be provided in such a way that they are loaded upto 90% to feed the load.

10.4. 33/11KV Sub-Station

The supply shall be taken from UPPCL on One 220 KV substation and 12 No. 33/11KV Outdoor type Sub-Station shall be installed in centre location of Load. Construction and installation of the 33/11KV Sub-Station shall be made as per standard practice and norms of the U.P.P.C.L.

The industrial state shall be given additional 33/11 KV substations as per actual requirement. The commercial sectors/plots shall also be given 33/11 KV substations as per actual requirement in addition to above mentioned 12 Nos. 33/11 KV substations. Group Housing shall be given supply on 33KV feeders as per UPPCL norms.

33 KV Supply cable shall be laid underground. 33 KV Incoming supply will come from 220 KV Grid-Substation & for redundancy of supply two nearest 33 KV Sub-Station shall be inter connected by cable with providing of interlocked VCBs with Incoming supply.

10.5. 11/0.433 KV Package Sub-Station (Unitised Sub-Station)

11/0.433 KV Package Substation shall be installed in centre location of load. The rating of Package sub-Station shall be 63/100/250/400 KVA depending upon load requirement.

11 KV Supply cable shall be laid underground, 11 KV Incoming supply shall be connected from 33 KV Sub-Station, For redundancy of Supply two nearest Package Sub-Station shall be interconnected by cable with RMU (Ring Mains Unit) which is a part of Package Unit.

The Package Sub-Station will comprise the following equipments.

- RMU (Ring Mains Unit)- Two Isolator + One VCB.
- Transformer
- LT Distribution Board (One Incomer, Bus Bar and Outgoing feeders) Incomer shall be ACB and outgoing feeder shall be MCCB.
- MS enclosure with door fitted with above.

The unit is quite compact aesthetically pleasant and maintenance free. This will give rich look to the colony.

10.6. Supply Distribution

The voltage level of Power Supply shall be decided on following required load pattern:-

i) Load upto 56 KVA will be fed on three phase-4 wire LT Network.

ii) Load greater than 56 KVA and upto 4000 KVA will be fed on 11 KV Line.

iii) Load greater than 4000 KVA and upto 10000 KVA will be fed from 33 KV Line.

LT Supply distribution shall be done through feeder Pillars by underground Cable Laid from Package Sub Station LT side to Service Feeder Pillar and from Service Feeder Pillar to Load, the heavy load shall be directly fed from LT side outgoing.

The location of Feeder Pillar shall be centre location of load. Provision is made to install consumer meter in the feeder pillars.

The rating, Type and No. of Outgoings of Feeder shall be decided as per load requirement.

10.7. Street Lighting

LED Light Fixture shall be mounted on 7.5 M, 9.0M or 11 M swaged steel tubular plate for street lighting or GI type street light pole.

On 45 Mtrs wide and above road street light shall be provided with centre and opposite arrangement with double arm at the centre as well as on both side of road. The pole to pole distance will be 30m and the Wattage of the lamp will be 90W at the centre verge and 90W at the both side of the road. The Mounting height of the luminaries will be 11 m at the centre and 9m at the both side of the road.

On 30 Mtrs wide road street Light pole shall be provided on divider path only with two light fixture arrangement (Double Arm Type). The pole to pole distance will be 25m and the Wattage of the lamp will be 90W at the centre verge. The mounting height of the luminaries will be 11 m.

On 18 m Street light pole shall be provided with opposite arrangement on both side of road with single light fixture (Single Arm Type). The pole to pole distance will be 30m and the wattage of the lamp will be 150W. the mounting height of the luminaries will be 7.5 m

On 12 m street light pole shall be provided with staggered arrangement with single light fixture

(single Arm Type). The pole to pole distance will be 40 m and the wattage of the lamp will be 90W. The mounting height of the Luminaries will be 7.5 m

Street Light Feeder pillar shall be provided for automatic and in Group control of Street Light. The Incoming Supply of Street Light Feeder Pillar shall be connected from nearest LT Distribution feeder Pillar by underground Cable. 4 core underground Cable shall be laid from Street Light Feeder Pillar to Street Light pole. Timer arrangement shall be made for automatic On-Off of the street light Circuit. Street Light will be off for 12 hour and on for 12 hour automatically. In On duration all three phases will be on for time set, then two phase will be on for time set and then only one phase will be on for latter of the night.

10.8. Operation & Maintenance

The Street – Lighting shall be operated with timers located in the street light contribution boards/feeder pillars and shall operate as follows:

6 A.M. to 6 P.M.	-	Off Condition
6 P.M. to 10 P.M.	-	100% Lights on
10 P.M. to 2:00 P.M.	-	66% Lights on
2:00 P.M. to 6 A.M.	-	33% Lights on

This System shall facilitate the energy, saving and there would be no need to switch on the lights throughout the night. This shall also facilitate control of level of illumination with reference to the density of traffic. the distribution of street-lighting has been done on 3 phase system.

