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ಅಧಿಕೃತವಾಗಿ ಪ್ರಕಟಿಸಲಾದುದು

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ಭಾಗ – ೬ ಎ Part –VI A	ಮೈಸೂರು, ಶುಕ್ರವಾರ, ೧೪, ಮಾರ್ಚ್, ೨೦೨೫(ಫಾಲ್ಗುಣ, ೨೩, ಶಕವರ್ಷ, ೧೯೪೬) MYSURU, FRIDAY, 14, MARCH, 2025(PHALGUNA , 23, SHAKAVARSHA, 1946)	ನಂ. ೦೧ No. 01

MANGALURU CITY CORPORATION

NOTIFICATION

(No: NaAE 54 MMC 2023(E) Bengaluru date: 05-02-2025)

In exercise of powers conferred under section 295 and 423 of The Karnataka Municipal Corporation Act 1976, The Mangaluru City Corporation makes the draft Building bye-laws and same was sent to government for approval. The Government of Karnataka in exercise of powers conferred under a section 425 of KMC act 1976 has approved the Mangaluru City Corporation Building bye-laws 2025 (Draft) vide Notification No: NaAE 54 MMC 2023(E) Bengaluru date: 05-02-2025

Further, the draft building bye-laws have been published in the state gazette and local newspapers and a copy of the same is kept at the Corporation Office for public inspection for a period of 30 days under section 426 of KMC act 1976 and all persons are permitted to peruse the same during the office hours free of charge. And printed copies of the draft building bye-laws are available on payment of 600/- rupees to Corporation Office. The draft Building bye-laws is also available in website www.mangalurucity.mrc.gov.in .

(Ravichandra Naik, K.A.S)

Commissioner

Mangaluru City Corporation

DRAFT MANGALURU CITY CORPORATION BUILDING BYE-LAWS 2025

CHAPTER-1

1. Title, commencement and application-

(1) These Byelaws may be called the Mangaluru City Corporation Building Bye-laws 2025

(2) They shall come into force three months after final publication in the official Gazette.

(3) All mandatory Master Plan or Zonal Regulations regarding use, land use, coverage, FAR, setback or open space, height, number of stories, number of dwelling units, parking standards etc. for various categories of buildings including modification therein made from time to time shall be applicable mutatis mutandis in these Byelaws under this clause. All amendments or modifications made in the aforesaid regulations shall automatically stand deemed to have been included as part of these Byelaws.

CHAPTER-2

2. Definitions

1) **'Access'** – means a clear approach to a plot or a building.

2) **'Act'**- means the Karnataka Municipal Corporations Act, 1976.

3) **'Addition and/or Alteration'**- means a structural change including an addition to the area or change in height or the removal of part of building, or any change to the structure, such as the construction or removal or cutting of any wall or part of a wall, partition, column, beam, joist, floor including a mezzanine floor or other support, or a change to or closing of any required means of access ingress or egress or a change to fixtures or equipment as provided in these Byelaws.

4) **'Agriculture'** includes horticulture, farming, growing of crops, fruits, vegetables, flowers, grass, fodder, trees of any kind or any kind of cultivation of soil, breeding and keeping of livestock including cattle, horses, donkeys, mules, pigs, fish, poultry and bees, the use of land which is ancillary to the farming of land or any purpose aforesaid but shall not include the use of any land attached to a building for the purpose of garden to be used along with such building; and 'agriculture' shall be construed accordingly.

5) **'Air-conditioning'**- The process of treating air so as to control simultaneously its temperature, humidity, purity, distribution and air movement and pressure to meet the requirements of the conditioned space.

6) **Amalgamation'** means clubbing of two or more building sites into one.

7) **'Amenity'** as defined in the KUDA Act.

8) **'Annexure'** means the Annexure appended to these Byelaws;

9) **''Apartment'** Whether called block, chamber, dwelling unit, flat, suit, tenement, unit or by any other name, means a separate and self-contained part of any immovable property, including one or more rooms or enclosed spaces, located on one or more floors or any part thereof, in a building or on a plot of land, used or intended to be used for residential purpose.

10) **Group Housing** means one or more buildings, each containing more than Eight Apartments

11) **'Appendix'** means Appendix appended to these Byelaws.

12) **'Application'** means an application made in such form as may be prescribed herein or as notified by the Government from time to time

13) **'Applicant'** means any person who applies to the Local Authority with an intention to develop building as per these Byelaws. The Applicant shall be the owner of the property or his authorised representative or a promoter authorised by the owner.

14) **'Approved'** means as approved/sanctioned by the Authority under applicable Byelaws

15) **'Architect'**- means a person registered as an architect under the provisions of the Architects Act, 1972 (20 of 1972)

16) **'Auditorium'** means Premises having an enclosed space to seat audience and stage for various performances such as concerts, plays, music etc.

17) **'Authority'**- means Mangaluru City Corporation and which, for the purpose of administering / undertaking the various functions specified in these Byelaws, may authorize the Commissioner or any other designated officer of Local Body to act on its behalf; hereinafter called the 'Authority'.

18) **'Balcony'** means a horizontal projection with a handrail or balustrade, to serve as passage or sit out place.

19) **'Basement storey or cellar'** means any storey, which is partly / wholly below the average ground level contiguous to the building, with one or more than one level. The basement height should not project more than 1.2m above the average ground level.

20) **'Bifurcation'** means sub-division of a building site into two.

21) **'Building**'- means a structure constructed with any materials whatsoever for any purpose, whether used for human habitation or not, and includes: -

i. a house, out-house, stable, privy, shed, hut, wall, verandah, fixed platform, plinth, doorstep and any other such structure, whether of masonry, bricks, wood, mud, metal or any other material whatsoever;

ii. a structure on wheels simply resting in the ground without foundation;

iii. a ship, vessel, boat, tent and any other structure used for human habitation or used for keeping or storing any article or goods

iv. Foundation, plinth, walls, floors, roofs, chimneys, plumbing and building services, fixed platforms etc.

v. Verandahs, balconies, cornices, projections etc.

vi. Parts of a building or anything affixed thereto

vii. Any wall enclosing or intended to enclose any land or space, sign and outdoor display structures; etc.,

viii. Tanks constructed or fixed for storage of chemicals or chemicals in liquid form and for storage of water, effluent, swimming pool, ponds etc.,

ix. All types of buildings as defined in (a) to (k) below, except tents, shamianas and tarpaulin shelters erected temporarily for temporary purposes and ceremonial occasions, shall be considered to be 'building'.

Types of Buildings based on use of premises or activity:

a) '**Residential Building**'- includes a building in which sleeping and living accommodation is provided for normal residential purposes, with cooking facilities and includes one or more family dwellings, apartments/flats, and private garages of such buildings.

b) **Educational Building'**- Includes a building exclusively used for a school or college, recognized by the appropriate Board or University, or any other Competent Authority involving assembly for instruction, education or recreation incidental to educational use, and including a building for such other uses as research institution. It shall also include quarters for essential staff required to reside in the premises, and building used as a hostel captive to an educational institution whether situated in its campus or outside.

c) **'Institutional Building'**- Includes a building constructed by Government, Semi Government Organizations or Registered Trusts and used for medical or other treatment, or for an auditorium or complex for cultural and allied activities or for an hospice, care of persons suffering from physical or mental illness, handicap, disease or infirmity, care of orphans, abandoned women, children and infants, convalescents, destitute or aged persons and for penal or correctional detention with restricted liberty of the inmates ordinarily providing sleeping accommodation and includes Dharamshalas, hospitals, sanatoria, custodial and penal institutions such as jails, prisons, mental hospitals, houses of correction, detention and reformatories etc.

d) **Assembly Building'**- means a building or part thereof, where groups of people (not <50) congregate or gather for amusement, recreation, social, religious, patriotic, civil, travel and similar purposes and this includes buildings of drama and cinemas theatres, drive-in theatres, assembly halls, city halls, town halls, auditoria, exhibition halls, museums, kalyana mantapas, 'mangal karyalayas', skating rinks, gymnasia, restaurants, eating or boarding houses, places of worship, dance halls, clubs, gymkhanas and road, railways, air, sea or other public transportation stations and recreation piers.

e) **'Business Building'**- Includes any building or part thereof used principally for transaction of business and/or keeping of accounts and records including offices, banks, professional establishments, court houses etc., if their principal function is transaction of business and/or keeping of books and records.

f) **Commercial/Mercantile Building'**- Includes a building or part thereof used as shops, stores or markets for display and sale of wholesale and or retail goods or merchandise, including office, storage and service facilities incidental thereto and located in the same building

g) **'Industrial Building'**- Includes a building or part thereof wherein products or material are fabricated, assembled or processed, such as assembly plants, laboratories, power plants, refineries, gas plants, mills, dairies and factories etc.

h) **'Storage Building'**- means a building or part thereof used primarily for storage or shelter of goods, wares, merchandise and includes a building used as a warehouse, cold storage, freight depot, transit shed, store house, public garage, hanger, truck terminal, grain elevator, barn and stables.

i) **'Hazardous Building'**- Includes a building or part thereof used for storage, handling, and manufacture of processing of radioactive substances or highly combustible or explosive materials or of products which

are liable to burn with extreme rapidity and/or producing poisonous fumes or explosive emanations. And storage, handling, manufacture or processing of which involves highly corrosive, toxic or noxious alkalis, acids, or other liquids, gases or chemicals producing flame, fumes and explosive mixtures etc. or which result in division of matter into fine particles capable of spontaneous ignition.

j) '**Mixed Land Use Building'**- means a building partly used for non-residential activities and partly for residential purpose.

k) '**Wholesale Establishment'**- means an establishment wholly or partly engaged in wholesale trade and manufacture, wholesale outlets, including related storage facilities, warehouses and establishments engaged in truck transport, including truck transport booking agencies.

Types of building based on design:

a) 'Detached Building'- means a building with walls and roofs independent of any other building and with open spaces on all sides within the same plot

b) 'Semi-detached Building'- means two buildings, together having not more than 4 dwelling units with a maximum of G+1 floor, attached to each other with a common wall and each building having setbacks only on three sides.

c) 'Row Housing' – means two or more dwelling units with a maximum of G+1 floor, in a row attached to each other, where the intermediate dwelling units have only front and rear setbacks and the dwelling units on the extreme ends have setbacks on three sides.

Types of building based on height:

a) B1- means residential buildings of G+1 floors up to 4 dwelling units

b) B2- means all buildings up to G+2 floors other than B1 buildings and Industrial buildings

c) B3- means all low-rise buildings other than B1 & B2 buildings and Industrial buildings.

d) B4- means all high-rise buildings (multi storey buildings) other than Industrial buildings.

e) B5- means all Industrial buildings

Types of building based on other features:

a) '**Multi-Level Car parking'**- means a building partly below ground level having two or more basements or above ground level with two or more floors, primarily to be used for parking of cars, scooters or any other type of light motorized vehicle.

b) . '**Unsafe Building'**- Includes a building which:

i. Is structurally unsafe, or

ii. Is insanitary, or

iii. Is not provided with adequate means of ingress or egress or

iv. Constitutes a fire hazard or

v. Is dangerous to human life or

vi. In relation to its existing use, constitutes a hazard to safety or health or public welfare by maintenance, dilapidation or abandonment.

Note: All unsafe buildings /structure will require be restoring by repairs, demolition or dealing with as directed by the Local Authority. The relevant provisions of the Act shall apply for procedure to be followed by the Local Authority in taking action against such buildings

22) **'Building line'** means the line upto which the plinth of building may lawfully extend within the plot on a street or an extension of a street and includes the line prescribed, if any in the Master Plan or Town Planning scheme. No portion of the building may extend beyond this line. (Except as specified in ZR)

23) **'Building Site'** means a site held for building purposes, approved as per Section 17 of KTCP Act.

24) **'Bus Depot**' means a premise used by public transport agency or any other agency for parking, maintenance and repair of buses. These may include the workshop.

25) **'Bus Terminal'** means a premise used by public transport agency to park the buses for short duration to serve the public. It may include the related facilities for passengers.

26) **'Canopy'**- shall mean a cantilevered projection from the face of the wall over an entry to the building at the lintel or slab level provided that:

i. It shall not project beyond the plot line.

ii. It shall not be lower than 2.3 m. or 7'- 6' when measured from the ground.

iii. There shall be no structure on it and the top shall remain open to sky

27) **'Carpet Area'** means the net usable floor area of an apartment or commercial premises, excluding the area covered by the external walls, areas under services shafts, exclusive balcony or verandah area and exclusive open terrace area, but includes the area covered by the internal partition walls of the apartment/ commercial premises.

28) **'Chajja'** means a continuous sloping or horizontal cantilever projection provided over an opening or external wall to provide protection from sun and rain.

29) **'Chimney'** means a structure usually vertical containing a passage or flue by which the smoke, gas, etc. of a fire or furnace are carried off by means of which a draught is created.

30) '**Common Wall'** means a wall built on land belonging to adjoining owners, the wall being the joint property of both owners.

a) If two adjoining owners build a dividing wall on their property, they are not common walls and no part of the footings of either wall shall project on to the land of the adjoining owner, except by legal agreement between the owners. And

b) Any such 'common' or 'dividing' wall shall be considered for the purpose of these Byelaws, as being equivalent to an external wall as far as the thickness and height are concerned.

31) **'Community Hall'** means congregational place to be developed by government or local bodies, trust, society, having a hall without separate kitchen and dining.

32) **'Competent Authority'** means any state of central government authority which has jurisdiction / authority over the areas / activities specified in the Building Byelaws, whose Rules, Regulations, Terms and Conditions shall prevail over the Building Byelaws, wherever applicable

33) **'Construction'** means; Any erection of a structure or a building, including any addition or extension thereto either vertically or horizontally, but does not include any repair and renovation of an existing structure or building, or, construction, maintenance and cleansing of drains and drainage works and of public latrines, urinals and similar conveniences, or, the construction and maintenance of works meant for providing supply of water for public, or, the construction or maintenance, extension, management for supply and distribution of electricity to the public; or provision for similar facilities for publicity.

34) **Contractor'** means the agency executing the works of any of the components of the building or land, on behalf of the owner / Promoter, who is required to be registered under these Byelaws.

35) **'Conversion of Occupancy'**- means the change from one occupancy to other occupancy or any change in building structure or part thereof resulting in a change of space and use requiring additional occupancy certificate should comply with the provisions of section 14 and 14-A of the KTCP Act and after obtaining permission under section 301 of KMC Act,1976"

36) **'Corner Plot'** means a Building site facing two or more intersecting streets/roads.

37) **'Corridor'** means a common passage or circulation space connecting separate rooms or different parts of the same building including a common entrance hall.

38) **'Cornice'**- means a sloping or horizontal structural overhang usually provided over openings or external walls to provide protection from sun and rain.

39) **'Courtyard'** means a space permanently open to sky, enclosed fully or partially by buildings and maybe at ground level or any other level either in the interior or exterior of a building within the site.

40) **'Cultural buildings'** means a building built by a Trust, Society, Government or Local body for cultural activities.

41) **'Damp Proof Course'**- means a course consisting of some appropriate water proofing material provided to prevent penetration of dampness or moisture.

42) **'Density of Households'** means number of dwelling units per hectare

43) **'Density of Population'** means concentration of population expressed in terms of number of persons per hectare in a particular area.

44) **'Development'** with its grammatical variations means the carrying out of building, engineering, mining or other operations in, or over or under land or water, or the making of any material change in any building or land (including compound wall) or in the use of any building or land and includes sub-division of any land.

45) **DR/T.D.R.'** – means Development Rights or Transfer of Development Rights available for plots as prescribed under Section 14B of KTCP Act and the Rules framed thereof.

46) **'Drains'** as defined in KMC Act,1976.

47) **'Drainage system'** – means a system or a line of pipes, with their fittings and accessories, such as manholes, inspection chambers, traps, gullies, floor traps used for drainage of building or yards appurtenant to the buildings within the same cartilage for conveying surface water or a system for the removal of any waste water.

48) **'Duplex'** means a dwelling unit in two levels connected with an internal staircase.

49) **'Dwelling'**- means a building or a portion thereof which is designed or used wholly or principally for residential purposes for one family.

50) **'Encroachment'**- means an act to enter into the possession or rights either of permanent or temporary nature on a land or built-up area of a private property or local body or state/central Government.

51) **'Existing development'** means all developments (including buildings) which existed before coming into force of the Karnataka Municipal Corporations Act 1976, and all approved developments thereafter (including building) and which are completed or under development at the time of commencement of these Byelaws.

52) **'Existing development'** means all developments (including buildings) which existed before coming into force of the Karnataka Municipal Corporations Act 1976, and all approved developments thereafter (including building) and which are completed or under development at the time of commencement of these Byelaws.

53) **'Existing Use'**- means use of a building or structure existing before the commencement of these Byelaws.

54) **'Exit'** means a passage channel or means of egress from the building, its storey or floor to a street or, other open space of safety; whether horizontal, outside and vertical exits meaning as under: -

i. Horizontal exit means an exit, which is a protected opening through or around afire well or bridge connecting two or more buildings.

ii. Outside exit mean an exit from building to a public way to an open area leading to a public way or to an enclosed fire-resistant passage leading to a public way, and

iii. Vertical exit means an exit used for ascending or descending between two or more levels including stairway, fire towers, ramps and fire escapes.

55) **External Wall'** means the outer wall of the building not being a partition wall, even though an adjoining wall of another building and also a wall abutting on an interior open space of any building.

External wall of an apartment or commercial premises means the outer wall of the apartment or commercial premises, even though an adjoining wall of another apartment or commercial premises.

56) **'First floor'** means the floor immediately above the ground floor or stilt, on which second and other floors follow subsequently

57) **'Flatted factory'** 'means premises having Green and White industrial units, as specified by KSPCB and these units may be located in multi-storeyed industrial buildings.

58) **'Floor'** means the lower surface in a storey on which one normally walks in a building

59) **'Floor Area'** means the area in each floor considered for calculating the FAR utilised in the building.

60) **'Floor Area Ratio (FAR)'** means the quotient of the ratio of the combined gross floor area of all the floors, excepting areas specifically, exempted under the Zonal Regulations, to the total area of the plot. Viz.

Floor Area Ratio =	Total floor area of all the floors.
	Plot Area

61) **'Fire and/or Emergency Alarm System'**- means Fire alarm system comprises of components for manually or automatically detecting a fire, initiating an alarm of fire and initiating other actions as appropriate.

62) '**Fire Hazard Industries'**-

i. 'Low Fire Hazard Industries' includes engineering industries using/processing or assembling non-combustible materials i.e. lathe machines, steel works, steel components etc.

ii. Moderate Fire Hazard Industries includes industries using / processing combustible materials but not flammable liquid etc., plastic industries, rubber, and PVC industries, textile, paper, furniture, flour mills etc.

iii. 'High Fire Hazard Industries' includes industries using/processing flammable liquids, gases, chemicals petroleum products, plastic or thermo setting group etc.

63) **'Fire Lift'**- Means a special lift designed for the use of fire service personnel in the event of fire or any other emergency.

64) '**Fire Proof Door'**- Means a door or shutter fitted to a wall opening, and constructed and erected with the requirement to check the transmission of heat and fire for a period.

65) '**Fire Pump'**- Means a machine, driven by external power for transmitting energy to fluids by coupling the pump to a suitable engine or motor, which may have varying outputs/capacity but shall be capable of having a pressure of 3.2 kg/ cm^2 at the topmost level of multi-storey or high-rise building.

66) '**Fire Pump-Booster Fire Pump'**- Means a mechanical/electrical device that boots up the water pressure at the top level of a multi-storey / high-rise building and which is capable of a pressure of 3.2 kg/cm^2 at the nearest point.

67) **'Fire Resistance'**-Fire resistance is a property of an element of building construction and is the measure of its ability to satisfy for a stated period, some or all of the following criteria:

a) Load bearing capacity (Stability) The ability of a load bearing element to withstand fire exposure without any loss of structural stability.

b) Integrity Resistance to penetration of flame and hot gases.

c) Insulation Resistance to temperature rise on the unexposed face up to a maximum of 180°C at any single point and average temperature of 140°C.

68) **'Fire Resistance Rating**- The time that a material or construction will withstand the standard fire exposure as determined by fire test done in accordance with the standard methods of fire tests of materials/ structures as per the accepted standard as specified in Part IV of NBC.

69) **'Fire Separation'**- Means the distance in meters measured from any other building on the site or from another site, or from the opposite side of a street or other public space to the building.

70) '**Fire Brigade Inlet'**- Means a connection provided at the base of a building for pumping up water through in-built fire-fighting arrangements by fire service pumps in accordance; with the recommendation of the Chief Fire Officer.

71) '**Fire Tower'**- Means an enclosed staircase that can only be approached from the various floors through landings or lobbies separated from both the floor area and the staircase by fire resistant doors and open to the outer air.

72) **'Fire Resisting Building'**- means a building in which material, which has, appropriate degree of fire resistance is used.

73) **Footing**'- means a foundation unit constructed in stone masonry or concrete under the base of a wall or column for the purpose of distributing the load over a larger area.

74) '**Form**' means a Form appended these Byelaws.

75) '**Foundation**' means that part of structure which is below the lowest floor and which provides support for the superstructure and which transmits the load of the superstructure to the bearing strata.

76) '**Frontage**' means the width of the site/land abutting the access/public road.

77) **Gal1ery**'- means an intermediate floor or platform projecting from a wall of an auditorium or a hall providing extra floor area, and or additional seating accommodation and includes the structures provided for seating in stadia.

78) '**Garage-Private'**- means a building or a portion thereof designed and used for the parking of vehicle.

79) '**Garage-Public**' – means a building or portion thereof, designed other than as a private garage, operated for gain, designed and/or used for repairing, servicing, using, selling or storing or parking motor driven or other vehicles.

80) '**Gas Go down**' means premises where LPG cylinders are stored.

81) **Government**' means the Government of Karnataka.

82) '**Ground Floor**' As defined in the Zonal Regulations.

83) '**Ground Coverage**' means area covered by the building immediately above the ground level contiguous to the building. Covered area does not include the space covered by ramps around the building, roof of basement floor beyond the plinth of the building projecting above the ground level, structures for services permitted in the setback area, garden, rocky area, well and well structures, plant, nursery, water pool, swimming pool (if uncovered) platform around a tree, tank, fountain, bench with open top and unenclosed sides by walls cut outs and ducts which are open to sky and the like drainage, culvert, conduit, catch-pit, gully-pit, chamber gutter and the like, within the site, compound or boundary wall, gate, unstoreyed porch and portico, Chejja, slide, swing, uncovered staircase, watchman booth, pump house and the like within the site.

84) '**Habitable Room**' means a room occupied or designed for occupancy by one or more persons for study, living, sleeping, Eating, cooking but does not include bathrooms water closet compartments, laundries serving and storage pantries, corridors, cellars, and spaces that are not used frequently or during extended periods.

85) **'Head room'** means the clear space between the finished floor level and ceiling/ beam bottom. Minimum headroom shall be 2.4m.

86) **'Heritage building'** Heritage Building" means a building possessing architectural, aesthetic, historic or cultural values which is declared as heritage building by the Planning Authority or any other competent authority within whose jurisdiction such building is situated

87) **'Heritage Precinct'** means an area comprising heritage building or buildings and precincts thereof or related places declared as such by the Planning Authority or any other Competent Authority within whose jurisdiction such area is situated.

88) **'High-rise Building'** means a building defined as High Rise Building in the Zonal Regulations of the Master Plan of Mangaluru.

89) **'Height of Building'** Building, Height of — The vertical distance measured, in the case of flat roofs from the average level of the ground around and contiguous to the building or as decided by the Authority to the terrace of last livable floor of the building adjacent to the external walls; and in the case of pitched roofs, up to the point where the external surface of the outer wall intersects the finished surface of the sloping roof, and in the case of gables facing the road, the midpoint between the eaves level and the ridge. Architectural features serving no other function except that of decoration shall be excluded for the purpose of measuring heights.

90) **Hospital**: means a premise providing medical facilities of general or specialized nature for treatment of in-patient and out-patients.

91) **Hotel:** means Premises used for lodging with payment, with or without boarding facilities.

92) **'Illuminated Exit Signs**'- means a device for indicating the means of escape during normal circumstances and power failure.

93) **'Land use'** includes the purpose to which the site or part of the site or the building or part of the building is in use or permitted to be used by the Authority. Land use includes Zoning of land use as stipulated in the Master Plan and the Zonal Regulations.

94) **'Licence'** means a valid permission or authorization in writing by the LocalAuthority to carryout development of building or a work regulated by these Byelaws.

95) **'Licensed Professional''** means Qualified professionals who have been registered with the Local Authority as per the Qualification and Competence as notified by the government.

96) **'Lift'** means an appliance designed to transport persons or materials between two or more levels in a vertical or substantially vertical direction by means of a guided car platform. The word 'elevator' is also synonymously used for 'lift'.

97) **'Lobby'**- means a covered space in which all the adjoining rooms open.

98) **'Lodging House'** means a premise used for lodging on payment. This is synonymous to hotel

99) **'Loft'** means a residual space above normal floor level which may be constructed or adopted for storage purposes.

100) **'Market value'** means the guideline value of the land notified under section 45B of the Karnataka Stamp Act, 1957

101) **'Master Plan'** means Master Plan prepared for the local planning area approved by the government under the Karnataka Town and Country Planning Act, 1961. which is in force.

102) **'Means of Escape'**- means an escape route provided in a building for safe evacuation of occupants.

103) **'Mezzanine Floor'** As specified in Zonal Regulations.

104) **'Multilevel Car Parking (MLCP)'** means multilevel structure used for car parking connected to all floors by means of ramps / mechanical elevators. MLCP can be an independent structure or part of a building with other land uses. However, in the portion used for parking, no other land uses shall be permitted.

105) **'Multiplex complex'** means a building accommodating more than one auditorium and an entertainment and cultural centre including food courts, restaurant, shops;

Explanation. - In case of Multiplex Complex, the portion of the permanent building used for the purpose of Cinema theatres, auditorium including the areas for all ancillary uses such as projector room, toilets, entrance/exit lobbies/corridors, food kiosks/cafes/ canteens attached to the theatre, ticket counters shall only be considered;

106) **'MCB/ELCB'** means Devices for tripping of electrical circuits in event of any fault in the circuit or installation.

107) **'Non-Combustible Material'**- means a material which is not liable to burn or add heat to a fire when tested for combustibility in accordance with the latest code of Bureau of Indian Standards Method of Test for combustibility of Building Materials.

108) **Nursing home** means A premises having medical facility for in-patients and out patients, having up to 30 beds, it shall be managed by a doctor or a group of doctors.

109) **'Occupancy or use'**-means the principal occupancy or use for which a building or a part of a building is intended to be used. For the purposes of classification of a building according to occupancy, occupancy shall be deemed to include the subsidiary occupancies which are contingent upon it.

'Mixed occupancy' buildings being those in which more than one occupancy is present in different portions of the buildings.

110) **'Open space in a plot'** means an area forming an integral part of the plot, left open to sky.

111) **'Owner'** A person, a group of persons or a body having a legal interest in land and/or building thereon.

112) **'Parapet'** means a low wall or railing built along the edge of a roof or a balcony.

113) **'Parking space'** means an area enclosed or unenclosed, covered or open sufficient in size to park vehicles together with a drive-way connecting the parking space with a public street or any public area and permitting the ingress and egress of the vehicles.

114) **'Partition'** means an interior non-load bearing barrier, one storey or part-storey in height.

115) **'Partition Wall'** includes (i)A wall forming part of a building and being used or constructed to be used in any part of the height or length of such wall for separation of adjoining buildings belonging to different owners or constructed or adopted to be occupied by different persons; or ii) A wall forming part of a building and standing in any part of the length of such wall, to a greater extent than the projection of the footing on one side or ground of different owners.

116) **'Plinth**' means the portion of a structure between the surface of the surrounding ground and surface of the floor immediately above the ground.

117) **'Plinth Area'** means the built-up covered area of the building/ buildings immediately above plinth level.

118) **'Plinth Level'** means the level of the floor of a building immediately above the surrounding ground.

119) **'Plot'** means as defined under section 17 of KTCP Act.

120) **'Porch or Portico**' means a roof cover supported on pillars or cantilevered projection for the purpose of pedestrian or vehicular approach to a building without any structure above.

121) **'Premium F.A.R.** shall be as defined in the Karnataka Town and Country Planning Act 1961 or the notified Rules.

122) **'Premises'** in a building means any portion of the building used for specific use other than the common areas of the building and includes dwelling units.

123) **'Professional on record'**- means an Architect/Competent Professional who is brought on record to represent his/her client for a construction project, to act on their behalf regarding Building Licences and process of construction.

124) **'Prohibited area'** means any area specified or declared to be a prohibited area under section 20A of the Ancient Monuments and Archaeological Sites and Remains Act, 1958 (Central Act 24 of 1958).

125) **'Promoter'** means **–**

a) A person who constructs or causes to be constructed an independent building or a building consisting of Apartments, or converts an existing building or a part thereof into Apartments, for the purpose of selling all or some of the Apartments to other persons and includes his assignees; or

b) A person who develops land into a project, whether or not the person also constructs structures on any of the plots, for the purpose of selling to other persons all or some of the plots in the said project, whether with or without structures thereon; or

c) Any development Authority or any other public body in respect of Allottees of –

i. Buildings or Apartments, as the case may be, constructed by such Authority or body on lands owned by them or placed at their disposal by the Government; or

ii. plots owned by such Authority or body or placed at their disposal by the Government; for the purpose of selling all or some of the Apartments or plots, or

d) An Apex State level co-operative housing finance society and a primary co-operative housing society which constructs Apartments or buildings for its members or in respect of the Allottees of such Apartments or buildings; or

e) Any other persons who acts himself as a builder, coloniser, contractor, developer, estate developer or by any other name or claims to be acting as the holder of a power of attorney from the owner of the land on which the building or apartment is constructed or plot is developed for sale; or

f) such other person who constructs any building or apartment for sale to the general public

Explanation *– For the purpose of this clause, where the person who constructs or converts a building into apartments or develops a plot for sale and the persons who sells apartments or plots are different persons, both of them shall be deemed to be the promoters and shall be jointly liable as such for the functions and responsibilities specified, under RERA Act or the rules and regulations made there under;*

For the purpose of this clause, Apartment, whether called block, chamber, dwelling unit, flat, office, showroom, shop, go down, premises, suit, tenement, unit or by any other name, means a separate and self-contained part or an immovable property, including one or more rooms or enclosed spaces, located on one or more floors or any part thereof, in a building or on a plot of land, used or intended to be used for any residential or commercial use such as residence, office, shop, showroom or go down or for carrying on any business, occupation, profession or trade or for any other type of use ancillary to the purpose specified;

This is synonymous to Developer.

126) **'Protected monument'** means an ancient monument which is declared to be of national importance by or under the Ancient Monuments and Archaeological Sites and Remains Act, 1958 (Central Act 24 of 1958).

127) **'Public and semi-public building'** means a building which is for Public and Semi-Public uses specified as per the Zonal Regulations.

128) **'Pump room'** means the room provided below ground level adjacent to the sump tank to house various types of pumps with self-priming mechanism. However, the entrance shaft of the pump room of maximum 2 m x 2 m may be permitted above the ground level.

129) **Recreational Club'** means a premise used for assembly of a group of persons for social and recreational purposes with all related facilities.

130) **'Regulated area'** means any area specified or declared under section 20B under the Ancient Monuments and Archaeological Sites and Remains Act, 1958 (Central Act 24 of 1958).

131) **'Repair Shop'** means a premise similar to retail shop for carrying out repair of house hold goods, electronic gadgets, automobiles, cycles etc.,

132) **'Restaurant'** means a premise used for serving food items on commercial basis including cooking facilities, with covered or open space or both having seating facilities.

133) **'Retail Shop'** means a premise for sale of commodities directly to the consumer with necessary storage.

134) **'Retention Activity'** means an activity or use which is allowed to continue, notwithstanding its non-conforming nature in relation to the use permitted in the adjoining or surrounding area.

135) **'Road/Street'** shall be as defined in KMC Act 1976.

a) The roadway over any public bridge or causeway;

b) The footway attached to any such street, public bridge or causeway; and

c) The drains attached to any such street, public bridge or causeway and the land, whether covered or not by any pavement verandah or other structure which lies on either side of the roadway up to the boundaries of the adjacent property, whether that property is private property or property belonging to the Government or the Corporation.

136) **'Road/Street Level or Grade'** shall be as defined in the Zonal regulations.

137) **'Road/Street Line'** means the line defining the side limits of a road/street, where existing road width is considered and the road widening line where proposed road width is considered.

138) **'Road Width or Width of Road/Street'** means the right of way/distance between the boundaries of the property on either side of the road including, carriageway, footways, service road at same level or at different level and storm water drains as laid down in the city survey or Master Plan or the prescribed road lines by any act of law and measured at right angles to the course or intended course of direction of such road. In case of sides facing a T-junction or at the intersection of multiple roads, the width of the road parallel to the side of the plot shall be considered.

139) **'Room Height'** means the vertical distance measured from the finished floor surface to the finished ceiling surface. Where a finished ceiling is not provided, the underside of the joists or beams or tie beams shall determine the upper point of measurement.

140) **'Service Apartments'** means fully furnished room or suite or rooms with kitchen, which is intended to be used on rental basis.

141) **'Service Road'** means a road / lane provided adjacent to a plot for access or service purposes as the case may be and shall be parallel to the main road and may or may not be at grade with the main road and shall be partly or fully falling within the proposed road width of the main road.

142) **'Setback'** means the distance prescribed under the Zonal Regulations of the Master Plan of Mangaluru, between the plot boundary and the plinth of the building or the covered Cantilever projection of the building in any floor. If cantilever projection of the building is proposed, the prescribed setback shall be provided between the plot boundary and such covered cantilever projection.

143) **'Set-back Line'** means a line drawn at the setback distance, parallel to the plot boundaries or road widening line as prescribed in the Master Plan / Zonal Regulations beyond which nothing can be constructed towards the plot boundaries in any floor except as prescribed in the Zonal Regulations.

144) **'Site Plan'** means a detailed Plan showing the proposed placement of structures, parking areas, open space, landscaping, and other development features, on the plot as required by specific sections of these Byelaws.

145) **'Solar Assisted** Water **Heating System'** means a device to heat water using solar energy as heat source.

146) **'Spiral Staircase'** means a staircase forming continuous winding curve round a central point or axis provided in an open space having tread without risers.

147) **'Staircase room'** means a room accommodating the stair and for purpose of providing protection from weather and not used for human habitation.

148) **'Stair Cover'** means a structure with a covering roof over a staircase and its landing built to enclose only the stairs for the purpose of providing protection from weather and not used for human habitation.

149) **'Stilt floor'** As specified in Zonal Regulations.

150) **'Storey'** means the space between the surface of one floor and the surface of the other floor vertically above or below. The minimum floor to floor height shall not be less than 2.9m.

151) **'To Erect'-** in relation to a building means:

a) To erect a new building on any plot whether previously built upon or not;

b) To re-erect any building of which portions above the plinth level have been pulled down, burnt or dismantled.

152) **'TPO'** means an officer on deputation from the Department of Town and Country Planning.

153) **'Un-authorised Development'**- means the erection or re-erection, addition or alternations which is not approved or sanctioned by the Competent Authority or as prescribed by the Government.

154) **'Underground/Overhead Tank'** means an installation constructed or placed for storage of water.

155) **'Utility Area'** means a covered area with at least one side open to the outside with the exception of 1m high parapet on the upper floors to be provided on the open side.

156) **'Ventilation'**- means Supply of outside air into, or the removal of inside air from an enclosed space.

a) Natural Ventilation – means Supply of outside air into a building through window or other openings due to wind outside and convection effects arising from temperature or vapor pressure differences (or both) between inside and outside of the building.

b) Positive Ventilation – means the supply of outside air by means of a mechanical device, such as a fan,

c) Mechanical Ventilation – means supply of outside air either by positive ventilation or by infiltration by reduction of pressure inside due to exhaust of air, or by a combination of positive ventilation and exhaust of air.

157) **'Water Closet (W.C)'**- means water flushed plumbing fixture designed to receive human excrement directly from the user of the fixture. The term is used sometimes to designate the room or compartment in which the fixture is placed.

158) **'Window'**- means an opening to the outside other than a door, which provides all or part of the required natural light or ventilation or both to an interior space and not used as a means of egress/ingress.

159) **'Zonal Regulations'** means the regulations of the Master Plan governing land use and developments. Words and expressions used in these bye laws but not defined shall have the same meaning as defined in KTCP Act & KMC Act

CHAPTER -3

3. JURISDICTION, APPLICABILITY AND PROCEDURAL REQUIREMENTS FOR OBTAINING BUILDING LICENCE

3.1 Jurisdiction of Building Byelaws

These Building Byelaws shall apply to the building activity within Mangaluru City Corporation

3.2 Applicability of Building Byelaws

These building byelaws shall be applicable to all building activities under taken by private or Government agencies and read in conjunction with the Master plan /Metropolitan development plan or any other statutory plan in force, if any, and notifications, if any, with regard to the same and as amended from time to time and these building bye-laws may be reviewed after five years. Till such time the reviewed building bye laws are notified, these building bye laws will continue to be in force.

Notwithstanding any of the terms and conditions specified in the Building Byelaws, if any requirements / conditions specified / imposed by the Competent Authority is applicable or if any approval from the Competent Authority has to be obtained, for the development of buildings, as per the requirements of the Competent Authority, such requirements / conditions shall be followed or such approvals shall be obtained, as the case may be, for the development of the buildings

3.3 Applicability of Byelaws for all types of building developments

Except hereinafter or otherwise provided, these Byelaws shall apply to all development, redevelopment, erection and/or re-erection of a building whether temporary or permanent as well as to the design, construction of, or reconstruction and additions and alterations to a building.

3.4 Applicability of Byelaws for Part construction

Where the whole or part of a building is demolished or altered or reconstructed, except where otherwise specifically stipulated, these Building Byelaws shall apply only to the extent of the work involved.

3.5 Change of use or occupancy

3.5.1 Where use of a building is changed, except where otherwise specifically stipulated, these Building Byelaws shall apply to all parts of the building affected by the change.

3.5.2 If such change of use or occupancy is proposed during the course of construction which is in accordance with the zonal regulations the procedure prescribed for revised licence shall be followed and revised license should be obtained.

3.5.3 Any change of use or occupancy shall be permitted in a building after obtaining Occupation Certificate, in case the changes proposed in the use or occupancy of the building satisfies all requirements of these Byelaws, the Master Plan &Zonal Regulations subject to compliance of Section 14 & 14-A of KTCP Act, 1961, wherever applicable.

In such cases, the Owner shall submit revised drawings of the proposed change in use or occupancy and submit the same to the Local Authority for revised licence. Such revised licence shall be issued only after following the procedure prescribed for obtaining new Building Licence. The fees as specified in **Appendix VII** shall be collected before issuing revised licence."

3.6 Requirement in respect of building sites

3.6.1 Damp Site

Wherever the dampness of a site or the nature of the soil renders such precautions necessary, the ground surface of the site between the walls of any building erected thereon shall be rendered damp-proof to the satisfaction of the Local Authority

3.6.2 Minimum Size of Site

The minimum size of sites for the construction of different types of building or different use groups shall be in accordance with provisions of the Master Plan, Zonal Regulations and Section 17 of KTCP Act 1961

3.6.3 Sanction for Building Sites

The building sites shall have sanction under Section 17 of KTCP Act 1961from the Planning Authority before sanction is accorded under these Byelaws.

3.6.4 Restrictions on use of land for construction of buildings

No piece of land shall be used as a site for the construction of buildings under the following circumstances

a) if the site is not drained properly or is incapable of being well drained;

b) if the Local Authority considers that the site is insanitary or it is dangerous to construct a building on it;

c) if the building is proposed on any area filled up with filthy and offensive matter without a certificate from the Health Officer and Corporation Engineer to the effect that it is fit to be built upon from health and sanitary point of view;

d) if the owner of the land has not shown to the satisfaction of the Local Authority that all the measures required to safeguard the construction from constantly getting damp are being taken;

e) if it violates any provisions of Section 17 of KTCP Act 1961 or any provisions of Zonal Regulations

Note: *If the proposed use of the building on the plot does not conform to the land use proposals of the Master plan or Zonal Regulations, permission from the Planning Authority for the change of land use has to be furnished.*

3.7 Renovation / Retrofit / Demolition

3.7.1 Permission under these Byelaws shall not be given for renovation / retrofit in whole or part of a building which has ceased to operate due to fire, natural collapse or demolition having been declared unsafe, or which is likely to be demolished by or under an order of the Local Authority as the case may be and for which the necessary certificate has been given by the Local Authority. However, in case of buildings that are damaged partially due to fire and which can be restored may be permitted for renovation/ retrofit after verification that the building or portion of the building is not declared as unsafe building.

3.7.2 DEMOLITION OF BUILDING

Before a building is demolished, the owner shall notify all agencies having service connections within the building, such as water, electric, gas, sewer and other connections. A permit to demolish a building shall not be issued until a release is obtained from the agencies stating that their respective service connections and appurtenant equipment, such as meters and regulators have been removed or sealed and plugged in a safe manner. The owner shall, until notice thereof is given to the Commissioner, that the building is demolished is liable for the payment of the property tax for which he would have been liable had the building not been demolished or destroyed.

3.8 Existing Buildings

3.8.1 Existing approved Buildings

Nothing in these Byelaws shall require the removal, alteration or abandonment nor prevent continuance of the lawfully established use or occupancy of an existing approved building unless, in the opinion of the Local Authority such a building is unsafe or constitutes a hazard to the safety of adjacent property or to the occupants of the building itself.

3.9 Development of Buildings

3.9.1 Building Licence

No person shall erect, re-erect or make addition/ alterations in any building or cause the same to be done without, first obtaining a separate building license for each such building from the Local Authority

3.9.2 Building Licence obtained before these Byelaws:

Where any building licence which has been issued by the Local Authority before the commencement of these Building Byelaws and where construction is in progress and has not been completed within the specified period from the date of such licence, the said permission shall be deemed to be sanctioned under these Byelaws and shall only be eligible for payment of validation extension fee there under. Accordingly, where the

validity of sanction has expired, and construction has not commenced, construction shall be governed by the provisions of these Building Byelaws and building licence has to be obtained as per these Building Byelaws.

Provided that, if the building construction could not commence due to the orders of any competent court of law, the construction may be permitted to commence as per the licensed plan, within three months of clearance obtained from the court.

3.10 Procedure for obtaining building licence

3.10.1 Registration of Stake Holders

The following Stake Holders involved in the development activities in the ULB shall register themselves with the Local Authority, as per the procedure prescribed in **Appendix-I**

a) Promoters/ Developers who intend to undertake developments within the jurisdiction of the Local Authority.

b) Land owners who intend to undertake any building activity as per these Byelaws

c) Professionals for preparing plans and details for obtaining sanction from the Local Authority (as detailed in **Appendix-II**) and NOCs from different departments (as detailed in **Appendix-IV**), referred as professionals for drawings.

d) Professionals who intend to supervise the implementation of various components specified in the plans sanctioned by the Local Authority, referred as professionals for supervision.

e) Professionals who are licensed by the Local Authority (as detailed in **Appendix-I**) to inspect the constructions / implementations as per the provisions of the approved plans.

f) Contractors or Agencies implementing major components of the developments.

3.10.2 Application for building plan approval:

Every person (Owner or his authorised representative, including Promoter / Developer) who intends to erect, re-erect or make alteration in any place in a building or demolish any building, shall apply in **Form-I** along with the required documents (as detailed in **Appendix-VI**) and payment of necessary fees (as detailed in **Appendix-VII**) along with all the drawings and details for obtaining building licence prepared by the professionals on record for drawings (as detailed in **Appendix- II**). The Applicant shall submit Common application containing details of **Form-I** or **Form-II,** as applicable, for obtaining the required NOCs, along with the drawings and details for obtaining NOCs from other departments as applicable (as detailed in **Appendix-IV**) and payment of necessary fees (as detailed in **Appendix-VII**).

3.10.3 Verification of documents submitted:

The Commissioner of the Local Authority shall verify the documents submitted along with the application and if found in order, will accept the application. In case of any discrepancy, an endorsement shall be issued in Form-III to the applicant stating the discrepancy and the applicant may rectify the same and resubmit to the Local Authority.

3.10.4 Evaluation of Technical details submitted:

(1) If the application is accepted after finding that the documents submitted along with the application are in order, the TPO of the Local Authority as specified in these Byelaws shall evaluate the Technical drawing and details submitted by the Applicant, for compliance with the provisions of the Master plan, ZR and Byelaws and compliance of the conditions incorporated for obtaining NOCs from

different departments and submit the evaluation report to the Commissioner of the Local Authority, with noting of discrepancy, if any. The Commissioner shall approve the evaluation report with or without accepting the noting of discrepancy.

(2) In case the noting of discrepancy is accepted by the Commissioner, an endorsement shall be issued in **Form-IV** to the applicant stating the discrepancy and the concerned Licensed Professional may rectify the same and resubmit to the Local Authority

3.10.5 Forwarding details to obtain NOCs and issuing NOCs:

(1) If the Technical drawing and details submitted are complying with the provisions of the Master Plan, ZR and Byelaws and the requirements for obtaining NOCs from different departments, the Commissioner of the Local Authority shall forward the application, technical drawings and details submitted for NOCs to the concerned departments stating the timelines within which the NOCs have to be issued, (as detailed in **Appendix-IV**), failing which the NOCs would be deemed to have been issued.

(2) All the respective departments shall verify the drawing and details submitted along with the application of the NOC and if found in order shall issue NOC within the timelines as notified by government, with or without site inspection, as required and forward the NOC to the Local Authority.

(3) In case of any discrepancy, the concerned department shall issue endorsement to the applicant stating the discrepancy and the applicant through the concerned Licensed Professional may rectify the same and resubmit to the concerned Department.

3.10.6 Submission of Site Inspection Report

(1) If the Technical drawings and details submitted are accepted by the Commissioner, Commissioner shall select the licensed professional (based on the qualification and competence and the procedure specified in **Appendix-V**) and inform the licensed professional in **Form-V** to inspect the site and submit Site Inspection Report for approval of site plan.

(2) On receipt of intimation from the Local Authority, the selected licensed professional shall inspect the site and submit site inspection report (as detailed in **Appendix-IX**) in **Form-VI** to the Local Authority, with noting of discrepancy, if any. The Commissioner shall approve the site inspection report

3.10.7 Action in case of discrepancy in site inspection report.

If any discrepancies are noted in the site inspection report and endorsement in **Form-VII** to the applicant stating the discrepancy shall be issued and the applicant shall through the licensed professional rectify the same and resubmit to the local authority.

3.10.8 Sanctioning of Building Licence

(1) On receipt of all the required NOCs from the concerned departments, or deemed NOCs issued by the Local Authority (in case NOCs are not issued by the concerned departments within the timelines as notified by government) and all the technical drawings and details accepted by the Local Authority and the Site Inspection Report being consistent with the details submitted by the applicant, the Commissioner shall sanction the Building Licence within the timelines as notified by government

(2) The Local Authority shall intimate the Applicant to pay the required fees (as specified in **Appendix-VII** for the various NOCs as well as the Building Licence.

(3) The Commissioner of the Local Authority shall hand over the various NOCs received from the concerned departments and sanction building licence after receiving the required fees from the Applicant.

3.10.8.1 Sanctioning of permission for demolition of buildings

The Applicant shall submit application for demolition of building along with the following details;

1. Key Plan
2. Site Plan
3. Building floor plans showing the area of existing building to be demolished
4. Estimated quantity of C&D Waste expected in the various categories of waste
5. Details of process of reuse, recycle and disposal of C&D Waste generated
6. release order obtained from the agencies stating that the respective service connections and appurtenant equipment, such as meters and regulators have been removed or sealed and plugged in a safe manner.
7. Latest tax paid certificate

3.11 Plans for Sanction

1) All Building plans submitted to the Local authority shall be prepared as per the Jurisdictional Master Plan, Zonal Regulations, Section 17 of KTCP Act 1961, Building Byelaws and the conditions of the various NOCs required for the building.

2) The drawings and details have to be submitted for the different types of buildings (B1, B2, B3, B4 and B5 Buildings) as follows;

3.11.1 Key Plan (For all types of Buildings):

The key plan to be submitted along with the application shall be the related portion of the approved road map of the Local Authority on which the plot (on which Building sanction is applied for) is located (As detailed in **Appendix-IIA**).

3.11.2 Site Plan (For all types of Buildings): (As detailed in **Appendix-IIB)**

3.11.3 Floor Plan of parking areas (For all types of Buildings) (As detailed in **Appendix-II C)**

3.11.4 Floor Plan of other uses (For all types of Buildings) (As detailed in **Appendix-II D)**

3.11.5 Sections of buildings (For all types of Buildings) (As detailed in **Appendix-II E)**

3.11.6 Elevations of buildings (For all types of Buildings) (As detailed in **Appendix-II F)**

3.11.7 Drawings for all services provided

a) Electrical system including energy saving measures and use of renewable energy (For B3, B4 & B5 Buildings) (As detailed in **Appendix II-Ga**)

b) Water supply system including water conservation measures (For B3, B4 & B5 Buildings) (As detailed in **Appendix II-Gb**)

c) Rain water harvesting and ground water recharging systems (For all types of Buildings) (As detailed in **Appendix II-Gc**)

d) Sewerage system including STP and usage of treated water (For all types of Buildings specified in Table11.1) (As detailed in **Appendix II-Gd**)

e) HVAC System (For B2, B3, B4 & B5 Buildings wherever centralised HVAC system are proposed) (As detailed in **Appendix II-Ge**)

3.11.8 Landscape plan (Buildings for which Table 15.1, 15.2 & 15.3 are applicable) (As detailed in **Appendix-II-H)**

3.11.9 Circulation Plan indicating vehicular and pedestrian movement and parking facilities including traffic impact study and report (Buildings for which Table 15.2 & 15.3 are applicable) (As detailed in **Appendix-II-I**)

3.11.10 Structural Drawings and details (For B2, B3, B4 & B5 Buildings) (As detailed in **Appendix-II-J**)

3.11.11 Green Building drawings and details (Buildings for which Table 11.1 is applicable) (As detailed in **Appendix-II-K**)

3.12 Signing of plans

3.12.1 Signing the Building Plans:

All plans for submission to the Local Authority shall be signed by the owner(s) and by the Competent professionals on record (to prepare the required plans for sanction) for the building

3.12.2 Signing of plans for NOC:

All plans for submission to different departments for NOC shall be signed by the owner(s) and by the competent professionals on record (to prepare the required plans for NOCs) for the construction project.

3.13 Alteration / Modification / Addition in Plans

The concerned professional on record for preparing the particular plan which has to be altered, modified or added, shall make the necessary changes and submit to the Local Authority as detailed in **Clause 3.15.5** with joint validation of applicant along with an application in **Form-I** and payment of required fees.

3.13.1 Alterations exempted from obtaining building licence

No building licence is necessary for the following alterations, which do not otherwise violate any provisions regarding general building requirements, structural stability and fire safety requirements of these Byelaws;

a) Plastering and patch repairs;

b) Re-roofing or renewals of roof including roof of intermediate floors at the same specifications and height;

c) Flooring and re-flooring;

d) Opening and closing of windows, ventilators and doors not opening into other properties and / or public road/property;

e) Replacing fallen bricks, stones, pillars, beams etc.

f) Construction or re-construction of sunshade not more than 75cm in width within one's land and not overhanging over a public street;

g) Construction or re-construction of parapet not more than 1.5 m. in height and also construction or re-construction of boundary wall as permissible under these Byelaws;

h) White-washing, painting, etc. including erection of false ceiling in any floor at the permissible clear height provided the false ceiling in no way can be put to use as a loft etc.;

i) Reconstruction of portions of buildings damaged by storm, rains, fire, earthquake or any other natural calamity to the same extent and specification as existed prior to the damage provided the use conforms to provisions of Master Plan/Zonal Regulations;

j) Erection or re-erection of internal partitions (within the specific premise) provided the same are within the purview of the Byelaws.

Note: Any of the above activities in a building, shall not be permitted in the portion falling within the proposed road widening line.

3.14 Fees for sanction of Building licence

Every person intending to construct or reconstruct or alter any building shall pay to the Local Authority, the various fees prescribed in **Appendix-VII.** The Local Authority or the Government shall prescribe the rate of fees, time to time.

Provided wherever the fee is fixed by the Local Authority the approval of the Government for the same is to be sought by the Local Authority**.**

3.15 Sanction

3.15.1 Sanction by the Authority

3.15.2 The Local Authority shall issue the commencement certificate in **Form-III** of the Karnataka Planning Authorities Rules, 1965 and sanction the building plan by signing the Building Licence and the drawings.

3.15.3 Grant of Licence or Refusal

(1) The Local Authority shall either sanction or refuse sanction to the plans and specifications or may sanction them with such modification or directions as he may deem necessary as per these Byelaws.

(2) In case where the building scheme requires the clearance of an Urban Art Commission, whenever constituted for the city, the Local Authority shall issue the building license only after getting the clearance from the Urban Art Commission.

(3) The licence shall be issued by the Local Authority for the different types of buildings within the timelines as notified by government, failing which the sanction shall be deemed to have been accorded, provided that the failure to sanction the licence by the Local Authority within the timelines is immediately brought to the notice of the Local Authority in writing by the person who has applied for licence. On receiving such intimation from the applicant, if the Commissioner fails to issue the licence within seven days, the licence shall be deemed to have been sanctioned and issued by the Local Authority. In such an event, the applicant shall submit an affidavit & undertaking to the Local Authority stating that drawings and details submitted by him

for obtaining licence are prepared as per the provisions of the jurisdictional Master plan, Zonal Regulations and these Building Byelaws and all other applicable laws, including those related to NOCs issued for the project and he would execute the works as per such drawings and details submitted and the applicable laws and he shall be responsible for any violations or deviations. Nothing shall be construed to authorize any person to do anything in contravention or against the terms of the lease or title of the land or against any regulations, Byelaws or ordinance operating at the time of execution of the work at site.

(4) It is further clarified that:

a) The above provision of deemed sanction shall be applicable only in those cases where the building plan are in conformity with the Master Plan/Zonal Regulations/Byelaws/ Section 17 of KTCP Act 1961.

b) No application under **Clause3.10.2** shall be valid unless the information required by the Local Authority under these Byelaws or any further information which may be required has been furnished to the satisfaction of the Local Authority and

3.15.4 Duration of Sanction, Revalidation and revised Sanction

(1) Once a building licence is sanctioned, the duration of Sanction, revalidation and revised sanction shall be as prescribed in **Appendix-X;**

Provided that, if the construction is not completed within the timelines prescribed in **Appendix-X**, the applicant shall pay the required fee as prescribed in **Appendix-VII** for extension of validation of licence.

(2) The project shall be completed within the timelines prescribed in **Appendix-X.** The validity period of sanction shall be extended as specified in **Appendix-X** in case of additions / alterations proposed in the project or for any other reason specifically mentioned. If multiple blocks / buildings are proposed in the sanctioned plan, a schedule of executing the blocks in sequence has to be specified and the timelines for completing each of the multiple blocks shall be permitted accordingly as specified in **Appendix-X**.

(3) If the Applicant intends to avail extension for the validity period of the sanction, he shall make an application stating the reason for not completing the project within the validity period and the validity of sanction shall be extended for one year after paying the fees for extension of validation as prescribed in **Appendix-VII.**

(4) If the building is not completed within the period of revalidation, he may avail further extension of the validity period after repeating the procedure specified in clause **3.15.4(3).**

(5) Revalidation shall not be permitted if the construction has not commenced within the validation period of two years from the date of sanction. In such cases the Applicant has to apply for revised sanction as per the Master Plan / Zonal Regulation and Building Byelaws as in force at the time of application of revised sanction

3.15.5 Revised Licence during the course of construction:

a) The Applicant has to apply for revised building licence if the Applicant intents to make changes from the sanctioned plans in any or all of the following, but within the provisions of the Zonal Regulations, Section 17 of KTCP Act 1961, and these Byelaws;

   i. Setbacks

   ii. Coverage

   iii. FAR

   iv. Car parking

b) The Local Authority shall issue revised licence after collecting the fees as prescribed in **Appendix VII** before issuing the Occupancy Certificate.

c) If the revised licence is applied during the execution of work of the building for which revised licence is applied, then construction of the portion of the building for which revised licence is sought for, shall not be commenced unless the revised licence is issued by the Local Authority.

3.15.6 Revocation of Licence:

a) The Local Authority shall revoke any building licence issued under the provisions of these Byelaws, wherever there has been any false statement, misrepresentation of material facts in the application on which the building licence was based or if during construction it is found that the Owner has violated any of the provisions of these Building Byelaws or sanctioned plan or compoundable limits. Revised sanction of building plans and occupancy certificate shall be taken from the Local Authority after bringing the building within the framework of Master Plan/ Zonal Regulations/Building Byelaws.

b) Any construction made in violation of Master Plan / Zonal Regulations / Building Byelaws / Section 17 of KTCP Act / Conditions of various NOCs issued, etc. based on the licence issued by providing false information / documents / details / drawings by the Applicant shall be considered as unauthorised and revised licence shall be issued only after such unauthorised portion of the constructions are demolished or regularised as per law. The Applicant shall not seek protection under the pretext that such unauthorised construction was made as per the licence issued.

3.15.7 Withdrawal of Building Licence:

If the Owner / Applicant decides not to construct the building for which Building Licence is obtained from the Local Authority, he may apply to the Local Authority to withdraw the Building Licence issued (if the construction of the building has not commenced and Licence is within the validation period). On receipt of such application for withdrawal of Building Licence, the Local Authority shall withdraw the Building Licence issued.

3.15.8 Qualification and Competence:

Qualification and competence of all professionals registered shall be as specified in Government Notification No. UDD 14TTP 2017 dated 30.10.2017.

3.16 Execution of works at site

3.16.1 Construction to be in Conformity with Byelaws

Owners' liability: Neither the granting of the permission nor the approval of the drawing and specification, nor inspection by the Local Authority or the licensed professional during erection of the building shall in any way relieve the Owner of the building or the promoter on behalf of the owner, from full responsibility for carrying out work in accordance with these Byelaws.

3.16.2 Commencement of work:

The owner, within the validity period of the building plan sanction given, shall start the construction work at the site for which building license has been granted, under the supervision of the licensed professional. The owner and the licensed professional with the required qualification/Competences specified in the Government Notification No. UDD 14TTP 2017 dated 30.10.2017 and subsequent modifications notified by the Government shall be required to follow the procedure during construction work as prescribed in these Byelaws.

3.16.3 Appointment of professionals on record for supervision

The owner, to whom a licence is issued, shall engage the services of the licensed professional to supervise the construction of the various components of the building, before the commencement of works at site and the licensed professional shall submit the Completion Report.

3.16.4 Intimation of commencement of work at site and issuing commencement certificate

(1) The applicant and the Licensed professional shall intimate the Local Authority within the 5th day of every three month from the date of sanctioning the building licence, that the construction work has not commenced at site, along with the letter of undertaking that the work has not commenced at site.

(2) The Applicant and the Licensed professional shall intimate the Local Authority at least one day before the commencement of works at site.

(3) The Commissioner shall issue Plinth Commencement Certificate in Form-VIII-A within seven days of receiving satisfactory inspection report from the designated officer regarding the commencement of foundation work at site.

3.16.5 Documents at Site:

(1) The person to whom a licence is issued shall, during construction, display in a conspicuous place on the exterior wall / fence near the entrance gate to the site, in **Form-IX**.

(2) The details specified in **Appendix-XI** shall be maintained in the site office throughout the period of construction, until Occupation Certificate is issued by the Local Authority and shall be available for verification of the Local Authority or the licensed professional appointed by the Local Authority for certification of works.

3.16.6 Procedure during construction

(1) The Applicant and the Licensed professional shall intimate the Local Authority, on the completion of various stages of construction

(2) On receiving the intimation from the Applicant**,** the designated officer of the Local Authority shall certify the stage of completion of work intimated.

(3) The designated officer of the Local Authority shall inspect the site and after checking the work completed as indicated, certify the same in **Form-X**

(4) During inspection, according to the designated officer of the Local Authority, if the work executed by the Applicant is not as per the approved plans, specifications and other provisions of these Byelaws, he shall intimate the Local Authority in **Form-X**, stating the defects in the works executed, along with the photos of such defective works.

(5) Local Authority shall issue endorsement to the Applicant in **Form-XI**, to rectify the defects.

(6) On receiving the endorsement from the Local Authority, the Applicant shall rectify the defects and intimate the Local Authority.

(7) According to the Applicant or the Licenced Professional if the defects mentioned in the endorsement is incorrect, the Applicant may file objection, to the Local Authority, stating the correctness of the works executed, along with the photos to prove the correctness, if required.

(8) If objection is received from the Applicant, the Commissioner shall conduct joint inspection along with the Applicant, the concerned Licenced Professional and the designated officer by giving notice to all, to conduct joint inspection within seven days of receiving objection.

(9) During the joint inspection, the Commissioner, after hearing the views of both the parties, shall either accept or reject the objection raised by the Applicant and instruct the Applicant accordingly after making his inspection report in **Form-XII** and the Applicant shall abide by the decision of the Local Authority and rectify the defects mentioned in **Form-XII**, if any, and intimate the same to the Local Authority.

(10) On receiving the intimation of defect rectification by the Applicant, the designated officer of Local Authority shall inspect and certify the rectified work.

12) The applicant/owner/developer and **Licenced Professional** shall take necessary precaution to control the epidemic/ communicative diseases like Malaria, Dengue etc.

3.16.7 Action against works executed without intimation and works not rectified

(1) Any works executed in the building without the certification of the preceding works specified in **Appendix-XII** and the works not rectified as intimated in **Form-X,** shall be liable for penalty as per the Provisions of KMC Act.

(2) In such cases, the owner or the promoter, as the case may be, and the Licenced professional shall also be liable for action as per the provisions of the KMC Act.

3.17 Safety measures to be taken during construction

The safety measures specified in Part VII of NBC 2016 and as per best practice of the construction industry shall be adopted by the applicant in the construction site during the construction period.

3.18 Completion of project and submitting Completion Certificate

3.18.1 Submitting Completion Certificate

(1) On completion of all works at site that have been certified by the designated officer as specified in **Appendix-XII**, as per the specifications and other provisions of these Byelaws, the **Licensed professional,** shall submit Completion Certificate in **Form-XIII**, along with the certification of Structural design and safety in **Form-XV**.

(2) In case of independent Residential Houses and Industrial buildings, the Licensed professional shall submit work Completion Certificate only if all the works within the building and the yard are completed.

(3) In case of other Residential and Non-Residential buildings, the **Licensed professional** shall submit work Completion certificate only if all the works are completed in the common areas of the building, the exterior of the building and services to be provided in the Apartments, Commercial and other Premises of the building are also completed.

3.18.2 Submitting Partial Completion Certificate.

(1) In case of partial completion of the building, partial work Completion Certificate may be submitted by the **Licensed professional** for the number of floors (starting from the lowermost floor moving upwards) upto

which all works of the common areas and exterior of the building are completed and services to be provided in the Apartments, Commercial and other Premises of those floors of the building are also completed.

In such cases, necessary Clearance Certificate or any other form of approval shall be obtained from the concerned Departments from which NOCs are obtained for issuing Building Licence (wherever there is a condition in the NOC to obtain Clearance Certificate or any other form of approval that has to be obtained from them before issuing Occupation Certificate to the Building or allowing occupation in the building), for such partial occupation of the building, before the Local Authority issues partial Occupation Certificate

3.18.3 Approval of works from other Departments

(1) The Licensed professional with the required qualification notified by the Government shall submit the required applications in **Form-II** (any or all of a, b, c, d, e, f, g, h, i and j, as applicable),for approvals from other departments for the construction done at site as per the NOCs issued (only in cases where the condition for obtaining clearance certificate / certificate for the approval of works done, is mentioned in the NOC).

(2) On receiving the Work Completion Certificate and the application to various departments for approving the works executed at sites as per the NOCs issued, the Local Authority shall intimate all the concerned Departments which have issued NOCs.

(3) On receiving the intimation from the Local Authority, the concerned Departments which had issued NOCs, shall issue the required Certificates of Approval for the construction done at site, wherever applicable, with or without site inspection.

(4) During the site inspection, according to the Designated Officer of the concerned Department, if any of the works executed at site is not as per the conditions/specifications of the NOC issued, he shall issue endorsement through the Authority, to the Applicant, along with the photographs of the defective works, to rectify the defects.

(5) On receiving the endorsement from such Departments through the Local Authority, the Applicant shall rectify the defects and intimate the concerned Department.

(6) According to the Applicant or the concerned licensed professional if the defects mentioned in the endorsement is incorrect, the Applicant may file objection, to the concerned Department and the Local Authority, stating the correctness of the works executed, along with the photos to prove the correctness, if required.

(7) If objection is received from the Applicant, the Commissioner shall conduct joint inspection along with the Applicant, the concerned licensed professional, the designated officer of the local authority and the Designated Officer of the concerned Department who has issued the endorsement for defective work, by giving notice to all, to conduct joint inspection within seven days of receiving objection.

(8) During the joint inspection, the Commissioner, after hearing the views of both the parties, shall either accept or reject the objection raised by the Applicant and instruct the Applicant accordingly after making his Inspection Report in **Form-XII** (copy of the same to be sent to the Designated Officer of the concerned Department) and the decision of the Commissioner shall be final. The Applicant shall abide by the decision of the Local Authority and rectify the defects mentioned in **Form-XII**, if any and intimate the Local Authority.

(9) On receiving the intimation of defect rectification by the Applicant**,** the designated officer of the local authority shall inspect the site and after checking the work rectified as indicated in **Form- XII,** certify the same in **Form- X**.

(10) The Local Authority shall forward the certification issued in **Form-X** by the designated officer of the concerned Department and the concerned Department shall issue the required Certificate of Approval for the construction done at site, with or without site inspection

3.19 Occupancy Certificate

On receiving the Completion Certificates from the applicant through the Licenced Professional and the necessary Approvals from the concerned Departments, wherever applicable, the Local Authority shall issue Occupancy Certificate in **Form-XIV** to the building constructed as per these Byelaws.

3.19.1 Occupancy or letting of the new buildings–

No person shall occupy or allow any other person to occupy any new building or part of a new building for any purpose whatsoever until Occupancy Certificate to such buildings or part thereof has been granted

3.19.2 Occupancy/ Part Occupancy Certificate for Phased Project-

In such cases where a project has not been completed at one stretch but constructed in different stages, part Occupancy Certificate for the building otherwise complete in all respects, may be issued subject to the condition that;

(a) part work Completion certificate is submitted by the licensed professionals.

(b) The remaining construction of the building is completed within the validity period or the extended validity period.

Connection to the Municipal Sewer / Water Mains and Power Supply system of MESCOM

1) Temporary connection for water, electricity or sewer, permitted for the purpose of facilitating the construction, shall not be allowed to continue in the premises without obtaining occupancy certificate.

2) No new connection to the Municipal Water Mains or to the Municipal Sewer line with a building shall be made without obtaining occupancy certificate and any existing connection provided for construction shall be disconnected if the building is occupied without Occupancy Certificate.

3) Permanent power supply to the building shall also not be provided to any new building unless the building has received Occupancy Certificate / Part Occupancy Certificate

4) In case the use is changed, or unauthorized construction is made, the Local Authority is authorized to discontinue such services or cause discontinuance of such services.

3.20 Changes to be made in the approved plans after the completion of the project:

1) If the owner/s who intend/s to make any changes / deviations in the building from the sanctioned plan, after the completion of the project, the owner/s through the Licenced Professional shall make the necessary changes and submit to the Local Authority with joint validation of Applicant along with an Application in **Form-I** and payment of required fees.

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2) Any such proposed changes from the sanctioned plans shall be as per the provisions of the Master Plan and its Zonal Regulations, these Byelaws or any other relevant laws.

3) The proposed changes shall be executed at site only after obtaining the approval for such modifications/changes from the Local Authority.

Note: The applicant for revised licence may be the Owner/s of the premises of the completed building or the Promoter who has developed the building.

3.21 Action in case of certain violations in the construction of Buildings

Till the time of demolition of additional area built violating the provisions of Zonal regulations, Local Authority may disconnect utilities such as water supply and Sewerage to the entire building and also order MESCOM to disconnect power supply to the entire building.

CHAPTER-4

4. DEVELOPMENT REGULATIONS

The provisions contained in Master Plan/Zonal Regulations shall apply and where these are silent on such issues or which require interpretation, the norms as decided by the Authority, shall apply. The provisions include but are not limited to the use/activity of premises, ground coverage, FAR, setbacks, open space, height and parking standards for Residential premises on plotted development, Group housing, Resettlement colonies, Slums, In-situ up gradation, Non-residential premises. The permission of uses/use activities in use premises shall be permitted in accordance with provisions of Master Plan and Zonal Regulations. The object of these regulations is to provide control for building/buildings within use premises excluding the internal arrangement, which is covered and controlled by Building Byelaws.

CHAPTER – 5

5. GENERAL BUILDING REQUIREMENTS AND SERVICES

5.1 Requirements for Parts of Buildings

5.1.1 Plinth

5.1.1.1 The plinth or any part of a building or outhouse shall be so located with respect to the surrounding ground level that adequate drainage of the site is assured. The height of the plinth shall be not less than 450 mm from the surrounding ground level, in case of independent houses and not less than 300mm in case of other buildings

5.1.1.2 Interior Courtyards and Covered Parking: Every interior courtyard shall be raised at least 150 mm above the determining ground level and shall be satisfactorily drained.

5.1.2 Habitable Rooms

5.1.2.1 Height

The clear height of all rooms for human habitation shall not be less than 2.75 m measured from the surface of the floor to the lowest point of the ceiling (bottom of slab) provided that the minimum clear headway under any beam shall not be less than 2.4 m. In the case of pitched roof, the average height of rooms shall not be less than 2.75 m. The minimum clear head room under a beam, folded plates or eaves shall be 2.4 m. In the case of air-conditioned rooms, a height of not less than 2.4mmeasured from the surface of the floor to the lowest point of air-conditioning duct or the false ceiling shall be provided.

5.1.2.2 The requirements of **clause 5.1.2.1** shall apply to residential, business and mercantile buildings. For educational and industrial buildings, the following minimum requirements apply:

Table 5.1Minimum height requirement for educational and industrial buildings

Sl. No	Type of Occupancy	Ceiling height
1	Educational Buildings	Ceiling height 3.6m for all regions
2	Industrial Buildings	Ceiling height 3.6m, except when air-conditioned, 3m (Factory Act 1948 and Rules therein shall govern such heights, where applicable)

5.1.2.3 Size

The area of habitable room shall not be less than 9.5 Sqm, where there is only one room with a minimum width of 2.4 m. Where there are two rooms, one of these shall not be less than 9.5Sqm and the other not less than 7.5Sqm, with a minimum width of 2.1 m.

5.1.3 Kitchen

5.1.3.1 Height

The height of a kitchen measured from the surface of the floor to the lowest point in the ceiling (bottom of slab) shall not be less than 2.75 m, except for the portion to accommodate floor trap of the upper floor.

5.1.3.2 Size

The area of a kitchen where separate dining area is provided shall be not less than 5.0 Sq. m with a minimum width of 1.8 m. Where there is a separate store, the area of the kitchen may be reduced to 4.5 Sq. m. A kitchen, which is intended for use as a dining area also, shall have a floor area of not less than 7.5 Sq. m with a minimum width of 2.1 m.

5.1.3.3 Other Requirements

Every room to be used as kitchen shall have:

a) Unless separately provided in a pantry, means for the washing of kitchen utensils which shall lead directly or through a sink to a grated and trapped connection to the waste pipe

b) An impermeable floor

c) A flue, if found necessary

5.1.4 Bathrooms and Water-Closets

5.1.4.1 Height

The height of a bathroom or water-closet measured from the surface of the floor to the lowest point in the ceiling (bottom of slab) shall not be less than 2.1 m.

5.1.4.2 Size

The area of a bathroom shall not be less than 1.8 Sqm with a minimum width of 1.2m. The floor area of water-closet shall be 1.1 Sqm with a minimum width of 0.9 m. If bath and water-closet are combined, its floor area shall not be less than 2.8 Sqm with a minimum width of 1.2 m.

5.1.4.3 Other Requirements

Every bathroom or water-closet shall:

a) Be so situated that at least one of its walls shall face a shaft or open space

b) Not be directly over or under any room other than another water-closet, washing place, bath or terrace, unless it has a water-tight floor;

c) Have the platform or seat made of water-tight non-absorbent material;

d) be enclosed by walls or partitions and the surface of every such wall or partition shall be finished with a smooth impervious material to a height of not less than 1 m above the floor of such a room;

e) Be provided with an impervious floor covering, sloping towards the drain with a suitable grade and not towards VERANDAH or any other room; and

f) Have a window or ventilator, opening to a shaft or open space, of area not less than 0.3 Sqm with side not less than 0.3 m.

5.1.4.4 No room containing water closets shall be used for any purpose except as a lavatory and no such room shall open directly into any kitchen or cooking space by a door, window or other opening. Every room containing water-closet shall have a door completely closing the entrance to it**.**

5.1.5 Loft

5.1.5.1 Height

The minimum head-room of loft shall be 2.2 m. The maximum height of loft shall be 1.5 m.

5.1.5.2 Size

A loft in a habitable room shall not cover more than 25 percent of the area of the floor on which it is constructed and shall not interfere with the ventilation of the room under any circumstances.

5.1.6 Mezzanine Floor

5.1.6.1 Height

It shall have a minimum height of 2.2 m.

5.1.6.2 Size

The minimum size of the mezzanine floor, if it is to be used as a living room, shall not be less than 9.5 Sqm. The aggregate area of such mezzanine floor in a building shall in no case exceed one third the plinth area of the building.

5.1.6.3 Other Requirements

A mezzanine floor may be permitted over a room or a compartment provided:

a) it conforms to the standard of living rooms as regards lighting and ventilation in case the size of mezzanine floor is 9.5 Sqm or more

b) It is so constructed as not to interfere under any circumstances with the ventilation of the space over and under it;

c) Such mezzanine floor is not sub-divided into smaller compartments;

d)) Such mezzanine floor or any part of it shall not be used as a kitchen; and

e) In no case shall a mezzanine floor be closed so as to make it liable to be converted into unventilated compartments.

5.1.7 Store Room

5.1.7.1 Height

The height of a store room shall be not less than 2.1m.

5.1.7.2 Size

The size of a store room, where provided in a residential building, shall be not less than 3 Sqm

5.1.8 Garage

5.1.8.1 Height The height of a garage shall be not less than 2.4 m.

5.1.8.2 Size

The size of garages shall be as per Zonal regulations.

5.1.9 Basement

5.1.9.1 The Local Authority in accordance with the land use and other provisions specified under the Zonal Regulations shall allow the construction and usage of the basement

5.1.9.2 The basement shall have the following requirements:

a) Every basement shall be in every part at least 2.4 m in height from the floor to the underside of the roof slab or ceiling;

b) Adequate ventilation shall be provided for the basement. The ventilation requirements shall be the same as required by the particular occupancy according to byelaws. Any deficiency may be met by providing adequate mechanical ventilation in the form of blowers, exhaust fans, air conditioning systems, etc;

c) The height of the ceiling of any basement shall be minimum 0.9 m and the maximum, 1.2 m above the average surrounding ground level. However, in case of parking, mercantile or business occupancy at ground floor, minimum height of the ceiling of the basement maybe 0.3 m above the average surrounding ground level subject to mechanical ventilation being provided (see Fig. 11);

d) Adequate arrangements shall be made such that surface drainage does not enter the basement;

e) The walls and floors of the basement shall be watertight and be so designed that the effects of the surrounding soil and moisture, if any, are taken into account in design and adequate damp proofing treatment is given;

f) The access to the basement shall be separate from the main and alternative staircase providing access and exit from higher floors. Where the staircase is continuous in the case of buildings served by more than one staircase, the same shall be of enclosed type serving as a fire separation from the basement floor and higher floors. Open ramps shall be permitted if they are constructed within the building line subject to the provision of (d);

g) Access to basements through ramps shall be permitted subject to provision of (d).

h) For all public buildings and uses including group housing, having basement going up to more than one level, access to all levels shall also be provided through lift. The exit requirements in basements shall comply with the provisions of Part 4 'Fire and Life Safety' of the Code.

5.1.10 Chimneys

The chimneys shall be built at least 0.9 m above flat roofs, provided the top of the chimneys is not below the top of the adjacent parapet wall. In the case of sloping roofs, the chimney top shall not be less than 0.6 m above the ridge of the roof in which the chimney penetrates.

5.1.11 Parapet

Parapet walls and handrails provided on the edges of roof terraces, balcony, verandah, etc. shall not be less than 1.0 m and not more than 1.5m in height from the finished floor level. The railings / parapet wall shall be designed by keeping in mind the safety of children.

Note:

i. The above shall not apply where roof terrace is not accessible by a staircase.

ii. However on terrace floor in the portion where installations like DG Set, Water Tank and other, screening parapet of a suitable height may be constructed to hide such equipment's etc. and there is no need to have uniform increase in the height of the parapet.

5.1.12 Boundary Wall

The requirements of the boundary wall shall be as follows:

a) Except with the special permission of the Local Authority, the maximum height of the compound wall shall be 1.5 m above the average level of the front street measured at the center line of the road. Compound wall up to 2.4 m height may be permitted if the top 0.9 m is of open type construction of a design to be approved by the Local Authority.

b) In the case of a corner plot, the height of the boundary wall shall be restricted to 0.75 m for a length of 6 m on the front and side of the intersections and the balance height of 0.75 m, if required in accordance with (a) may be made up of open type construction (through railings) and of design to be approved by the Local Authority.

c) However, the provisions of (a) and (b) are not applicable to boundary walls of jails. In electric sub-stations, transformer stations, institutional buildings like sanatoria, hospitals, industrial buildings like workshops, factories and educational buildings like schools, colleges, including hostels and other uses of

public utility undertakings and strategically sensitive buildings, a height up to 2.4 m may be permitted by the Local Authority.

5.1.13 Septic Tanks

Where a septic tank is used for sewage disposal, the location, design and construction of septic tank shall conform to requirements as specified in **Annexure-XVA** of **Appendix-XV**.

5.1.14 Office-cum-Letter Box Room

In the case of multi-storeyed multifamily dwelling apartments constructed by existing and proposed Cooperative Housing Societies or Apartment Owners Associations, limited companies and proposed societies, an office-cum-letter box room of dimension 3.6 m × 3 m shall be provided on the ground floor. In case the number of flats is more than 20, the maximum size of the office-cum-letter box room shall be 20 m^2

Business Buildings Provision shall be made for letter boxes on the entrance floor as per the requirements of the postal department.

5.1.15 Meter Rooms

For all buildings above 15 m in height and in special occupancies, like educational, assembly, institutional, industrial, storage, hazardous and mixed occupancies with any of the aforesaid occupancies having area more than 500 m^2 on each floor, provision shall be made for an independent and ventilated meter (service) room, as per requirements of electric (service) supply undertakings on the ground floor with direct access from outside for the purpose of termination of electric supply from the licensee's service and alternative supply cables. The door/doors provided for the service room shall have fire resistance of not less than two hours.

5.1.16 Roofs

5.1.16.1 The roof of a building shall be so designed and constructed as to effectively drain water by means of sufficient rain-water pipes of adequate size, wherever required, so arranged, jointed and fixed as to ensure that the rainwater is carried away from the building without causing dampness in any part of the walls, roof or foundations of the building or an adjacent building.

(1) The Local Authority may require rain-water pipes to be connected to a drain or sewer to a covered channel formed beneath the public footpath to connect the rainwater pipe to the road gutter or in any other approved manner.

(2) Rain-water pipes shall be affixed to the outside of the external walls of the building or in recesses or chases cut or formed in such external walls or in such other manner as may be approved by the Local Authority.

(3) It is desirable to conserve rainwater using suitable rain water harvesting techniques including by roof water collection. In this context, reference may be made to Part 9 'Plumbing Services, Section 1 Water Supply, Drainage and Sanitation (Including Solid Waste Management)' of NBC, 2016.

5.2 Other general requirements

5.2.1 Swimming Pool

1) *Definition:* A constructed pool or a tank indoor or outdoor, used for the purpose of swimming, bathing, aquatic sports or games, training, treatment (Therapy) or recreation, meant exclusively for human being, having a depth of water not less than that 60 cm. and the surface area exceeding 23.25 Sq.m both for the use of public or the institution concerned.

a. *'Capacity of Pools in Relation to Bathers':* The maximum number of persons in bathing attire within the pool enclosures of the bathing area shall not exceed one person per 20 Sft. (1.86 Sqm.) of pool i.e. the area of the water surface.

2*) 'Hand Rail*': A side handrail extending up above and returning to the horizontal surface of the pool deck curb or coping shall be provided at each side of each ladder.

3) '*Depth Markers*': Depth of water shall be clearly marked at or above the water surface on the vertical pool wall and on the edge of the deck or walk-way next to the pool, at maximum points and at the points of break between the deep and shallow portions and at intermediate increments of depth, spaced at not more than 2.5' (7.62cm) intervals. Depth markers, contrasting with background shall be on both sides of the pool.

4) *'Lighting and wiring*': Where submarine lightning is used, not less than 0.5 watts shall be employed per sq. ft. of pool area.

5) '*Area Lightning*': Where submarine lightning is employed, area lightning shall be provided for the deck areas and directed towards the deck areas and away from the pool surface so far as practicable, in a total capacity of not less than 0.6 watt per Sft of deck area.

Where submarine lighting is not provided and night swimming is not permitted combined pool lightning shall be provided in an amount of not less than 2 watts per Sft. of total area. All submarine lightning shall be individually earthed and must be water tight and damp proof.

6) '*Over Head wiring*': No electrical wiring for electrical or power shall be permitted to pass over within 20 feet of the pool enclosure.

7) '*Shallow Minimum Depth*': Every swimming pool shall have a minimum depth in the shallow area of the main swimming area of not less than 0.9 m (3 feet), but not more than 1.07m. (3'-6') from the overflow level to the floor.

8) '*Shallow Areas*': In a swimming pool with a diving area, the shallow area of the pool shall be defined as the portion between the shallow end and the break point between the shallow area and the diving area. The slope of the floor shall be uniform from the break point between the diving area and the shallow portion to the outside edge of the shallow portion and shall not be greater than 1 in 2 m.

9) *'Vertical Wall Depth':* The pool walls shall be vertical at all points for a depth of not less than 0. 76 m.

5.2.2 Means of access

5.2.2.1 No Building shall be erected as to deprive any other building of its means of access.

5.2.2.2 Every person who erects a building shall not at any time erect or cause or permit to erect or re-erect any building, which in any way encroaches upon or diminishes the area set apart as means of access.

5.2.2.3 The Means of Access prescribed in the Zonal Regulations shall be considered while sanctioning Building Licence. The portion of the building site required for widening the road to the proposed width shall be relinquished free of cost without claiming any compensation (including DR), before sanctioning Building Licence.

5.2.3 Staircase Requirements

5.2.3.1 The minimum clear width, minimum tread width and maximum riser of staircases for buildings shall be as given as below (*see also* Part 4 'Fire and Life Safety of NBC 2016).

5.2.3.2 Minimum width

Table 5.2 The minimum width of staircase

A	i) Residential buildings (dwellings) ii) Apartment buildings	1.0m 1.25m
B	Hotel buildings/Lodging House	1.5m
C	Assembly buildings like auditoria, theatres and cinemas	2.0m
D	Educational building	1.5m
E	Institutional buildings	2.0m
F	All other buildings	1.5m

5.2.3.3 Minimum tread

The minimum width of tread without nosing shall be 250 mm for residential buildings. The minimum width of tread for other buildings shall be 300 mm.

5.2.3.4 Maximum riser

5.3.2.4.1 The maximum height of riser shall be 190 mm for residential buildings and 150 mm for other buildings and these shall be limited to 12 per flight. The maximum height of riser shall be 190 mm for residential buildings and 150 mm for other buildings and these shall be limited to 12 per flight.

5.3.2.4.2 The minimum head-room in a passage under the landing of a staircase shall be 2.1m. The minimum clear head-room in any staircase shall be 2.1 m.

5.2.4 Exit Requirements

Exit Requirements All aspects of exit requirements for corridors, doors, staircases, ramps, etc, in respect of widths, travel distance shall be as per Part 4 'Fire and Life Safety' of the NBC Code-2016.

5.2.4.1 Occupant Load

The following occupant load shall be considered for calculating the exit requirement of the building

Table 5.3 Occupant Load

Sl. No.	**Type of Occupancy**	**Occupant Load per 100 Sqm of Carpet Area (in persons)**
1	Residential	8.0
2	Educational	25.0
3	Institutional	6.60
4	Assembly With fixed or loose seats and dance floor without seating facilities including dining rooms	166.6 66.6
5	Mercantile	33.3 16.6

	Street floor and sales basement Upper sale floor	
6	Business and industrial	10.0
7	Storage	3.3
8	Hazardous	10.0

Note: 1. The occupant load in dormitory potions of homes for the aged, orphanages or mental hospitals etc. where sleeping accommodation is provided shall be calculated at not less than 13.3 persons per 100 Sqm

2. In case of assembly occupancy, all rooms, toilets common areas connected to the assembly occupancy shall be included in the carpet area for calculating the occupancy load.

5.2.4.2 Number and size of Exits

The requisite number and size of various exits shall be provided, based on the occupants in each room and floor based on the occupant load, capacity of exits, travel distance and height of buildings as prescribed in these Byelaws.

At least one primary entrance to each building shall be usable by individuals in wheelchairs and shall be indicated by a sign. At least one entrance usable by individuals in wheelchairs shall be on a level that would make the elevators accessible.

5.2.4.3 Arrangement of Exits

(1) Exits shall be so located so that the travel distance on the floor shall not exceed 30 m for residential, educational, institutional assembly, business, mercantile and storage occupancies, 45.0m. for industrial occupancy and 22.5m for hazardous building. For fully sprinklered building, the travel distance may be increased by 50 percent of the above values. Whenever more than one exit is required for a floor of a building they shall be placed as remote from each other as possible. All the exits shall be accessible from the entire floor area at all floor levels, where separate fire separation walls are not provided.

(2) The travel distance to an exit from the dead end of the corridor, if applicable, shall not exceed half the distance as stated above except in the case of institutional occupancy in which case it shall not exceed 6.0 m.

5.2.4.4 Capacity of Exits

The capacity of exits (staircase, ramps and doorways) indicating the number of persons that could be safely evacuated through a unit exit width of 50 cm shall be as given below:

Table 5.4 Occupants per unit Exit width

Sl. No.	Group of Occupancy	Number of Occupants		
		Stairways	Ramps	Doors
1	Residential	25	50	75
2	Educational	25	50	75
3	Institutional	25	50	75
4	Assembly	40	50	60

5	Business	50	60	75
6	Mercantile	50	60	75
7	Industrial	50	60	75
8	Storage	50	60	75
9	Hazardous	25	30	40

5.2.4.5 Minimum Width Provisions for Passageway/Corridors

The following minimum width provisions shall be made for each passage way/corridor.

a) Residential buildings, upto 4 dwelling units 1.00 m.

b) Apartment buildings, hostels, etc. 1.25 m.

c) Assembly buildings like auditorium theatres and cinemas 2.00 m.

d) All other buildings including hotels 1.50 m.

e) Hospital, Nursing Homes, etc. 2.40 m.