10.9. Distribution

The power of External lighting shall be distributed through MCB distribution boards (Feeder Pillars) which shall be located in different places at suitable locations. From the distribution boards, the street light poles and fixtures shall be connected through PVC insulated Aluminum conductor, XLPE armoured cable laid in ground. Cable sizes shall be designed after considering voltage drop and current carrying capacity of the Circuit.

10.10. Metering System

Residential development LT metering shall be provided by the developer for each apartment individually. In this case, the Sub Station shall be maintained by the community/ maintenance cell in locally electric supplying unit.

So, the requirement of Power supply capacity and its rating shall be depended on development of area and their demand of loads in different phases.

11. LANDSCAPE

Developer will create a comprehensive landscape plan to suit the township while keeping in mind all the constraints challenges and site centric approach. The following guidelines shall be kept in mind during the green development of the township.

1. The pit size for planting trees will be maintained at 45 cm x 45 cm x 45 cm.
2. Top soil removed from the project area shall be used for filling the pit will be mixed with well decomposed farm yard manure in the range of 2.0– 3.0 kg.
3. The filling of soil will be completed at least 7 days prior to the plantation.
4. Seedlings with good condition shall be identified and opted for plantation.
5. The distance between the trees shall be maintained at 2 m and underneath shrubs and herbs can be grown.
6. The plantation needs to be monitored regularly by watering, weeding, application of manure and impart proper protection.
7. Dead species will be replaced immediately

11.1. Guideline for tree plantation shall be referred from the following table:

LEGEND

TREE NAME	HEIGHT	SPACING (ROADSIDE/OPEN)	SYMBOL	NUMBER
Ficus virens (white Fig or Pilkhan)	15- 30 m	15- 30 m		23
Ficus benjamina (Weeping Fig or Ficus))	12- 18 m	18- 21 m		10
Ficus benghalensis (Banyan)	30 m	30 m		2
Neolamarckia cadamba, (Burflower-tree or Kadam)	45 m	6-12 m		142
Azadirachta indica (Neem)	15 - 20 m	5-10 m		41
Ficus religiosa (Sacred Fig,Pipal)	30 m	9-12 m		2
Pongamia pinnata (Honge Mara or Buddhafal)	15 - 25 m	3- 8 m		10
Polyalthia longifolia(False Ashok)	10 m	1.8- 2.5 m		156
Tectona Grandis (Teak Tree or Saugan)	7- 9 m	2- 4 m		108
Bombax Malabarica (Red Silk Cotton or Ragat Semal)	20-30 m	3- 3 m		16
Artocarpus heterophyllus (Jackfruit)	10-20 m	4- 7 m		34
Cinnamomum verum (True Cinnamon or Dalchini)	6- 8 m	2- 2 m		9
Syzygium cumini (Jamun or Java Plum)	10-30 m	10- 10 m		16
Mangifera indica (Mango trees)	15-30 m	3- 10 m		29
Sterculia Foetida (Wild Almond or Indian Almond)	35 m	6- 6 m		61
Terminalia chebula (Black Myrobalan or Harad)	30 m	6- 6 m		16
Tamarindus indica (Tamarind or Imli)	24-30 m	8-12 m		10
Eucalyptus globulus (Gum Tree or Eucalyptus)	45-55 m	2-3 m		275
Punica granatum (Pomegranate or Anar)	3-6 m	2-5 m		140
Existing Tree				

Cassia fistula (Indian laburnum or Amaltas)	10 - 15 m	6- 6 m		46
Michelia champaca (Champak)	30 m	3- 3 m		21
Saraca asoca (Ashoka/ Sita Ashoka)	7-10 m	8-12 m		47
Lagerstroemia speciosa (Pride of India Or Jarul)	20 m	8-12 m		88
Bauhinia variegata (Kachnar or Mountain Ebony)	10- 12 m	4- 8 m		63
Alstonia scholaris (Indian devil tree or Chitwan)	40 m	6- 6 m		3
Delonix regia (Gulmohar)	5- 12 m	4- 6 m		99
Jacaranda mimosifolia (Jacaranda or Neeli Gulmohur)	20- 30 m	9- 9 m		58
Mimusops elengi (Bullet wood or Maulshree)	15- 16 m	6- 9 m		6
Butea monosperma (Flame of the forest)	6- 12 m	10-15 m		9
Erythrina Indica (Tiger claw or Pangara or Coral Tree)	18- 25 m	6-10 m		17
Cassia javanica (Pink Shower or Rainbow Shower Tree)	25 - 40 m	9-12 m		61
Samanea Saman (Woman's Tongue or Rain Tree)	15- 25 m	18-30 m		2
Spathodea campanulata(African tulip tree or Rugtoora)	9- 12 m	2- 8 m		4
Millingtonia hortensis (Indian Cork Tree or Akashneem)	18- 25 m	7-11 m		17
Plumeria Kubra (Temple Tree or Gulachin)	7- 8 m	3-6 m		17
Bougainvillea	1- 12 m	1.5-3 m		17