5.2.5 Ramps

(1) The ramp to basement and parking floors shall be as prescribed in the Zonal Regulations.

(2) Ramps may also be provided in the setbacks to function as fire drive cum ramp for basements, which can be sloped considering unhindered movement of fire engine and in no case the gradient shall be steeper than 1 in 10 for Plains and steeper than 1 in 8 for Hilly areas.

(3) All structural design/safety aspects as per latest BIS Codes & NBC 2016 shall be complied along with consideration of weight of Fire Engine & its manoeuvrings.

(4) The minimum width of the ramps in hospitals shall be 2.4 m for stretcher and not for vehicular movement.

(5) In this case Handrails shall be provided on both sides of the ramp.

(6) Ramps shall lead directly to outside open space at ground level or courtyards or safe place.

(7) No Portion of the Ramp shall project in to the road or drain outside the property.

(8) No Portion of gate shall open towards the roadside.

5.2.6 Doorways

(1) Every doorway shall open into an enclosed stairway, a horizontal exit, on a corridor or passageway providing continuous and protected means of egress

(2) No exit doorways shall be less than 1m in width except assembly and institutional buildings where Doorway shall not be less than 2 m.

(3) Exit doorways shall open outwards, that is away from the room but shall not obstruct the travel along any exit. No door when opened shall reduce the required width of stairway or landing to less than 0.90 m Overhead or sliding door shall not be installed.

Note: In the case of buildings where there is a central corridor, the doors of rooms shall open inwards to permit smooth flow of traffic in the corridor

(4) Exit door shall not open immediately upon a flight of stairs. A landing equal to at least, the width of the door shall be provided in the stairway at each doorway. Level of landings shall be the same as that of the floor, which it serves.

(5) Exit doorways shall be open-able from the side, which they serve without the use of a key.

(6) Revolving doors shall not to be provided as means of fire exit.

(7) Mirrors shall not be placed in exit ways or exit doors to avoid confusion regarding the direction of exit.

5.2.7 Provision of exterior open spaces and height limitation around the building

5.2.7.1 The open spaces/setbacks, coverage, FAR, parking requirements shall be as per Zonal regulations of the Master Plan

5.2.7.2 Every room that is intended for human habitation shall abut on an interior or exterior open space or on to a verandah open to such interior or exterior open space. In case of High rise, the driveway in exterior open spaces around a building shall be of or hard surface capable of taking load of fire engine weighing up to 45 ton

5.2.7.3 In case, kitchen and toilets do not about either interior or exterior open spaces, mechanical ventilation would be accepted.

5.2.8 Interior Open Space for Light and Ventilation

5.2.8.1 The whole or part of one side of one or more rooms intended for human habitation and not abutting on either the front, rear or side open spaces shall abut on an interior open space whose minimum width in all directions shall be 3m in case of buildings not more than 15m in height, and in case of high-rise buildings it shall have mandatory mechanical ventilation in addition

5.2.8.2 Sunken Courtyard:

Sunken courtyard up to 3m in depth from the ground level as 'light well' within building envelop shall be permitted for light and ventilation for basement area.

5.2.8.3 Skylight: Skylight in interior open space (courtyard) shall be permitted

5.2.9 Lighting and ventilation of rooms

5.2.9.1 IS Codes for lighting & ventilation requirements

Rooms shall have, for the admission of light and air, one or more openings, such as windows and ventilators**,** opening directly to the external air or into an open *VERANDAH*.

Windows for all residential buildings shall be compulsorily provided with protective grills / railings (atleast upto a height of 1.1 from the floor level) which shall be designed by keeping in mind the safety of children.

Lighting and ventilation requirements of all types of buildings shall be designed and approved in accordance with the provisions of the following two IS Codes –

a. SP 32 (1986): Handbook on Functional Requirements of Industrial Buildings (Lighting and Ventilation) [CED 12: Functional Requirements in Buildings] and

b. SP 41 (1987): Handbook on Functional Requirements of Buildings (Other than Industrial Buildings) [CED 12: Functional Requirements in Buildings]

Lighting loads of various spaces of –

a. Industrial buildings shall be determined as per Clause 1, Section 1 of SP 32(1986)

b. Non-Industrial buildings shall be determined as per Clause 2, Part 4 of SP 41(1987)

Thermal comfort levels and design requirement of various spaces of –

a. Industrial buildings shall be determined as per Section 2 of SP 32 (1986)

b. Non-Industrial buildings shall be determined as per Part 2 of SP 41 (1987)

Minimum Fresh Air requirement for –

a. Industrial buildings shall be determined as per Clause 13 of Section 2 of SP 32(1986)

b. Non-Industrial buildings shall be determined as per Clause 4 of Part 3 of SP 41(1987)

5.2.9.2 The minimum aggregate area of openings

(1) The minimum aggregate area of such openings, excluding doors inclusive of frames, shall be not less than one-sixth of the floor area. Openable part of French window shall be considered as openings for applying this clause.

Notes:

i. *If a window is partly fixed, the openable area shall be counted*

ii. *No portion of a room shall be assumed to be lighted, if it is more than 7.5 m away from the opening assumed for lighting that portion.*

iii. *The area of openings as given above shall be increased by 25 percent in the case of a kitchen.*

(2) All habitable rooms shall have for the admission of light and air, one or more apertures, such as window, glazed door, opening directly to the external air or into an open verandah not more than 2.40 m. in width. In case light and ventilation to habitable space area are through an internal courtyard, the minimum dimensions of such courtyard shall not be less than 3.0 m. x 3.0 m. for buildings up to 12.50 m. in height. For buildings with higher heights, the minimum dimensions of the internal courtyard shall be as given in these Byelaws.

(3) Where the lighting and ventilation requirements are not met through day lighting and natural ventilation, the same shall be ensured through artificial lighting and mechanical ventilation as given in part-VII building services Section-1 lighting and Ventilation of National Building Code of India published by the Bureau of Indian Standards. The latest version of the National Building Code of India shall be taken into account at the time of enforcement of the Building Byelaws.

5.2.9.3 Ventilation Shaft

For ventilating the spaces for water closets and bathrooms, if not opening on the front side, rear and interior open spaces, shall open on the ventilation shaft, the size, of which shall not be less than the values given below:

Table 5.5 Size of Ventilation Shaft

Height of Building (m)	Size of ventilation shaft (Sqm)	Minimum size of shaft (m)
Up to 10.0	1.2	0.9
Up to 12.0	2.8	1.2
Up to 18.0	4.0	1.5
Up to 24.0	5.4	1.8
Up to 30.0	8.0	2.4
Above 30.0	9.0	3.0

Notes:

i. If mechanical ventilation system works in an uninterrupted manner is proposed to be installed in the building, then ventilation shaft need not be insisted upon.

ii. For fully air-conditioned buildings the ventilation shaft need not be insisted upon, provided the air-conditioning system works in an uninterrupted manner, also, provided there is an alternative source of power supply. However, it is not mandatory in case of buildings where ventilation is mechanized

5.3 Building Services

5.3.1 Electrical, Air conditioning, Lift & Escalator installations

5.3.1.1 Planning, design and installations of electrical, air-conditioning and lift installations

The Planning design and installation of electrical installations, air conditioning installation of lifts and escalators can be carried out in accordance with Part-VII Building Services, section–2 electrical installation, section–3 air conditioning and heating, section-5 installation of lifts and escalators of National Building Code of India. However, deviations from National Building Code may be done as per good Engineering practices. Details to be considered for evaluating the Power Consumption for a Project is provided as **Appendix-XIII**

5.3.1.2 Number and types of lifts

(1) Lift shall have to be provided for buildings with more than ground plus three floors.

(2) The number and type of lifts to be provided in different buildings shall be as given in **Appendix-XIVA**.

5.3.1.3 Requirements of Electrical substation

The requirements of electric sub-station are given in **Appendix-XIVB**. The provision of electric sub-station shall also require approval from Electricity Board concerned.

5.3.2 Plumbing and Sanitary Services

5.3.2.1 Planning, design, construction and installation of Water supply, drainage and sanitation and gas supply system

The planning, design, construction and installation of water supply, drainage and sanitation and gas supply system shall be in accordance with Part-9: Plumbing Services, Section-l Water supply, Drainage and sanitation (including Solid Waste Management) and Section-2 Gas supply of NBC, 2016.

5.3.2.2 Norms for differently-abled within segregated toilets

i. One special W.C. in a set of toilets shall be provided for the use of differently abled persons, with essential provision of wash basin near the entrance.

ii. Minimum clear opening of the door shall be 900 mm. and the door shall swing out.

ii. Minimum clear opening of the door shall be 900 mm. and the door shall swing out.

iii. Suitable arrangement of vertical/horizontal handrails with 50 mm. clearance from wall shall be made in the toilet.

iv. The W.C. seat shall be 500 mm. from the floor.

5.3.2.3 Water requirement and facilities:

Water requirement for the facility may be worked out and enough storage for ½ day operation is to be kept in storage. If municipal water supply is reliable, the toilet blocks may have underground sump that can store half a day requirement and overhead tanks for another half. If municipal water supply is not available, toilet block may have its own water source and pump with or without underground sump

Alternatively, a hand tube well can be used for storing water in an elevated (not overhead) tank. To minimize the wastage of water, self-closing water taps should be used. The pans must be of Pour Flush (PF) design i.e. with a steep slope. Traps should be of a 20-mm water seal. (Use of 50 mm water seal traps will require more water for flushing.) If toilet is to be linked to city sewer, a master trap has to be provided at the sewer connection for waste water line (excluding soil line).

Details to be considered for calculating Water Demand for buildings and Water Balance Chart is provided as **Appendix-XV**

Table 5.6 Water Requirements for Various Occupancies / Uses (Ref. NBC 2016 Part 9, Section 1, Clause 4.1.1, 4.1.2 & Table 1)

Sl. No.	Type of Building	Domestic Per day litre	Flushing Per Day litre	Total Consumption Per Day litre
i)	Residences a) For communities with population up to 20,000 1) Water supply through stand post 2) Water supply through house service connection (70 to 100 lphd)			40 lphd (Min) 100 lphd
	b) For communities with Population 20 000 to 100 000 (100 to 135 lphd)	95 lphd	45 lphd	135 lphd
	c) For communities with Population above 100 000 (150 to 200 lphd)	155 lphd	45 lphd	200 lphd
	NOTE: The value of water supply given as 150 to 200 litre per head per day may be reduced to 135 lphd for houses for Medium Income Group (MIG) and Lower Income Groups (LIG) and Economically Weaker Section (EWS), depending upon prevailing conditions and availability of water.			

ii)	Factories including canteen where bath rooms are required to be provided	30 per head	15 per head	45 per head
iii)	Factories including canteen where no bath rooms are required to be provided	20 per head	10 per head	30 per head
iv)	Hospital (excluding laundry and kitchen (see Note 2): a) Number of beds not exceeding 100	230 per head	110 per head	340 per head
	b) Number of beds exceeding 100	300 per head	150 per head	450 per head
	c) Outpatient department (ODP)	10 per head	5 per head	15 per head
v)	Nurses homes and medical quarters	90 per head	45 per head	135 per head
vi)	Hostels	90 per head	45 per head	135 per head
vii)	Hotel (up to 3 start) excluding laundry, kitchen, staff and water bodies	120 per head	60 per head	180 per head
viii)	Hotel (4 star and above) excluding laundry, kitchen, staff and water bodies.	260 per head	60 per head	320 per head
ix)	Offices (including canteen)	25 per head	20 per head	45 per head
x)	Restaurants and food court including water requirement for kitchen: a) Restaurants	55 per head	15 per head	70 per head
	b) Food court	25 per head	10 per head	35 per head
xi)	Clubhouse	25 per head	20 Per head	45 per head
xii)	Stadiums	4 per head	6per head	10 per head
xiii)	Cinemas, Concert halls and theatres and multiplex	5 per head	10 per head	15 per head
xiv)	Schools/Educational institutions: a) Without boarding facilities	25 per head	20 per head	45 per head
	b) With boarding facilities	90 per head	45 per head	135 per head
xv)	Shopping and retail (mall) a) Staff	25 per head	20 per head	45 per head
	b) Visitors	5 per head	10 per head	15 per head
xvi)	Traffic terminal stations (see Notes 3 and 4) a) Airports	40 per head	30 Per head	70 per head
	b) Railway stations (Junctions) with bathing facility	40 per head	30 per head	70 per head
	c) Railway stations (Junctions) without bathing facility	30 per head	15 per head	45 per head
	d) Railway stations (Intermediate) with bathing facility	25per head	20 per head	45 per head
	e) Railway stations (Intermediate) without bathing facility	15 per head	10 per head	25 per head
	f) Interstate bus terminals	25 per head	20 per head	45 per head
	g) Interstate Bus Terminals/ Metro Stations	10 per head	5 per head	15 per head
	NOTES:			

	1. For Calculating water demand for visitors, consumption of 15 litre per head per day may be taken. 2. The Water demand includes requirement of patients, attendants, visitors and staff. Additional water demand for kitchen, laundry and clinical water shall be computed as per actual requirements. 3. The number of persons shall be determined by average number of passengers handled by stations, with due considerations given to the staff and vendors who are using these facilities. 4. Consideration should be given for seasonal average peak requirements. 5. The hospitals may be categorized as Category A (25 to 50 beds), Category B (51 to 100 beds), Category C (101 to 300 beds), Category D (301 to 500) and Category E (501 to 750 beds).

Table 5.7 Water Storage Capacities (Ref. NBC 2016 Part 9, Section 1, Clause 4.4.10)

Sl. No.	Description	Storage Capacity
1	In case only OHT is provided,	33.33 to 50 percent of one day's requirement
2	In case only UGT is provided,	50 to 150 percent of one day's requirement
3	In case combined storage is provided, a) For UGT b) For OHT	66.6 percent of one day's requirement 33.3 percent of one day's requirement

Table 5.8 Sanitation Requirements for Office Building
(Ref. NBC 2016 Part 9, Section 2, Clause 4.2.5.1, Table 1)

Sl. No.	Fixtures	Public Toilets		Staff Toilets	
		Males	Females	Males	Females
(1)	(2)	(3)	(4)	(5)	(6)
	Executive Rooms and Conference Halls in Office Buildings				
(i)	Toilet suite comprising one WC, one washbasin(with optional shower stall if building is used round the clock at user's option) Pantry optional as per use requirement **Main Office Toilets for Staff and Visitors**	Unit could be Model for male/female or separate depending on the number of user of each facility		For individual officer rooms	
(ii)	Water closets	See Note		1per25	1per15
(iii)	Ablution tap with each Water closet	1ineachwatercloset			
(iv)	Urinals	See Note	-	Nil up to 61for7to20 2 for21to45 3 for46to70 4 for71to100 From101to 200,add@3% Forover200, Add@2.5%	-
(v)	Washbasins		See Note	1per25	1per25
(vi)	Drinking water fountain		See Note	1per100	1per100
(vii)	Cleaner's sink	← 1perfloor →			

NOTE: Staff and public toilet utilities are generally Model in office buildings. Where public toilets are to be provided independently, similar requirements as that of staff

toilet may be provided.

PROJECT NAME: Date:

Refer : Part 9 Section 2 Table 1 Cluase 4.2.5.1 of NBC 2016

Sl. No.	Occupancy**	Floor Area (Gross) in Sqm#	Occupant Load Factor (M^2/Person) (Part 4, Table 3 of NBC 2016)	Total No of Person	Staff -90%		Public -10%		Water Closet with Flush Valve and Ablution Tap/HF*					Urinal*			Wash Basin*					Bath/Shower*			Remarks
					Males - 65%	Females 35%	Males - 65%	Females 35%	Staff		Public		Total Quantity	Staff	Public	Total Quantity	Staff		Public		Total Quantity	Staff		Total Quantity	
									M	F	M	F					M	F	M	F		M	F		
a	b	c	d	e = c/d	f = e* 0.9*0.65	g = e* 0.9*0.35	h = e* 0.1*0.65	i = e* 0.1*0.35	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
	OFFICE BUILDING																								
1	Executive Rooms																								
2	Conference Halls																								
3	Main Office		10	0	0	0	0	0					0			0					0			0	
4	Pantry																								
	*To Calculate the Quantity, Refer Table No. ---																								

Table 5.9 Sanitation Requirements for Factories
(Ref.NBC2016Part9,Section2,Clause4.2.5.1,Table2)

Sl. No.	Fixtures	Offices/Visitors		Workers	
		Males	Females	Males	Females
(1)	(2)	(3)	(4)	(5)	(6)
(i)	Water closets (Workers and Staff	1forupto25	1forupto15	1forupto15	1forupto12
		2for26to35	2for16to25	2for16to35	2for13to25
		3for36to65	3for26to40	3for36to65	3for26to40
		4for66to100	4for41to57	4for66to100	4for41to57
			5for58to77		5for58to57
			6for78to100		6for78to100
	For persons 101–200 add	3%	5%	3%	5%
	For persons over 200add	2.5%	4%	2.50%	4%
(ii)	Ablution tap	1 in each water closet	1 in each water closet	1 in each water closet	1 in each water closet
(iii)	Urinals	Nilupto6	-	Nilupto6	-
		1for7to20		1for7to20	
		2for21to45		2for21to45	
		3for46to70		3for46to70	
		4for71to100		4for71to100	
		From 101 to 200,add		From 101 to 200,add	
		@3%		@3%	

Sl. No.	Fixtures	Offices/Visitors		Workers	
		Males	Females	Males	Females
(1)	(2)	(3)	(4)	(5)	(6)

		Forover200, add@2.5%		Forover200, add@2.5%	
(iv)	Wash basins Wash basins in rows or troughs andtapsspaced750 mmc/c	1 per 25 or part thereof	1 per 25 or part there of	1 per 25 or part there of	1 per 25 or part thereof
(v)	Drinking water fountain	1 per every 100 or part there of With minimum one on each floor		1 per every 100 or part there of With minimum one on each floor	
(vi)	Cleaner's sink	1 on each floor	1 on each floor	1 on each floor	1 on each floor
(vii)	Showers/bathing rooms	As per trade requirements			
(viii)	Emergency shower and eye wash fountain	-	-	1 per every shop floor per 500 persons	

NOTES:

1. *For factories requiring workers to be engaged in dirty and dangerous operations or requiring them to being extremely clean and sanitized conditions additional and separate (if required so)toilet facilities and if required by applicable Industrial and safety laws and the Factories Act shall be provided in consultation with the user.*
2. *Depending on the type of disability of a person and the hazard posed by the type of activities in the factory for a person with disabilities, if a person with disabilities is decided to be engaged for a particular activity, the requirements of accessibility shall be guided by the provisions given in 13 of Part3 'Development Control Rules and General Building Requirements' of the Code.*

PROJECT NAME: Date:

Refer : Part 9 Section 2 Table 2 Cluase 4.2.5.1 of NBC 2016

Sl. No.	Occupancy**	Floor Area (Gross) in Sqm#	Occupant Load Factor (M^2/Person) (Ref. Part 4,Table 3 of NBC 2016)	Total No of Person	Offices/Visitors - 10%		Workers -90%		Water Closet with Flush Valve and Ablution Tap/HF*					Urinal*			Wash Basin*					Drinking Water Fountain*	Cleaner's Sink*	Bath/Shower/ eye wash fountain*			Remarks
					Males 65%	Females 35%	Males 65%	Females 35%	Staff		Public		Total Quantity	Staff	Public	Total Quantity	Staff		Public		Total Quantity			Staff		Total Quantity	
									M	F	M	F					M	F	M	F				M	F		
a	b	c	d	e = c/d	f = e* 0.1*0.65	g = e* 0.1*0.35	h = e* 0.9*0.65	i = e* 0.9*0.35	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa	ab
	FACTORIES																										
1	Industrial		10	0	0	0	0	0					0			0					0					0	
	* To Calculate the Quantity, Refer Table No. ---																										

Table 5.10 Sanitation Requirements for Cinema, Multiplex Cinema, Concert and Convention Halls, Theatres and Stadia
(Ref. NBC 2016 Part 9, Section 2, Clause 4.2.5.1, Table 3)

Sl. No.	Fixtures	Public		Staff	
		Males	Females	Males	Females
i)	Water Closets	1 per 100 up to 400 Over 400 add at 1 per 250 or part thereof	3 per 100 up to 200 Over 200 add at 2 per 100 or part thereof	1 for up to 15	1 for up to 12
				2 for 16 to 35	2 for 13 to 25
ii)	Ablution tap	1 in each water closet			
		1 water tap with draining arrangements shall be provided for every 50 persons or part thereof in the vicinity of water closets and urinals			
iii)	Urinals		----------	Nil up to 6	----------

		1 per 25 or part thereof		1 for 7 to 20	
				2 for 21 to 45	
iv)	Wash basins	1 per 200 or part thereof		1 for up to 15	1 for up to 12
				2 for 16 to 35	2 for 13 to 25
v)	Drinking water fountain	1 per every 100 or part thereof with minimum one on each floor			
vi)	Cleaner's sink	1 per floor			
vii)	Showers/bathing rooms	As per trade requirements			
	NOTES				
	1) Some WCs may be Indian Style, if desired.				
	2) Male population may be assumed as two-third and female population as one-third.				

PROJECT NAME: Date:

Refer : Part 9 Section 2 Table 3 Cluase 4.2.5.1 of NBC 2016

Sl. No.	Occupancy**	Number of Seats	Occupant Load Factor (Ref. Part 4,Table 3 of NBC 2016)	Total No of Person	Public -85%		Staff -15%		Water Closet with Flush Valve and Ablution Tap/HF*					Urinal*			Wash Basin*					Drinking Water Fountain *	Cleaner's Sink*	Bath/Shower*			Remarks
					Males 65%	Females 35%	Males 65%	Females 35%	Public		Staff		Total Quantity	Staff	Public	Total Quantity	Public		Staff		Total Quantity			Staff		Total Quantity	
									M	F	M	F					M	F	M	F				M	F		
a	b	c	d	e = c*d	f = e* 0.85*0.65	g = e* 0.85*0.35	h = e* 0.15*0.65	i = e* 0.15*0.35	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa	ab
	Cinema, Multiplex Cinema, Concert and Convention Halls, Theatres and Stadia																										
1	Fixed seating (cinemas, concert halls and theatres and multiplex) (*The ocupant load shall be determined by multiplying*		1.2	0	0	0	0	0					0			0					0					0	
	* To Calculate the Quantity, Refer Table No. ---																										

Table 5.11 Sanitation Requirements for Art Galleries, Libraries and Museums
(Ref. NBC 2016 Part 9, Section 2, Clause 4.2.5.1, Table 4)

Sl. No.	Fixtures	Public		Staff	
		Males	Females	Males	Females
i)	Water Closets	1 per 200 up to 400 Over 400 add at 1 per 250 or part thereof	1 per 100 up to 200 Over 200 add at 1 per 150 or part thereof	1 for up to 15	1 for up to 12
				2 for 16 to 35	2 for 13 to 25
ii)	Ablution tap	1 in each water closet			
		1 water tap with draining arrangements shall be provided for every 50 persons or part thereof in the vicinity of water closets and urinals			
iii)	Urinals	1 per 50	----------	Nil up to 6	----------
				1 for 7 to 20	
				2 for 21 to 45	
iv)	Wash basins	1 for every 200 or part thereof. For Over 400, add at 1 per 250 or part thereof	1 for every 200 or part thereof. For Over 200, add at 1 per 150 or part thereof	1 for up to 15	1 for up to 12
				2 for 16 to 35	2 for 13 to 25
v)	Drinking water fountain	1 per 100 persons or part thereof			
vi)	Cleaner's sink	1 per floor (Minimum)			
vii)	Showers/bathing rooms	As per trade requirements			
	NOTES				

	1) Some WCs may be Indian Style, if desired.
	2) Male population may be assumed as two-third and female population as one-third.

PROJECT NAME: Date:

Refer : Part 9 Section 2 Table 4 Cluase 4.2.5.1 of NBC 2016

Sl. No.	Occupancy**	Floor Area (Gross) in Sqm#	Occupant Load Factor (M^2/Person) (Ref. Part 4,Table 3 of NBC 2016)	Total No of Person	Public -85%		Staff -15%		Water Closet with Flush Valve and Ablution Tap/HF*					Urinal*			Wash Basin*					Drinking Water Fountain*	Cleaner's Sink*	Bath/Shower*			Remarks
					Males 65%	Females 35%	Males 65%	Females 35%	Public		Staff		Total Quantity	Staff	Public	Total Quantity	Public		Staff		Total Quantity			Staff		Total Quantity	
									M	F	M	F					M	F	M	F				M	F		
a	b	c	d	e = c*d or c/d	f = e* 0.85*0.65	g = e* 0.85*0.35	h = e* 0.15*0.65	i = e* 0.15*0.35	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa	ab
	Art Galleries, Libraries and Museums																										
1	Concentrated use without fixed seating		0.65	0	0	0	0	0					0			0					0					0	
2	Less Concentrated use without fixed seating		1.4	0	0	0	0	0					0			0					0					0	
3	Fixed seating		1.2	0	0	0	0	0					0			0					0					0	
	* To Calculate the Quantity, Refer Table No. ---																										

Table 5.12 Sanitation Requirements for Hospitals with Indoor Patient Wards
(Ref. NBC 2016 Part 9, Section 2, Clause 4.2.5.1, Table 5)

Sl. No.	Fixtures	Patient		Staff	
		Males	Females	Males	Females
i)	Toilet suite comprising one WC and one wash basin and shower stall	Private room with up to 4 patients		For individual doctor's/officer's rooms	
	For General Wards, Hospital Staff and Visitors				
ii)	Water Closets	1 per 5 beds or part thereof	1 per 5 beds or part thereof	1 for up to 15	1 for up to 12
				2 for 16 to 35	2 for 13 to 25
iii)	Ablution tap	1 in each water closet			
		1 water tap with draining arrangements shall be provided for every 50 persons or part thereof in the vicinity of water closets and urinals			
iv)	Urinals	1 per 15 beds	----------	Nil up to 6	----------
				1 for 7 to 20	
				2 for 21 to 45	
v)	Wash basins	2 for every 30 beds or part thereof. Add 1 per additional 30 beds or part thereof		1 for up to 15	1 for up to 12
				2 for 16 to 35	2 for 13 to 25
vi)	Drinking water fountain	1 per ward		1 per 100 persons or part thereof	

vii)	Cleaner's sink	1 per ward	----------
viii)	Bed pan sink	1 per ward	
ix)	Kitchen sink	1 per ward	
	NOTES		
	1) Some WCs may be Indian Style, if desired.		
	2) Male population may be assumed as two-third and female population as one-third.		
	3) Provision for additional and special hospital fittings where required shall be made.		
	4) Drinking water fountains are not recommended for hospitals for reasons of infection control. This is to be decided by the health authority recommendations.		

PROJECT NAME: Date:

Sl. No.	Occupancy**	Floor Area (Gross) in Sqm # / No. of Beds**	Occupant Load Factor (M^2/Person) (Ref: Part 4, Table 3 of NBC 2016)	Total No of Person	Patient -85%		Staff -15%		Water Closet with Flush Valve and Ablution Tap/HF*					Urinal*			Wash Basin*					Drinking Water Fountain*	Cleaner's Sink*	Bed pan sink*	Kitchen sink*	Remarks
					Males 65%	Females 35%	Males 65%	Females 35%	Patient		Staff		Total Quantity	Patient	Staff	Total Quantity	Patient		Staff		Total Quantity				
									M	F	M	F					M	F	M	F						
a	b	c	d	e = c/d or c*d	f = e* 0.85*0.65	g = e* 0.85*0.35	h = e* 0.15*0.65	i = e* 0.15*0.35	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa
1	Indoor Patients Area		15	0	0	0	0	0					0			0					0					
2	Secondary care hospital (No of Beds to be considered)		5	0	0	0	0	0					0			0					0					
3	Tertiary care hospital (No of Beds to be considered)		7	0	0	0	0	0					0			0					0					
4	Quaternary care hospital (No of Beds to be considered)		9	0	0	0	0	0					0			0					0					

NOTE -

1) #**Floor Area (Gross)** - The area of the floor within the inside perimeter of the outside walls of the floor of the building under consideration with no deductions for corridors and passage ways, stairs, closets, thickness of interior walls, columns, lifts and building shafts or other features.

2) ***Refer :** Part 9 Section 2 Table 5 Cluase 4.2.5.1 of NBC 2016

Table 5.13 Sanitation Requirements for Hospitals with Outdoor Patient Department
(Ref. NBC 2016 Part 9, Section 2, Clause 4.2.5.1, Table 6)

Sl. No.	Fixtures	Patient		Staff	
		Males	Females	Males	Females
i)	Toilet suite comprising one WC and one wash basin (with optional shower stall if building used for 24 h)	For up to 4 patients		For individual doctor's/officer's rooms	
ii)	Water Closets	1 per 100 persons or part thereof	2 per 100 persons or part thereof	1 for up to 15	1 for up to 12
				2 for 16 to 35	2 for 13 to 25
iii)	Ablution tap	1 in each water closet			
		1 water tap with draining arrangements shall be provided for every 50 persons or part thereof in the vicinity of water closets and urinals			
iv)	Urinals		----------	Nil up to 6	----------
				1 for 7 to 20	

		1 per 50 persons or part thereof		2 for 21 to 45	
v)	Wash basins	2 per 100 persons or part thereof	2 per 100 persons or part thereof	1 for up to 15	1 for up to 12
				2 for 16 to 35	2 for 13 to 25
vi)	Drinking water fountain	See Note 2		1 per 100 persons or part thereof	
	NOTES				
	1) Some WCs may be Indian Style, if desired.				
	2) Drinking water fountains are not recommended for hospitals for reasons of infection control. This is to be decided by the health authority recommendation.				
	3) The WCs shall be provided keeping in view the location of main OPD waiting hall and sub-waiting halls, floor wise, so as to serve the people effectively. The number of patients shall be calculated floor wise. The OPD population shall include patient attendants @ at least 1 per patient.				
	4) Male population may be assumed as two-third and female population as one-third.				
	5) Provision for additional and special hospital fittings where required shall be made.				

PROJECT NAME: Date:

Sl. No.	Occupancy**	Floor Area (Gross) in Sqm#	Occupant Load Factor (M^2/Person) (Ref: Part 4, Table 3 of NBC 2016)	Total No of Person	Patient -85%		Staff -15%		Water Closet with Flush Valve and Ablution Tap/HF*					Urinal*			Wash Basin*					Drinking Water Fountain*	Remarks
					Males 65%	Females 35%	Males 65%	Females 35%	Patient		Staff		Total Quantity	Patient	Staff	Total Quantity	Patient		Staff		Total Quantity		
									M	F	M	F					M	F	M	F			
a	b	c	d	e = c/d	f = e* 0.85*0.65	g = e* 0.85*0.35	h = e* 0.15*0.65	i = e* 0.15*0.35	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x
1	Out Patient Department		10	0	0	0	0	0					0			0					0		

NOTE -

1) #Floor Area (Gross) - The area of the floor within the inside perimeter of the outside walls of the floor of the building under consideration with no deductions for corridors and passage ways, stairs, closets, thickness of interior walls, columns, lifts and building shafts or other features.

2) *Refer : Part 9 Section 2 Table 6 Cluase 4.2.5.1 of NBC 2016

Table 5.14 Sanitation Requirements for Hospitals, administrative Buildings
(Ref. NBC 2016 Part 9, Section 2, Clause 4.2.5.1, Table 7)

Sl. No.	Fixtures	Staff Toilets	
		Males	Females
i)	Toilet suite comprising one WC, one urinal and one wash basin (with optional shower stall if building is used for 24 h)	For individual doctor's/officer's rooms	
ii)	Water Closets	1 per 25	1 per 15
iii)	Ablution tap	1 in each water closet	
		1 water tap with draining arrangements shall be provided for every 50 persons or part thereof in the vicinity of water closets and urinals	
iv)	Urinals	1 for 6 to 15	----------
		2 for 16 to 50	
v)	Wash basins	1 per 25	1 per 25
vi)	Drinking water fountain (See Note 2)	1 per 100	1 per 100
vii)	Cleaner's sink	1 per floor, minimum	
viii)	Kitchen sink	1 per floor, minimum	
	NOTES		
	1) Some WCs may be Indian Style, if desired.		
	2) Drinking water fountains to be provided only when it is a separate block and patients will not use it.		

PROJECT NAME: Date:

Sl. No.	Occupancy**	Floor Area (Gross) in Sqm#	Occupant Load Factor (M^2/Person) (Ref: Part 4, Table 3 of NBC 2016)	Total No of Person	Staff		Water Closet with Flush Valve and Ablution Tap/HF*			Urinal *	Wash Basin*	Drinking Water Fountain*	Cleaner's Sink*	Kitchen Sink*	Remarks
					Males 65%	Females 35%	M	F	Total Qty						
a	b	c	d	e = c/d	f = e*0.65	g = e*0.35	h	i	j	k	l	m	n	o	p
1	Hospitals, Administrative Buildings		10	0	0	0			0						

NOTE -

1) #**Floor Area (Gross)** - The area of the floor within the inside perimeter of the outside walls of the floor of the building under consideration with no deductions for corridors and passage ways, stairs, closets, thickness of interior walls, columns, lifts and building shafts or other features.

2) ***Refer :** Part 9 Section 2 Table 7 Cluase 4.2.5.1 of NBC 2016

Table 5.15 Sanitation Requirements for Hospitals Staff Quarters and Nurses Homes (Ref.NBC2016Part9, Section2, Clause4.2.5.1, Table8)

Sl. No	Fixtures	Staff Quarters		Nurses	
(1)	(2)	Males (3)	Females (4)	Males (5)	Females (6)
(i)	Water closets	1 per 4 persons or part thereof	1 per 4 persons or part thereof	1 per 4 persons or part there of 2 For 5to35	1 per 4 persons or part there of 2 For 5 to 35
(ii)	Ablution tap	One in each Water closet	One in each Water closet	One in each Water closet	One in each Water closet
		I water tap with draining arrangements shall be provided for every 50 persons or part there of in the vicinity of water closets and urinals.			
(iii)	Washbasins	1per 8 persons or part thereof		1per 8 persons or part thereof	
(iv)	Bath(show ers)	1per4 persons or part there of		1per4 persons or part there of	
(v)	Drinking Water fountain	1 per 100 persons or part Thereof,Min1 per floor		1 per100 persons or part Thereof,Min1 per floor	
(vi)	Cleaner's sink	1per floor		1per floor	

NOTES:

(1) Some WCs may be Indian style, if desired

(2) For independent housing units, fixtures shall be provided as for residences

PROJECT NAME: Date:

Sl. No.	Occupancy**	Floor Area (Gross) in Sqm#	Occupant Load Factor (M^2/Person) (Ref: Part 4, Table 3 of NBC 2016)	Total No of Person	Staff Quarters/ Nurses Homes		Water Closet with Flush Valve and Ablution Tap/HF*			Wash Basin*	Bath/Shower*	Drinking Water Fountain*	Cleaner's Sink*	Remarks
					Males 65%	Females 35%	M	F	Total Quantity					
a	b	c	d	e = c/d	f = e*0.65	g = e*0.35	h	i	j	k	l	m	n	o
1	Hospital Staff Quarters		12.5	0	0	0			0					
2	Hospital Nurses Homes		12.5	0	0	0			0					

NOTE -

1) #**Floor Area (Gross)** - The area of the floor within the inside perimeter of the outside walls of the floor of the building under consideration with no deductions for corridors and passage ways, stairs, closets, thickness of interior walls, columns, lifts and building shafts or other features.

2) ***Refer :** Part 9 Section 2 Table 8 Cluase 4.2.5.1 of NBC 2016

Table 5.16 Sanitation Requirements for Hotels
(Ref.NBC2016Part9,Section2,Clause4.2.5.1,Table9)

Sl.No	Fixtures	Public Rooms		Non-Residential staff	
(1)	(2)	Males	Females	Males	Females
		(3)	(4)	(5)	(6)
(i)	Toilet suite comprising one WC wash basin with shower or A bathtub	Individual guestrooms with attached toilets		-	
(ii)	Water closets	1per100persons upto400 Over400addat1per250orpartthereof	2per100person sup to200 Over200add at1per100 or part thereof	1 forupto15 2 for16to35 3 for36to65 4 for66to100	1 forupto12 2 for13to25 3 for26to40 4 for41to57 5 for58to77 6 for78to100
(iii)	Ablution tap	One in each water closet	One in each Water closet	One in each Water closet	One in each Water closet
		I water tap with draining arrangements shall be provided for every 50 persons or part there of in the vicinity of water closets and urinals.			
(iv)	Urinals	1per50 persons or part thereof	-	Nil upto 61for7to20 2 for21to45 3 for46to70 4 for71to100	-
(v)	Washbasins	1perWC/Urinal	1perWC	1 for upto15	
(vi)	Bath(showers)	1per10 persons or part there of		-	-
(vii)	Cleaner's sink	1per 30rooms, Min1per floor			

(viii)	Kitchen sink	1perKitchen

NOTES:

(1) Some WCs may be Indian style,if desired
(2) Male population may be assumed as two-third and female populations one-third.
(3) Provision for additional and special fitting where required shall be made.

PROJECT NAME: Date:

Sl. No.	Occupancy**	Floor Area (Gross) in Sqm*	Occupant Load Factor (M^2/Person) (Ref: Part 4, Table 3 of NBC 2016)	Total No of Person	Visitors/Public -90%		NR Staff -10%		Water Closet with Flush Valve and Ablution Tap/HF*					Urinal*			Wash Basin*					Bath (shower)*	Cleaner's Sink*	Kitchen sink*	Remarks
					Males 65%	Females 35%	Males 65%	Females 35%	Public		Staff		Total Quantity	Public	Staff	Total Quantity	Public		Staff		Total Quantity				
									M	F	M	F					M	F	M	F					
a	b	c	d	e = c/d	f = e* 0.9*0.65	g = e* 0.9*0.35	h = e* 0.1*0.65	i = e* 0.1*0.35	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
1	Hotel		12.5	0	0	0	0	0					0			0					0				

NOTE -
1) *Floor Area (Gross) - The area of the floor within the inside perimeter of the outside walls of the floor of the building under consideration with no deductions for corridors and passage ways, stairs, closets, thickness of interior walls, columns, lifts and building shafts or other features.
2) *Refer : Part 9 Section 2 Table 9 Cluase 4.2.5.1 of NBC 2016

Table 5.17 Sanitation Requirements for Restaurants
(Ref. NBC 2016 Part 9, Section 2, Clause 4.2.5.1, Table 10)

Sl. No.	Fixtures	Public Rooms		Non Residential Staff	
		Males	Females	Males	Females
i)	Water Closets	1 per 50 seats up to 200. Over 200 add at 1 per 100 or part thereof	2 per 50 seats up to 200. Over 200 add at 1 per 100 or part thereof	1 for up to 15	1 for up to 12
				2 for 16 to 35	2 for 13 to 25
				3 for 36 to 65	3 for 26 to 40
				4 for 66 to 100	4 for 41 to 57
					5 for 58 to 77
					6 for 78 to 100
ii)	Ablution tap	1 in each water closet			
		1 water tap with draining arrangements shall be provided for every 50 persons or part thereof in the vicinity of water closets and urinals			
iii)	Urinals	1 per 50 persons or part thereof	----------	Nil up to 6	----------
			----------	1 for 7 to 20	----------
			----------	2 for 21 to 45	----------
			----------	3 for 46 to 70	----------
			----------	4 for 71 to 100	----------
iv)	Wash basins	1 per WC	1 per WC	1 per WC	1 per WC
v)	Cleaner's sink	1 per each restaurant			
vi)	Kitchen sink/dish washer	1 per Kitchen			
	NOTES				
	1) Some WCs may be Indian Style, if desired.				
	2) Male population may be assumed as two-third and female population as one-third.				
	3) Provision for additional and special hospital fittings where required shall be made.				

PROJECT NAME: Date:

Sl. No.	Occupancy**	Floor Area (Gross) in Sqm#	Occupant Load Factor (M^2/Person) (Ref: Part 4, Table 3 of NBC 2016)	Total No of Person	Visitors/Public -85%		NR Staff -15%		Water Closet with Flush Valve and Ablution Tap/HF*					Urinal*			Wash Basin*					Cleaner's Sink*	Kitchen sink/ dish washer*	Remarks
					Males 65%	Females 35%	Males 65%	Females 35%	Public		Staff		Total Quantity	Public	Staff	Total Quantity	Public		Staff		Total Quantity			
									M	F	M	F					M	F	M	F				
a	b	c	d	e = c/d	f = e* 0.85*0.65	g = e* 0.85*0.35	h = e* 0.15*0.65	i = e* 0.15*0.35	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y
1	Dining areas and Restaurants with seating and table		1.8	0	0	0	0	0					0			0					0			

NOTE -

1) #**Floor Area (Gross)** - The area of the floor within the inside perimeter of the outside walls of the floor of the building under consideration with no deductions for corridors and passage ways, stairs, closets, thickness of interior walls, columns, lifts and building shafts or other features.

2) ***Refer :** Part 9 Section 2 Table 10 Cluase 4.2.5.1 of NBC 2016

Table 5.18 Sanitation Requirements for Schools and Educational Institutions
(Ref. NBC 2016 Part 9, Section 2, Clause 4.2.5.1, Table 11)

Sl. No.	Fixtures	Nursery School	Non Residential		Residential	
			Boys	Girls	Boys	Girls
i)	Water Closets	1 per 15 pupils or part thereof	1 per 40 pupils or part thereof	1 per 25 pupils or part thereof	1 per 8 pupils or part thereof	1 per 6 pupils or part thereof
ii)	Ablution tap	1 in each WC	1 in each WC	1 in each WC	1 in each WC	1 in each WC
		1 water tap with draining arrangements shall be provided for every 50 persons or part thereof in the vicinity of water closets and urinals				
iii)	Urinals	----------	1 per 20 pupils or part thereof	----------	1 per 25 pupils or part thereof	----------
iv)	Wash basins	1 per 15 pupils or part thereof	1 per 60 pupils or part thereof	1 per 40 pupils or part thereof	1 per 8 pupils or part thereof	1 per 6 pupils or part thereof
v)	Bath (showers)	1 per 40 pupils or part thereof	----------	----------	1 per 8 pupils or part thereof	1 per 6 pupils or part thereof
vi)	Drinking water fountain or taps	1 per 50 pupils or part thereof	1 per 50 pupils or part thereof	1 per 50 pupils or part thereof	1 per 50 pupils or part thereof	1 per 50 pupils or part thereof
vii)	Cleaner's sink	1 per each floor				
	NOTES					
	1) Some WCs may be Indian Style, if desired.					
	2) For teaching staff, the schedule of fixtures to be provided shall be the same as in case of office building.					

PROJECT NAME: Date:

Sl. No.	Occupancy**	Floor Area (Gross) in Sqm#	Occupant Load Factor (M^2/Person) (Ref: Part 4, Table 3 of NBC 2016)	Total No of Person	Nursery School	NR/Residential Students/ Staffs		Water Closet with Flush Valve and Ablution Tap/HF					Urinal			Wash Basin						Bath (showers)	Drinking water fountain or taps	Cleaner's Sink	Remarks
					Pupils	Boys/ Males 50%	Girls/ Females 50%	Pupils		Students/ Staffs		Total Quantity	Students	Staffs	Total Quantity	Pupils		Students/ Staffs			Total Quantity				
										M	F							M	F						
a	b	c	d	e = c/d	f	g = e*0.85*0.35	h = e*0.15*0.35	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y
1	Schools and Educational Institutions -Nursery School (for Students) Refer Table 11		4	0	0	NA	NA					0			0					0				
2	Schools and Educational Institutions -Non Residential (for Students) Refer Table 11		4	0	NA	0	0	NA				0			0	NA				0				
3	Schools and Educational Institutions -Residential (for Students) Refer Table 11		4	0	NA	0	0	NA				0			0	NA				0				
4	Schools and Educational Institutions (Office area for Staffs) Refer Table 1		10	0	NA	0	0	NA				0			0	NA				0				

NOTE -

1) #**Floor Area (Gross)** - The area of the floor within the inside perimeter of the outside walls of the floor of the building under consideration with no deductions for corridors and passage ways, stairs, closets, thickness of interior walls, columns, lifts and building shafts or other features.

2) ***Refer :** Part 9 Section 2 Table 1 & Table 11 Cluase 4.2.5.1 of NBC 2016

Table 5.19 Sanitation Requirements for Hostels
(**Ref. NBC 2016 Part 9, Section 2, Clause 4.2.5.1, Table 12**)

Sl. No.	Fixtures	Resident		Non Resident		Visitor/ Common Rooms	
		Males	**Females**	**Males**	**Females**	**Males**	**Females**
i)	Water Closets	1 per 8 or part thereof	1 per 6 or part thereof	1 for up to 15	1 for up to 12	1 per 100 up to 400	2 per 100 up to 200
				2 for 16 to 35	2 for 13 to 25	Over 400 add at 1 per 250	Over 200 add at 1 per 100
				3 for 36 to 65	3 for 26 to 40		
				4 for 66 to 100	4 for 41 to 57		
					5 for 58 to 77		
					6 for 78 to 100		
ii)	Ablution tap	1 in each water closet					
		1 water tap with draining arrangements shall be provided for every 50 persons or part thereof in the vicinity of water closets and urinals					
iii)	Urinals	1 per 25 or part thereof	----------	Nil up to 6	----------	1 per 50 or part thereof	----------
			----------	1 for 7 to 20	----------		----------
			----------	2 for 21 to 45	----------		----------
			----------	3 for 46 to 70	----------		----------
			----------	4 for 71 to 100	----------		----------
iv)	Wash basins	1 per 8 or part thereof	1 per 6 or part thereof	1 for up to 15	1 for up to 12	1 per WC/ Urinal	1 per WC
				2 for 16 to 35	2 for 13 to 25		
				3 for 36 to 65	3 for 26 to 40		
				4 for 66 to 100	4 for 41 to 57		
					5 for 58 to 77		
					6 for 78 to 100		
v)	Bath/showers	1 per 8 or part thereof	1 per 6 or part thereof	----------	----------	----------	----------
vi)	Cleaner's sink	1 per each floor					
	NOTES - Some WCs may be Indian Style, if desired.						

PROJECT NAME: Date:

Sl. No.	Occupancy**	Floor Area (Gross) in Sqm[#]	Occupant Load Factor (M^2/Person) (Ref: Part 4, Table 3 of NBC 2016)	Total No of Person	Resident -85%		NR/ Visitor/ Common Rooms -15%		Water Closet with Flush Valve and Ablution Tap/HF*					Urinal*			Wash Basin*					Bath/showers *	Cleaner's Sink*	Remarks
					Males 65%	Females 35%	Males 65%	Females 35%	Resident		NR/ Visitors		Total Quantity	Resident	NR/ Visitors	Total Quantity	Resident		NR/ Visitors		Total Quantity			
									M	F	M	F					M	F	M	F				
a	b	c	d	e = c/d	f = e* 0.85*0.65	g = e* 0.85*0.35	h = e* 0.15*0.65	i = e* 0.15*0.35	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y
1	Hostel		12.5	0	0	0	0	0					0			0					0			

NOTE -

1) [#]**Floor Area (Gross)** - The area of the floor within the inside perimeter of the outside walls of the floor of the building under consideration with no deductions for corridors and passage ways, stairs, closets, thickness of interior walls, columns, lifts and building shafts or other features.

2) ***Refer :** Part 9 Section 2 Table 12 Cluase 4.2.5.1 of NBC 2016

Table 5.20 Sanitation Requirements for Fruit and Vegetable Markets (Ref.NBC2016Part9,Section2,Clause4.2.5.1,Table13)

Sl. No.	Fixtures	ShopOwners		CommonToiletsMarket Building		PublicToiletfor FloatingPopulation	
		Males	Females	Males	Females	Males	Females
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Water Closets	1per8orpartth ereof		1 forupto15 2 for16to35 3 for36to65 4 for66to 100	1 forupto12 2 for13to25 3 for26to40 4 for41to57 5 for58to77 6 for78to100	1per50 (Min2)	1per50 (Min2)
ii)	Ablution tap	One in each water closet	One in each water closet	One in each water closet	One in each water closet	One in each water closet	One in each water closet
		1 Water tap with draining arrangements shall be provided in receiving/ sale area of each shop and for every 50 persons or part thereof in the vicinity of water Closets and urinals					
iii)	Urinals	-	-	Nil up to 61for7to20 2 for21to45 3 for46to70 4 for71to 100	-	1per50	-
iv)	Wash basins	1per8orpartth ereof		1 forupto15 2 for16to35 3 for36to65 4 for66to 100	1 forupto12 2 for13to25 3 for26to40 4 for41to57	-	-
v)	Bath/showers	1 per8 persons or part thereof	1 per6persons or part thereof	-	-	1per50 persons	1per50 persons

NOTE-

1) Toilet facilities for individual buildings in a market should be taken same as that for office buildings.
2) Common toilets in the market buildings provide facilities for persons working in shops and the irregular visitors.
3) Special toilet facilities for a large floating population of out of town buyers/sellers,labourers,drivers of vehicles for whom special toilet(public toilets).

PROJECT NAME: Date:

Sl. No.	Occupancy	Floor Area (Gross) in Sqm#	Occupant Load Factor (M^2/Person) (Ref: Part 4, Table 3 of NBC 2016)	Total No of Person	Public -90%		Owner/Staff -10%		Water Closet with Flush Valve and Ablution Tap/HF*					Urinal*			Wash Basin*					Bath/showers *	Remarks
					Males 65%	Females 35%	Males 65%	Females 35%	Public		Owner/ Staff		Total Quantity	Public	Owner/ Staff	Total Quantity	Public		Owner/ Staff		Total Quantity		
									M	F	M	F					M	F	M	F			
a	b	c	d	e = c/d	f = e* 0.9*0.65	g = e* 0.9*0.35	h = e* 0.1*0.65	i = e* 0.1*0.35	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x
1	Fruit and Vegetable Markets		3	0	0	0	0	0					0			0					0		

NOTE -

1) #Floor Area (Gross) - The area of the floor within the inside perimeter of the outside walls of the floor of the building under consideration with no deductions for corridors and passage

2) *Refer : Part 9 Section 2 Table 13 Cluase 4.2.5.1 of NBC 2016

Table 5.21 Sanitation Requirements for Bus Stations, Airports and Railway Stations
(Ref. NBC 2016 Part 9, Section 2, Clause 4.2.5.1, Table 14)

Sl. No.	Fixtures	Junction Stations, Intermediate Stations and Bus Stations		Terminal Railway and Bus Stations		Domestic and International Airports	
		Males	Females	Males	Females	Males	Females
i)	Water Closets	3 for up to 1000	4 for up to 1000	4 for up to 1000	5 for up to 1000	*Min* 2	*Min* 2
		Add 1 per additional 1000 or part thereof		Add 1 per additional 1000 or part thereof		For 200 : 5	For 200 : 8
						For 400 : 9	For 400 : 15
						For 600 : 12	For 600 : 20
						For 800 : 16	For 800 : 26
						For 1000 : 18	For 1000 : 29
ii)	Ablution tap	1 in each water closet					
		1 water tap with draining arrangements shall be provided for every 50 persons or part thereof in the vicinity of water closets and urinals					
iii)	Urinals	4 for up to 1000	----------	6 for up to 1000	----------	1 per 40 or part thereof	----------
		Add 1 per additional 1000 or part thereof	----------	Add 1 per additional 1000 or part thereof	----------		----------
iv)	Wash basins	1 per WC/ Urinal	1 per WC	1 per WC/ Urinal	1 per WC	1 per WC/ Urinal	1 per WC
v)	Bath/showers	2 per 1000		3 per 1000		4 per 1000	
vi)	Drinking water fountain or taps (in common lobby for M/F)	2 per 1000 or part thereof		3 per 1000 or part thereof		4 per 1000 or part thereof	
vii)	Cleaner's sink	1 per toilet compartment with 3 WCs					
	NOTES						
	1) Some WCs may be Indian style, if desired.						
	2) Male population may be assumed as three-fifth and female population as two-fifth.						
	3) Separate provision shall be made for staff and workers.						

PROJECT NAME: Date:

Sl. No.	Occupancy**	Floor Area (Gross) in Sqm*	Occupant Load Factor (M^2/Person) (Ref: Part 4, Table 3 of NBC 2016)	Total No of Person	Public -90%		Owner/Staff -10%		Water Closet with Flush Valve and Ablution Tap/HF*					Urinal*			Wash Basin*					Bath/showers*	Cleaner's sink*	Remarks
					Males 60%	Females 40%	Males 60%	Females 40%	Public		Owner/ Staff		Total Quantity	Public	Owner/ Staff	Total Quantity	Public		Owner/ Staff		Total Quantity			
									M	F	M	F					M	F	M	F				
a	b	c	d	e = c/d	f = e*0.9*0.6	g = e*0.9*0.4	h = e*0.1*0.6	i = e*0.1*0.4	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y
1	Junction Stations, Intermediate Stations and Bus Stations		0.65	0	0	0	0	0					0			0					0			
2	Terminal Railway and Bus Stations		0.65	0	0	0	0	0					0			0					0			
3	Domestic and International Airports		0.65	0	0	0	0	0					0			0					0			

NOTE -

1) ***Floor Area (Gross)** - The area of the floor within the inside perimeter of the outside walls of the floor of the building under consideration with no deductions for corridors and passage ways, stairs, closets, thickness of interior walls, columns, lifts and building shafts or other features.

2) ***Refer:** Part 9 Section 2 Table 14 Cluase 4.2.5.1 of NBC 2016

Table 5.22 Sanitation Requirements for Shopping Mall and Retail Buildings
(Ref. NBC 2016 Part 9, Section 2, Clause 4.2.5.1, Table 15)

Sl. No.	Fixtures	Staff Toilets in Shopping Building		Public Toilet for Floating Population	
		Males	Females	Males	Females
i)	Water Closets	1 for up to 15	1 for up to 12	1 per 50 (Min 2)	1 per 50 (Min 2)
		2 for 16 to 35	2 for 13 to 25		
		3 for 36 to 65	3 for 26 to 40		
		4 for 66 to 100	4 for 41 to 57		
			5 for 58 to 77		
			6 for 78 to 100		
ii)	Ablution tap	1 in each water closet			
iii)	Urinals	Nil up to 6	----------	1 per 50	----------
		1 for 7 to 20			
		2 for 21 to 45			
		3 for 46 to 70			
		4 for 71 to 100			
iv)	Wash basins	1 for up to 15	1 for up to 12	1 per 50 (Min 2)	1 per 50 (Min 2)
		2 for 16 to 35	2 for 13 to 25		
		3 for 36 to 65	3 for 26 to 40		
		4 for 66 to 100	4 for 41 to 57		
v)	Bath/showers	1 per 100 persons		----------	----------
	NOTES				
	1) Toilet facilities for individual facilities in a shopping building should be taken same as that for office buildings.				
	2) Staff toilets in the shopping buildings provide facilities for persons working in shops and building, as well as for maintenance staff.				
	3) The number of persons against the fixture bath/showers represent the maintenance staff requiring such facility.				
	4**)** Public toilet facilities are provided for a large floating population for buyers and visitors.				

PROJECT NAME: Date:

Sl. No.	Occupancy**	Floor Area (Gross) in Sqm*	Occupant Load Factor (M^2/Person) (Ref: Part 4, Table 3 of NBC 2016)	Total No of Person	Visitors/Public -90%		Staff -10%		Water Closet with Flush Valve and Ablution Tap/HF*					Urinal*			Wash Basin*					Bath/showers$	Remarks
					Males 65%	Females 35%	Males 65%	Females 35%	Public		Staff		Total Quantity	Public	Staff	Total Quantity	Public		Staff		Total Quantity		
									M	F	M	F					M	F	M	F			
a	b	c	d	e = c/d	f = e* 0.9*0.65	g = e* 0.90*0.35	h = e* 0.1*0.65	i = e* 0.1*0.35	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x
1	Street Floor and Sales Basement		3	0	0	0	0	0					0			0					0		
2	Upper Sales Floor		6	0	0	0	0	0					0			0					0		
3	Storage/warehouse, receiving and the like		20	0	0	0	0	0					0			0					0		
4	Car Parking Area		30	0	0	0	0	0					0			0					0		

NOTE -

1) *Floor Area (Gross) - The area of the floor within the inside perimeter of the outside walls of the floor of the building under consideration with no deductions for corridors and passage ways, stairs, closets, thickness of interior walls, columns, lifts and building shafts or other features.

2) *Refer : Part 9 Section 2 Table 15 Cluase 4.2.5.1 of NBC 2016

GENERAL NOTES -

1 **Occupant load in dormitary portions of homes for the aged, orphanages, insane asylums, etc, where sleeping accomodation is provided shall be calculated at not less than 7.5 m^2 gross floor area/person.

2 **Car parking areas under occupancy other than storage shall also be 30 m^2 per person.

3 $Following areas to be excluded while calculating the drainage & sanitation requirements; Services/Engineering Equipments, Ducts, Toilets, Lift/Escalators/Travellators, Staircases, Landscape area in interior & exterior part of the building, etc.

4 Common area, Corridors, etc in each floor shall be proportionately added to the uses specified in the respective floor.

5 The Drainage & Sanitation requirements shall be preferably provided (not compulsory) in the respective floors based on the uses specified in that floor. The total requirements for the building shall be distributed in the different floors of the building.

6 Drinking water facility shall be provided in common area of the building preferably in the Ground Floor. One location in every three floors.

7 The Drainage & Sanitation requirements for Cinemas and Hotels shall be provided within the respective premises itself and such of the exclusive uses.

5.3.2.4 Construction Site

1.At construction sites, one toilet must be provided per 20 employees. In a work zone with between 21 and 199 employees, a toilet seat and one urinal must be provided for every 40 employees. For 200 or more workers, regulations call for a toilet seat and a urinal per 50 workers. The toilet must be located within 200 m or 5-minute walk.

2. Job sites that are not equipped with a sanitary sewer must, unless prohibited by local codes, provide privies, in locations where their use will not contaminate either ground or surface water. Other alternatives to a privy could be chemical toilets, re-circulating toilets, or combustion toilets.
3. Toilets should be cleaned regularly and maintained in good order, running water, must be provided along with soap and individual hand towels.

5.3.2.5 Temporary Camp Toilets

Toilet facilities shall be provided within 60 m of the, site, which shall not be closer than 15 m of dining area or kitchen. Make sure that toilet area is cleaned at least once per day, it is sanitary, adequately lighted and is employee safe.

5.3.2.6 Special / Contingency Toilets

1) For Special events like open air theatre, religious/political gatherings, mela, etc. for which there are no permanent toilet facilities, contingency toilets/PSUs shall be provided. The following considerations shall determine the number of toilets to be provided for particular event:

a) Duration of the event

b) Type of crowd

c) Weather conditions

d) Whether finishing times are staggered if the event has multi-functions and the following guidelines shall be applied with minimum 50 per cent female toilets.

Table 5.23 Contingency Toilets facilities for Special Events

Sl.No.	Patrons	For Males			For Females	
		Toilets	Urinals	Sinks	Toilets	Sinks
1	<500	1	2	2	6	2
2	<1000	2	4	4	9	4
3	<2000	4	8	6	12	6
4	<3000	6	15	10	18	10
5	<5000	8	25	17	30	17

3) ***Special Purpose Toilets:*** *Special toilet facilities shall be adequately provided in public projects (transport terminals/ healthcare and other public spaces) in million plus cities for the Third gender with appropriate cleanliness arrangements.*

5.3.2.7 General guidance for water supply arrangements

1. For new construction: Provision shall be made for underground tank for the storage of water, having capacity at 200 l. per person with adequate pumping arrangements to supply water to upper floors. Water connection from the Water Supply system of the Authority will be allowed only for use of drinking and bathing. For other purposes i.e. flushing and gardening etc., the individual shall be required to have own arrangements of open well, tube well (with the permission of Ground Water Authority), rain water or recycled water, within the premises. While according sanction to Layout Plan, the Authority shall make a special mention that provision for space shall be kept for the construction of underground reservoir of adequate capacity along with booster pumping station

2.The plumbing arrangement in case of new constructions shall be made in a way that the potable water shall be used for drinking, cooking & bathing only and for rest of the uses, provision for dual piping system shall be made for the buildings specified in chapter 11.

3. Low-capacity cistern should preferably be provided instead of normal 12.5 L capacity.

4. Provisions for sustainable methods of Water and Wastewater management and Water harvesting may be referred from Chapter 10 and Chapter 11 of these Byelaws.

5.3.2.8 Provision for Closed Circuit Camera System

All buildings above 500 sqm. shall provide minimum two numbers of High-Definition Closed Circuit Cameras facing the road and connected to compatible DVRs with recording facility of at least one week.

CHAPTER 6

6. PROVISIONS FOR HIGH RISE DEVELOPMENT

6.1 General

These provisions shall be in addition to the **Chapter 4** for plan sanction procedure, general building requirements (low/high) given in **Chapter 5** of this document and structural safety given in **Chapter7**

6.2 Means of access: Shall be as specified in the Zonal Regulations

6.3 Parking Spaces

(1) The parking spaces shall be provided as per the provisions of Master Plan and Zonal Regulations as prevalent. The location of parking spaces shall be well ventilated.

(2) In case of high-rise buildings parking will be permitted at any/all of the following:

a. Basements

b. Stilt floor

c. Stacked/ Multi-level/ Automated parking

6.4 Building components

6.4.1 Doorways

The doorway requirements shall be as prescribed in **Clause no.5.2.6**

6.4.2 Revolving Doors

Revolving door shall not be provided as a means of fire exit

6.4.3 Stairways

The internal staircases may be constructed with an external wall, or otherwise, and shall comply with the following:

(1)A staircase shall not be arranged round a lift shaft.

The natural ventilation requirement of the staircase shall be, achieved through opening at each landing, of an area 0.5 m^2 in the external wall. A cross ventilated staircase shall have 2 such openings in opposite/adjacent walls or the same shall be cross ventilated through the corridor.

Enclosed staircase leading to more than one basement shall be pressurized.

The pressure difference for staircases shall be 50 Pa. For pressurized stair enclosure systems, the activation of the systems shall be initiated by signalling from fire alarm panel.

The minimum width of tread without nosing shall be 250 mm for staircase of residential buildings. This shall be minimum 300 mm for assembly, hotels, educational, institutional, business and other buildings. The treads shall be constructed and maintained in a manner to prevent slipping. The maximum height of riser shall be 190 mm for staircase of residential buildings(A-2) and 150 mm for other buildings. The number of risers shall be limited to 12 per flight.

Handrails, to be provided on both sides, shall be of a height not less than 1 000 mm and not exceeding 1 200 mm. There shall be provisions of balusters with maximum gap of 150 mm

Access to exit staircase shall be through a fire door of a minimum 120 min fire resistance rating.

No living space, store or other fire risk shall open directly into staircases.

(2) The minimum width of staircase shall be as per Zonal regulations:

(3) Handrails shall be provided with a minimum height of 1.0 m from the center of the tread.

(4) Access to main staircase shall be gained through adequate fire resistance rating specified in Chapter12 Automatic closing doors shall be placed in the enclosing walls of the staircases. It shall be a swing type door opening in the direction of the escape.

(5). No living space, store or other fire risk shall open directly into the staircase or staircases.

(6). External exit door of staircase enclosure at ground level shall open directly to the open spaces or can be reached without passing through any door other than a door provided to form a draught lobby

(7). The exit sign with arrow indicating the way to the escape route shall be provided at a height of 0.5m from the floor level on the wall and shall be illuminated by electric light connected to corridor circuits. All exit way marking signs should be flushed with the wall and so designed that no mechanical damage shall occur to them due to moving of furniture or other heavy equipment. Further all landings of floor shall have floor indication boards indicating the number of floor. The floor indication board shall be placed on the wall immediately facing the flight of stairs and nearest to the landing. It shall be of size not less than 0.5x 0.5m and it shall be prominently on the wall facing the staircase.

(8). In case of single staircase, it shall terminate at the ground floor level and the access to the basement shall be by a separate staircase. However, the second staircase may lead to basement levels provided the same is separated at ground level by either a ventilated lobby with discharge points at two different ends or through enclosures with fire resistance rating door specified in Chapter12 or through a fire protected corridor.

6.4.4 Lifts

General requirements of lifts shall be as follows:

(1) All the floors shall be accessible for 24 hours by the lifts. The lifts provided in the buildings shall not be considered as a means of escape in case of emergency. In a dual line arrangement (lifts opposite to each other) the lobby may be between 1.5 times to 2.5 times the depth of one car. For in-line (single line) arrangements the lobby may be typically half of the above recommendations.

(2) Grounding switch, at ground floor level, to enable the fire service to ground the lift shall also be provided.

(3) The lift machine room shall be separate and no other machinery shall be installed therein.

(4) Walls of lift enclosures and lift lobby shall have fire rating of 2 hour; as specified in Chapter12 lifts shall have a vent at the top of area not less than 0.2 Sqm

(5) Lift car door shall have a fire resistance rating of 1 hour.

(6) Lift lobby doors in lift enclosures shall have fire resistance as specified in Chapter12.

(7) Collapsible gates shall not be permitted for lifts and shall have solid doors with fire resistance of at least 1 hour.

(8) If the fire man lift shaft and lobby is in the core of the building, a positive pressure between 25 and 30 Pa shall be maintained in the lobby and a positive pressure of 50 Pa shall be maintained in the lift shaft. The mechanism for pressurization shall act automatically with the fire alarm; it shall be possible to operate this mechanically also.

(9) Lifts if communicating with the basement, the lift lobby of the basements shall be pressurized as suggested in clause 12.9.1(g) and 12.9.1(h) with self-closing door with fire resistance rating as specified in Chapter 12. Telephone or other communication facilities shall be provided in lift cars and to be connected to fire control room for the building.

(10) Exit from the fire man lift lobby, if located in the core of the building, shall be through a self-closing fire door of half an hour fire resistance.

(11) Suitable arrangements such as providing slope in the floor of lift lobby shall be made to prevent water used during firefighting, etc., at any landing from entering the lift shafts.

(12) A sign shall be posted and maintained on every floor at or near the lift indicating that in case of fire, occupants shall use the stairs unless instructed otherwise. The sign shall also contain a plan for each floor showing the locations of the stairways. Alternate source of power supply shall be provided for all the lifts through a manually operated changeover switch.

(13) For Pressurization Specifications of various building components refer NBC Chapter 4 Fire and Life Safety Pressurization of Staircases (Protected Escape Routes)

In case of High-rise buildings, "Clause-7:7.1 Fire Protection Requirements of Lifts in High Rise Buildings of section 5 installation of lifts, escalators and Moving walks: 5A lifts"of part 8 of NBC-2016 shall be applicable with respect to the fire ratings and other installation provisions.

6.4.5 Basements

6.4.5.1 General requirements

Basement floors shall be permitted as prescribed in the Zonal Regulations

6.4.5.2 Requirements for High rise development

(1) Each basement shall be separately ventilated. Vents with cross-sectional area (aggregate) not less than 2.5 percent of the floor area spread evenly round the perimeter of the basement shall be provided in the form of grills or breakable stall board lights or pavement lights or by way of shafts. Alternatively, a system of air inlets shall be provided at basement floor level and smoke outlets at basement ceiling level. Inlets and extracts may be terminated at ground level with stall board or pavement lights, but ducts to convey fresh air to the basement floor level have to be laid. Stall board and pavement lights should be in positions easily accessible to the fire brigade and clearly marked 'SMOKE OUTLET' or 'AIR INLET' with an indication of area served at or near the opening

(2) The staircase of basements shall be of enclosed type having fire resistance rating as specified in Chapter 12. The staircase shall be situated at the periphery of the basement to be entered at ground level only, from outside open air. The staircase shall communicate with basement through a lobby with self-closing doors with fire resistance rating as per relevant NBC code mentioned above.

(3) In multi-storey basements, intake ducts may serve all basement levels, but each basement level and basement compartment shall have separate smoke outlet duct or ducts. Ducts so provided shall have the same fire resistance rating as the compartment itself. Fire rating may be taken as the required smoke extraction time for smoke extraction ducts.For multistoried basements, clause 11.5 of Section -3: Air Conditioning, Heating and Mechanical Ventilation of part 8- Building Services is applicable.

(4) Mechanical extractors for smoke venting system from lower basement levels shall also be provided. The system shall be of such design as to operate on actuation of heat / smoke sensitive detectors or sprinklers, if installed, and shall have a considerably superior performance compared to the standard units. It shall also have an arrangement to start it manually.

(5) Mechanical extractors shall have an internal locking arrangement, so that extractors shall continue to operate and supply fans for HVAC shall stop automatically with the actuation of fire detectors.

(6) Mechanical extractors shall be designated to permit 30 air changes per hour in case of fire or distress call. However, for normal operation, air changes schedule shall be as given in Part 8, Building Services, Section 3, Air-conditioning, Heating and Mechanical Ventilation of National Building Code, 2016.

(7) Mechanical extractors shall have an alternative source of supply.

h. Ventilating ducts shall be integrated with the structure and made out of brick masonry or reinforced cement concrete and when this duct crosses the transformer area or electrical switchboard, fire dampers shall be provided.

(8) Use of basements for kitchens working on gas fuel shall not be permitted, unless air conditioned. The basement shall not be permitted below the ward block of a hospital/nursing home unless it is fully sprinkled. Building services such as electrical sub-stations, boiler rooms in basements shall comply with the provisions of the Indian Electricity Act / Rules. Boiler room shall be provided at the first basement along the periphery wall with fire resistance rating as specified in Chapter 12 or shall be separated with the blast wall.

(9) If cut-outs are provided from basements to the upper floors or to the atmospheres, all sides' cut-out openings in the basements shall be protected by sprinkler head at close spacing so as to form a water curtain in the event of a fire.

(10) It is essential to make provisions for drainage of any such water on all floors to prevent or minimize water damage of the contents. The drain pipes should be provided on the external wall for drainage of water from all floors. On large area floors, several such pipes may be necessary which should be spaced 30 m apart. Care shall be taken to ensure that the construction of the drain pipe does not allow spread fire / smoke from floor to floor.

6.4.6 Compartmentation

The building shall be suitably compartmentalized so that fire/smoke remains confined to the area where fire incident has occurred and does not spread to the remaining part of the building. Compartmentation and Pressurization method shall be adopted (as per Part 4 of NBC2016) to protect escape routes against ingress of smoke, or toxic gases into the escape routes will be prevented. Pressurization shall be adopted for high rise buildings and building having mixed occupancy/multiplexes having covered area more than 500 Sqm. Compartmentation in high rise building should be followed as per NBC 2016.

6.4.7 Ramps

Ramps shall be provided as prescribed in Clause **5.2.5**

6.4.8 Corridors

(1) Exit corridors and passageways shall be of width not less than the aggregate required width of exit doorways leading from them in the direction of travel to the exterior.

(2) The width of the corridor shall be as specified in the Zonal Regulations.

(3) Where stairways discharge through corridors and passageways, the height of corridors and passageways shall be not less than 2.4 m.

(4) All means of exit including staircases lifts lobbies and corridors shall be ventilated.

6.4.9 Glass Façade/ Service Ducts/Shafts/ Refuge Area/ Vents

(1) An Opening to the glass façade of min. width 1.5 m and height 1.5m shall be provided at every floor at a level of 1.2 m from the flooring facing compulsory open space as well as on road side. Construction that complies with the fire rating of the horizontal segregation and has any gap packed with a non-combustible material to withstand thermal expansion and structural movement of the walling without the loss of seal against fire and smoke.

(2) (2) Mechanism of Opening: The openable glass panel shall be either left or right shall have manual opening mechanism from inside as well as outside. Such openable panels shall be marked conspicuously so as to easily identify the openable panel from outside.

(3) Fire seal to be provided at every floor level between the external glazing and building structure.

(4) The glazing used for the façade shall be of toughened (tempered) safety glass as per I.S.2553.

(5) To avoid fire propagation vertically from one floor to another floor, a continuous glass I must be separated internally by a smoke/ fire seal which is of non-combustible material having a fire resistance rating of not less than 2 hours.

(6) Service ducts and shafts shall be enclosed by walls and doors with fire resistance rating (Refer Clause 12.7.1 of Chapter 12). All such ducts/shafts shall be properly sealed and stopped fire ingress at all floor levels.

(7) A vent opening at the top of the service shaft shall be provided having an area between one- fourth and one-half of the area of the shaft.

(8) The openable vent of minimum 2.5% of the floor area shall be provided. The openable vent can be pop out type or bottom hinged provided with fusible link opening mechanism and shall also be integrated with automatic Smoke Detection System.

a) Alternate vertical glass panels of the façade shall be openable type with the mechanism mentioned above in order to ventilate the smoke.

b) Refuge areas covered with the glass façade shall have all the panels fully openable (either left or right hinged) both from inside as well as outside. Glass quality and Practice of use of Glass in buildings shall have to be in conformity with the BIS codes as given in Table 5.1 below:

IS Code	**Specifications**
2553(Part 1):1990	Specification for safety glass: Part 1 General purpose *(third revision)*
2835:1987	Specification for flat transparent sheet glass *(third revision)*
438:1994	Specification for silvered glass mirrors for general purpose *(second revision)*

5437:1994	Specification for figured rolled and wired glass *(first revision).*
14900:2000	Specification for transparent float glass.
16231 Part 1	General methodology for selection
16231 Part 2	Energy and Light
16231 Part 3	Fire and Loading
16231 Part 4	Safety related to Human Impact

Clause 3.4.8.2.2, clause 3.4.10.2 and E-4"Horizontal Exits /Refuge Area"of Annexure E; Additional Requirements for High Rise Buildings of Part-4 of NBC 2016 are applicable.

6.5 Building Services

6.5.1 Staircase and Corridor Lighting

(1) The staircase and corridor lighting shall be on separate service and shall be independently connected so as it could be operated by one switch installation on the ground floor, easily accessible to firefighting staff at any time irrespective of the position of the individuate control of the light points, if any.

(2) Staircase and corridor lighting shall also be connected to alternate supply from parallel high-tension supply or to the supply from the stand-by generator.

(3) Emergency lights shall be provided in staircase and corridor/ passageway, horizontal exits, refuge area; and all wires and other accessories used for emergency light shall have fire retardant property

Clause 2.13: Emergency and lighting system; Clause 3.4.6.2 Emergency power for fire and life safety systems of part-4: and Annexure B-22.5 of Part-3 of NBC 2016 is applicable.

6.5.2 Electrical Services

(1) The electric distribution cables/wiring shall be laid in separate duct the duct shall be sealed at every floor with non-combustible materials having the same fire resistance as that of the duct. Low and medium voltage wiring running in shaft and in false ceiling shall run in separate conduits.

(2) Water mains, telephone cables, intercom cables, gas pipes or any other service line shall not be laid in the duct for electric cables. Use of bus ducts/solid rising mains instead of cables is preferred.

(3) The provision of dedicated telecommunication ducts for all new building proposals is mandatory for conveyance of telecommunication and other data cables.

(4) Separate circuits for water pumps lifts, staircases and corridor lighting and blowers for pressurizing system shall be provided directly from the main switchgear panel (for detailed specifications refer NBC 2016, Chapter 4 Fire and Life Safety).

Clause 3.4.6: Electrical Installation; and E-5 "Electrical Services" of Annexure E; Additional Requirements for High Rise Buildings of Part-4 of NBC 2016 are applicable.

6.5.3 Alternate Source of Electric Supply

A stand-by electric generator shall be installed to supply power to staircase and corridor lighting circuits, fire lifts, the stand-by fire pumps, pressurization fans and blowers, smoke extraction and damper system in case of failure of normal electric supply. The generator shall be capable of taking starting current of all

the machines and circuits stated above simultaneously. If the stand-by pump is driven by diesel engine, the generator supply need not be connected to the stand-by pump.

Clause 3.4.6.2: Emergency power for fire and life safety systems; and clause 3.4.6.4 Standby supply, of Part-4 of NBC 2016 are applicable.

6.5.4 Air-conditioning

Air-conditioning shall conform to the following:

a. Escape routes like staircases, common corridors, lift lobbies, etc. shall not be used as return air passage.

b. The ducting shall be constructed of substantial gauge metal in accordance with good practice.

c. Wherever the ducts pass through fire walls or floors, the opening around the ducts shall be sealed with materials having fire resistance rating of the compartment.

d. Where duct crosses a compartment which is fire rated, the ducts shall be fire rated for same fire rating. Further depending on services passing around the duct work, which may get affected in case of fire temperature rising, the ducts shall be insulated.

e. ceiling Metallic ducts shall be used even for the return air instead of space above the false.

f. Where plenum is used for return air passage, ceiling and its fixtures shall be of non-combustible material.

g. The materials used for insulating the duct system (inside or outside) shall be of non-combustible material; glass wool shall not be wrapped or secured by any material of combustible nature.

h. Air ducts serving main floor areas, corridors, etc. shall not pass through the staircase enclosure.

i. The air-handling units shall be separate for each floor and air ducts for every floor shall be separated and in no way inter-connected with the ducting of any other floor.

j. If the air-handling unit serves more than one floor, the recommendations given above shall be compiled with in addition to the conditions given below:

i. Proper arrangements by way of automatic fire dampers working on smoke detector / or fusible link for isolating all ducting at every floor from the main riser shall be made.

ii. When the automatic fire alarm operates, the respective air-handling units of the air conditioning system shall automatically be switched off.

iii. The vertical shaft for treated fresh air shall be of masonry construction.

iv. The air filters of the air-handling units shall be of non-combustible materials or fire rated (Refer Clause 12.7.1 of Chapter 12)

v. The air-handling unit room shall not be used for storage of any combustible materials.

vi. Inspection panels shall be provided in the main trunk line to facilitate the cleaning of ducts of accumulated dust and to obtain access for maintenance of fire dampers.

vii. No combustible material shall be fixed nearer than 150 mm to any duct unless such duct is properly enclosed and protected with non-combustible material (glass wool or spyglass with neoprene facing enclosed and wrapped with aluminium sheeting) at least 3.2 mm thick and which would not readily conduct heat.

Clause 3.4.8: Air Conditioning, Ventilation and Smoke Control; and clause 3.4.8.2 Air handling unit of Part-4 of NBC 2016 are applicable.

6.5.5 Transformers

(1) If transformers are housed in the building below the ground level it shall be necessarily in the first basement in separate fire resistance room of 4 hours rating. Transformer shall be dry type and shall be kept in an enclosure with walls, doors and cut-outs having fire resistance rating of 4 hour. The room shall necessarily be at the periphery of the basement having separate and direct access from open area at ground floor through a fire escape staircase. The entrance to the room shall be provided with a steel door of 2 hours fire rating. A curb of a suitable height shall be provided at the entrance in order to prevent the flow of oil from ruptured, transformer into other parts of the basement. The switchgears shall be housed in a separate room separated from the transformer bays by a fire-resisting wall with fire resistance not less than 4 hours.

(2) The transformer shall be protected by an automatic foam sprinkler system. When housed at ground floor level it/they shall be cut-off from the other portion of premises by Fire Resisting Walls of 4 hours rating.

(3) A tank of RCC construction of adequate capacity shall be provided at lower basement level, to collect the oil from the catch pit in case of emergency. The pipe connecting the catch-pit to the tank shall be of non-combustible construction and shall be provided with a flame-arrester.

(4) The electric sub-station shall be located in a separate building in accordance with I.E. Rules 68(I) and 64(I) .

(5) If this is not possible due to site conditions, the sub-station shall be located on the ground floor. As far as possible sub-station shall not be installed in a basement, for such situations special provisions like mechanical ventilation, wherever required, cable ducting, cable trays, top/bottom entry of HV/LV cable, hooks on Transformer(s) & HV panels, adequate fire detection and firefighting arrangement, adequate drainage, effective measures to prevent flooding etc. shall be provided. Adequate precautions shall also be taken for water proofing to prevent seepage of water. A ramp shall also be provided with a slope, not steeper than 1 in 7, for easy movement of equipment's to and from sub-station.

(6) Fire regulations – The installations shall be carried out in conformity with the local regulations and rules there under wherever they are in force. At other places NBC guidelines shall be followed.

Clause **3.4.6.3: Substation/Transformers**; clause **3.4.6.3.1Oil filled substation; 3.4.6.3.2 Dry type substation; 4.8 Hazardous Areas, Gaseous, Oil Storage Yard, etc; 4.4.2.4.3.5 Ramps. -**of Part-4 of NBC 2016 are applicable.

6.5.6 Gas supply

(1) Town Gas / L.P. Gas Supply Pipes – Where gas pipes are run in buildings, the same shall be run in separate shafts exclusively for this purpose and these shall be on external walls, away from the staircases. There shall be no interconnection of this shaft with the rest of the floors.

(2) LPG distribution pipes shall always be below the false ceiling. The length of these pipes shall be as short as possible. In the case of kitchen cooking range area, apart from providing hood, covering the entire cooking range, the exhaust system should be designed to take care of 30 cum per minute per Sqm of hood protected area. It should have grease filters using metallic grill to trip oil vapours escaping into the fume hood.

Note: For detailed information on gas pipe installations, reference may be made to Para.9 'Plumbing Services, Section 3 Gas Supply', of National Building Code of India.

(3) For large/commercial kitchens all wiring in fume hoods shall be of fiberglass insulation. Thermal detectors shall be installed into fume hoods of large kitchens for hotels, hospitals and similar areas located in high rise buildings. Arrangements shall be made for automatic tripping of the exhaust fan in case of fire.

(4) If LPG is used, the same shall be shut off. The voltage shall be of 24 V or 100V DC operated with the external rectifier. The valve shall be of the hand re-set type and shall be located in an area segregated from cooking ranges. Valves shall be easily accessible. The hood shall have manual facility for steam or carbon dioxide gas injection, depending on duty condition; and Gas meters shall be housed in a suitably constructed metal cupboard located in a well-ventilated space, keeping in view the fact that LPG is heavier than air and town gas is lighter than air

Clause 4.7 Gas Supply of Part-4 of NBC 2016 is applicable.

6.5.7 Boiler Room

Further, the following additional aspects may be taken into account in the location of Boiler/Boiler Room:

a. The boiler shall not be allowed in sub-basement but be allowed in the first basements away from the escape routes.

b. The boilers shall be installed in a fire resisting room of 4 hours fire resistance rating, and this room shall be situated on the periphery of the basement. Catch pit shall be provided at the low level. Entry to this room may be provided with a composite door of two-hour fire resistance

c. The boiler room shall be provided with fresh air inlets and smoke exhausts directly to the atmosphere.

d. Foam inlets shall be provided on the external walls of the building at the ground floor level to enable the fire services to use foam in case of fire.

e. The furnace oil tank for the boiler, if located in the adjoining room shall be separated by fire resisting wall of 4-hour rating. Entry to this room shall be provided with a composite door of 2-hour fire resistance. A curb of suitable height shall be provided at the entrance in order to prevent the flow of oil into the boiler room in case of tank rupture.

Clause 3.4.9 Heating; clause 4.8 Hazardous Areas, Gaseous, Oil Storage Yard, etc of Part-4 of NBC 2016 is applicable.

6.5.8 Helipad

Buildings above 200 m in height, helipad shall be provided.

6.5.9 Disaster Management / Fire Safety

Refer **Chapter 12** of this document.

6.5.10 Sustainable Environment and Buildings

Refer **Chapter 11& Chapter 15** of this document

6.5.11 Structural Safety

As per provisions made for Structural Safety in **Chapter 7**

CHAPTER 7

PROVISIONS FOR STRUCTURAL SAFETY

7.1 Structural design and safety

For any building under the jurisdiction of these Byelaws structural/retrofitting design shall only be carried out by a registered Licenced Structural Engineer. Proof checking of various designs/ reports shall be carried out by competent authority as per Table 7.1wherever applicable.

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7.1.1 Additional Provisions for natural hazard prone areas

Generally, the structural design of foundations, elements of masonry, timber, plain concrete, reinforced concrete, pre-stressed concrete and structural steel shall conform to the provisions of Part 6: Structural Design –

Section– 1 Loads, Forces and Effects

Section– 2 Soils and Foundations,

Section– 3 Timber and Bamboo,

Section– 4 Masonry,

Section– 5 Concrete &

Section– 6 Steel

Section– 7 Prefabrication Systems, Building and Mixed /Composite Construction of National Building Code of India (NBC), taking into consideration the Indian Standards as given below.

For General Structural Safety

1) IS: 456:2000 'Code of Practice for Plain and Reinforced Concrete'.

2) IS: 800-2007 'Code of Practice for General Construction in Steel'.

3) IS: 801-1975 'Code of Practice for Use of Cold Formal Light Gauge Steel Structural Members in General Building Construction'

4) IS 875 (Part 2):1987 Design loads (other than earthquake) for buildings and structures Part2 Imposed Loads.

5) IS 875 (Part 3):1987 Design loads (other than earthquake) for buildings and structures Part 3 Wind Loads.

6) IS 875 (Part 4):1987 Design loads (other than earthquake) for buildings and structures Part 4 Snow Loads.

7) IS 875 (Part 5):1987 Design loads (other than earthquake) for buildings and structures Part 5 special loads and load combination.

8) IS: 883:1994 'Code of Practice for Design of Structural Timber in Building.

9) IS: 1904:1986 (R 2005) 'Code of Practice for Structural Safety of Buildings: Foundation'

10) IS 1905:1987 'Code of Practice for Structural Safety of Buildings: Masonry Walls.

11) IS 2911(Part 1): Section 1: 2010 'Code of Practice for Design and Construction of Pile Foundation Section 1

Part 1: Section 2 Bored Cast-in-situ Piles

Part 1: Section 3 Driven Precast Concrete Piles

Part 1: Section 4 Bored Precast Concrete Piles

Part 2: Timber Piles

Part 3: Under Reamed Piles

Part 4: Load Test on Piles

For Cyclone/Wind Storm Protection

12) IS 875 (3):1987 'Code of Practice for Design Loads (other than Earthquake) for Buildings and Structures, Part 3, Wind Loads'

13) Guidelines (Based on IS 875 (3)-1987) for improving the Cyclonic Resistance of Low-rise houses and other building.

For Earthquake Protection

14) IS: 1893 (Part 1)-2002 'Criteria for Earthquake Resistant Design of Structures (Fifth Revision)'

15) IS: 13920-1993 'Ductile Detailing of reinforced Concrete structures subjected to Seismic Forces-Code of Practice

16) IS: 4326-2013 'Earthquake Resistant Design and construction of buildings code of practice (second revision)'

17) IS: 13828-1993 'Improving earthquake resistance of low strength masonry buildings-guidelines

18) IS: 13827:1993 'Improving Earthquake Resistance of Earthen Buildings-Guidelines

19) IS: 13935-2009 'Seismic Evaluation, Repair and Seismic Strengthening of Buildings -Guidelines'

For Protection of Landslide Hazard

20) IS 14458 (Part 1): 1998 Guidelines for retaining wall for hill area: Part1Selection of type of wall.

21) IS 14458 (Part 2): 1997 Guidelines for retaining wall for hill area: Part 2 Design of retaining/breast walls

22) IS 14458 (Part 3): 1998 Guidelines for retaining wall for hill area: Part 3Construction of dry stone walls

23) IS 14496 (Part 2): 1998 Guidelines for preparation of landslide – Hazard zonation maps in mountainous terrains: Part 2 Macro-zonation.

Note: Whenever an Indian Standard including those referred in the National Building Code or the National Building Code is referred, the latest revision of the same shall be followed except specific criteria, if any, mentioned above against that code.

7.1.2 Structural Design Basis Report (SDBR)

In compliance of the design with the above Indian Standard, the Structural Engineer on Record will submit a structural design basis report in the Performa attached herewith covering the essential safety requirements specified in the Standard.

The 'Structural Design Basis Report (SDBR)'consists of four parts

Part 1: General Information/ Data

Part 2: Load Bearing Masonry Buildings

Part 3: Reinforced Concrete Buildings

Part 4: Steel Buildings

a) Drawings and Documents to be submitted for approval of appropriate authorities shall include SDBR as detailed below:

Part 1: Completed

Part 2: (if applicable) – completed

Part 3: (if applicable) – undertaking that completed Part 3 will be submitted before commencement of construction.

Part 4: (if applicable) – undertaking that completed Part 4 will be submitted before commencement of construction.

b) SDBR as detailed below shall be submitted to the appropriate authority as soon as design of foundation is completed, but not later than one month prior to commencement of construction.

Part 1: Completed

Part-2, Part-3 or Part-4: (if applicable) Completed

7.1.3 Seismic strengthening/retrofitting

Prior to seismic strengthening/retrofitting of any existing structure, evaluation of the existing structure as regards structural vulnerability in the specified wind/seismic hazard zone shall be carried out by the Licenced Structural Engineer. If as per the evaluation of the Licenced Structural Engineer the seismic resistance is assessed to be less than the specified minimum seismic resistance as given in the note below, action will be initiated to carry out the upgrading of the seismic resistance of the building as per applicable standard guidelines.

Note:

1. For masonry buildings reference shall be made to IS 4326 and IS 13935

2. For concrete buildings and structures reference shall be made to IS15988: 2013 Seismic evaluation and strengthening of existing RCC buildings.

7.1.4 Buildings with Soft Storey

In case buildings with a flexible storey, such as the ground storey consisting of open spaces for parking that is 'Stilt buildings or any other storey with open halls, special arrangements are to be made to increase the lateral strength and stiffness of the soft/open storey such as Steel bracing / Shear walls / Brick infill's between columns. Dynamic analysis of building is to be carried out including the strength and stiffness effects

of infills and inelastic deformations in the members, particularly, those in the soft storey, and the structural members are to be designed accordingly.

Alternatively, the following design criteria are to be adopted after carrying out the earthquake analysis, neglecting the effect of infill walls in other storeys:

a. The columns and beams of the soft storey shall be designed for 2.5 times the storey shears and moments, calculated under seismic loads specified in the other relevant clauses; or,

b. Besides the columns designed and detailed for the calculated storey shears and moments, shear walls shall be placed symmetrically in both directions of the building as far away from the Centre of the building as feasible; to be designed exclusively for 1.5 times the lateral storey shear force calculated as before. For details of design and provisions, IS 1893, Part 1 shall be referred. Further, the provisions of Clause 4.8 of Part-6 of NBC is applicable. .

7.1.5 Review of structural design

1) The Local Authority shall create a Structural Design Review Panel (SDRP) consisting of senior Registered Licenced Structural Engineers. whose task will be to review and certify the design prepared by Registered Licenced Structural Engineer. whenever referred by the competent authority.

2) The Reviewing Agency shall submit addendum to the certificate or a new certificate in case of subsequent changes in structural design.

3) Table-7.1 gives requirements of SDRP for different structures of different complexities.

(4) Buildings & structures greater than 45m m in height or more than G+14 floors will require proof checking by SDRP**.** All other buildings requiring Proof Check as mentioned in Table 7.1, shall be Proof checked by EMSE.

Table 7.1 Proof Checking Requirements for Structural Design

Sl. No	Type of Structure	Submission from SER	To be Proof Checked
1.	Load Bearing Buildings up to three storeys	SDBR*	Not to be checked
2.	Buildings of 15.0 m height and above.	SDBR	To be checked
		Preliminary design	To be checked
3.	Buildings of 15.0 m height and above.	SDBR	To be checked
		Preliminary design	To be checked
		Detailed structural design and structural drawing	To be checked
4.	Non-Residential Buildings	SDBR	To be checked
		Preliminary design	To be checked
		Detailed structural design and structural drawing	To be checked

** SDBR – Structural Design Basis Report*

Notes:

1. Table 5.3may be referred for occupant load/live loads for different building types.

2.At the preliminary proposal stage of a project, the objective is to undertake feasibility study/comparison of a number of possible alternatives of structural schemes and determine the most cost effective one, detailed structural calculations are not necessary for each alternative scheme. However, it is necessary to determine the member sizes and reinforcement content in order to determine the cost. By making conservative assumptions it

is possible to derive simplified calculations for both analysis and design. ***This is called 'Preliminary or approximate analysis, and design'.***

After the most cost-effective scheme is selected and signed-off by the Client, the detailed calculations are performed on the selected scheme to determine the precise structural members and composition (size, dimension and stress behaviour), and this is called the ***'Detailed structural design'.***

In the aforesaid, the design of structural members is typically assumed to account for all the stress loads identified from section xx to be applicable in the given project.

3. Special structure means large span structures such as stadium, assembly halls, or tall structures such as water tanks, TV tower, chimney, etc.

It will be seen from the **Table 7.1** above that there is a wide range of structure typology, and the requirement by the Competent Authority for third party verification will depend on the type of structure.

4. *SER may adopt suitable structural design software for designing the buildings.*

7.1.6 Certification regarding structural safety in design

Registered Licenced Structural Engineer shall give a certificate of structural safety of design as per **Form-XV** at the time of completion, stating that the structure of the building has been designed as per the relevant standards satisfying the soil investigation report submitted by GER and for the loads expected on the building and that the building will be structurally safe if constructed accordingly. (as per **Clause 3.17)**

7.1.7 Constructional safety

7.1.7.1 Supervision

All constructions, shall be carried out under supervision of Licenced Professional who shall submit the Completion certificate to the Local Authority for obtaining Occupation Certificate. .

7.1.7.2 Certification of structural safety in construction

Licenced Structural Engineer shall give a certificate of structural safety of construction as per Performa given **in Form- XVA** at the time of completion, stating that the building is structurally safe and the construction is in accordance with the specified designs and drawings. (as per **Clause 3.17)**.

7.1.7.3 Inspection

All the construction for high-rise buildings higher than seven storeys, public buildings and special structures shall be carried out under quality inspection program prepared and implemented under the Building Quality Auditor (BQA) in seismic zones IV &V (as notified by the government).

7.1.8 Control of signage & outdoor display structures, cell phone towers and telephone Towers.

Following provisions shall apply for telecommunication infrastructure

a) Location: The Telecommunication Infrastructure shall be either placed on the building roof tops or on the ground or open space within the premises subject to other regulations.
b) Type of structure

i. Steel fabricated tower or antennae on M.S. pole

ii. Prefabricated shelters of fibre glass or P.V.C. on the building roof top /terrace for equipment.

iii. Masonry Structure/ Shelter on the ground for equipment.

iv. D.G. set with soundproof cover to reduce the noise level.

c) Requirement:

i. Every applicant has to obtain/ procure the necessary permission from the 'Standing Advisory Committee on Radio Frequency Allocation' (SACFA)issued by Ministry of Telecommunications.

ii. Every applicant will have to produce the structural safety & stability certificate for the tower as well as the building from the Structural Engineer on Record (SER) which shall be the liability of both owner and SER.

iii. Applicant has to produce / submit plans of structure to be erected

d. Projection: No Pager and/or Telephone Tower shall project beyond the existing building line of the building on which it is erected in any direction.

Provided, for TELECOMMUNICATION SPACES ANDCONNECTING HARDWARE, clause 3.1 of Section 6 of Part-8 of NBC 2016 is applicable;

for signage & outdoor display structures, "Setion 2 Signs and Outdoor Display Structures" of Part-10 of NBC 2016 is applicable.

7.2 Inspection

The general requirement for inspection and certification of the development shall be as prescribed in **Clause no.3.15**

7.2.1 Maintenance of Buildings

In case of building older than fifty years, it shall be the duty of the owner of a building, to get his building inspected by a Licenced Structural Engineer within a year from the date of coming into force of these Byelaws. The Structural Inspection Report (Form No.16, of the MHA Expert Committee Report) shall be produced by the Owner to the Appropriate Authority. If any action, for ensuring the structural safety and stability of the building is to be taken, as recommended by Licenced Structural Engineer, it shall be completed within five years. For other buildings, the owner shall get his building inspected after the age of building has crossed forty years. .

7.2.2 Protective Measures in Natural Hazard Prone areas

In natural hazard, prone areas identified under the land use Zonal Regulations, structures buildings and installations which cannot be avoided, protective measures for such construction/development should be properly safeguarded based on the suggestion given in the Report of the MHA Expert Committee - Volume I.

7.3 Registration

Registration of the required Licenced Professionals has to be done as per these bye laws.

7.4 Appointment of Professionals on Record

The Owner / Promoter shall engage the services of the Licenced Professionals for obtaining the building licence and construction of the respective building.

7.5 Alternative Materials, Methods of Design and Construction and Tests

The provision of the Byelaws is not intended to prevent the use of any material or method of design or construction not specifically prescribed by the byelaw provided any such alternative has been approved. The building materials approved by B.I.S. or any statutory body will form part of the approved building material and technology as part of the Byelaws.

The Local Authority shall promote and encourage use of pre-fabricated factory-made building components for medium to large scale projects that have significant impact. The use of ready-mix concrete (RMC) shall also be encouraged for in-situ concrete constructions.

Clause 11.2.6 may be referred for further aspects of Sustainability and incentivized promotion of alternative materials, methods in construction.

CHAPTER 8

8 LAND USE ZONES

In order to promote public health, safety and the general social welfare of the community, it is necessary to apply control and reasonable limitation on the development of land and buildings. This is to ensure that most appropriate, economical and healthy development of the Town/City takes place in accordance with the land use plan, and its continued maintenance over the years. For this purpose, the city is divided into number of use zones, such as residential, commercial, industrial, public and semi-public etc. Each zone has its own regulations, as the same set of regulations cannot be applied to the entire Town. Zonal Regulations protects residential areas from the harmful invasions of commercial and industrial uses and at the same time promotes the orderly development of industrial and commercial areas, by suitable regulations on spacing of buildings to provide adequate light, air, protection from fire, etc. It prevents overcrowding in buildings and on land to ensure adequate facilities and services.

Zonal regulations are not retrospective. It does not prohibit the uses of land and buildings that are lawfully established prior to the coming into effect of these Zonal Regulations.

If these uses are contrary to the newly proposed uses, they are termed non-conforming uses and are gradually eliminated over years without inflicting unreasonable hardship upon the property owner.

The Zonal Regulations and its enforcement ensure proper land use and development and form an integral part of the Master Plan. It also ensures solutions to problems of development under local conditions.

The Master Plan along with the Zonal Regulations approved under sub section (3) of section 13 of the Karnataka Town and Country Planning Act, 1961 approved by the Government, time to time shall be applicable.

CHAPTER 9

9 PROVISIONS FOR DIFFERENTLY-ABLED, ELDERLY PERSONS AND CHILDREN

9.1 Applicability

These regulations shall be applicable to all buildings and facilities used by the public such as educational, institutional, assembly, commercial, business, mercantile buildings and group housing constructed on plots having an area of more than 2000 Sq.m. It shall not apply to private residential buildings.

9.2 Guidelines and Provisions

1.Provisions in the following guidelines shall apply:

2. 'Guidelines and Space Standards for Barrier Free Built Environment for Disabled and Elderly Persons', (1998), Central Public Works Department, GoI

3. 'Manual on Barrier Free Environment', (2002), O/o the Chief Commissioner for Persons with Disabilities, Ministry of Urban Development, Goo.

4. 'National Building Code', (2016), Bureau of Indian Standards,

5. 'National Policy for Persons with Disabilities', (2006), Ministry of Social

Justice and Empowerment, Goo.

6. Harmonised Guidelines and Space standards for Barrier Free Environment for Persons with Disabilities"2016 published by TCPO.

9.3 Types of buildings to adopt barrier free guidelines as notified by the State Government

9.3.1 Buildings to be designed for Ambulant Disabled People

Higher Secondary School, Conference Hall, Dance Halls, Youth Centres, Youth Clubs, Sport Centres, Sport Pavilions, Boat Club Houses, Ice Rinks, Bowling Centres, Swimming Pools, Police Stations, Law Courts, Courts Houses, Sport Stadiums, Theatres, Concert Halls, Cinemas, Auditoria, Small Offices (the maximum plinth area 1400 Sqm) Snack Bars, Cafes and banqueting rooms (for capacity above 50 dinners).

Note:

a. In sport stadiums provisions shall be made for non-ambulant spectators (small wheel chair)

b. @ 1:1000 up to 10,000 spectators and @ 1:2000 for spectators above 10,000.

c. In Theatres, Concert Halls, Cinemas and Auditoria provisions shall be made for non-ambulant spectators (Small Wheel Chairs) @ 1/250 up to 1000 spectators and 1/500 for spectators above1000.

9.3.2 Buildings to be designed for Non-Ambulant Disabled People

Schools for differently abled, Botanical Gardens, Religious Buildings, Elderly People Clubs, Village Halls, Day Centres, Junior Training Centres, Post Offices, Banks, Dispensaries, Railway Stations, Shops, Super Markets, and Departmental Stores.

Note: *Large wheel chair criteria shall be applicable on ground floors of the following building, post offices, banks, dispensaries, railway station, shops, supermarkets, and departmental stores.*

9.3.3 Buildings to be designed for Non-Ambulant People (using small wheel chairs)

Public lavatories in Tourist Spots, Clubs, Motels, Professional and Scientific Institution, Museum, Art Galleries, Public Libraries, Laboratories, Universities, College for further Education, Teachers Training Colleges, Technical College, Exhibition Halls, Dentist Surgeries, Administrative Department of the Hospitals, Service Stations, Car Parking Buildings, Airports Terminals, Bus Terminals, Factories Employing differently-abled for sedentary works, Large Offices, (with plinth area above 1400 Sq.mt.), Tax Offices, Passport Offices, Pension Offices, and Labour Offices, Cafes, Banqueting Rooms and Snack Bars (For capacity above 100dinners).

9.3.4 Site development

Level of the roads, access paths and parking areas shall be described in the plan along with specification of the materials.

9.3.4.1 Access Path / Walk Way

Walkways and pathways (used here interchangeably shall meet the following general requirements:

a) Walkways shall be smooth, hard and have levelled surface suitable for walking and wheeling. Irregular surfaces as cobble stones, coarsely exposed aggregate concrete, bricks, etc, often cause bumpy rides and shall be avoided.

b) Minimum walkway width shall be provided as per B-2.2.2 **(1800 mm).** The width of footpath shall be in accordance with 4.3.2.1.1

c) The walkway shall not have a gradient exceeding 1:20. If the slope or any part of a walkway on an accessible route to a building exceeds 1:20, it shall be designed and constructed as a ramp in accordance with B-6.2.

d) Where pathway meets the road, a kerb shall be provided; which shall be designed in accordance with B-2.3.

e) The cross-fall gradient across an accessible route shall not exceed 1:50 (20 mm/m), except when associated with a dropped kerb.

f) The requirements for drainage of pathways shall be as per B-2.2.5.

g) When walkways exceed 60 m in length, it is desirable to provide rest area adjacent to the walk at convenient intervals of 30 m in the form of benches/resting seats. For comfort, seat height shall be between 450 mm and 500 mm, and the seating shall have a back rest and arm rests at 700 mm height. One side of seating may be without arm rest to address the transfer needs of persons with disabilities. A colour contrast should be provided around the seating area for ease of identification by persons with low vision.

h) Texture change in walkways adjacent to seating shall be provided for persons with vision impairment by means of warning blocks (see B-2.5).

i) Gratings and manholes should be avoided in walks.

9.3.4.2 Parking

For parking of vehicles of differently-abled people, the following provisions shall apply:

Location of Parking
The designated accessible parking spaces that serve a building shall be located as near as possible to the main entrance, and the distance from the accessible parking space to the main entrance shall not be more than 30 m. In case the access is through lift, the parking shall be located within 30 m of the lift lobby. Kerb ramp from parking space to an adjacent higher pedestrian path shall be provided in accordance with NBC 2016.

Accessible Car Parking Space Dimensions and Surface Requirements
The accessible car parking space shall meet the following requirements:
a) The minimum width of the parking space for a car shall be 3600 mm and the minimum length shall be 5 400 mm. This minimum width includes the transfer area beside the car with a minimum of 1 500 mm.

Number of Designated Accessible Parking Spaces
The following minimum requirements concerning the number of parking places shall apply:
a) A minimum of one accessible designated parking space shall be provided in every parking area;
b) For up to 10 parking spaces, one designated accessible parking space shall be provided;
c) For up to 25 parking spaces, two designated accessible parking space shall be provided;
d) For up to 50 parking spaces, three designated accessible parking spaces shall be provided;
e) For up to 100 parking spaces, four designated accessible parking spaces shall be provided;
f) For up to 200 parking spaces, six designated accessible parking spaces shall be provided; and
g) For over 200 parking spaces, six designated accessible parking spaces for 200 parking spaces and one for each additional 100 parking spaces shall be provided.
In specialized facilities such as health care facilities, shopping areas and recrational facilities, a greater number of designated accessible parking spaces shouldbe considered

9.4 Building requirements

The specified facilities in buildings for differently abled persons shall be as follows:

9.4.1 Approach to plinth level

Every building should have at least one entrance accessible to the differently able and shall be indicated by proper signage. This entrance shall be approached through ramp together with the stepped entry.

(1) **Ramped Approach**: Ramp shall be finished with non-slip material to enter the building. Minimum width of ramp shall be 1800mm with maximum gradient 1:12.

Length of ramp shall not exceed 9.0 meter having 800mm high hand rail on both sides extending 300mm beyond top and bottom of the ramp. Minimum gap from the adjacent wall to the hand rail shall be 50mm.

(2) **Stepped Approach**: For stepped approach size of tread shall not be less than300mm and maximum riser shall be 150mm. Provision of 800mm high hand rail on both sides of the stepped approach similar to the ramped approach.

(3) **Exit/Entrance Door:** Minimum & clear opening of the entrance door shall be900mm and it shall not be provided with a step that obstructs the passage of a wheelchair user. Threshold shall not be raised more than 12mm.

(4) **Entrance Landing:** Entrance landing shall be provided adjacent to ramp with the minimum dimension 1800mm x 2000mm. The entrance landing that adjoins the toped of a slope shall be provided with floor materials to attract the attention of visually impaired person's (limited to coloured floor material whose colour and brightness is conspicuously different from that of the surrounding floor material or the material that emits different sound to guide visually impaired persons. Finishes shall have a non-slip surface with a texture traversable by a wheel chair. Kerbs wherever provided should blend to a common level.

9.4.2 Corridor connecting the entrance/ exit for the differently abled

The corridor connecting the entrance / exit for differently abled leading directly outdoors to a place where information concerning the overall use of the specified building can be provided to visually impaired persons either by a person or by signs, shall be provided as follows:

a) Guiding floor materials shall be provided or device that emits sound to guide visually impaired persons.

b) The minimum width shall be 1500mm.

c) In case there is a difference of level, slope ways shall be provided with a slope of 1:12.

d) Handrails shall be provided for ramps/slope ways.

9.5 Stair-ways

One of the stair–ways - near the entrance / exit for the differently abled shall have the following provisions:

a) The minimum width shall be 1350 mm.

b) Height of the riser shall not be more than 150 mm and width of the tread300mm. The steps shall not have abrupt (square) nosing.

c) Maximum number of risers on a flight shall be limited to 12

d) Handrails shall be provided on both sides and shall extend 300 mm on the top and bottom of each flight of steps.

9.6 Lifts

Wherever lift is required as per Byelaws, provision of at least one lift shall be made for the wheel chair user with the following cage dimensions of lift recommended for passenger lift of 13 person's capacity of NBC 2016, BIS. Section 4.9.3 Table no1-Desirable Lift size

Clear internal width 1100 mm

Clear internal depth 2000 mm

Entrance door width 900 mm

a) A hand rail not less than 600mm long at 1000mm above floor level shall be fixed adjacent to the control panel.

b) The lift lobby shall be of an inside measurement of 1800 mm x 2000 mm or more.

c) The time of an automatically closing door should be minimum 5 seconds and the closing speed should not exceed 0.25 m/ sec.

d) The interior of the cage shall be provided with a device that audibly indicates the floor, the cage has reached indicates that the door of the cage of entrance/exit is either open or closed.

e) Graphic/Braille signage, as per the Harmonized Guidelines, shall be provided in the lift lobby.

9.7 Toilets

One special W.C. in a set of toilets shall be provided for the use of differently able with essential provision of washbasin near the entrance for the differently abled.

a) The minimum size shall be 1500 mm x 1750 mm.

b) Minimum clear opening of the door shall be 900mm and the door shall swing out.

c) Suitable arrangement of vertical/horizontal handrails with 50mm clearance from wall shall be made in the toilet.

d) The W.C. seat shall be 500mm from the floor

Other specifications shall confirm to the **Annex B of part3 of NBC 2016.**

9.7.1 Provision of WCs in buildings without lift:

Provision of special W.C. shall be made on all floors for buildings designed for ambulant disabled persons. For buildings designed for non-ambulant disabled special W.C. shall be provided at Ground Floor. Size of W.C. shall depend on the type of wheel chair used by the disabled.

9.7.2 Provisions of WCs in buildings with lift

Provision of Special W.C. shall be made on all floors. Size will depend on the category of disabled for whom it has been provided.

9.7.3 Toilet Details: For Toilets Designed for Ambulant Disabled and Non-Ambulant Disabled.

Toilet rooms and sanitary rooms requirements of Ambulant Disabled and Non-Ambulant Disabled persons should confirm to the Annex B of part3 of NBC 2016**.**

9.8 Designing for Children

In the buildings meant for the pre-dominant use of the children, it will be necessary to suitably alter the height of the handrail and other fittings & fixtures etc.

Note: Guiding / Warning Floor Material: The floor material to guide or to warn the visually impaired persons with a change of colour or material texture and easily distinguishable from the rest of the surrounding floor materials. The material with different texture gives audible signals with sensory warning when a person moves on this surface with walking stick. The guiding/warning floor material is meant to give the directional effect or warn a person at critical places. It should be provided in the following areas:

a. The access path to the building and to the parking area.

b. The landing lobby towards the information board, reception, lifts, staircases and toilets

c. Immediately at the beginning/end of walkway where there is a vehicular traffic.

d. At the location abruptly changing in level or beginning/end of a ramp.

e. Immediately in front of an entrance/exit and the landing.

9.9 Drinking Water:

The drinking water facility (fountains, coolers, taps, etc) shall comply with the following:

Wall/post-mounted cantilevered units shall have a clear floor space of at least 900 mm × 1 200 mm. the front edge of the unit shall extend 430-480 mm from the wall. It shall have a clear knee space between the bottom of the apron/ equipment and floor or ground of at least 900 mm wide, 200 mm deep extending from the front edge of the equipment to back towards the wall, and 700 mm high. It shall have a toe space not less than 900 mm wide, mm high, extending from the back wall to a maximum of 150 mm.

Freestanding or built-in-drinking water units not having a clear space under them shall have a clear floor space of at least 1 200 mm wide mm in front of the unit.

Spout heights should be between 800-900 mm, measured from the floor to the spout outlet. The maximum distance of the spout from the front edge of the drinking water facility shall be 125 mm. There shall be water glass provision; a minimum 100 mm space below the spout outlet shall be provided to allow for the insertion of a cup or glass.

Wall-mounted drinking water provision in an alcove is preferred, because it does not create a hazard for persons with visual impairments. The provision of two drinking facilities at different heights is very convenient for standing adults, people in wheelchairs and children. Where only one is provided, it shall be at a height of 700 mm above floor level

Controls shall be centrally positioned at the front of the unit or, if at the side, on both sides, not more than 180 mm from the front. Control shall be easily operable with one hand with an operative force.

9.10 Refuge

An alternative to immediate evacuation of a building via staircases and/ or lifts is the movement of disabled persons to areas of safety within a building. If possible, they could remain there until the fire is controlled and extinguished or until rescued by the fire fighters.

a) It is useful to have the provisions of a refuge area, usually at the fire protected stair landing on each floor that can safely hold one or two wheelchairs.

b) Hand Doorways with clear opening width of 900 mm and regular compliance

c) Have an alarm switch installed between 900 mm and 1200 mm from floor level.

Annex-B of Part 3 of NBC-2016 is applicable.

9.11Proper signage

1) Appropriate identification of specific facilities within a building for the differently abled persons should be done with proper signals.

2) Visually impaired persons make use of other senses such as hearing and touch to compensate for the lack of vision, whereas visual signals benefit those with hearing disabilities. Signs should be designed and located so that they are easily legible by using suitable letter size .The height of letters, figures, signs and graphical symbols shall be between 15 mm and 55 mm. The minimum height of its relief shall be 0.8 mm; a height between 1 mm and 1.5 mm is preferred .The profile of the relief should be shaped as a rounded upside-down turned letter V.
3) For visually impaired persons, information board in brail should be installed on the wall at a suitable height and it should be possible to approach them closely.Where an arrow is used in the tactile sign, a small arrow shall be provided for Braille readers. On signs with multiple lines of text and characters, a semi-circular Braille locator on the left margin shall be horizontally aligned with the first line of Braille text. Braille should be raised, domed and comfortable totouch. It should be located 8 mm below the bottom line of the text and be left justified.Common alternative formats may be used to assist people with visual impairments who are best able to interpret information through hearing or touch. Embossed letters, raised pictograms and raised

arrows are tactile features that may be incorporated into signs, which may be particularly helpful to persons with visual impairments.
4) To ensure safe walking, there should not be any protruding sign which creates obstruction in walking.

5) Public Address System may also be provided in busy public areas.

6) The symbols/information should be in contrasting colour and properly illuminated because people with limited vision may be able to differentiate amongst primary colours.

7) International Symbol Mark for wheel chair be installed in a lift, toilet, staircase, parking areas, etc., that have been provided for the differently abled.

9.12 Public Building regulations

In case of design regulations in ***public buildings*** (excluding domestic buildings), provisions for differently-abled shall be adopted as per **Appendix-XVI** of the Byelaws and according to the ***Annex 'D' of Part 3, NBC*** 2016**.**

CHAPTER 10

10. RAINWATER HARVESTING

10.1 Rainwater harvesting principle

The harvesting of rainwater simply involves the collection of water from surfaces on which rain falls, and subsequently storing this water for use. The rainwater collected can be stored for direct use or can be recharged into the underground aquifers. In scientific terms water harvesting (broadly) refers to collection and storage of rainwater from the rooftops. This also restricts evaporation and seepage into building foundations. Every owner or occupier of a building having sital area of not less than 2400 square feet or every owner who propose to construct a building on a sital area of not less than 1200 square feet shall provide rain water harvesting structure for storage for reuse or for ground water recharge within such date as may be notified by the State Government in such manner and subject to such conditions as may be provided in the rules and guidelines issued by the Corporation, while submitting for the sanction of the building plan, shall mandatorily include the complete proposal of rainwater harvesting and method of calculation as per **Appendix XVII**

A rainwater harvesting system consists of:

i. Roof catchment

ii. Gutters

iii. Down pipes

iv. Rain water/ Storm water drains

v. Filter chamber

vi. Storage Tanks/ Pits/ Sumps

vii. Ground Water recharge structures like pit, trench, tube well or combination of above structure.

Rainwater Harvesting is a way to capture the rain runoff, store that water aboveground or charge the underground aquifers and use it later. This happens naturally in open rural areas. But in congested, over-paved metropolitan cities, there is a need to devise methods to capture the rain water. The rainwater that is incident on the surface/ roof top is guided to bore wells or pits or new/old/ abandoned wells through small diameter pipes to recharge the underground water which can be used later whenever required.

Rainwater can be harvested to the extent of 55,000 Liters per 100Sq. m area per year from rooftops.

10.2 Factor Affecting Run Off from Catchment

i. Rainfall - quantity, pattern, intensity & duration.
   High intensity in less duration may get same quantity but may get wasted due to high surface run off due to less infiltration capacity whereas mild rainfall with long duration will help in recharging ground water.
ii. Catchment area characteristic.
   Unpaved surface have greater capacity of retaining rain water & similarly green patches of grass can retain large proportion of rainwater.

Runoff depends upon the area and type as well as surface of catchment over which it falls as well as surface features. Runoff can be generated from both paved and unpaved catchment areas. Paved surfaces have a

greater capacity of retaining water on the surface and runoff from unpaved surface is less in comparison to paved surface. In all calculations for runoff estimation, runoff coefficient is used to account for losses due to spillage, leakage, infiltrations catchment surface wetting and evaporation, which will ultimately result into reduced runoff. Runoff coefficient for any catchment is the ratio of the volume of water that run off a surface to the total volume of rainfall on the surface. The runoff coefficient for various surfaces is given in table 1.1.

Table 10.1 Runoff coefficients for various surfaces

Sl No	Type of Surface	Coefficient of Runoff
1	Concrete roof area	0.9
2	Paved podium areas and asphalted roads	0.8
3	Tiles	0.8-0.9
4	Corrugated metal sheets	0.7-0.9
	Ground Surface Covering	
	Untreated ground catchment	
5	Soil on slope less than 10%	0.0-0.3
6	Rocky material catchment	0.2-0.5
7	Business area	
8	Down Town	0.7-0.95
9	Neighbourhood	0.5-0.7
	Residential Complexes in Urban Areas	
10	Single family	0.3-0.5
11	Multiunits, detached	0.40-0.60
12	Multiunits, attached	0.60.75
13	Residential Complexes in Suburban Areas Apartments	0.5-0.70
	Industrial	
14	Light	0.5-0.7
15	Heavy	0.6-0.9
16	Parks, cemeteries	0.10-0.25

17	Play grounds	0.20-0.35
18	Railroad yard	0.20-0.35
19	Unimproved Land Areas	0.10-0.30
20	Aspheltic or concrete pavement	0.70-0.95
21	Brick pavement	0.70-0.85
22	Lawn, sandy soil having slopes	
23	Flat 2%	0.05-0.10
24	Average 2 to 7%	0.10-0.15

(Ref: Clause 4.5.11.2 of Part 9, Plumbing Services (Including Solid Waste Management), Section 2, Drainage and Sanitation, NBC 2016 and Rain water harvesting manual, CPWD,2019)

10.3 Rainwater harvesting techniques:

There are two main techniques of rain water harvestings.

a. Storage of rainwater on surface for future use.

b. Recharge to ground water.

10.4 Harvesting provisions in various Building categories:

All buildings in a city contribute to the rainwater runoff during the monsoon and hence such runoff can be harvested for water reuse/recharge.

Rainwater harvesting in a building site includes storage or recharging into ground of rainwater falling on the terrace or on any paved or unpaved surface within the building site.

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

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

b) Rainwater harvesting for recharge of ground water may be done through a bore well around which a pit of one meter width may be excavated up to a depth of at least 3.00 m and refilled with stone aggregate and sand. The filter drain water may be channelled to the refilled pit for recharging the bore well.

c) An impervious storage tank of required capacity may be constructed in the setback or any other space and the rainwater may be channelled to the storage tank. The storage tank may be raised to a convenient height above the surface and shall always be provided with ventilating the surface and shall always be provided with ventilating covers and shall have draw-off taps suitably place so that the rain water may be drawn off for domestic, washing, gardening and such other purposes. The storage tanks shall be provided with an overflow.

d) The surplus rainwater after storage may be recharged into ground through percolation pits, trenches, or combination of pits and trenches. Depending on the geomorphologic and topographical condition, the pits may be of the size of1.20 m width x 1.20 m length x 2.00 m to 2.50 m depth. The trenches can be or0.60 m width x 2.00 m to 6.00 m length x 1.50 m to 2.00m depth. Terrace water shall be channelled to pits or trenches. Such pits or trenches shall be backfilled with filter media comprising the following materials. –

i. 40 mm stone aggregate as bottom layer up to 50% of the depth;

ii. 20 mm stone aggregate as lower middle layer up to 20% of the depth;

iii. Course sand as upper middle layer up to 20% of the depth;

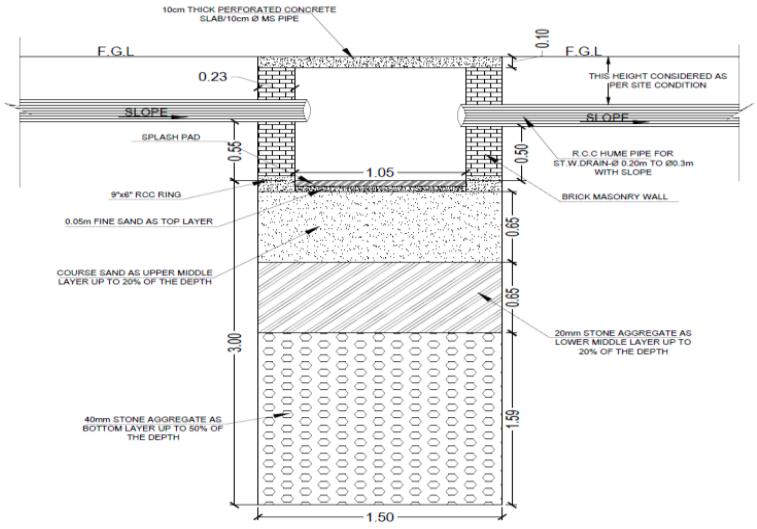
iv. A thin layer of fine sand as top layer;

v. Top 10% of the pits / trenches will be empty and a splash is to be provided in this portion in such a way that roof top water falls on the splash pad;

vi. Brick masonry wall is to be constructed on the exposed surface of pits /trenches and the cement mortar plastered;

vii. The depth of wall below ground shall be such that the wall prevents lose soil entering into pits / trenches. The projection of the wall above ground shall at least be 15 cm;

viii. Perforated concrete slabs shall be provided on the pits / trenches.



PERCOLATION PIT

e) If the open space surrounding the building is not paved, the top layer up to a sufficient depth shall be removed land refilled with course sand to allow percolation of rainwater into ground.

The terrace shall be connected to the open well / bore well / storage tank /recharge pit /trench by means of H.D.P.E. / P.V.C. pipes through filter media. A valve system shall be provided to enable the first washings from roof or terrace catchments, as they would contain undesirable dirt. The mouths of all pipes and opening shall be covered with mosquito (insect) proof wire net

For the efficient discharge of rainwater, there shall be at least two rain water pipes of 100 mm dia. for a roof area of 100Sq.mRainwater harvesting structures shall be sited as not to endanger the stability of building or

earthwork. The structures shall be designed such that no dampness is caused in any part of the walls or foundation of the building or those of an adjacent building.

The indicative provisions of rainwater harvesting in various buildings types are:

Table 10.2 Provisions for Rainwater harvesting by building types

Category /Use	Area of Plot (sq.m.)	Provisions to be made	Other Conditions
Residential Plotted Houses			
New Proposals	100 and above	Construction of Rain water harvesting structure	Shall have emphasis on both storage and re-use.
Group Housing			
New Proposal	All plot sizes	i. Construction of rain water harvesting structure. ii. Concrete paving to be avoided and permeable materials are to be used for all open parking spaces.	Should indicate the system of Storm Water Drainage, Rain Water Harvesting Structure and Recharging well.
Public and semi-public buildings			
All Proposals	All plot sizes	i. Shall have Rain water harvesting structure and storage ii. Shall have recharge pits	Shall have emphasis on both storage and re-use.
Commercial /Mixed Use			
All Proposals	All plot sizes	i. Construction of Rain water harvesting structure. ii. Soft Landscape provisions and open spaces with percolation pits. iii. Common treatment plant to be made part of the integrated development, funded by sale of commercial space.	Should indicate the system of storm water drainage, Rain water harvesting structure and recharging well. Shall have emphasis on both storage and reuse.
Industrial			
All Proposals	All plot sizes	i. Construction of Rain water harvesting structure. ii. Soft Landscape provisions and open spaces with percolation pits. iii. Use of abandoned bore wells for recharging of ground water. iv. Common treatment plant to be made part of the integrated development, funded by sale of commercial space.	Should indicate the system of storm water drainage, Rain water harvesting structure and recharging well. Provision should be made not to inject contaminated water into recharge structures in industrial areas and care is to be taken to keep such structures away from sewer lines, septic tanks, soak pits, landfill and other

			sources of contamination.
Other proposals	All plot sizes	Similar as above	Similar as above

10.5 Rain Water Harvesting Provisions for Open spaces in cities

The open spaces/recreational land use generally constitute regional parks, district parks, playground and stadium, sports complex, monument zones, public parking, Plaza and other public open space. This may be as high as 30% to 50% of the city's geographic area. All such public open spaces above the size of 500 Sqm. shall have arrangements for complete utilization and capture of storm water with scientific rainwater harvesting arrangements.

Following ideas may also be included:

i. Well cum Channel cum Percolation pits.

ii. Use of abandoned bore wells for recharging of ground water

iii. Artificial or natural Storage of storm water runoff from larger sites.

10.6 Ground Water Recharge

Recharging of ground water should be made mandatory not only for residential buildings but for all types of buildings, including Group Housing Societies having a plot area more than 500 Sqm. and above. The Ground Water Recharge should also be mandatory for open spaces like parks, parking, plazas and playgrounds. The h**a**rvesting and recharge structures could be constructed by the Local Authority with the involvement of community-based organizations like Resident Welfare Associations.

10.7 Enforcement and Monitoring

1. The Local Authority shall constitute an Environment Monitoring Cell which will be responsible for enforcement and monitoring of the provisions of Rainwater Harvesting. The cell shall employ qualified persons who are well versed with the interpretation of Building Byelaws and responsible for enforcement as well as monitoring the functioning of the Rainwater Harvesting System.

2. The Local Authority shall include inspection of Rainwater Harvesting Structures before issuing Completion Certificates or NOCs for service connections to the property.

3. Set an example in the city by ensuring that Rainwater is harvested in the properties assets owned by them including public buildings, markets, centres, parking spaces, roads and parks etc.

4. The Local Authority shall also establish a mechanism to monitor 100% of RWH provisions in all the buildings above 1000 Sqm with annual physical verification, while buildings less than 1000 Sqm can be monitored on the basis of 10% random survey by competent authority.

5. With regard to open public spaces viz., Parks, playgrounds etc. the implementation of provision rainwater harvesting may be done with the help of Residents Welfare Associations, Community Building Organization and Non- Governmental Organizations.

6. The Local Authority shall ensure earmarking budgetary provision for the creation and maintenance of rainwater harvesting structures in public spaces owned and maintained by them, like parking spaces, parks, plazas etc.

7. The practice of incentives and penalties to promote rainwater harvesting shall be as as notified by the government, considering the water level and scarcity.

CHAPTER 11

11. GREEN BUILDINGS AND SUSTAINABILITY PROVISIONS

Modern buildings consume about 25 to 30 % of total energy, and up to 30 % of fresh potable water, and generate approximately 40 % of total waste. Sustainable buildings have demonstrated reduction in energy and water consumption to less than half of the present consumption in conventional buildings, and complete elimination of the construction and operational waste through recycling.

Thus, all buildings on various plot sizes shall comply with the green norms and conform to the requirements mandatory for sanction as mentioned in this chapter.

These provisions are not specific to any rating system and are not intended to provide single metric indication of overall building performance. These provisions allow the practitioners to easily exercise their engineering judgment in holistically and objectively applying the underlying principles of sustainability to a development or building facility, considering its functionality and required comfort level.

11.1 Provision for Applicability

The green building provisions are categorised as Mandatory provisions and Optional provisions.

The mandatory provisions shall be applicable to new buildings and existing buildings as follows;

a) New Buildings – The provisions of this Chapter and elsewhere in these Byelaws shall be applicable.

b) Existing Buildings

i) Buildings for which condition for making green building provisions were imposed in the building licence or in the NOC / Clearance given by MOEF / KSPCB - All such provisions imposed shall be made within 6 months from the date of coming into force of these Byelaws.

The optional provisions are additional provisions over and above the mandatory provisions to achieve better green rating for the buildings, both existing and new.

In case owners of properties desire to procure green building ratings from one or more rating bodies, they may suitably incorporate the additional provisions as notified by the Government for the additional incentives offered therein.

The green building mandatory provisions for new buildings on various plot sizes and construction areas are indicated in the **table 11.1**

Table 11.1 Provisions and applicability for various plot sizes and construction areas (Residential and Non-Residential)

Plot Category	Applicable plot area (Sq.m)	Applicable construction area (Sq.m)	Provisions for Residential	Provisions for Non-Residential
I	Upto 100	Any extent	4(a)	4(a)

II	Above 100 Upto 250	Above 100	1(a),4(a)	1(a),4(a)
III	251 to 500	101 to 250	1(a),4(a)	1(a),4(a)
		251 to 500	1(a),1(b),2(a),4(a)	1(a),4(a)
		Above 500	1(a),1(b),2(a),4(a)	1(a),1(b),2(a),4(a)
II	501to1000	101to250	1(a),4(a)	1(a),4(a)
		251to500	1(a),1(b),1(d),2(a), 4(a)	1(a),1(d),2(a),4(a)
		501to1000	1(a),1(b),1(d),2(a), 4(a)	1(a),1(b),1(d),2(a) ,4(a)
		Above1000	1(a),1(b), 1(d), 2(a),3(a), 3(c),4(a)	1(a),1(b),1(d), 2(a),3(a), 3(c),4(a)
III	Above1000	101to250	1(a),4(a)	1(a),4(a)
		251to500	1(a),1(b),1(d),2(a), 4(a)	1(a),1(d),2(a),4(a)
		501to1000	1(a),1(b),1(d),2(a), 4(a)	1(a),1(b),1(d),2(a) ,4(a)
		1001to2000	1(a),1(b), 1(d), 2(a),3(a), 3(c),4(a),4(b), 4(c)	1(a),1(b), 1(d), 2(a),3(a),3(c),4(a), 4(b), 4(c)
		2001to5000	1(a),1(b),1(d),2(a), 2(b), 3(a), 3(b),3(c),4(a), 4(b), 4(c)	1(a),1(b), 1(d), 2(a),2(b), 3(a),3(b),3(c),4(a) ,4(b), 4(c)
		Above5000	1(a),1(b),1(c),1(d), 2(a), 2(b), 3(a),3(b), 3(c),4(a), 4(b),4(c)	1(a),1(b), 1(c), 1(d),2(a),2(b), 3(a),3(b),3(c),4(a) , 4(b),4(c)

Note: (1) provisions marked 1(a), 2(b) etc. are as per **Clause 11.2*

(2) Area mentioned above is the total construction area including the car parking area in the building.

The schemes/ projects formulated on the basis of provisions given in Master plan/ Zonal Regulations will require approval as indicated:

EIA/ ECC (as per MoEF), NBC (latest), ECBC 2007 or latest, BEE Star rating/ LEED / IGBC/ GRIHA of TERI Certification}

EIA- Environmental Impact Assessment Study Report,

ECC- Environmental Clearance Certificate,

MoEFCC – Ministry of Environment Forest and Climate Change.

NBC – National Building Code,

ECBC – Energy Conservation Building Code,

BEE – Bureau of Energy Efficiency,

LEED – Leadership in Energy and Environment Design,

IGBC –Indian Green Building Council,

GRIHA – Green Rating for Integrated Habitat Assessment,

TERI – The Energy and Resources Institute**.**

The prevailing provisions of the above shall be applicable. However, if there are any modifications in the same, the modified provisions shall become automatically applicable

11.2 Provisions for Sanction of new buildings

1. Water Conservation and Management

a) Rainwater Harvesting (as detailed in Chapter 10 and as specified in **Appendix-XVII**)

b) Low Water Consumption Plumbing Fixtures (as specified by the Competent Authority or as notified by the Government

c) Wastewater Recycle and Reuse (as specified in **Appendix-XV**)

d) Reduction of Hardscape (detailed at **Clause 11.2.1**)

2. Solar Energy Utilization

a) Installation of Solar Assisted Water Heating Systems (detailed at **Clause 11.2.4**). In case of non-residential buildings, Solar Assisted Water Heating Systems / energy efficient centralised hot water system shall be adopted only where hot water is required in the building.

b) Installation of Solar Photovoltaic Panels (detailed at **Clause 11.2.3**)

3. Energy Efficiency (Concept of passive solar design of buildings

a) Low Energy Consumption Electrical Fixtures (Electrical Appliances – BEE Star and Energy Efficient Appliances) (as specified by the Competent Authority or as notified by the Government)

b) Energy Efficiency in HVAC systems. (as specified by the Competent Authority or as notified by the Government)

c) Lighting of Common areas by LED devices. (As specified by the Competent Authority or as notified by the Government

4. Waste Management

a) The Waste Management is categorised into;

i. Liquid Waste Management – Liquid Waste Management in buildings shall be as specified in Clause No.11.2(1)(c)

ii. Solid Waste Management –

Solid Waste Management is further categorised into;

(a) Municipal Solid Waste (MSW) Management – MSW Management during the operation of buildings shall be as specified in **Appendix-XVIII-A.**

(b) Construction & Demolition (C&D) Waste Management – C&D Waste Management during the construction, renovation and demolition of buildings / structures shall be as specified in **Appendix-XVIII-B.**

11.2.1 Provision for Site level greening

In alignment with National Sustainable Habitat Mission, the Local Authority shall encourage augmentation of green cover in the plot, by following:

The Urban Greening Guidelines, 2014 and other provisions as given below –

a. Provision of minimum 1 tree / every 80S.qm of plot area for plot sizes >100 Sqm and planted within the setback of the plot.

b. Compensatory Plantation for felled/transplanted tress in the ratio 1:3 within the premises under consideration

c. Choice of species for plantation in site and abutting the road to be adopted as per Section 8 of the Urban Green Guidelines, 2014.

d. The unpaved area shall be more than or equal to 20% of the open spaces provided.

11.2.2 Water Re-use and Recycling

The recycled water should be used for flushing, HVAC, cleaning of non-living areas and horticultural purposes.

11.2.3 Roof Top Solar Energy Installations

Roof top photovoltaic power station, or rooftop PV system, is a photovoltaic system that has its electricity-generating solar panels mounted on the rooftop of residential or commercial buildings. The various components of such a system include photovoltaic modules, mounting systems, cables, solar inverters and other electrical accessories. Rooftop PV systems are faster than other types of renewable power plants. They're clean, quiet, and visually unobtrusive.

The norms for Roof Top Solar PV Installation and Generation for residential and non-residential buildings as per the area standards mentioned in **Table 11.1** shall be as follows and in compliance with the requirements as notified by the Government.

Minimum 5% of the consumed electrical load (excluding the electrical load required for hot water generation through electrical geysers, if applicable) or7.75 W/Sft (derived @ 12Sqm per 1 KWP as suggested by the Ministry of New and Renewable energy) for 'available roof space', whichever is less.

The estimated consumed power load (at the time of applying for building sanction), to derive the required Roof Top Solar PV Installation, may be calculated as notified by the government, -these Byelaws, provided that the Owner / Promoter submits an Affidavit / Undertaking that if the actual consumed load during operation is more than the estimated power load, the Owner / Promoter shall provide the required additional roof top Solar PV installation as mentioned above. The Promoter shall be responsible for the initial five years of operation and the Owners shall be responsible for the remaining period of operation of the building.

S.No.	Category of buildings/area	Area standards	Generation requirement *
	Residential		
1	Plotted Housing	For HIG Plots and above	Minimum 5% of connected load or 20W/sqft for "available roof space"**, whichever is less.
2	Group Housing	All proposals, as per Group Housing Norms	Minimum 5% of connected load or 20W/sqft for "available roof space", whichever is less.
All other buildings (Government or Private, defined as per clause 1.16 b to g) (mandatory for buildings having shadow free rooftop area > 50 sqmt)			
3	Educational	Plot size of 500 sqmt and above	Minimum 5% of connected load or 20W/sqft for "available roof space", whichever is less.
4	Institutional		
5	Commercial		
6	Industrial		
7	Mercantile		
8	Recreational		

Note: 'Available roof space' = 70% of total area of roof / terrace, considering 30% area reserved for residents' amenities.

If solar heating panels are erected on the roof, the same shall be part of the available roof space and the balance area (after deducting the area covered by solar water heating panels) shall only be considered for Solar PV panels.

11.2.4 Installation of Solar Assisted Water Heating System and other energy efficient centralised hot water system in Building

No new building in the categories mentioned in **Table 11.1** in which there is a system of installation for supplying hot water shall be built unless the system of the installation is having an auxiliary solar assisted water heating system or other permitted centralised hot water system specified in these Byelaws. Wherever hot water requirement is continuous, auxiliary heating arrangement either with electric elements or oil of adequate capacity can be provided.

Clearance of plan for the construction of new buildings of the aforesaid categories shall only be given if they have a provision in the building design itself for an insulated pipeline from the rooftop in the building to various distribution points where hot water is required. The building must have a provision for continuous water supply to the solar water heating system or any other energy efficient centralised water heating system, such as Heat Pump etc. The building should also have open space on the rooftop, which receives direct sunlight. The load bearing capacity of the roof should at least be 50 kg/Sq. All new buildings of above said categories must complete installation of solar water heating systems before obtaining necessary licence to commence their business.

The capacity and specifications of the Solar Assisted Water Heating Systems shall be as specified in these Byelaws.

Normal electric geysers may also be permitted for hot water generation, provided that additional Solar PV Installation is done in the building for the additional power consumed for operating such electric geysers, over and above the Solar PV installation required to be provided as per **clause 11.2.3**. If the available roof

space is not sufficient to provide the additional Roof top solar PV installation equivalent to the additional power consumed for hot water generation, the shortfall shall be substituted through solar PV installations elsewhere in the plot or through 'Off site solar power generation'.

Note: 'Off site solar power generation' means the solar power generated outside the plot by the owner / promoter or purchase of Solar power from third party Solar power generators through a power purchase agreement made between such agency and the owner / promoter to purchase solar power equivalent to the shortfall of solar power generation within the plot (required for the additional electric power consumed for hot water generation).

Specifications: Installation of Solar Assisted Water Heating Systems shallconform to BIS specification IS 12933. The solar collectors used in the systemshall have the BIS certification mark."

11.2.5 Sustainable Solid Waste Management

Zero Waste is a concept of waste management and planning approaches that emphasize waste prevention as opposed to end waste management. This means restructuring production and distribution systems, designing and managing products and processes to systematically follow the 3R rule of Reduce, Re-use and Re-cycle the volume of waste, to conserve and recover all used resources, and therefore eliminating all discharges to landfills, and prevent air, water and land pollution.

Zero Waste/ land- fill can be achieved by adopting systematic approach of segregation at source by planning, by collection facilitation and most importantly by creating public awareness.

The green waste can be converted into fuel cakes, kitchen waste into manure, construction & demolition waste into bricks, plastic waste into oil, paper, glass and steel back into the same and all residual inert materials can also be converted into bricks.

The process to be adopted by the Local Authority and the Owner / Promoter of the buildings categorised in **Table 11.1** for Solid waste management shall be as mentioned in Appendix XVIIIA & XVIIIB

11.2.6 Sustainability of Building Materials

Sustainability of natural resources for building materials shall be ensured through conservation of available natural resources and use of supplementary materials such as industrial/agricultural by-products, renewable resources, factory-made building components and recycled construction and demolition waste. Supplementary building materials (derived or processed waste) shall be suitably used in combination with conventional resources offers dual advantages in purview of health & environmental benefits.

Use of Factory made pre-fab/pre-cast and recycled components with green benefits:

a) Panels, hollow slabs, hollow blocks–etc. - conservation of materials, less water requirement

b) Fly Ash bricks, Portland Pozzolana cement, Fly ash concrete, phosphor gypsum-based walling & roofing panels, particle wood – recycled use of industrial/agricultural by-products. (**Ref. Table 14**)

c) Fly ash/ AAC (Autoclaved aerated light weight concrete) panels/ CLC (Cellular light weight concrete) panels- ensures thermal comfort (significant reduction in air conditioning requirement)

d) Use of bamboo & rapidly growing plantation timbers- environmental benefits. Local materials are generally suitable for prevailing geo-climatic conditions & have advantage of low transportation cost & time. Sustainable use of building materials shall be encouraged which may combine certain mandatory provisions and incentives.

The above provision is not included in the mandatory provisions but to avail additional incentives the above provision may be adopted.

11.2.7 Sustainable C&D Waste Management

The process to be adopted by the Local Authority and the owner / promoter of the buildings for C&D waste management shall be as mentioned in **Appendix XVIII**.

11.3 Various Guidelines for Green Rating System

The Government shall notify separate **Green Rating** systems for buildings by selectively combining/adopting/amending the provisions between the following guidelines:

1. IGBC guidelines by the Confederation of Indian Industries.

2. GRIHA guidelines by the Ministry of New and Renewable Energy, GoI. In pursuance of the **National Sustainable Habitat Mission** on Energy Efficiency in Buildings, the Local Authority shall encourage the provisions of the following Energy efficiency guidelines by certain mandatory provisions and incentives-

3. LEED Guidelines

4. ECBC guidelines prepared by Bureau of Energy Efficiency, Ministry of Power GoI

5. Model Energy Efficiency guidelines. (NSMH Sub report by Bureau of Energy Efficiency)

CHAPTER 12

12. FIRE PROTECTION AND FIRE SAFETY REQUIREMENTS

12.1 Scope

This part covers the requirements of the fire protection for the multi-storeyed buildings (high rise buildings-as specified by fire department) and low occupancies of categories such as Assembly, Institutional, Educational (more than two storeyed and built-up area exceeds 1000Sq.m), Business (where plot area exceeds 500 Sqm), Mercantile (where aggregate covered area exceeds 750 Sqm), Hotel, Hospital, Nursing Homes, Underground Complexes, Industrial Storage, Meeting/Banquet Halls, Hazardous Occupancies.

The requirements of NBC-2016 Part 4. and THE KARNATAKA FIRE FORCE ACT are applicable.

12.2 Procedure for obtaining NOC and Clearance Certificate from DFES

The procedure of obtaining NOC from Department of Fire & Emergency Services (DFES) is detailed in **clause no. 3.10.5** and the procedure of obtaining Clearance Certificate is detailed in **Clause no. 3.18**

12.3 Renewal of fire clearance

On the basis of undertaking given by the Fire Consultant / Architect, the Chief Fire Officer shall renew the fire clearance in respect of the following buildings on annual basis: -

1) Public entertainment and assembly
2) Hospitals
3) Hotels
4) Underground shopping complex and all high-rise buildings

12.4 Fee

For augmentation of fire service facilities for effecting rescue/firefighting operation in high rise building, fee payable to Chief Fire Officer by the applicant(s) along with sets of plans for obtaining the No Objection Certificate shall be as notified by the Government.

12.5 Responsibility of providing Fire Protection & Fire Fighting Measures

The engaged Licensed Professional of the project shall be responsible for making provisions for fire protection and firefighting measure as provided in this Chapter

12.6 Terminology

For the purpose of this Chapter all the technical terms shall have the meaning as defined in National Building Code of India, Part-IV, Fire Protection as amended from time to time but for the terms which are defined otherwise in these Byelaws.

12.7 General

The DFES may insist on suitable provisions in the buildings from fire safety and means of escape point of view depending on the occupancy, height or on account of new developments creating special fire hazard, in addition to the provision of these Building Byelaws and part IV (Fire Protection) of National Building Code of India, which are not contradicting to the provision of the Zonal Regulations.

12.7.1 Fire Resistance of Types of Constructions / Building Components

The fire resistance ratings for various types of construction for structural and non-structural members shall be as given in Table 1 of Part IV of the NBC, 2016.Building elements/components such as walls, columns, beams and floors shall have the requisite fire resistance rating in accordance with the accepted standards at Tables 10 to 26 of Part IV of the NBC.

12.7.2 Means of Access

As provided in Zonal Regulations.

12.7.3 Provisions of Exterior Open Spaces around the building*:*

As provided in Zonal Regulations

12.7.4 Exit Requirement

As provided in Section 4.2 of Part 4, NBC 2016

As provided in Section 4.2 of Part 4, NBC 2016

Type of Exits: As provided in Section 4.2 of Part 4, NBC 2016

Number of Size of Exits: As provided in Section 4.4.2.1 of Part 4, NBC 2016.

Arrangements of Exits: As provided in Section4.4.2.2 of Part 4, NBC 2016

Occupant Load: As provided in Section 4.3 of Part 4, NBC 2016**.**

Capacity of Exit: As provided in Section4.4.2.3 of Part 4, NBC 2016

Staircase Requirements: As provided in Section 4.4.2.4.3 of Part 4, NBC 2016.

Minimum Width Provision for Stairways: As provided in Section 4.4.2.4.3.2 of Part 4, NBC 2016

Minimum Width Provision for Passageway/Corridors: As provided in Section 4.4.2.4.2 of Part 4, NBC 2016

Doorways: As provided in Section 4.4.2.4.1of Part 4, NBC 2016

Stairways: As provided in Section 4.4.2.4.3.2 of Part 4, NBC 2016

12.8 Fire Escapes or External Stairs:

1. Fire escape including Occupant load and Travel distance shall not be taken into account while calculating the number of staircases for a building.
2. All fire escapes shall be directly connected to the ground.
3. Entrance to the fire escape shall be separate and remote from internal staircase.
4. The route to fire escape shall be free of obstructions at all times except the doorway leading to the fire escape which shall have the required fire resistance.
5. Fire escape shall be constructed of non-combustible materials.

6. Fire escape stairs shall have straight flight not less than 125 cm wide with 25cm treads and risers not more than 19 cm.

7. Handrails shall be at a height not less than 100 cm.

8. Fire escape staircase in the mercantile, business, assembly, hotel buildings above 24 m. height shall be a fire tower and in such a case width of the same shall not be less than the width of the main staircase. No combustible material shall be allowed in the fire tower.

12.8.1 Spiral Stairs

1. The use of spiral staircase shall be limited to low occupant load and to building height of9 m.

2. A spiral stair shall not be less than 150 cm in diameter and shall be designed to give the adequate headroom.

12.8.2 Staircase Enclosures

1. The external enclosing walls of the staircase shall be of the brick or the R.C.C.

Construction having fire resistance of not less than two hours. All enclosed staircases shall have access through self-closing door of one-hour fire resistance. These shall be single swing doors opening in the direction of the escape. The door shall be fitted with the check action door closers.

2. The staircase enclosures on the external wall of the building shall be ventilated to the atmosphere at each landing.

3. Permanent vent at the top equal to the 5% of the cross-sectional area of the enclosure and openable sashes at each floor level with area equal to 1 to 15% of the cross-sectional area of the enclosure on external shall be provided. The roof of the shaft shall be at least 1 m. above the surrounding roof. There shall be no glazing or the glass bricks in any internal closing wall of staircase. If the staircase is in the core of the building and cannot be ventilated at each landing, a positive of 5-mm. e.g. by electrically operated blower/blowers shall be maintained.

4. The mechanism for pressurizing the staircase shaft shall be so installed that the same shall operate automatically on fire alarm system/sprinkler system and be provided with manual operation facilities.

12.8.3 Ramps

1. Ramps of slope of not more than 1 in 8 may be substituted for and shall comply with all the applicable requirements of all required stairways as to enclosure capacity and limiting dimensions. Larger slopes shall be provided for special uses but in no case greater than 1 in 8. For all slopes steeper than 1 in 10 and where the use is such as to involve danger of slipping, the ramp shall be surfaced with approved non-slipping material.

2. The minimum width of the ramps in the Hospitals shall be 3.5 m. and, in the basement, using car parking shall be 6.0 m or as specified in the Zonal Regulations.

3. Handrails shall be provided on both sides of the ramp.

4. Ramp shall lead directly to outside open space at ground level or courtyards of safe place.

5. For building above 24.0 m. in height, access to ramps from any floor of the building shall be through smoke fire check door.

6. In case of nursing homes, hospitals etc. area exceeding 300Sq.m at each floor one of the exit facility shall be a ramp of not less than 3.5 m. in width.

12.9 Provision of lifts

1) Provision of the lifts shall be made for all multi-storeyed building having a height of 15.0 m. and above.

2) All the floors shall be accessible for 24 hours by the lift. The lift provided in the buildings shall not be considered as a means of escape in case of emergency.

3) Grounding switch at ground floor level to enable the fire service to ground the fire man lift car in case of emergency shall also be provided.

4) The lift machine room shall be separate and no other machinery be installed in it.

5) The Karnataka Lifts Escalators and Passenger Conveyors Act,2012 shall also be complied with.

12.9.1 Lift Enclosure / Lift

General requirements shall be as follows

a) Walls of lift enclosures shall have a fire rating of two hours. Lift shafts shall have a vent at the top of area not less than 0.2 Sqm

b) Lift motor room shall be located preferably on top of the shaft and separated from the shaft by the floor of the room (not applicable for machine room less lifts).

c) Landing door in lift enclosures shall have a fire resistance of not less than one hour.

d) The number of lifts in one lift bank shall not exceed four. A wall of two hours fire rating shall separate individual shafts in a bank.

e) Lift car door shall have a fire resistance rating of 1 hour.

f) For buildings 15.0 m. and above in height, collapsible gates shall not be permitted for lifts and solid doors with fire resistance of at least one hour shall be provided.

g) If the lift shaft and lobby is in the core of the building a positive pressure between 25 and 30 pa shall be maintained in the lobby and a possible pressure of 50 pa shall be maintained in the lift shaft. The mechanism for the pressurization shall act automatically with the fire alarm/sprinkler system and it shall be possible to operate this mechanically also.

h) Exit from the lift lobby, if located in the core of the building, shall be through a self-closing fire smoke check door of one-hour fire resistance.

i) Lift shall not normally communicate with the basement. If, however, lifts are in communication, the lift lobby of the basement shall be pressurized as in (g) with self-closing door as in (h).

j) Grounding switch (es), at ground floor level shall be provided to enable the fire service to ground the lifts.

k) Telephone/talk back communication facilities may be provided in lift cars for communication system and lifts shall be connected to the fire control room of the building.

l) Suitable arrangements such as providing slope in the floor of the lift lobby shall be made to prevent water used during firefighting, etc. at any landing from entering the lift shafts.

m) A sign shall be posted and maintained on every floor at or near the lift indicating that in case of fire, occupants shall use the stairs unless instructed otherwise. The sign shall also contain a plan for each floor showing the location of the stairways. Floor marking shall be done at each floor on the wall in front of the lift-landing door.

n) Alternate power supply shall be provided in all the lifts.

12.9.2 Fire Lift

Following details shall apply for a fire lift in addition to above requirements:

a) To enable fire service personnel to reach the upper floors with the minimum delay, one or more of the lifts shall be so designed so as to be available for the exclusive use of the fireman in an emergency and be directly accessible to every dwelling/lettable floor space on each floor.

b) The lift shall have a floor area of not less than 1.4 Sqm It shall have a loading capacity of not less than 545 kg. (8 persons lift) with automatic closing doors.

c) The electric supply shall be on a separate service from electric supply mains in a building and the cables run in a route safe from fire that is within a lift shaft. Lights and fans in the elevator having wooden panelling or sheet steel construction shall be operated on 24-volt supply.

d) In case of failure of normal electric supply, it shall automatically switch over to the alternate supply. For apartment houses, this changeover of supply could be done through manually operated changeover switch. Alternatively, the lift should be so wired that in case of power failure, it comes down at the ground level and comes to stand still with door open.

e) The operation of a fire lift shall by a single toggle of two-button switch situated in a glass-fronted box adjacent to the lift at the entrance level. When the switches on landing; call points will become inoperative and the lift will be on car control only or on a priority control device. When the switch is off, the lift will return to normal working. This lift can be used by the occupants in normal times.

f) The words 'F1RE LIFT' shall be conspicuously displayed in fluorescent paint on the lift landing doors at each floor level.

g) The speed of the fire lift shall be as specified in NBC 2016.

Buildings of Height as per requirement of fire department and above clause 7.1.1 sub clause (x) Operational requirements of fireman's Lift of NBC 2016 is applicable

12.10 Basement

As provided in **Clause 5.1.9 and 6.4.5**of these Building Byelaws.

12.10.1Requirements

1) The access to the basement shall be either from the main or alternate staircase providing access and exit from higher floors. Where the staircase is continuing, the same shall be enclosed type serving as a fire separation from the basement floor and higher floors. Open ramps shall be permitted if they are constructed within the building line subject to the provision of the (iv).

2) In case of basement for office, sufficient number of exit ways and access ways shall be provided with a travel distance not more than 15.0 m. The travel distance in case of dead-end shall be 7.5 m.

3) All floors shall be compartmented/zoned with area of each compartment being not more than 750 m2. The maximum size of the compartment shall be as follows in case of sprinklered basement/building.

SI No.	Use	Compartmentation Area (m^2)
i)	Basement car parking	3,000
ii)	Basements (other than car parking)	2,000
iii)	Institutional buildings: Subdivision C-1	1,800
iv)	Institutional buildings: Subdivision C-2 and C-3	1,125
v)	Mercantile and assembly buildings	2,000
vi)	Business buildings	3,000
vii)	All other buildings (excluding low hazard and moderate hazard industrial buildings and storage buildings)	750

Each compartment shall have ventilation standards as laid down in Bye-Laws separately and independently. The partition shall be made in consultation with Chief Fire Officer.

4) The first basement (fully below ground level) can be used or services/parking/other permissible services. Lower basements, if provided, shall exclusively be used for the uses permitted in the Zonal Regulations only.

5) Each basement shall be separately ventilated. Vents with cross-sectional area(aggregate) not less than 2.5 percent of the floor area spread evenly round the perimeter of the basement shall be provided in the form of grills or breakable starboard lights or pavement lights or by way of shafts. Alternatively, a system of air inlets shall be provided at basement floor level and smoke outlets at basement ceiling level. Inlets and extracts may be terminated at ground level with starboard or pavement lights as before. But ducts to convey fresh air to the basement floor level have to be laid. Starboard and pavement lights should be in positions easily accessible to the firemen and clearly marked 'SMOKE

OUTLET' or 'AIR INLET' with an indication of area served at or near the opening.

6) The staircase of basement shall be of enclosed type having fire resistance of not less than two hours and shall be situated at the periphery of the basement to be entered at ground level only from the open air and in such positions that smoke from any fire in the basement shall not obstruct any exit serving the ground and upper stories of the building and shall communicate with basement through a lobby provided with fire resisting self-closing door of one hour rating. In case of basement being used as car parking only, the travel distance shall be 45 m

7) In multi-storeyed basements, intake duct may serve all basements levels, but each basement and basement compartment shall have separate smoke outlet duct or ducts. Mechanical extractors for smoke venting system from lower basement levels shall also be provided. The system shall be

of such design as to operate on actuation of smoke, heat sensitive detectors/sprinklers, if installed, and shall have a considerably superior performance compared to the standard units. It shall also have an arrangement to start it manually.

8) Mechanical extractors shall have an internal locking arrangement so that extractors shall continue to operate and supply fans shall stop automatically with the actuation of fire detectors. Mechanical extractors shall be designed to permit 30 air changes per hour in case of fire or distress call. However, for normal operation, only 30 air changes or any other convenient factor can be maintained.

9) Mechanical extractors shall have an alternate source of power supply.

10) Ventilating ducts shall be integrated with the structure and made out of brick masonry or RCC as far as possible and when this duct crosses the transformer area of electrical switchboard, fire dampers shall be provided.

11) Kitchens working on gas fuel shall not be permitted in basement/sub-basement.

12) If cut-outs are provided from basement to the upper floors or to the atmosphere, all side cut-out openings in the basements shall be protected by sprinkler headset closed spacing so as to form a water curtain in the event of a fire.

13) Dewatering pump shall be provided in all bases.

12.11 Provision of helipad

All high-rise buildings of height 200 m. and above shall have provision for a Helipad as per **clause no 6.5.8** of the Byelaws. The same shall be approved by the Authority.

12.12 Service ducts/refuge chute

a) Service duct shall be enclosed by walls and door, if any, of 2 hours fire rating. If ducts are larger than 10 Sqm the floor should seal them, but provide suitable opening for the pipes to pass through, with the gaps sealed.

b) A vent opening at the top of the service shaft shall be provided between one fourth and one-half of the area of the shaft. Refuge chutes shall have an outlet at least of wall of non-combustible material with fire resistance of not less than two hours. They shall not be located within the staircase enclosure or service shafts or air-conditioning shafts. Inspection panel and door shall be tight fitting with 1 hour fire resistance; the chutes should be as far away as possible form exits.

c) Refuse chutes, if any provided in a building, shall have opening at least 1 m above roof level for venting purpose and they shall have an enclosure wall of non-combustible material with fire resistance of not less than 120 min. They shall not be located within the staircase enclosure or service shafts, or air conditioning shafts. Refuse chutes inspection panel and doors shall be tight fitting with 60 min fire resistance. Sprinkler protection system shall be provided for the refuse chutes. Refuse chutes shall be at least 6 m away from exits.

12.13 Electrical services

Electrical Services shall conform to the following:

a) The electric distribution cables/wiring shall be laid in a separate duct shall be sealed at every floor with non-combustible material having the same fire resistance as that of the duct. Low and medium voltage wiring running in shaft and in false ceiling shall run in separate conduits.

b) Water mains, telephone wires, inter-com lines, gas pipes or any other service lines shall not be laid in ducts for electric cables.

c) Separate conduits for water pumps, lifts, staircases and corridor lighting and blowers for pressuring system shall be directly from the main switch panel and these circuits shall be laid in separate conduit pipes, so that fire in one circuit will not affect the others. Master switches controlling essential service circuits shall be clearly labelled.

d) The inspection panel doors and any other opening in the shaft shall be provided with airtight fire doors having fire resistance of not less than 1 hour.

e) Medium and low voltage wiring running in shafts and within false ceiling shall run in metal conduits. Any 230-voltage wiring for lighting or other services, above false ceiling should have 660V grade insulation. The false ceiling including all fixtures used for its suspension shall be of non-combustible material.

f) An independent and well-ventilated service room shall be provided on the ground floor with direct access from outside or from the corridor for the purpose of termination of electrical supply from the licenses service and alternative supply cables. The doors provided for the service room shall have fire resistance of not less than 2 hours.

g) Miniature circuit breakers (MCB) and Earth leakage circuit breaker (ELCB)shall be provided for electrical circuit.

12.14 Staircase and corridor lights

The staircase and corridor lighting shall be on separate circuits and shall be independently connected so that it could be operated by one switch installation on the ground floor easily accessible to firefighting staff at any time irrespective of the position of the individual control of the light points, if any. It should be of miniature circuit breaker type of switch so as to avoid replacement of fuse in case of crisis.

a) Staircase and corridor lighting shall also be connected to alternate source of power supply.

b) Suitable arrangement shall be made by installing double throw switches tonsure that the lighting installed in the staircase and the corridor does not get connected to two sources of supply simultaneously. Double throw switch shall be installed in the service room for terminating the stand by supply.

c) Emergency lights shall be provided in the staircase and corridor.

12.15 Air-conditioning

1) Air- conditioning system should be installed and maintained so as to minimize the danger of spread of fire, smoke or fumes thereby from one floor of fire area to another or from outside into any occupied building or structure. –

2) Air -Conditioning systems circulating air to more than one floor area should be provided with dampers designed to close automatically in case of fire and thereby prevent spread of fire or smoke. Such a system should also be provided with automatic controls to stop fans in case of fire, unless arranged to remove smoke from a fire, in which case these should be designed to remain in operation.

3) Air- conditioning system serving large places of assembly (over one thousand persons), large departmental stores, or hostels with over 100 rooms in a single block should be provided with effective means for preventing circulation of smoke through the system in the case of fire in air filters or from other sources drawn into the system even though there is insufficient heat to actuate heat smoke

sensitive devices controlling fans or dampers. Such means shall consist of approved effective smoke sensitive controls.

12.15.1Details to be conformed for Air- Conditioning

Air-conditioning should conform to the following:

a) Escape routes like staircase, common corridors, lift lobbies; etc. should not bemuse as return air passage.

b) The ducting should be constructed of metal in accordance with BIS 655:1963

c) Wherever the ducts pass through fire walls or floor, the opening around the ducts should be sealed with fire resisting material of same rating as of walls/floors.

d) Metallic ducts should be used even for the return air instead of space above the false ceiling.

e) The material used for insulating the duct system (inside or outside) should be of flame resistant (IS 4355: 1977) and non- conductor of heat.

f) Area more than 750 Sqm on individual floor should be segregated by a firewall and automatic fire dampers for isolation should be provided.

g) In case of more than one floor, arrangement by way of automatic fire dampers for isolating the ducting at every floor from the floor should be made. Where plenums used for return air passage, ceiling and its features and air filters of the air handling units, these should be flame resistant. Inspection panels should be provided in the main trenching. No combustible material should be fixed nearer than 15 cm. to any duct unless such ducting is properly enclosed and protected with flame resistant material

h) In case of buildings more than 24 m. in height, in non-ventilated lobbies, corridors, smoke extraction shaft should be provided.

12.15.2 Fire Dampers

1. These shall be located in air ducts and return air ducts/passages at the following points:

a) At the fire separation wall.

b) Where ducts/passages enter the central vertical shaft.

c) Where the ducts pass through floors.

d) At the inlet of supply air duct and the return air duct of each compartment on every floor.

2. The dampers shall operate automatically and shall simultaneously switch off the air- handling fans. Manual operation facilities shall also be provided.

Note: For blowers, where extraction system and dust accumulators are used, dampers shall be provided.

3. Fire/smoke dampers (for smoke extraction shafts) for building more than 24 m height.

   For apartment houses in non-ventilated lobbies/corridor operated by detection system and manual control sprinkler system. For other buildings, on operation of smoke/heat detection system and manual control/sprinkler system.

4. Automatic fire dampers shall be so arranged so as to close by gravity in the direction of air movement and to remain tightly closed on operation of a fusible link.

12.16 Boiler Room

Provisions of boiler and boiler rooms shall conform to Indian Boiler Act, 2007.

Further, the following additional aspects may be taken into account in the location of boiler/ boiler room –

a) The boiler shall not be allowed in sub-basement, but may be allowed in the basement away from the escape routes.

b) The boilers shall be installed in a fire resisting room of 4 hours' fire resistance rating, and this room shall be situated on the periphery of the basement. Catch pits shall be provided at the low level.

c) Entry to this room shall be provided with a composite door of 2 hours' fire resistance.

d) The boiler room shall be provided with fresh air inlets and smoke exhaust directly to the atmosphere.

e) The furnace oil tank for the boiler if located in the adjoining room shall be separated by fire resisting wall of 4 hours rating. The entrance to this room shall be provided with double composite doors. A curb of suitable height shall be provided at the entrance in order to prevent the flow of oil into boiler room in case of tank rupture.

f) Foam inlets shall be provided on the external walls of the building near the ground level to enable the fire services to use foam in case of fire.

Clause **3.4.9 Heating; clause 4.8 Hazardous Areas, Gaseous, Oil Storage Yard, etc** of Part-4 of NBC 2016 is applicable.

12.17 Alternate source of electric supply

A stand by electric generator shall be installed to supply power to staircase and corridor lighting circuits, lifts detection system, fire pumps, pressurization fans and bowlers, Public Address (PA) system, exit sign, smoke extraction system, Emergency lighting, Fire alarm system, Fireman's lifts (including all lifts), Lighting in fire command center and security room, magnetic door hold open devices, Pressurization and smoke venting in case of failure of normal electric supply. The generator shall be capable of taking starting current of all the machines and circuits stated above simultaneously. If the standby pump is driven by diesel engine; the generator supply need not be connected to the standby pump. The generator shall be automatic in operation Diesel generator set(s) shall not be installed at any floor other than ground first basement.

12.18 Safety measures in electric sub-station

1) Clear independent approach to the sub-station from outside the building shall be made available round the clock.

2) The approaches/corridors to the sub-station area shall be kept clear for movement of men and material at all times.

3) The sub-station space is required to be provided with proper internal lighting arrangements.

4) In addition to natural ventilation proper ventilation to the sub-station area is to be provided by grill shutters and exhaust fans at suitable places so as to discharge all smoke from the sub-station without delay in case of fire so that sub-station operations can be carried out expeditiously.

5) Cable trenches of 0.6 m. X 0.6 m. dummy floor of 0.6 m. depth shall be provided to facilitate laying of cable inside the building for connecting to the equipment.

6) Steel shutters of 8'X 8' with suitable grills shall be provided for transformers and sub-station room.

7) The floor of the sub-station should be capable of carrying 10 tons of transformer weight on wheels.

8) Built up substation space is to be provided free of cost.

9) Sub-station space should be clear from any water, sewer, air conditioning, and gas pipe or telephone services. No other service should pass through the sub-station space or the cable trenches.

10) Proper ramp with suitable slope may be provided for loading and unloading of the equipment and proper approach will be provided.

11) RCC pipes at suitable places as required will be provided for the cable entries to the sub-station space and making suitable arrangement for non-ingress of water through these pipes.

12) The sub-station space is to be provided in the approved/sanctioned covered area of the building.

13) Any other alteration /modification required while erection of the equipment will be made by the Owner / builder at site as per requirement.

14) Adequate arrangement for fixing chain pulley block above the fixing is available for load of 15 tons.

15) Provision shall be kept for the sumps so as to accommodate complete volume of transformer oil, which can spill over in the event of explosion of the transformer in the basement of the building. Sufficient arrangement should exist to avoid fire in the sub-station building from spread of the oil from the sumps.

16) Arrangement should be made for the provision of fire-retardant cables so as to avoid chances of spread of fire in the sub-station building.

17) Sufficient pumping arrangement should exist for pumping the water out, in case of fire so as to ensure minimum loss to the switchgear and transformer.

18) No combustible material should be stacked inside the substation premises or in the vicinity to avoid chances of fire.

19) It should be made mandatory that the promoters of the multi-storeyed building should get substation premises inspected once a year to get their license revalidated for the provision of electric supply from Electricity Board so that suitable action can be taken against the Owner / Builder in case of non-implementation of Byelaws.

20) The sub-station must not be located below the 1st basement and above the ground floor.

21) The sub-station space should be totally segregated from the other areas of the basement by fire resisting wall. The ramp should have a slope of 1:10 with entry room ground level. The entire Sub-station space including the entrance in ground floor is handed over to the licensee of electricity free of cost and rent.

22) The sub-station area shall have a clear height of 15 feet (4.5 m.) below beams. Further the Sub-station area will have level above the rest of basement level by 2 feet.

23) It is to be ensured that the Sub-station area is free of seepage / leakage of water.

24) The licensee of electricity will have the power to disconnect the supply of the building in case of violation of any of the above points. However, provision of emergency lights has to be made in the sub-station for emergency operations.

25) Electric sub-station enclosure must be completely segregated with 4-hoursfire rating wall from remaining part of basement.

26) The sub-station should be located on periphery /sub-basement and (not aboveground floor).

27) Additional exit shall be provided if travel distance from farthest corner tramp is more than l5 m.

28) Perfect independent vent system 30 air changes per hour linked with detection as well as automatic high velocity water spray system shall be provided.

29) All the transformers shall be protected with Nitrogen Injection System Carbon Dioxide total flooding system in case of oil filled transformer. In addition to this, manual control of auto high velocity spray system for individual transformers shall be located outside the building at ground floor.

30) Suitable arrangement for pump house, water storage tanks with main electrical pump and a diesel-operated pump shall be made if no such arrangement is provided in the building. In case the water pumping facilities are existing in the building for sprinkler system, the same should however be utilized for high velocity water spray system. Alternatively, automatic CO2 total flooding system shall be provided with manual controls outside the electric sub-station.

31) System shall have facility to give an audio alarm in the basement as well as at the control room.

32) Fire control room shall be manned round the clock.

33) The electric sub-station shall have electric supply from alternate source for operation of vent System lighting arrangements.

34) Cable trenches shall be filled with sand.

35) Partition walls shall be provided between two transformers as per the rules.

36) Electric control panels shall be segregated.

37) Exits from basement electric substation shall have self-closing fire smoke check doors of 2-hours fire rating near entry to ramp.

38) All openings to lower basement or to ground floor shall be sealed properly.

39) Yearly inspection shall be carried out by electrical load sanctioning Authority.

40) Ramp to be designed in a manner that in case of fire no smoke should enter the main building.

41) Electric sub-station transformer shall have clearance on all sides as per BBL/relevant electric rules.

42) Other facility will be as per Building Byelaws and relevant electric rules.

43) Rising electrical mains shall consist of metal bus bars suitably protected from safety point of view.

44) Oil less transformer shall be preferred. If the sub-station is located in basement / ground floor of the main building, the transformers shall be essentially of dry type. In case of dry type transformer room with wall enclosure is not essential.

Note: The sub-station installations shall be carried out in conformity with the local fire regulations and rules there under wherever they are in force. At other places NBC guidelines shall be followed.

12.19 Fire protection requirements

Buildings shall be planned, designed and constructed to ensure fire safety and thissha11 be done in accordance with part IV Fire Protection of NBC, 2016 of India, unless otherwise specified in the Zonal Regulations and these Byelaws. In the case of High-Rise buildings NOC &Clearance Certificate has to be obtained from DFES.

12.19.1First Aid /Fixed Fire Fighting /Fire Detection Systems and other Facilities

Provision of fire safety arrangement for different occupancy from Sl. No. 1 to 23 as indicated below shall be as per **Annexure 'B-I' 'B-II' & 'B-III'**.

1) Access
2) Wet Riser
3) Down Comer
4) Hose Reel
5) Automatic Sprinkler System
6) Yard Hydrant
7) U.G. Tank with Draw off Connection
8) Terrace Tanks
9) Fire Pump
10) Terrace Pump
11) First Aid Fire Fighting Appliances
12) Auto Detection System
13) Manual operated Electrical Fire Alarm System
14) P.A System with talk back facility
15) Emergency Light
16) Auto D.G. Set
17) Illuminated Exit Sign
18) Means of Escape
19) Compartmentation
20) MCB /ELCB
21) Fire Man Switch in Lift

22) Hose Boxes with Delivery Hoses and Branch

23) Pipes Refuge Area

12.19.1.1 Note for Annexure 'B-I' 'B-II' & 'B-III'

1) Where more than one riser is required because of large floor area, the quantity of water and pump capacity recommended in these Annexure should be finalized in consultation with Chief Fire Officer.

2) The above quantities of water shall be exclusively for firefighting and shall note utilized for domestic or other use.

3) A facility to boost up water pressure in the riser directly from the mobile pump shall be provided in the wet riser, down comer system with suitable fire service inlets (collecting head) with 2 to 4 numbers of 63 mm inlets for 100-200 mm dia. main, with check valve and a gate valve.

4) Internal diameter of rubber hose for reel shall be minimum 20 mm. A shut off branch with nozzle of 5 mm. size shall be provided.

5) Fire pumps shall have positive suctions. The pump house shall be adequately ventilated by using normal/mechanical means. A clear space of 1.0 m. shall be kept in between the pumps and enclosure for easy movement/maintenance. Proper testing facilities and control panel etc. shall be provided.

6) Unless otherwise specified in Byelaws, the firefighting equipment's/ installation shall conform to relevant Indian Standard Specification.

7) In case of mixed occupancy, the firefighting arrangement shall be made as per the highest class of occupancy, unless fire separation walls are provided between different occupancies.

8) Requirement of water based first aid fire extinguishers shall be reduced to half if hose reel is provided in the building.

12.20 Static water storage tank

a) A satisfactory supply of water exclusively for the purpose of firefighting shall always be available in the form of underground static storage tank/ Overhead tank with capacity specified in NBC 2016 with arrangements of replenishment by town's main or alternative source of supply @ 1000 liters per minute. The static storage water supply required for the above-mentioned purpose should entirely be accessible to the fire tenders of the local fire service. Provision of suitable number of manholes shall be made available for inspection repairs and insertion of suction hose etc. The covering slab shall be able to withstand the vehicular load of 45 tons in case of high rise and 22 tons in case of low-rise buildings. A draw off connection shall be provided. The slab need not strengthened if the static tank is not located in mandatory driveway required around the building.

b) To prevent stagnation of water in the static water tank the suction tank of the domestic water supply shall be fed only through an over flow arrangement to maintain the level therein at the minimum specified capacity.

c) The static water storage tank shall be provided with a fire brigade inlet of 63mm dia. instantaneous male inlets arranged in a valve box with a suitable fixed pipe not less than 15 cm dia. to discharge water into the tank. Number of inlets shall be as specified in NBC. This arrangement is not required where down comer is provided.

12.21 Automatic sprinklers

Automatic sprinkler system shall be installed in the following buildings:

a) All buildings of 24 m. and above in height, except group housing and 45m and above in case of apartment /group housing society building.

b) Hotels below 15 m. in height and above 1000 Sqm built up area at each floor and or if basement is existing.

c) All hotels, mercantile and institutional buildings above15 m.

d) Underground Shopping Complex.

e) Underground car / scooter parking /enclosed car parking.

f) Any special hazards where the Chief Fire Officer considers it necessary.

g) For buildings, up to 24 m. in height where automatic sprinkler system is not mandatory as per these Byelaws, if provided with sprinkler installation following relaxation may be considered.

i. Automatic heat/smoke detection system and M.C.P. need not be insisted upon.

ii. The number of Fire Extinguisher required shall be reduced by half.

Automatic sprinkler system requirement in the buildings should comply as per NBC 2016 PART 4 Table 7 Minimum requirements for firefighting equipments."

12.22 Fixed Carbon di-oxide /Foam/DCO water spray extinguishing system

Fixed extinguishing installations shall be provided as per the relevant specifications in the premises where use of above extinguishing media is considered necessary by the Chief Fire Officer.

12.23 Fire alarm system

1) The requirements of fire detection systems in buildings should be followed as per Table 7 PART 4 FIRE AND LIFE SAFETY of NBC 2016. (As per requirement of fire department) All residential buildings like dwelling houses (including flats) boarding houses and hostels shall be equipped with manually operated electrical fire alarm system with one or more call boxes located at each floor. The location of the call boxes shall be decided after taking into consideration their floor without having to travel more than the distance specified in NBC.

2) The call boxes shall be of the break glass type without any moving parts, where the call is transmitted automatically to the control room without any other action on the part of the person operating the call boxes.

3) All call boxes shall be wired in a closed circuit to a control panel in a control room, located as per Byelaws so that the floor number from where the callbox is actuated is clearly indicated on the control panel. The circuit shall also include one or more batteries with a capacity of 48 hours normal working at full load. The battery shall be arranged to be a continuously trickle charged from the electric mains.

4) The call boxes shall be arranged to sound one or more sounders so as to ensure that all occupants of the floor shall be warned whenever any call box is actuated.

5) The call boxes shall be so installed that they do not obstruct the exit ways and yet their location can easily be noticed from either direction. The base of the call box shall be at a height of 1.5 m. from the floor level.

6) All buildings other than as indicated above shall, in addition to the manually operated electrical fire alarm system, be equipped with an automatic fire alarm system.

7) Voice evacuation systems shall employ Hindi, English and vernacular language using prerecorded messages and integrate with fire alarm panels for alerting the zone of fire and surrounding zones/floors as required for annunciation (see also Table 7 and its Note 1).
8) Appropriate visual warning arrangement through visual strobes/beacons may be considered in appropriate situations particularly in public buildings, at required locations to ensure visual as well as alarm for persons with hearing impairment.
9) For assembly buildings, institutional buildings and all buildings above 30 m in height where fire alarm system is provided in accordance to Table 7, detectors shall also be provided inside the electrical shafts, and lift machine rooms, etc, besides occupancy areas.
10) Fire alarm panels shall be connected in peer-to-peer network or with redundant cables, run in different shafts. Each panel shall be able to work in standalone mode and master slave architecture may be used where required.
11) Fire detection and alarm systems in buildings shall be so planned and programmed so as to enable operations of various systems and equipment to facilitate requirements leading to life safety, compartmentation and fire protection. These systems and equipment may include electromechanical systems such as air handling units; pressurization systems; smoke management systems; creation of compartmentation through the release of fire barrier, hold-up fire doors, etc; and monitoring of fire water storage tanks and pumps, pressures in hydrant and sprinkler system, etc. These planning and requirements shall be based on building occupancy and other requirements on case-to-case basis.
12) Automatic detection system shall be installed in accordance with the relevant standard specifications. In buildings where automatic sprinkler system is provided, the automatic detection system may not be insisted upon unless decided otherwise by the Chief Fire Officer

Note: The installation of Fire Alarm Systems shall be carried out in conformity with the local fire regulations and rules, there under whenever they are in force and the provisions in local Byelaws, if any. Several types of fire detectors are available in the market, but the application of each type is limited and has to be carefully considered in relation to the type of risk and the structural features of the building where they are to be installed.

12.24 Control Room

There shall be a control room on the entrance floor of the building with communication system (suitable public-address system) to all floors and facilities for receiving the message from different floors. Details of all floor plans along with the details of firefighting equipment and installation shall be maintained in the Control Room. The Control Room shall also have facility to detect the fire on any floor through indicator boards connecting fire detection and alarm system on all floors. The staff in charge of the Control Room shall be responsible for the maintenance of the various services and firefighting equipment and installation. The Control Room shall be manned round the clock by trained firefighting staff.

a) Fire command centre shall be on the entrance floor of the building having direct access. The control room shall have the main fire alarm panel with communication system (suitable public address system) to aid floors and facilities for receiving the message from different floors.

b) Fire command centre shall be constructed with 120 min rating walls with a fire door and shall be provided with emergency lighting. Interior finishes shall not use any flammable materials. All controls and monitoring of fire alarm systems, pressurization systems, smoke management systems shall

happen from this room. Monitoring of integrated building management systems, CCTVs or any other critical parameters in building may also be from the same room.

c) Details of all floor plans along with the details of firefighting equipment and installations (2 sets laminated and bound) shall be maintained in fire command centre.

d) The fire staff in charge of the fire command centre shall be responsible for the maintenance of the various services and firefighting equipment and installations in coordination with security, electrical and civil staff of the building.

12.25 Fire drills and fire orders

The guidelines for fire drill and evacuation etc. for high-rise building may be seen in NBC 2016 part IV. All such buildings shall prepare the fire orders duly approved by the Chief Fire Officer.

A qualified fire officer and trained staff shall be appointed for the following buildings:

a) All high-rise buildings above 30 m. in height where covered area of one floor exceeds 1000 Sqm except apartments / group housing.

b) All hotels identified under classification 3 star and above category by Tourism Department and all hotels above 15 m. in height with 150 beds capacity or more without star category.

c) All hospital building of 15 m. and above or having number of beds exceeding100.

d) Underground shopping complex where covered area exceeds 1000 Sqm

e) All high hazard industries.

f) Any other risk which Chief Fire Officer considers necessary.

g) Fire drills shall be conducted, in accordance with the Fire Safety Plan, at least once every three months for buildings during the first two years. Thereafter, fire drills shall be conducted at least once every six months.

h) All occupants of the building shall participate in the fire drill. However, occupants of the building, other than building service employees, are not required to leave the floor or use the exits during the drill.

i) A written record of such drills shall be kept on the premises for a three years period and shall be readily available for fire brigade inspection.

The lightening protection warning light (red) for high-rise buildings shall be provided in accordance with the relevant standard. The same shall be checked by electrical department.

12.26 Material used for construction of building

1) The combustible/flammable material shall not be used for partitioning, wall panelling, false ceiling etc. Any material giving out toxic gases/smoke if involved in the fire shall not be used for partitioning of a floor or wall panelling or a false ceiling etc. The surface frames spread of the lining material shall conform to class- I of the standard specification. The framework of the entire false ceiling would be provided with metallic sections and no wooden framework shall be allowed for panelling/false ceiling.

2) Construction features/elements of structures shall conform to National Building Code and BIS code.

12.27 Liquefied Petroleum Gas (LPG)

The use of LPG shall not be permitted in the high-rise building except residential/hotel/hostel/kitchen/pantry (if any) and shall be located at the periphery of the building on the ground level.

Fire suppression system and leakage detection system needs to be installed whenever cooking appliances are using LPG in commercial kitchen.

12.28 House keeping

A high standard of housekeeping must be insisted upon by all concerned. There must be no laxity in this respect. It must be borne in mind that fire safety independent to a large extent upon good housekeeping.

12.28.1 Details for Good Housekeeping: -

Good Housekeeping includes the following:

a) Maintaining the entire premises in neat and clean condition.

b) Ensuring that rubbish and combustible material are not thrown about or allowed to accumulate, even in small quantity, in any portion of the building. Particular attention must be paid to corners and places hidden from view.

c) Providing metal receptacles/wastepaper basket (of non-combustible material) at suitable locations for disposal of waste. Separate receptacles must be provided for disposal of cotton rags/waste, wherever it is generated, these must under no circumstances be left lying around in any portion of the building.

d) Ensuring that receptacles for waste are emptied at regular intervals and the waste removed immediately for safe disposal outside the building.

e) Ensuring that all doors/fixtures are maintained in good repairs, particular attention must be paid to self-closing fire smoke check doors and automatic fire/doors/rolling shutters.

f) Ensuring that self-closing fire/smoke check doors close properly and that the doors are not wedged open.

g) Ensuring that the entire structure of the building is maintained in good repairs.

h) Ensuring that all electrical and mechanical service equipment's are maintained in good working condition at all times.

i) Ensuring that Cars /Scooters etc. are parked systematically in neat rows. It is advisable to mark parking lines on the ground in the parking areas near the building and in the parking area on ground floor and in basement(s); as applicable, inside the building. A parking attendant must ensure that vehicles are parked in an orderly manner and that the vehicles do not encroach upon the open space surrounding the building.

12.28.2 Smoking Restrictions

1) Smoking shall be prohibited throughout the basement(s) and in all areas where there is a profusion of combustible materials. Easily readable 'NO SMOKING' signs must be conspicuously posted at

locations where they can catch the eye. Each sign must also include a pictograph. The sign may also be illuminated.

12.28.3Limiting the Occupant Load in Parking and Other Areas of Basement(s)

Where parking facility is provided in the basement(s) no person other than the floor parking attendant may be allowed to enter and remain in the parking areas except for parking and removal of Cars/Scooters. Regular offices must not be maintained in the storage/parking area in the basement(s)unless separated by Fire separation walls. The stores/go down must be opened for the limited purpose of keeping or removing stores. No person other than those on duty may be permitted in the air-conditioning plant room(s), HT/LT switch room, transformer compartment, control room pump-house, generator room, stores and records etc.

12.29 Fire prevention

In addition to the measures recommended above, the following fire prevention measures must be implemented when the building is in occupation.

a) Storage of flammable substances, such as diesel oil, gasoline, motor oils, etc. must not be allowed anywhere within the building. The only exception to this rule may be:

i. Storage of diesel oil in a properly installed tank in a fire-resisting compartment in the generator room;

ii. Diesel oil, gasoline, motor oil etc., filled in the vehicle tanks.

b) Preparation of tea and warming of food must be prohibited throughout the hazardous building.

c) Where heaters are used during winters, the following precautions must be taken.

i. All heaters, except convector heaters, must be fitted with guards.

ii. Heaters must not be placed in direct contact with or too close to any combustible material.

iii. Heaters must be kept away from curtains to ensure that the latter do not blow over the heater accidentally.

iv. Heaters must not be left unattended while they are switched on.

v. Defective heaters must be immediately removed from service until they have been repaired and tested for satisfactory performance.

vi. Use of heaters must be prohibited in the entire basement, fire control room and in all-weather maker rooms throughout the building. Also, in all places where there is profusion of combustible flammable materials.

d) Fluorescent lights must not be directly above the open file racks in offices/record rooms. Where this is unavoidable, such lights must be switched on only for as long as they are needed.

e) Filling up of old furniture and other combustible materials such as scrap paper, rags, etc. must not be permitted anywhere in the building. These must be promptly removed from the building.

f) More than one portable electrical appliance must not be connected to any single electrical outlet.

g) Used stencils, ink smeared combustible materials and empty ink tubes must note allowed to accumulate in rooms/compartments where cyclostyling is done. These must be removed and disposed of regularly.

h) All shutters/doors of main switch panels and compartments/shafts for electrical cables must be kept locked.

i) Aisles in record rooms and stores must have a clear uniform width of not less than 1.0 m. Racks must not be placed directly against the wall/partition.

j) In record rooms, offices and stores, a clear space of not less than 30 cm. must be maintained between the top-most stack of stores/records and or lighting fittings whichever is lower.

k) A similar clearance, and at (k) above must be maintained from fire detectors.

l) Fire detectors must not be painted under any circumstances and must also be kept free from lime/distemper.

m) Records must not be piled/dumped on the floor.

n) Welding or use of blow torch shall not be permitted inside the building, except when it is done under strict supervision and in full conformity with the requirements laid down in IS: 3016-1966 code of practice for fire precautions in welding and cutting operation.

o) Printing ink/oil must not be allowed to remain on the floor. The floor must be maintained in a clean condition at all times.

12.30 Occupancy restrictions

1) The premises leased to any party shall be used strictly for the purpose for which they are leased.

2) No dangerous trade/practices (including experimenting with dangerous chemicals) shall be carried on in the leased premises.

3) No dangerous goods shall be stored within the leased premises.

4) The common/public corridor shall be maintained free of obstructions, and the occupants shall not put up any fixtures that may obstruct the passage in the corridor and/or shall not keep any wares, furniture or other articles in the corridor.

5) The penalty for contravention of the condition mentioned above must be immediate termination of lease and removal of all offending materials.

6) Regular inspection and checks must be carried out at frequent intervals tonsure compliance with conditions above.

Note: *For any further details / clarification NBC, Part 4 shall be referred. Norms and standards in Part 4 of NBC 2016 shall be overriding in any instance of variance of standards.*

CHAPTER 13

13. CONSERVATION OF HERITAGE SITES INCLUDING HERITAGE BUILDINGS, HERITAGE PRECINCTS AND NATURAL FEATURE AREAS

The objective of this regulation shall be to conserve, regulate and manage buildings, artefacts, structures, areas and precincts of historic and / or aesthetic and / or architectural and / or cultural significance and / or environmental significance (heritage buildings and heritage precincts) and / or natural features of environmental significance and or sites of science beauty, so as to promote heritage sensitive development.

13.1 Applicability:

These regulations shall apply to all heritage sites, buildings, precincts and natural features declared under Section 2(1ea) and 2(1eb) of the Karnataka Town and Country Planning Act, 1961 (Karnataka Act 11 of 1963).

13.2 Establishment and composition of the Heritage conservation committee

(1) For every district, except Bengaluru District, there shall be a Heritage Conservation Committee (herein after referred to as the committee), consisting of the following Members appointed by the State Government

Table 13.1 Composition of heritage conservation committee for Mangalore City Corporation Areas:

TABLE Committee Composition		
1.	The Deputy Commissioner	Chairman
2.	The Commissioner, Archaeology, Museums and Heritage Department, Mysore or his nominee.	Ex-Officio Member
3.	The Joint Director or Deputy Director or Assistant Director of Town and Country Planning of the Respective City Corporation.	Ex-Officio Member
4.	Town planning Member of the respective urban development authority	Ex-Officio Member
5.	Representative from the Department of Tourism.	Ex-Officio Member
6.	The Assistant Director of Department of Archaeology, Museums and Heritage of state.	Ex-Officio Member
7.	The Commissioner of the respective corporation.	Ex-Officio Member
8.	The Commissioner of the respective City Municipal Council.	Ex-Officio Member
9.	The Chief officer of the respective Town Municipal Council.	Ex-Officio Member
10.	The Chief officer of the respective Town Panchayat.	Ex-Officio Member
11.	A Structural Engineer having experience of at least ten years in the field and membership of the Institute of Engineers (India)	Member
12.	Representative of Archaeological survey of India, Government of India.	Member
13.	The Project Director, DUDC Cell.	Ex-Officio Member
14.	An Architect having at least ten years of experience in architecture and five years in heritage conservation architecture and membership of the Council of Architecture.	Member
15.	An Environmentalist with post graduate	Member

	degree from a recognized university and having in depth knowledge and having experience of ten years in the subject.	
16.	An Academician possessing a doctorate in history or Archaeology and having knowledge of the region for at least ten years.	Member
17.	A Natural historian possessing post-graduation in botany or zoology or forestry, preferably with doctorate degree, having ten years' experience in the field.	Member
18.	An Artist possessing degree in fine arts having at Least ten years of experience in the field.	Member
19.	Representatives of two NGOs in existence for more Than three years.	Member
20.	Representative of Indian Heritage Cities Network (IHCN), Saraswathi Puram, Mysuru.	Member
21.	The Commissioner or Member Secretary of the Respective urban development authority or planning authority.	Ex-Officio Member-Convener

(2) The Committee shall have the power to appoint two additional members who may have lesser experience, but who have special knowledge of the subject matter.

(3) The tenure of the non-official members shall be three years:

Provided that, the same person shall be eligible for reappointment for further period of three years.

(4) No meeting shall be conducted unless one-third of the members are present from the beginning to the end of such meeting. Any vacancy in the office of members shall not vitiate any decision taken by the majority of the members present.

13.3 Powers and functions of the committee- The Committee shall exercise the following powers and following functions, namely: -

(1) to advise the Local Authority whether development permission shall be granted under these regulations and the conditions under which permission may be accorded;

(2) to prepare a list of buildings, artefacts, structures, areas, precincts of historic, aesthetic, architectural, cultural or environmental significance and a supplementary list of natural features of environmental significance or scenic beauty including sacred groves, hills, hillocks, water bodies (and the areas adjoining the same), open areas, wooded areas etc., to which these regulations shall apply from time to time, and grade them according to the heritage value;

(3) to advise whether any relaxation, modification, alteration or variance of any of the zonal regulations or building bye-laws is called for;

(4) to assist the Archaeology, Museums and Heritage Department (AM&HD) in framing regulations for specific precincts and if necessary for natural features to guide the planning or local or competent authority, regarding issue of permissions.

(5) To advise on the extent of Development Rights Certificates to be granted.

(6) To advise whether Development Right Certificates may be allowed to be consumed in a heritage precinct.

(7) to advise in terms of these regulations to allow commercial or office or hotel use of a heritage building and when to terminate the same.

(8) To advise the planning or local or competent authority in the operation of advertisements or billboards or street furniture.

(9) To make recommendations to the local or competent authority regarding guidelines to be adopted by those private parties or public or Government agencies that sponsor beautification schemes near heritage building and precincts at public intersections and elsewhere.

(10) To provide technical advice, if possible, on the guidelines to the owners of heritage buildings or precincts to protect, conserve or restore them.

(11) to recommend or advice the Archaeology, Museum and Heritage Department in preparing special designs and guidelines or publications for the listed buildings, control of height and essential façade characteristics, such as maintenance of specialty pes of balconies and other heritage items of the buildings and to suggest suitable designs and appropriate material for replacements, keeping the old form intact to the extent possible.

(12) to recommend or advice the Archaeology, Museum and Heritage Department in preparing guidelines relating to design elements and conservation principles to be adhered to and to prepare other guidelines for the purpose of these regulations.

(13) To advise the local authority on any other issues as may be required, from time to time, during the course of scrutiny of development permissions and in overall interest of heritage or environmental conservation.

(14) To appear before the Government either independently or through or on behalf of the local authority in cases of listed buildings or precincts and listed natural features.

13.4 Procedure for the preparation of list of the heritage sites, buildings, precincts and natural features. -

(1) The list of the heritage sites, buildings, precincts and additions there to shall be declared by the planning authority on the advice of the committee and notified accordingly:

Provided that, before the list is so notified, objections and suggestions from all persons likely to be affected shall be invited by newspaper notification of which at least two newspapers published in local language, granting at least fifteen days of time.

(2) Restrictions on the heritage precincts shall be in force with effect from the date of such newspaper notification:

Provided that, such listing does not prevent change of ownership or usage.

(3) The list may be supplemented from time to time by the Government, on receipt of proposal from the concerned agency or suo motto:

Provided that, before the list is so notified, objections and suggestions from all persons likely to be affected shall be invited by newspaper notification of which atleast two newspapers published in local language, granting atleast fifteen days of time.

13.5Criteria for listing. - Before the list so notified under clause 3, the following criteria shall be observed, namely:-

(a)	Value for architectural, historical or cultural reasons.	A
	Architectural	A(arc)
	Historical	A(his)
	Cultural	A(cul)
(b)	The date or period or design or unique use of the building or artefact.	B
	Building or artefact	
	Period	B(per)
	Design	B(des)
	Use	B(use)
(c)	Relevance to social or economic history.	C(seh)
(d)	Association with well-known persons or event.	D(bio)
(e)	A building or group of buildings or areas of distinct architectural design or style, historic period or way of life having sociological interest or community value.	E
	Style	
	Historical	
(f)	The unique value of building or architectural feature or artefactorbeingpartofachainofarchitecturaldevelopmentthatwouldbebrokenifitwerelost.	F
(g)	Its value as a part of a group of buildings.	G(gr)
(h)	Representing forms of technological development.	H(tec)
(i)	Vistas of natural or scenic beauty or interest, including water-front areas, distinctive or planned lines of sight ,street lines of sight, street line, sky line or topographical.	I(se)
(j)	Open spaces sometimes integrally planned with their associated areas having a distinctive way of life which have the potential to be areas of recreation.	J
(k)	Natural heritage sites.	NH
(l)	Sites of scenic beauty.	(sec)

13.6Grading.-Heritage sites, buildings, precincts and natural features shall be graded as I, II, III, as detailed below.-

	GRADE–I	**GRADE–II**	**GRADE–III**
(a)Definition	(i) Shall comprises of the buildings and precincts of national or historical importance, embodying excellence in architectural style, design, technology and material, usage or aesthetics, which may be associated with a great historic event, personality, movement or institution; (ii) Shall have been and are the prime landmark of the region; and (iii) All natural sites.	(i)Shall comprise of the buildings and precincts of regional or local importance possessing special architectural or aesthetic merit or cultural or historical significance of a lower scale than in Grade-1; (ii)They shall have been and are the local landmarks that contribute to the image and identity of the region; and (iii)They may be the work of master craftsmen or may be models of proportion and ornamentation, or designed to suit a particular climate.	(i) Shall comprise of the buildings and precincts of important townscapes. (ii) They evoke architectural, aesthetic or sociological interest of a lower scale than in Grade–II; and (iii) They contribute to determine the character of the locality and are the representatives of lifestyle of a particular community or region and, be distinguished by setting on a streetline or special character of the façade and uniformity of height, width and scale.
(b)Objective	Deserves careful preservation.	Deserves intelligent Conservation.	Deserves protection of unique features and attributes.
(c)Scope for changes	Interventions shall be permitted to enter on the exterior or interior unless it is necessary in the interest of strengthening and prolonging the life of the buildings or precincts or any part or features thereof. For this purpose, only absolutely essential and minimal changes shall be allowed and they must be in accordance with the original.	(i)Internal changes and adaptive reuse shall generally be allowed but external changes shall be subject to scrutiny. Care shall be taken to ensure the conservation of all the special aspects for which it is enlisted under these regulations. (ii)Extension or additional buildings in the same plot or compound may be allowed in certain circumstances: Provided that, the extension or additional building is in harmony with and does not detract from the existing heritage buildings or precincts, especially in terms of height and facade.	(i)External and internal changes and adaptive reuse shall generally be allowed. Changes may include extensions and additional buildings in the same plot or compound: Provided that the extension or additional building is in harmony with and does not detract from the existing heritage building or precinct especially in terms of height or facade; and (ii)Reconstruction shall be allowed when the building is structurally weak or unsafe or affected by accidental fire or any other calamity or if reconstruction is required to consume

			the permissible FSI and no option other than reconstruction is available: Provided that, unless absolutely essential, nothing shall be allowed to spoil or destroy the special features or attributes for which it is enlisted under these regulations.
(d)Procedure	(i)Development permission for the changes shall be given by the Planning Authority on the advice of the heritage conservation committee. (ii) All developments in the areas surrounding the enlisted building or precinct, shall be regulated and controlled, ensuring that it does not mar the grandeur of or view from the enlisted building or precinct.	(i)Development permission for the changes shall be given by the Planning Authority in consultation with a sub-committee formed under the heritage conservation committee (ii)All developments in the areas surrounding the enlisted building or precinct, shall be regulated and controlled, ensuring that it does not mar the grandeur of or view from the enlisted building or precinct.	(i)Development permission shall be given for changes by the Planning Authority in accordance with the guidelines, which shall be laid down by Government in Consultation with Heritage Conservation Committee. (ii)All developments in the areas surrounding the enlisted building or precinct, shall be regulated and controlled, ensuring that it does not mar the grandeur of or view from the enlisted Building or precinct.

13.7 Restriction on development, re-development, repairs, etc.-

(1) No development or re-development or engineering operations or additions or alterations or repairs or renovation, including the painting of buildings, replacement of special features or plastering or demolition of any or part thereof of the enlisted buildings, precincts and natural features, including the compound wall, shall be allowed, except with the prior written permission of the local planning authority, in accordance with these regulations:

Provided that, before granting any such permission for alteration of boundaries of any enlisted buildings, precincts or natural features, objections and suggestions from the public shall be invited, by publishing prominently, in two local newspapers and duly considered by the Committee:

Provided further that, only in exceptional cases, for reasons to be recorded in writing, the planning authority may refer the matter back to the heritage conservation committee for reconsideration.

(2) Heritage buildings and precincts which are under the control of department of Public Works or Corporation or Universities or Boards and any other Government organizations, under the purview of Government of Karnataka and Government of India, shall been listed and declared as heritage properties:

Provided that, the decision of the heritage conservation committee, after such re-consideration shall be final.

(3) To preserve the heritage value of the zone, the committee shall have the power to direct, especially in areas designated, that the exterior design and height of buildings shall have prior approval.

(4) The local authority before permitting signs, outdoor display structures including street furniture in the enlisted building or precinct, shall strictly follow the specifications, codes, conditions given below.-

(A) The display or averting signs and outdoor display structures on building and land shall be permitted in accordance with PartX- Signs and Outdoor Display Structures of National Building Code of India.

(B) In addition to condition specified under item(A),the following provisions shall apply to advertisement signs in different land use zones.-

(i) In case of residential Zone, the following non-flashing neon signs with illumination not exceeding 40-watt light.

(a) One name plate with an area not exceeding 0.1 square metres for each dwelling unit.

(b) For other uses permissible in the zone, one identification sign or bulletin boardwithanareanotexceeding10square metres, provided that, such area shall not exceed 1.5 metres height.

(c) 'For sale' or 'for rent' signs for real estate, not exceeding 2 square metres in area, provided they are located on the premises offered for sale or rent.

(ii) in case of residential Zones with shop lines, non-flashing business sign placedparalleltothewallandnotexceeding1metreinheightperestablishment.

(iii) not withstanding the provisions under item (A) and (B), no advertisements ignore outdoor display structures shall be permitted on buildings of architectural, aesthetic, historical or heritage importance as may be decided by the local authority on the advice and approval of the committee, including on Government buildings:

Provided that, in the case of Government buildings only advertising signs or outdoor display structures shall be permitted, if they are related to the activities, purposes or programmes of the said building, which shall be approved by the committee.

Provided further that, if the committee so advises, the local authority shall refuse permission for any sign or outdoors display structure.

Provided also that, the Committee may prescribe additional guidelines for the same.

13.8 Responsibility of the owners. - It shall be the duty of the owners of enlisted buildings and precincts to carryout regular repairs and maintenance, at their own cost. The Government or the local authority shall not be responsible for such repairs and maintenance, except for the buildings owned by the Government or local authority.

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13.9 Regulations for specified heritage precincts or natural features. -

(1) In case of heritage precincts and natural features, where it is deemed necessary by the committee, development permission in the form of commencement certificate shall be granted in accordance with separate guidelines prescribed for the respective precincts or natural features, which shall be framed by the Archaeology, Museum and Heritage Department (AM&HD) in consultation with the local authority, on the advice of the committee.

(2) These guidelines shall concern architectural appearances, materials, the setting of buildings, their volumes, height, planting of trees and include regulations, which will govern planning, building permissions, choices of restoration methods or spatial planning.

(3) Separate guideline shall be prepared after commissioning a study of the enlisted precincts or natural features by the Archeology, Museum and Heritage Department. The study shall identify the heritage issues in all its aspects, fix the objectives to be reached in order to assure the conservation of the heritage identified and to draft guidelines for management and development of the same. The local authority shall consider the draft guidelines submitted by Archaeology, Museum and Heritage Department and obtain public opinion by publishing in the official Gazette and in leading newspapers for the purpose of inviting suggestions and objections from the public. The local authority, Archaeology, Museum and Heritage Department and the Committee shall consider all the suggestions and objections received within a period of sixty days from the date of publication in the official Gazette.

(4) After consideration of the suggestions and objections, the Archaeology, Museum and Heritage Department in consultation with local authority, acting on the advice of the committee, shall modify, if necessary, the draft guidelines and forward the same to the local authority for further submission to the Government for sanction;

Provided that, pending the consideration of suggestions and objections and pending final sanction from Government to the draft guidelines, the committee shall have due regard to the draft guidelines, while considering applications for development, re-development,etc.,of the heritage buildings or precincts or natural features.

13.10 Road widening and building lines. -

(1) If road widening or building line, under the Karnataka Town and Country Planning Act, 1961, are prescribed, they shall be in accordance with these regulations, so as to protect the features of the enlisted buildings or precincts.

If any new road widening or building lines are proposed in the Master Plan, the local authority shall consider the heritage provisions and environmental aspects while considering applications for development permissions in these precincts. Necessary steps shall be taken to modify the Master Plan accordingly and pending this action, the development of new roads shall not be carried out.

(2) No widening of the existing roads under the Karnataka Town and Country Planning Act, 1961 or Master Plan shall be carried out in a manner which may affect the existing heritage buildings (even if they are not included in a heritage precinct) or which may affect the enlisted natural features.

13.11 Master plan reservations. - If there are Master Plan reservations shown on heritage buildings or precincts or enlisted natural features, the reservation may be deleted or modified if required. The local authority, on the advice of the committee, shall move the Government to get these reservations deleted or modified accordingly.

13.12 Grant of Transferable Development Rights (TDR) in cases of loss of development rights. - The extent of Development Rights to be granted and used shall be determined by the rules specially framed for transfer of development rights.

13.13 Incentive uses for heritage buildings.-In cases of buildings, included in the list, falling in zones where office or commercial or hotel use is normally prohibited, if the owner or lessee agrees to maintain the listed heritage building in its existing state and to preserve its heritage status with due repairs and give a written undertaking to that effect, he may be permitted, with the approval of the committee, to convert part or the whole thereof of the non-commercial area, within such heritage building to commercial or office or hotel;

Provided that, if the heritage building is not maintained suitably or if the heritage value of the building is allowed to be diminished in any manner, the local authority suo motto or on the advice of the committee, shall revoke permission given for such use.

13.14 Maintaining skyline and architectural harmony.-Buildings within heritage precincts or in the vicinity of heritage building or listed natural features, shall maintain the skyline and follow the architectural style (without any high rise or multi-storied development), as may be existing in the surrounding area, so as not to diminish or destroy the value and beauty of, or the view from, the said heritage building or precinct or natural feature. The development within the precinct or in the vicinity of heritage building or natural features shall be in accordance to the guidelines framed by Archaeology, Museum and Heritage Department in association with the local authority on the advice of the committee.

13.15 Repair fund.- With a view to give monetary help for repairs of the enlisted property, a separate fund shall be created through Government grants or local authorities or public contributions, which shall be available to the local authority, who shall disburse the funds on the advice of the committee:

Provided that, nothing mentioned above shall be deemed to confer any right on the owner or occupier of the plot to demolish or re-construct or make alterations or additions to his enlisted building or building in a enlisted precinct, if in the opinion of the committee, such demolition or re-construction or addition is undesirable.

13.16 Voluntary contribution and agreement with any voluntary organization, person or company.- (1) The local authority may receive voluntary contributions towards the cost of maintaining any enlisted building or precinct, and shall manage such contributions for the purpose of preservation and conservation.

(2)Subject to the prior approval of the Government, local authority may enter into any agreement with any person or voluntary organization or company, whether incorporated or not, willing to preserve and conserve any enlisted building or precinct, owned by Government on such terms and conditions as the Government may determine

CHAPTER 14

14 STREAMLINING OF BUILDING PLAN APPROVALS

14.1 Streamlining the building approval/sanction procedure (Ease of Doing Business)

In order to attract investments into the country, efforts are being made by the Government to improve 'Ease of Doing Business'. In this direction, the limit of Built-up Area (BUA) for Foreign Direct Investment (FDI) has been reduced from 50,000 Sqm to 20,000 Sqm. In this context, the local bodies have to operate the entire building approval process in online mode, so that the building plan applications are submitted online along with building fees and other charges, and after due scrutiny, the approvals are also conveyed online.

Further, external bodies like Fire and Emergency Services Department, Airports Authority of India (AAI), Metro Rail Corporation (MRC), Ministry of Railways, Ministry of Environment, Forest and Climate Change (MoEFCC), Karnataka State Pollution Control Board (KSPCB), Heritage Conservation Committee (HCC), National Monuments Authority (NMA), Urban Art Commission (UAC), etc. shall grant No Objection Certificate (NOC)/ approvals on the proposed building plans to the local bodies. All such external bodies are mandated to prepare online NOC systems compatible to and integrated with that of the local bodies and the desired information is to be sent to the concerned external bodies and their comments/ NOC/ approval are to be received online so that there is no need for building proponents to pursue matter with local bodies or external agencies. The specific requirements of the external bodies are to be added in the Common Application Form (CAF) of the Authority (as specified in **Form I** and **Form II**) so that building proponent has to file all information at a single customized online application (as specified in **Appendix-II).** The objective is to make the whole process simplified and streamlined to ensure ease in getting the approvals for building licence within stipulated time.

14.2 Clearances at Master Plan level

Individual construction proposals should not generally require separate clearances from various authorities each time. Such clearances should be integrated into the Zonal Regulations of the Master Plan of the concerned Local Planning Area. The areas unaffected by any of the restrictions should be clearly marked out and mapped, preferably on a GIS platform. Area zones of differential control regulations (within the city) by any of these agencies may also be mapped accordingly. This will result in a composite map of the city with various control regulations as per the various agencies clearly marked on the map. Thus, the sites which are located outside these restricted/regulated areas would not require availing clearance from the respective authorities, thereby reducing the clearance process significantly.

The composite map of each LPA would be incorporated as part of the automation process undertaken by the Government and notified separately for each LPA as and when such maps are prepared, in consultation with the concerned authorities, preferably on GIS platform.

Following are the clearances which should be integrated into the city Master Plan-

Table 14.1 Clearances from various agencies proposed to be integrated in Master Plans

Sl. No.	Name of Agency	Type of Clearance	Area of Influence
1.	National Monuments Authority through Competent Authority	Ancient Monument approval	As prescribed in the AMASAR (Amendment and Validation) Act, 2010 for protection of monuments
2.	Ministry of Environment	Environment Clearance (EC)	As prescribed in the statutory provisions for EIA and clearance based on the size of the

			project in accordance with Environment Protection Act, 1986
3.	Ministry of Defence	Defence Clearance	Area in and around Defence Establishments as identified by MoD.
4.	Coastal Zone Management Authority	NOC (if near sea/coastal areas)	Area under the CRZ regulations.
5.	NHAI/PWD	Road access	Buffer zones as prescribed by NHAI along National Highways.
6.	Ministry of Railways	Area clearance	Buffer zones as prescribed by Railways along Rail tracks/depots/yards etc.
7.	Airport Authority of India	Height clearance	Height restriction areas in the vicinity of Airports

Efforts are being made at the Government of India level and the State Government level to coordinate with all the Central and State ministries and their organizations so that they streamline their own internal processes to issue no objection etc. wherever required by law. The efforts are mainly focused on delegating the powers at appropriate levels, establishing an online application process for time bound delivery, creating public awareness about their requirements, reviewing the restrictions and reducing them, sharing the data and norms with local authorities to be incorporated in the Master Plan /Zonal Regulations.

Recognizing the concern for streamlining the procedures for clearances to be obtained from various departments in least possible number of procedures and number of days, the following model shall be adopted so that the entire process of Pre- and Post-Construction approvals shall be completed within one month. The detailed timelines for building licence and occupation certificate as notified by government.

14.3 Risk Based Classification of building proposals

There is a need to make provisions for fast-tracking building permission procedures for all non-automatic approvals. Therefore, in the spirit of 'Ease of Doing Business', the buildings have been classified further on the basis of risk parameters/ risk-based classification to clear the building permits on fast track system. This kind of classification shall be used for fast tracking the sanction of building plans.

14.3.1 Compound walls abutting public street without Building Development

Construction of Compound walls without Building Development shall be considered as very low risk development for the application of these Byelaws.

14.3.2 Residential Buildings

For approval of the residential plotted and group housing buildings, risk-based classification shall be as per Table 14.2 –

Table 14.2 Risk Matrix for development of different Residential buildings

Risks		**Very Low**	**Low**	**Moderate**	**High**
Criteria	**Parameters**				
Size of the Plot	Square Meters	Below125 m^2	125 500 m^2	Above 500 m^2	All sizes
No. of Floors/	(G + no. of floor)	(G+2)	(G+ 3)	(G+ 4)	Above (G+4)
Type of Development	Various Categories	Plotted	Plotted	Plotted/ Group Housing	Group Housing

Approval for risk-based category of buildings may be granted by the designated officers of different cadres as notified by Government.

14.3.3 Storage/Warehouse Buildings

For approval of the buildings meant for use as storage buildings/warehouses/go down, risk-based classification shall be as per **Table 14.3**

Table 14.3 Risk Matrix for development of Storage/Warehouses

Risks	**Very Low**	**Low**	**Moderate**	**High**
Construction area in all floors (Sqm)	Up to 250m^2	Above 250m^2 and up to 2000m^2	Up to 2000m^2	Above 2000m^2
Height of building	Below 15m	Below 15m	Below 15m	Below 15m
Abutting proposed Road width	Min. 12m	Min. 12m	Min. 12m	Min. 12m
Type of Material Storage	Category A	Category A	Category B (Stacking Height-Medium)	Category B (Stacking Height-High)

Note:

i. The level of Risk is classified according to the material stored in the warehouse/ storehouse. Material shall be classified according to the Categories defined in ***Appendix-XXI****.*

ii. Approval for risk-based category of buildings may be granted by the designated officers of different cadres as notified by Government.

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iii. The building application processing fees shall be as prescribed in ***Appendix-VII****.*

14.3.4 Commercial & Industrial Buildings

For approval of the buildings meant for Commercial & Industrial uses, risk-based classification shall be as per **Table 14.4**

Table 14.4 Risk Matrix for development of Commercial & Industrial Buildings

Risks		**Low**	**Moderate**	**High**
Criteria	**Parameters**			
Size of the Plot	Square Meters	up to 350 m^2	Above 350 m^2	All sizes
Height of building	Meters	Less than 15m	Upto 18m	Above18m
Abutting Proposed Road width	Meters	Min 6 m	Min 9 m	Min.12m

Note:

i. The level of Risk is classified according the size and height of the industrial building proposed.

ii. Approval for risk-based category of buildings may be granted by the designated officers of different cadres as notified by Government.

. The *building application processing fees shall be derived by an automated built-in calculator in the online system.*

14.4 Fast Tracking Tools:

Fast tracking tools are provided here below for issuing building licence. However, the procedure prescribed in **Clause 3.16, 3.17 & 3.18** shall be followed, except for the construction of Compound walls abutting public street, without Building Developments. In case of construction of compound wall without building development, Approval for risk-based category of buildings may be granted by the designated officers of different cadres as notified by Government.

For very Low Risk Developments:

1) Plans to be submitted online to the Local Authority along with the required details specified in **clause 3.10.2** and Affidavit / Undertaking from the Applicant and Professional on Record for drawing & supervision.

2) Deemed Approval with Self-Certification by Professional on Record for drawings and by Owner

14.4.1 For Low-Risk Developments:

1) Plans to be submitted online to the Local Authority along with the required details specified in **clause 3.10.2**

Approval for risk-based category of buildings may be granted by the designated officers of different cadres as notified by Government. as per the procedure specified in these Byelaws within the timelines specified in **Appendix VIII**

14.4.2 For Moderate Risk Developments:

1) Plans to be submitted online to the Local Authority along with the required details specified in **clause 3.10.2**

2) Approval to be granted by the Local Authority within the timelines specified by Government

3) Deemed licence to be issued online automatically if the Local Authority does not grant approval within the timelines specified in **Appendix VIII (KMC Act Procedure to be followed)**

14.4.3 For High Risk Developments:

1) Common application form (as specified in **Form I** & **Form II**) with all the details as specified in **Appendix-II** for building licence and all required NOCs to be submitted online to the Local Authority along with the details specified in **clause 3.10.2**

2) NOCs to be issued by the concerned departments online within the timelines specified by Government

3) Deemed NOCs to be issued online by the Local Authority if the concerned department does not issue NOC within the specified timelines.

4) Approval to be granted by the Local Authority within the timelines specified by Government

5) Deemed licence to be issued online automatically if the Local Authority does not grant approval within the timelines specified by Government **(KMC Act Procedure to be followed)**

14.5 Other Tools to enhance ease of doing business:

Some other Tools, regarding Fast-Track construction licences are:

14.5.1 'Citizens' Charter

A '**Citizens' charter** as notified by the Government shall list out the timelines and upper limits of time for the delivery of citizen services of the Authority. The objective of issuing the charter is to improve the quality of public service in terms of timely delivery. Such charters shall be brought out by all the Local Body to maintain high standards of accountability and transparency. The standards of service to be provided, the maximum number of days required for providing various citizen services and the standard procedure shall be listed out in the citizens' charter.

14.5.2 Capacity building

Capacity building measures are to be adopted for such functionaries to identify Training Needs (TNA) and other technical requirement of duties that they are required to discharge as per the provisions of this Byelaws. Fresh recruitments commensurate to the technical qualification/ experience are to be made by the Local Authority (in consultation with the State Government, if required), if there is complete / notable absence of the technical expertise needed for the said services.

The Local Authority shall conduct periodical orientation programmes, not less than once in 6 months for all stakeholders, to enhance the capacity of all the stakeholders and to bring in more awareness among the general public about the benefits of this Byelaws.

14.5.3 Simplification of Byelaws

The building Byelaws have been simplified for easy comprehension of lay person as well as professionals involved in developmental activities. The simplification process also includes the process of application, the filling up of forms and streamlining the process of application and sanctioning through online system.

CHAPTER 15

15. CLIMATE RESILIENT CONSTRUCTION – INTEGRATION OF ENVIRONMENTAL CLEARANCE WITH SANCTION

Land, Air, Noise, Water, Energy, biological, socio-economic, solid / other waste management are the main facets considered in relation to Pre, during and Post Building Construction for Sustainable Environment Management. Therefore, it is necessary for the building process to ensure compliance to various conditions laid down by the Ministry of Environment, Forest and Climate Change.

The building construction sector is a major contributor towards carbon footprints which affects climate change. India is committed towards mitigating the effects of climate change and moving towards internationally accepted norms for environmental friendly building construction. Currently this objective of environmental safeguard is achieved through obtaining a specific environmental clearance (EC) for any construction project having a size of more than 20,000 Sqm. This is administered under notification of Ministry of Environment, Forest and Climate Change.

With rapid urbanisation and growth of Indian economy, it is anticipated that the construction activity will experience a proportionate growth. Government is also committed towards streamlining of clearances for buildings and real estate sector and empowering the urban local bodies with an objective of Ease of Doing Business.

Integration of environmental condition in building Byelaws:

1) When the State Government notifies the Byelaws and rules concurred by the Ministry of Environment, Forest and Climate Change, the Central Government may issue an order stating that no separate environmental clearance is required for buildings to be constructed in the State or authority areas.

2) The Local Authority shall certify the compliance of the environmental conditions prior to issuance of Completion Report, as prescribed in the Byelaws, as per the requirements stipulated for such buildings based on the recommendation of the Environmental Cell constituted in the Authority.

3) For the purpose of certification regarding incorporation of environmental conditions in buildings, the Ministry of Environment, Forest and Climate Change may empanel through competent agencies, the Qualified Building Environment Auditors (QBEAs) to assess and certify the building projects, as per the requirements of this notification and the procedure for accreditation of Qualified Building Auditors and their role as given at **Appendix-XIX.**

4) In order to implement the integration of environmental condition in building Byelaws, the Local Authority shall constitute the Environment Monitoring Cell (herein after called as Cell), for compliance and monitoring and to ensure environmental planning within their jurisdiction.

5) The Cell shall monitor the implementation of the Byelaws and rules framed for Integration of environmental conditions for construction of building and the Cell may utilise the services of the licensed professionals as prescribed in **Appendix-IA**

6) The Cell shall function under the administrative control of the Authority.

7) The composition and functions of the Cell are given at **Appendix-XX**.

8) The environmental concerns are integrated in the building Byelaws, as per their size of the project, and the Local Authority shall follow the procedure, as given below:

9) No Environmental Clearance from Ministry of Environment, Forest and Climate Change and no Consent to Establish and Operate under the Water (Prevention and Control of Pollution) Act, 1974 and the Air

(Prevention and Control of Pollution) Act, 1981 will be required from the State Pollution Control Boards for buildings as specified by the competent Authority.

15.1 Environmental conditions for compliance during Building approvals

The Ministry of Environment, Forest and Climate Change has now decided to integrate the environmental concerns into building plan approval process and empowering the concerned local body to approve and certify compliance of stipulated requirements. The new building construction proposals, for the purpose of this chapter are classified in the following 3 categories: -

1) Building Category '1': Built-up Area 5,000 Sqm to < 20,000 Sqm

2) Building Category '2': Built-up Area ≥ 20,000 Sqm to 50,000 Sqm

3) Building Category '3': Built-up Area ≥ 50,000Sq.m to 1,50,000 Sqm

Note: (area mentioned against each building category is the total constructed area of the building including car parking area)

15.1.1 BUILDINGS CATEGORY '1' (5,000 to < 20,000 Square meters)

A Self Declaration Form to comply with the environmental conditions as stipulated in **Table 15.1** along with **Form-IIb** and certification by the Building Environment Auditor to be submitted by the project proponent as a common application for building licence to the Local Authority along with the specified fee in separate accounts. Thereafter, the Local Authority may issue the building License incorporating the environmental conditions in it and allow the project to start based on the self-declaration and certification along with the application. After completion of the construction of the building, the project proponent may update **Form-IIb** based on audit done by the qualified Building Environment Auditor (BEA) and shall furnish the revised compliance undertaking to the Local Authority along with **Form VIII**. Any non-compliance issues in buildings less than 20,000 square meters shall be dealt as prescribed in the rules framed under Section 76F & 76 FFF of KTCP Act.

15.1.2 BUILDINGS CATEGORY '2' (>20,000 to <1,50,000 Square meters)

A Self Declaration Form to comply with the environmental conditions as stipulated in **Table 15.2** along with **Form-IIb** and Compliance Report submitted by Environment Engineer on Record **(EER)** to be submitted by the project proponent as a common application for building licence to the Local Authority along with the specified fee in separate accounts. The fee for environmental appraisal will be deposited in a separate account. The Environment Monitoring Cell will process the Application after obtaining Evaluation Report of the Building Environment Auditor (of the compliance report submitted by the **EER**) and if the Application and drawings / details submitted are in order, forward the same to the Commissioner.

If the Environment Monitoring Cell is of the opinion that the application/drawings submitted by the proponent is not in accordance with the provisions of these Byelaws (based on the evaluation report submitted by the Building Environment Auditor (BEA), the Environment Monitoring Cell shall suggest the necessary changes to be made and forward the same to the Commissioner. The Commissioner shall issue endorsement to the proponent as per the suggestions made by the Environment Monitoring Cell and the proponent shall make the necessary changes and resubmit the application / drawings to the satisfactions of the Environment Monitoring Cell and the Environment Monitoring Cell shall accept the revisions made by the proponent.

According to the Proponent or the concerned **EER**, if the defects / changes suggested in the endorsement are incorrect, the proponent may file objection, to the commissioner, stating the correctness of the drawings / details submitted.

If any such objection is received from the Proponent, the Commissioner shall conduct joint enquiry along with the Applicant, the concerned **EER**, the Building Environment Auditor who has submitted the Evaluation Report and the Environment Monitoring Cell which has suggested the changes in the drawings / details submitted (based on which the endorsement was issued), by giving notice to all, within seven days of receiving objection.

During the enquiry, the Commissioner, after hearing the views of both the parties, shall either accept or reject the objection raised by the proponent and instruct the proponent accordingly in writing and sending a copy of the same to the Environment Monitoring Cell and the decision of the Commissioner shall be final. The Proponent shall abide by the decision of the Commissioner and make necessary changes as instructed by the commissioner, if any and resubmit the application.

After receiving the recommendation of the Environment Monitoring Cell or after receiving the changes made as instructed by the Commissioner (as mentioned above), the building Licence and environmental clearance shall be issued in an integrated format by the Authority.

After executing all works in site as per the environmental clearance issued by the Local Authority and certification of works by the licensed professional, the Completion Report shall be submitted as prescribed in **clause 3.17.**

The project proponent shall submit Performance Data and Certificate of Continued Compliance of the project for the environmental condition's parameters applicable after completion of construction, from Building Environment Auditors every year to the Environment Monitoring Cell with special focus on the following parameters (as detailed in **clause 11.2):** -

(a) Energy Use (including all energy sources).

(b) Energy generated on site from onsite Renewable energy sources.

(c) Water use and waste water generated, treated and reused on site.

(d) Waste Segregated and Treated on site.

(e) Tree plantation and maintenance.

After completion of the project, the Cell shall randomly check the projects compliance status including the yearly audit report. Penalties and action against the concerned persons for non-compliances of the environmental conditions and parameters shall be initiated as prescribed in the rules framed under Section 76F and 76 FFF of KTCP Act.

15.1.3 BUILDINGS CATEGORY '3' (≥ 50,000 to < 1,50,000 Square meters)

All the process mentioned in **Clause 15.1.2** shall be followed except that after completion of the project, the Cell shall check all the projects for compliance on a yearly basis including the yearly audit report submitted by Building Environment Auditors.

Table 15.1: Environmental Conditions for Building and Construction

(Building Category '1': 5,000Sqm to < 20,000Sqm)

Sl. No.	Medium	Environmental conditions
1	Topography Natural Drainage	The natural drain system should be maintained for ensuring unrestricted flow of water. No construction shall be allowed to obstruct the natural drainage through the site. No construction is allowed on wetland and water bodies. Check dams, bio swales, landscape, and other sustainable urban drainage systems (SUDS) are allowed for maintaining the drainage pattern and to harvest rainwater. Buildings shall be designed to follow the natural topography as much as possible. Minimum cutting and filling should be done.
2	Water conservations-Rainwater Harvesting and Ground Water Recharge	A complete plan for rainwater harvesting water efficiency and conservation should be prepared. The provisions on rainwater harvesting and Ground water recharging prescribed in **Chapter 10** and as specified by the Local Authority or as notified by the Government should be followed. A rainwater harvesting plan needs to be designed where the recharge bores of minimum one recharge bore per 5,000 Sqm of built-up area and storage capacity of minimum one day of total freshwater requirement shall be provided. In areas where ground water recharge is not feasible, the rainwater should be harvested and stored for reuse. The ground water shall not be withdrawn without approval from the Competent Authority. All recharges should be limited to shallow aquifer.
2(a)		At least 20% of the open spaces (setback area)) shall be pervious. Use of Grass pavers, paver blocks with at least 50% opening, landscape etc. would be considered as pervious surface.
2(b)		Water efficient appliances shall be used. Low flow fixtures or sensors be used to promote water conservation. Details as specified by the Local Authority or as notified by the Government shall be followed.
2(c)		Separation of grey and black water should be done by the use of dual plumbing system. In case of single stack system separate recirculation lines for flushing by giving dual plumbing system be done.
3	Solid Waste Management	Solid waste: Separate wet and dry bins must be provided in each unit and at the ground level for facilitating segregation of waste. The provisions of the Solid Waste (Management) Rules 2016 and the e-waste (Management) Rules 2016, and the Plastics Waste (Management) Rules 2016 shall be followed.
3(a)		All non-biodegradable waste shall be handed over to authorized recyclers for which a written tie up must be done with the authorized recyclers.
3(b)		Treatment of wet waste and sanitary waste on site (organic dry waste also is preferred) using Organic waste composter / Vermiculture pit, Black Soldier Fly larva or any other approved technology shall be installed with a minimum capacity of 0.3 kg /person/day must be installed.
4	Sewage Treatment Plant / Sullage Treatment Plant	Onsite sewage treatment of capacity of treating 100% wastewater to be installed, where the sewer lines of the building cannot be connected to city level sewerage system. In case the sewer line of the building can be connected to the city level sewerage system, the relaxation on the size of STP / Sullage Treatment Plant should be obtained from the competent Authority, subject to the minimum capacity of the STP / Sullage Treatment Plant to cater to the requirement of recycled treated water in the project. Treated waste water shall be reused on site for landscape, flushing, cooling tower, and other end-uses. Excess treated water shall be discharged into the city level sewerage system or as per CPCB norms. Natural treatment systems shall be promoted. Sludge from the onsite sewage treatment, including septic tanks, shall be collected, conveyed and disposed as per the Ministry of Urban Development, Central Public Health and Environmental Engineering Organisation (CPHEEO) Manual on Sewerage and Sewage Treatment Systems, 2013. Preferred types of STP / Sullage Treatment Plant shall be as notified by the Government.

5	Energy	Compliance with the Energy Conservation Building Code (ECBC) of Bureau of Energy Efficiency shall be ensured. Buildings in the States which have notified their own ECBC, shall comply with the State ECBC. Details as notified by the Government shall be followed. All lighting and other electric fixtures shall be of low energy consumption (Electrical Appliances – BEE Star and Energy Efficient Appliances) Concept of passive solar design that minimize energy consumption in buildings by using design elements, such as building orientation, landscaping, efficient building envelope, appropriate fenestration, increased day lighting design and thermal mass etc. shall be incorporated in the building design. Wall, window, and roof u-values shall be as per ECBC specifications.
5(a)		Solar, wind or other Renewable Energy shall be installed to meet electricity generation equivalent to 5% of the power consumption of the project subject to minimum provision made as prescribed in **clause 11.2.3** or as notified by the Government.
5(b)		Solar water heating shall be provided to meet the total hot water demand of the commercial and institutional building. Residential buildings are also to meet its hot water demand from solar water heaters, unless additional power supply from renewable energy sources is provided equal to the power requirement of electric water heaters, as prescribed in **Clause 11.2.4**. Alternatively, any other hybrid system (including other cost-efficient technologies such as heat pump etc.) may be proposed for hot water generation instead of solar water heating system. Details prescribed in **Clause 11.2.4** or as notified by the Government shall be followed.
5(c)		Use of environment friendly materials in bricks, blocks and other construction materials, shall be required for at least 20% of the construction material quantity. These include fly ash bricks, hollow bricks, AACs, Fly Ash Lime Gypsum blocks, Compressed earth blocks, and other environment friendly materials. Fly ash should be used as building material in the construction as per the provisions of the Fly Ash Notification of September 1999 as amended from time to time.
6	Air Quality and Noise	Dust, smoke & other air pollution prevention measures shall be provided for the building as well as the site. These measures shall include screens for the building under construction, continuous dust/ wind breaking walls all around the site (at least 3 m height). Plastic/tarpaulin sheet covers shall be provided for vehicles bringing in sand, cement, murram and other construction materials prone to causing dust pollution at the site as well as taking out debris from the site. Wheel washing for the vehicles should be done before leaving the site. Sand, murram, loose soil, cement, stored on site shall be covered adequately so as to prevent dust pollution. Wet jet shall be provided for grinding and stone cutting. Unpaved surfaces and loose soil shall be adequately sprinkled with water to suppress dust. All construction and demolition debris shall be stored at the site (and not dumped on the roads or open spaces outside) before they are properly disposed. All demolition and construction waste shall be managed as per the provisions of the Construction and Demolition Waste Rules 2016. Details as specified by the Government shall be followed. All workers working at the construction site and involved in loading, unloading, carriage of construction material and construction debris or working in any area with dust pollution shall be provided with dust mask. For indoor air quality, the ventilation provisions as per National Building Code of India.
6(a)		The location of the DG set and exhaust pipe height shall be as per the provisions of the CPCB norms.
7	Green cover	A minimum of 1 tree for every 80 Sqm. of land should be planted and maintained. The existing trees will be counted for this purpose. Preference should be given to planting native species
7(a)		Where the trees need to be cut, compensatory plantation in the ratio of 1:3 (i.e., planting of 3 trees for every 1 tree that is cut) shall be done and maintained.

Table 15.2: Environmental Conditions for Building and Construction

(Building Category '2': ≥ 20,000 Sqm to 50,000 Sqm)

Sl. No.	Medium	Environmental conditions
1	Topography Natural Drainage	The natural drain system should be maintained for ensuring unrestricted flow of water. No construction shall be allowed to obstruct the natural drainage through the site. No construction is allowed on wetland and water bodies. Check dams, bio swales, landscape, and other sustainable urban drainage systems (SUDS) are allowed for maintaining the drainage pattern and to harvest rainwater. Buildings shall be designed to follow the natural topography as much as possible. Minimum cutting and filling should be done.
2	Water conservations-Rainwater Harvesting and Ground Water Recharge	A complete plan for rainwater harvesting water efficiency and conservation should be prepared. The provisions on rainwater harvesting and Ground water recharging prescribed in **Chapter 10** and **Appendix-XVII** as notified by the Government should shall be followed. A rainwater harvesting plan needs to be designed where the recharge bores of minimum one recharge bore per 5,000 Sqm of built-up area and storage capacity of minimum one day of total freshwater requirement shall be provided. In areas where ground water recharge is not feasible, the rainwater should be harvested and stored for reuse. The ground water shall not be withdrawn without approval from the Competent Authority. All recharges should be limited to shallow aquifer.
2(a)		At least 20% of the open spaces (setback area) shall be pervious. Use of Grass pavers, paver blocks with at least 50% opening, landscape etc. would be considered as pervious surface.
2(b)		Water efficient appliances shall be used. Low flow fixtures or sensors be used to promote water conservation. Details as notified by the Government shall be followed.
2(c)		Separation of grey and black water should be done by the use of dual plumbing system. In case of single stack system separate recirculation lines for flushing by giving dual plumbing system be done. Details as specified as notified by the Government shall be followed.
3	Solid Waste Management	Solid waste: Separate wet and dry bins must be provided in each unit and at the ground level for facilitating segregation of waste. The provisions of the Solid Waste (Management) Rules 2016 and the e-waste (Management) Rules 2016, and the Plastics Waste (Management) Rules 2016 shall be followed. Details as specified **Appendix-XVIII-A** shall be followed.
3(a)		All non-biodegradable waste shall be handed over to authorized recyclers for which a written tie up must be done with the authorized recyclers.
3(b)		Treatment of wet waste on site (organic dry waste also is preferred) using Organic Waste Converter, Vermiculture pit, Black Soldier Fly larva or any other approved technology shall be installed, and sanitary waste shall be incinerated as specified in **Appendix-XVIII-A**
4	Sewage Treatment Plant / Sullage Treatment Plant	Onsite sewage treatment has to be done for treating 100% wastewater, by installing Sewage Treatment Plant (STP) of required capacity to be installed, where the sewer lines of the building cannot be connected to city level sewerage system. In case the sewer line of the building can be connected to the city level sewerage system, the relaxation on the size of STP or Sullage Treatment Plant (SuTP), as the case may be, may be allowed should be obtained from the competent Authority, subject to the minimum capacity of the STP / SuTP to cater to the requirement of recycled treated water in the project and after getting NOC from the Authority to connect the excess raw Sewage to the city level sewerage system. Treated waste water shall be reused on site for landscape, flushing, cooling tower, and other end-uses. Excess treated water shall be discharged into the city level sewerage system or as per CPCB norms. Natural treatment systems shall be promoted. Sludge from the onsite sewage treatment, including septic tanks, shall be collected, conveyed and disposed as per the Ministry of Urban Development, Central Public Health and Environmental Engineering Organisation (CPHEEO) Manualon Sewerage and Sewage Treatment Systems, 2013. Preferred types of STP / Sullage Treatment Plant shall be as notified by the Government..

5	Energy	Compliance with the Energy Conservation Building Code (ECBC) of Bureau of Energy Efficiency shall be ensured Buildings in the States which have notified their own ECBC, shall comply with the State ECBC. Details as notified by the Government shall be followed. All lighting and other electric fixtures shall be of low energy consumption (Electrical Appliances – BEE Star and Energy Efficient Appliances) Concept of passive solar design that minimize energy consumption in buildings by using design elements, such as building orientation, landscaping, efficient building envelope, appropriate fenestration, increased day lighting design and thermal mass etc. shall be incorporated in the building design. Wall, window, and roof u-values shall be as per ECBC specifications.
5(a)		Solar, wind or other Renewable Energy shall be installed to meet electricity generation equivalent to 5% of the power consumption of the project subject to minimum provision made as prescribed in **clause 11.2.3** or as notified by the Government.
5(b)		Solar water heating shall be provided to meet the total hot water demand of the commercial and institutional building. Residential buildings are also to meet its hot water demand from solar water heaters, unless additional power supply from renewable energy sources is provided equal to the power requirement of electric water heaters as prescribed in **Clause 11.2.4**.. Alternatively, any other hybrid system (including other cost-efficient technologies such as heat pump etc.) may be proposed for hot water generation instead of solar water heating system. Details prescribed in **Clause 11.2.4** or as notified by the Government shall be followed.
5(c)		Use of environment friendly materials in bricks, blocks and other construction materials, shall be required for at least 20% of the construction material quantity. These include fly ash bricks, hollow bricks, AACs, Fly Ash Lime Gypsum blocks, Compressed earth blocks, and other environment friendly materials. Fly ash should be used as building material in the construction as per the provisions of the Fly Ash Notification of September 1999 as amended from time to time.
6	Air Quality and Noise	Dust, smoke & other air pollution prevention measures shall be provided for the building as well as the site. These measures shall include screens for the building under construction, continuous dust/ wind breaking walls all around the site (at least 3 m height). Plastic/tarpaulin sheet covers shall be provided for vehicles bringing in sand, cement, murram and other construction materials prone to causing dust pollution at the site as well as taking out debris from the site. Wheel washing for the vehicles should be done before leaving the site. Sand, murram, loose soil, cement, stored on site shall be covered adequately so as to prevent dust pollution. Wet jet shall be provided for grinding and stone cutting. Unpaved surfaces and loose soil shall be adequately sprinkled with water to suppress dust. All construction and demolition debris shall be stored at the site (and not dumped on the roads or open spaces outside) before they are properly disposed. All demolition and construction waste shall be managed as per the provisions of the Construction and Demolition Waste Rules 2016. Details as notified by the Government shall be followed. All workers working at the construction site and involved in loading, unloading, carriage of construction material and construction debris or working in any area with dust pollution shall be provided with dust mask. For indoor air quality, the ventilation provisions as per National Building Code of India.
6(a)		The location of the DG set and exhaust pipe height shall be as per the provisions of the CPCB norms.
7	Green cover	A minimum of 1 tree for every 80 Sqm. of land should be planted and maintained. The existing trees will be counted for this purpose. Preference should be given to planting native species
7(a)		Where the trees need to be cut, compensatory plantation in the ratio of 1:3 (i.e., planting of 3 trees for every 1 tree that is cut) shall be done and maintained.
8	Topsoil Preservation and Reuse	Topsoil should be stripped to a depth of 20 cm from the areas proposed for buildings, roads, paved areas, and external services. It should be stockpiled appropriately in designated areas and reapplied during plantation of the proposed vegetation on site.

9	Transport	A comprehensive mobility plan, as per MoUD best practices guidelines (URDPFI), shall be prepared to include motorized, non-motorized, public, and private networks. Road should be designed with due consideration for environment, and safety of users. The road system can be designed with these basic criteria. 1. Hierarchy of roads with proper segregation of vehicular and pedestrian traffic. 2. Traffic calming measures. 3. Proper design of entry and exit points. 4. Parking norms as per local regulation.

Table 15.3: Environmental Conditions for Building and Construction

(Building Category '3': ≥ 50,000 Sqm to 1,50,000Sqm)

Sl. No.	Medium	Environmental conditions
1	Topography Natural Drainage	The natural drain system should be maintained for ensuring unrestricted flow of water. No construction shall be allowed to obstruct the natural drainage through the site. No construction is allowed on wetland and water bodies. Check dams, bio swales, landscape, and other sustainable urban drainage systems (SUDS) are allowed for maintaining the drainage pattern and to harvest rainwater. Buildings shall be designed to follow the natural topography as much as possible. Minimum cutting and filling should be done.
2	Water conservations-Rainwater Harvesting and Ground Water Recharge	A complete plan for rainwater harvesting water efficiency and conservation should be prepared. The provisions on rainwater harvesting and Ground water recharging prescribed in **Chapter 10** and as notified by the Government should be followed. A rainwater harvesting plan needs to be designed where the recharge bores of minimum one recharge bore per 5,000 Sqm of built up area and storage capacity of minimum one day of total freshwater requirement shall be provided. In areas where ground water recharge is not feasible, the rainwater should be harvested and stored for reuse. The ground water shall not be withdrawn without approval from the Competent Authority. All recharges should be limited to shallow aquifer.
2(a)		At least 20% of the open spaces (setback area) shall be pervious. Use of Grass pavers, paver blocks with at least 50% opening, landscape etc. would be considered as pervious surface.
2(b)		Water efficient appliances shall be used. Low flow fixtures or sensors be used to promote water conservation. Details as notified by the Government shall be followed.
2(c)		Separation of grey and black water should be done by the use of dual plumbing system. In case of single stack system separate recirculation lines for flushing by giving dual plumbing system be done. Details as notified by the Government shall be followed.
3	Solid Waste Management	Solid waste: Separate wet and dry bins must be provided in each unit and at the ground level for facilitating segregation of waste. The provisions of the Solid Waste (Management) Rules 2016 and the e-waste (Management) Rules 2016, and the Plastics Waste (Management) Rules 2016 shall be followed. Details as as notified by the Government shall be followed.
3(a)		All non-biodegradable waste shall be handed over to authorized recyclers for which a written tie up must be done with the authorized recyclers.
3(b)		Treatment of wet waste and sanitary waste on site (organic dry waste also is preferred) using Organic waste composter/Vermiculture pit, Black Soldier Fly larva or any other approved technology shall be installed with a minimum capacity of 0.3 kg /person/day must be installed.
4	Sewage Treatment Plant / Sullage Treatment Plant	Onsite sewage treatment of capacity of treating 100% wastewater to be installed, where the sewer lines of the building cannot be connected to city level sewerage system.

		In case the sewer line of the building can be connected to the city level sewerage system, the relaxation on the size of STP / Sullage Treatment Plant should be obtained from the competent Authority, subject to the minimum capacity of the STP / Sullage Treatment Plant to cater to the requirement of recycled treated water in the project. Treated waste water shall be reused on site for landscape, flushing, cooling tower, and other end-uses. Excess treated water shall be discharged into the city level sewerage system or as per CPCB norms. Natural treatment systems shall be promoted. Sludge from the onsite sewage treatment, including septic tanks, shall be collected, conveyed and disposed as per the Ministry of Urban Development, Central Public Health and Environmental Engineering Organisation (CPHEEO) Manual on Sewerage and Sewage Treatment Systems, 2013. Preferred types of STP / Sullage Treatment Plant shall be as notified by the Government.
5	Energy	Compliance with the Energy Conservation Building Code (ECBC) of Bureau of Energy Efficiency shall be ensured Buildings in the States which have notified their own ECBC, shall comply with the State ECBC. Details as notified by the Government shall be followed. All lighting and other electric fixtures shall be of low energy consumption (Electrical Appliances – BEE Star and Energy Efficient Appliances) Concept of passive solar design that minimize energy consumption in buildings by using design elements, such as building orientation, landscaping, efficient building envelope, appropriate fenestration, increased day lighting design and thermal mass etc. shall be incorporated in the building design. Wall, window, and roof u-values shall be as per ECBC specifications.
5(a)		Solar, wind or other Renewable Energy shall be installed to meet electricity generation equivalent to 5% of the power consumption of the project subject to minimum provision made as prescribed in **clause 11.2.3** or as notified by the Government.
5(b)		Solar water heating shall be provided to meet the total hot water demand of the commercial and institutional building. Residential buildings are also to meet its hot water demand from solar water heaters, unless additional power supply from renewable energy sources is provided equal to the power requirement of electric water heaters, as prescribed in **Clause 11.2.4**. Alternatively, any other hybrid system (including other cost-efficient technologies such as heat pump etc.) may be proposed for hot water generation instead of solar water heating system. Details prescribed in **Clause 11.2.4** or as notified by the Government shall be followed.
5(c)		Use of environment friendly materials in bricks, blocks and other construction materials, shall be required for at least 20% of the construction material quantity. These include fly ash bricks, hollow bricks, AACs, Fly Ash Lime Gypsum blocks, Compressed earth blocks, and other environment friendly materials. Fly ash should be used as building material in the construction as per the provisions of the Fly Ash Notification of September 1999 as amended from time to time.
6	Air Quality and Noise	Dust, smoke & other air pollution prevention measures shall be provided for the building as well as the site. These measures shall include screens for the building under construction, continuous dust/ wind breaking walls all around the site (at least 3 m height). Plastic/tarpaulin sheet covers shall be provided for vehicles bringing in sand, cement, murram and other construction materials prone to causing dust pollution at the site as well as taking out debris from the site. Wheel washing for the vehicles should be done before leaving the site. Sand, murram, loose soil, cement, stored on site shall be covered adequately so as to prevent dust pollution. Wet jet shall be provided for grinding and stone cutting. Unpaved surfaces and loose soil shall be adequately sprinkled with water to suppress dust. All construction and demolition debris shall be stored at the site (and not dumped on the roads or open spaces outside) before they are properly disposed. All demolition and construction waste shall be managed as per the provisions of the Construction

		and Demolition Waste Rules 2016. Details as notified by the Government shall be followed. All workers working at the construction site and involved in loading, unloading, carriage of construction material and construction debris or working in any area with dust pollution shall be provided with dust mask. For indoor air quality, the ventilation provisions as per National Building Code of India.
6(a)		The location of the DG set and exhaust pipe height shall be as per the provisions of the CPCB norms.
7	Green cover	A minimum of 1 tree for every 80 Sqm. of land should be planted and maintained. The existing trees will be counted for this purpose. Preference should be given to planting native species
7(a)		Where the trees need to be cut, compensatory plantation in the ratio of 1:3 (i.e., planting of 3 trees for every 1 tree that is cut) shall be done and maintained.
8	Topsoil Preservation and Reuse	Topsoil should be stripped to a depth of 20 cm from the areas proposed for buildings, roads, paved areas, and external services. It should be stockpiled appropriately in designated areas and reapplied during plantation of the proposed vegetation on site.
9	Transport	A comprehensive mobility plan, as per MoUD best practices guidelines (URDPFI), shall be prepared to include motorized, non-motorized, public, and private networks. Road should be designed with due consideration for environment, and safety of users. The road system can be designed with these basic criteria. 1. Hierarchy of roads with proper segregation of vehicular and pedestrian traffic. 2. Traffic calming measures. 3. Proper design of entry and exit points. 4. Parking norms as per local regulation.
10	Environment Management Plan	An environmental management plan (EMP) shall be prepared and implemented to ensure compliance with the environmental conditions specified in item number 1 to 9 above. A dedicated Environment Monitoring Cell with defined functions and responsibility shall be put in place to implement the EMP. The environmental cell shall ensure that the environment infrastructure like Sewage Treatment Plant, Landscaping, Rainwater Harvesting, Energy efficiency and conservation, water efficiency and conservation, solid waste management, renewable energy etc. are kept operational and meet the required standards. The environmental cell shall also keep the record of environment monitoring and those related to the environment infrastructure.

Note: The solid waste management system and wastewater management system proposed in the above tables or as notified by the government (along with monitoring mechanism for the effective functioning of the systems) shall be followed.

CHAPTER 16

16 KARNATAKA ENERGY CONSERVATION BUILIDING CODE (KECBC)

Compliance Requirements

a. Buildings or building complex that have a connected load of 100kW or greater or a contract demand of 120 KVA or greater and are intended to be used for commercial purposes must comply with the Karnataka Energy Conservation Building Code 2018 (hereinafter referred to as the said code) as modified from time to time:

Provided that, the buildings intended for private residential purposes only, are exempted for compliance.

b. **Commercial building**. - A building is classified as "Commercial", if it is used for any of the following purposes, namely; -

a) Hospitality: All hotels and resorts;

b) Educational: School, collage, university and other educational Institutions;

c) Healthcare: Hospitals, Out-patient units and other health care units;

d) Shopping Complex: Shopping malls, Stand-alone retails, Open-gallery malls and Super markets;

e) Business: Day-time use and 24-hour use business units; and

f) Assembly: Multiplex, Theatre and buildings used for transport services.

c. The Provisions of the said code shall be applicable to the following building-systems, namely; -

a) Building envelope;

b) Mechanical systems and equipment's, including heating, ventilating air-conditioning and service hot water heating:

c) Interior and Exterior lighting: and

d) Electric power, motors and renewable energy systems.

d. The provisions of the said code shall not be applicable to plug loads, equipment's and parts of buildings that use energy for manufacturing processes, unless otherwise specified in the said code.

e. The compliance of the energy performance of a building with the code, shall be ensured by the owner by following the mandatory requirements of the code and by following either prescriptive method, Building Envelope Trade off method or whole building performance method, as specified in the code.

f. The compliance with the code shall be verified in the following stages, namely; -

a) Stage-1: at the time obtaining the construction permit from the Authority;

b) Stage-2:at the time of obtaining construction completion or occupancy certificate from the Authority; and

c) Stage-3:at the time of obtaining the electrical connection from DISCOMs

g. No objection Certificate with respect to the compliance with the Code, for electrical installation shall be obtained from the State Electrical inspectorate.

Note: This chapter shall be read with the Karnataka Energy Conservation Building code (KECBC) 2018, as modified from time to time. and the Karnataka Energy Conservation Building Code (KECBC) Rules 2018, as from time to time

Annexure-A

Occupancy Categorization of Buildings for Water and Other Requirement for Fire fighting

Zone-I	**Zone-II**	**Zone-III**
GROUP 'A': RESIDENTIAL	**GROUP 'E': BUSINESS**	**GROUP 'G': INDUSTRIAL**
A-1 Lodging and Rooming House A-2 One or two family private A-3 Dormitories A-4 Apartment Houses A-5 Hotels A-6 Starred hotels	E-2 Laboratories, outpatient clinics, research establishments, libraries and test houses E-3 Electronic data processing centres, computer installations, information technology parks and call centres E-4 Telephone exchanges E-5 Broadcasting stations, T.V. stations and air traffic control towers	G-3 Buildings used for High hazard industries
GROUP 'B': EDUCATIONAL	**GROUP 'G' INDUSTRIAL**	**GROUP 'H' STORAGE BUILDINGS**
B-1 Schools up to senior secondary level B-2 All others/ training institutions	G-1 Buildings used for Low hazard industries G-2 Buildings used for Moderate hazard industries	This shall include any building or part of a building used primarily for the storage or sheltering of goods, ware or merchandise, vehicles or animals etc.
GROUP 'C' INSTITUTIONAL		**GROUP 'J' HAZARDOUS BUILDINGS**
C-1 Hospitals and Sanatoria C-2 Custodial Institutions C-3 Penal and mental Institutions		These shall include any building or part thereof which is used for the storage, handling, manufacture or processing of highly combustible or explosive materials or products which are liable to burn with extreme rapidity and/or which may produce poisonous fumes or explosions
GROUP 'D' ASSEMBLY		
D-1 Buildings having a theatrical or motion picture or any other stage and fixed seats for over 1000 persons D-2 Buildings having a theatrical or motion picture or any other stage and fixed seats up to 1000 persons D-3 Buildings without a permanent stage having accommodation for 300 or more persons but no permanent seating arrangement D-4 Buildings without a permanent stage having accommodation for less than 300 persons with no permanent seating arrangement D-5 All other structures including temporary structures designed for		

assembly of people not covered by D-1 to D-4, at ground level D-6 Buildings having mixed occupancies of assembly and mercantile (for example, shopping malls providing facilities such as shopping, cinema theatres, multiplexes and restaurants/ food courts) D-7 Underground and elevated mass rapid transit system		
GROUP 'E' BUSINESS		
E-1 Offices, Banks, professional establishments, like offices of architects, engineers, doctors, lawyers, post offices and police stations		
GROUP 'F' MERCANTILE		
F-1 Shops, Stores, departmental stores, markets (any with covered area up to 500m$^{2)}$ F-2 Shops, Stores, departmental stores, markets (any with covered area more than 500m$^{2)}$ F-3 Underground shopping centres		

Annexure-BI

Fire Protection Requirements for Buildings in Zone-I Category

Sl. No	**Measures**	**Group-A: Residential A-3, A-4, A-5, A-6 (see Note 3)**						**Group-B: Educational B-1, B-2 (see Note 3 and 23)**		**Group-C: Institutional C-1, C-2, C-3 (see Note 3 and 23)**		
		I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**VII**	**VIII**	**IX**
1	Access	P	P	P	P	P	P	P	P	P	P	P
2	Means of Escape	P	P	P	P	P	P	P	P	P	P	P
3	Compartmentation	P	P	P	P	P	P	P	P	P	P	P
4	Refuge Area	X	X	X	P	P	P	X	P	X	P	P
5	Emergency Lights	P	P	P	P	P	P	P	P	P	P	P
6	Exit Signs	P	P	P	P	P	P	P	P	P	P	P
7	Manually Operated Electronic Fire Alarm System (MOEFA) with Talk	p	p	p	p	P	P	P	P	P	P	P

	Back and PA system (see Note 1)											
8	Fire Extinguishers	P	P	P	P	P	P	P	P	P	P	P
9	First Aid Hose Reel	P	P	P	P	P	P	P	P	P	P	P
10	Yard Hydrant	X	X	P	P	P	P	X	P	P	P	P
11	Down Comer	P	X	X	X	X	X	P	X	X	X	X
12	Wet Riser	X	P	P	P	P	P	X	P	P	P	P
13	Automatic Fire Detection and Alarm System (see Note 2)	X	X	X	P	P	P	X	X	P	P	P
14	Automatic Sprinkler System	S	S	FS	FS	FS	FS	S	S	FS	FS	FS
15	Under Ground Tank	X	P4	P5	P6	P5	P6	X	P7	P5	P6	P6
16	Over Head Tank	P8	P9	P10	P10	P11	P11	P12	P13	P11	P11	P11
17	Fire Pumps Near UGT (with minimum pressure of 3.5Kg/cm2 at remotest location)	X	P15	P16	P17	P16	P16	X	P19	P15	P16	P16
18	Booster Pumps at the Terrace Tank level with minimum pressure of 3.5 kg/cm2	P14	X	X	X	X	X	P14	X	X	X	X
19	Auto D.G. Set	P	P	P	P	P	P	P	P	P	P	P
20	MCB/ELCB	P	P	P	P	P	P	P	P	P	P	P
21	Hose Boxes	P	P	P	P	P	P	P	P	P	P	P
22	Fireman's Grounding Switch	P	P	P	P	P	P	P	P	P	P	P

Fire Protection Requirements for Buildings in Zone-I Category

Sl. No	**Measures**	**Group-D: Assembly D-1 to D-6 (see Note 22 and 23)**				**Group-E: Business E-1 (see Note 22)**				**Group-F: Mercantile F-1, F-2 and F-3 (see Note 3 and 23)**		
		X	**VII**	**VIII**	**XI**	**X**	**VII**	**VIII**	**VI**	**VII**	**VIII**	**XII**
1	Access	P	P	P	P	P	P	P	P	P	P	P
2	Means of Escape	P	P	P	P	P	P	P	P	P	P	P
3	Compartmentation	P	P	P	P	P	P	P	P	P	P	P
4	Refuge Area	X	X	P	P	X	X	P	P	X	P	P
5	Emergency Lights	P	P	P	P	P	P	P	P	P	P	P
6	Exit Signs	P	P	P	P	P	P	P	P	P	P	P
7	Manually Operated Electronic Fire Alarm System (MOEFA) with Talk Back and PA system (see Note 1)	P1	P	P	P	P	P	P	P	P	P	P
8	Fire Extinguishers	P	P	P	P	P	P	P	P	P	P	P
9	First Aid Hose Reel	P	P	P	P	P	P	P	P	P	P	P
10	Yard Hydrant	X	P	P	P	X	P	P	P	P	P	P
11	Down Comer	X	X	X	X	X	X	X	X	X	X	X
12	Wet Riser	P	P	P	P	P	P	P	P	P	P	P
13	Automatic Fire Detection and Alarm System (see Note 2)	P	P	P	P	P	P	P	P	P	P	P
14	Automatic Sprinkler System	S	FS	FS	FS	S	FS	FS	FS	FS	FS	FS
15	Under Ground Tank	P24	P5	P6	P6	P7	P24	P5	P6	P24	P6	P5

16	Over Head Tank	P9 (P25)	P10	P11	P11	P9 (P25)	P10	P11	P11	P10	P11	P10
17	Fire Pumps Near UGT (with minimum pressure of 3.5Kg/cm2 at remotest location)	P15	P15	P16	P18	P19	P15	P16	P18	P15	P16	P16
18	Booster Pumps at the Terrace Tank level with minimum pressure of 3.5 kg/cm2	X	X	X	X	X	X	X	X	X	X	X
19	Auto D.G. Set	P	P	P	P	P	P	P	P	P	P	P
20	MCB/ELCB	P	P	P	P	P	P	P	P	P	P	P
21	Hose Boxes	P	P	P	P	P	P	P	P	P	P	P
22	Fireman's Grounding Switch	P	P	P	P	P	P	P	P	P	P	P

Legend

I. Height 15 m and above up to 35 m

II. Height 35 m and above up to 45 m

III. Height 45 m and above up to 60 m

IV. Height above 60 m

V. Height 15 m and above up to 30 m

VI. Height above 30 m

VII. Height 15 m and above up to 24 m

VIII. Height 24 m and above up to 30 m

IX. Height 24 m and above up to 45 m

X. Height 10 m and above up to 15 m

XI. For D-6 Occupancy

XII. For F-3 Occupancy

P -To be provided.

X -Not to be provided.

S -Sprinklers to be installed in basement, if area of basement exceeds 200 Sq.m.

FS -Fully Sprinklered.

NOTES:

1. MOEFA System shall also include talk-back system and public address system for the occupancies of A-5 less than 15 m in height if floor area exceeding 1000 m2 on any of the floor, C-1 less than 15 m in height with plot area more than 1000 m2, D-1 to D-5 above 10 m to 15 m in height, and in all buildings 15 m and above in height, except for A-3 and A-4 occupancies where these shall be provided for buildings of height 24 m and above. These shall also be provided in car parking areas more than 300 m2 and in multi-level car parking irrespective of other areas.

2.Automatic detection and alarm system is not required to be provided in car parking area. Such detection system shall be required in other areas of car parking such as electrical rooms, cabins and other areas.

3.Minimum requirements for Fire Fighting Installations for Buildings less than 15 m in height and requirements based on floor area and no.of rooms/floors of building, Refer NBC 2016, Part 4, Table 7. Building above 15 m in height are not to be permitted for occupancies A-1 and A-2.

4.75,000 Litres capacity

5.1,50,000 Litres capacity

6.2,00,000 Litres capacity

7.50,000 Litres capacity

8.25,000 Litres capacity

9.5,000 Litres capacity per Riser

10. 10,000 Litres capacity per Riser

11. 20,000 Litres capacity per Riser

12. 25,000 Litres capacity per Riser

13. 5,000 Litres capacity per Riser if basement area exceeds 200 m2.

14. Pump Capacity 900 Litre/min.

15. Provide required number of sets of pumps each consisting of one electric and one diesel pump (stand by) of capacity 2280 Lpm and one electric pumps of capacity 180 Lpm (see also notes 20 and 21)

16. Provide required number of sets of pumps each consisting of two electric and one diesel pump (stand by) of capacity 2280 Lpm and two electric pump of capacity 180 Lpm (see also notes 20 and 21)

17. Provide required number of sets of pumps each consisting of two electric and one diesel pump (stand by) of capacity 2850 Lpm and two electric pump of capacity 180 Lpm (see also notes 20 and 21). Lower levels in high rise buildings 60m or above in height are likely to experience high pressure and therefore, it is recommended to consider multi-stage, multi-outlet pumps (creating pressure zones) or variable frequency drive pumps or any other equivalent arrangement.

18. Provide required number of sets of pumps each consisting of two electric and one diesel pump (stand by) of capacity 2850 Lpm and two electric pump of capacity 180 Lpm (see also notes 20 and 21)

19. Provide required number of sets of pumps each consisting of one electric and one diesel pump (stand by) of capacity 1620 Lpm and one electric pumps of capacity 180 Lpm (see also notes 20 and 21)

20. One set of pumps shall be provided for each 100 hydrants or part thereof, with a maximum of two sets. In case of more than one pump set installation, both pump sets shall be interconnected at their delivery headers.

21. Alternative to provisions of additional set of pumps, the objective can be met by providing additional diesel pump of the same capacity and doubling the water tank capacity as required for one set of pumps.

22. Minimum requirements for Fire Fighting Installations for Buildings less than 10 m in height and D-7 occupancies, Refer NBC 2016, Part 4, Table 7.

23. Building above 30 m in height not to be permitted for Group B, Group C, Group D and Group F occupancies.

24. 1,00,000 Litres capacity

25. Additional 5000 Litres to be provided if basement area exceeds 200 m2

Annexure-BII

Fire Protection Requirements for Buildings in Zone-II Category

Sl. No	**Measures**	**Group-E: Business E-2 to E-5 (see Note 22)**				**Group-G-1 : Industrial**		**Group-G-2 : Industrial**		
		I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**
1	Access	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**
2	Means of Escape	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**
3	Compartmentation	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**
4	Refuge Area	**X**	**X**	**P**	**P**	**X**	**X**	**X**	**X**	**X**
5	Emergency Lights	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**
6	Exit Signs	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**
7	Manually Operated Electronic Fire Alarm System (MOEFA) with Talk Back and PA system (see Note 1)	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**
8	Fire Extinguishers	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**
9	First Aid Hose Reel	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**
10	Yard Hydrant	**X**	**P**	**P**	**P**	**X**	**P**	**X**	**P**	**P**
11	Down Comer	**X**	**X**	**X**	**X**	**P**	**X**	**P**	**X**	**X**
12	Wet Riser	**P**	**P**	**P**	**P**	**X**	**P**	**X**	**P**	**P**
13	Automatic Fire Detection and Alarm System (see Note 2)	**P**	**P**	**P**	**P**	**X**	**P**	**P**	**P**	**P**
14	Automatic Sprinkler System	**S**	**FS**	**FS**	**FS**	**S**	**S**	**FS**	**FS**	**FS**
15	Under Ground Tank	**P1**	**P3**	**P4**	**P5**	**X**	**P2**	**X**	**P3**	**P4**
16	Over Head Tank	**P6 (P10)**	**P7**	**P8**	**P8**	**P8 (P10)**	**P6 (P10)**	**P11**	**P7**	**P8**
17	Fire Pumps Near UGT (with minimum pressure of 3.5Kg/cm2 at remotest location)	**P16**	**P12**	**P13**	**P15**	**X**	**P16**	**X**	**P16**	**P13**
18	Booster Pumps at the Terrace Tank level with minimum pressure of 3.5 kg/cm2	**P19 (P21)**	**X**	**X**	**X**	**P19 (P21)**	**X**	**P20**	**X**	**X**
19	Auto D.G. Set	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**
20	MCB/ELCB	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**
21	Hose Boxes	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**
22	Fireman's Grounding Switch	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**

Annexure-BIII

Fire Protection Requirements for buildings in Zone -III Category

Legend

I. Height 10 m and above up to 15 m

II. Height 15 m and above up to 24 m

III. Height 24 m and above up to 30 m

IV. Height above 30 m

V. Covered area more than 500 m2 (for building height up to 15 m)

VI. Covered area more than 500 m2 (for building height above 15 m)

VII. Covered area more than 500 m2 and up to 1000 m2 (for building height up to 15 m)

VIII. Covered area more than 500 m2 and up to 1000 m2 (for building height above 15 m)

IX. Covered area more than 1000 m2

P -To be provided.

X -Not to be provided.

S -Sprinklers to be installed in basement, if area of basement exceeds 200 Sq.m.

FS -Fully Sprinklered.

NOTES:

1. 50,000 Litres capacity
2. 75,000 Litres capacity
3. 1,00,000 Litres capacity
4. 1,50,000 Litres capacity
5. 2,00,000 Litres capacity
6. 5,000 Litres capacity per Riser
7. 10,000 Litres capacity per Riser
8. 20,000 Litres capacity per Riser
9. 25,000 Litres capacity per Riser
10. Additional 5000 Litres to be provided if basement area exceeds 200 m2
11. 50,000 Litres capacity per Riser
12. Provide required number of sets of pumps each consisting of one electric and one diesel pump (stand by) of capacity 2280 Lpm and one electric pumps of capacity 180 Lpm (see also notes 17 and 18)

13. Provide required number of sets of pumps each consisting of two electric and one diesel pump (stand by) of capacity 2280 Lpm and two electric pump of capacity 180 Lpm (see also notes 17 and 18)

14. Provide required number of sets of pumps each consisting of two electric and one diesel pump (stand by) of capacity 2850 Lpm and two electric pump of capacity 180 Lpm (see also notes 17 and 18). Lower levels in high rise buildings 60m or above in height are likely to experience high pressure and therefore, it is recommended to consider multi-stage, multi-outlet pumps (creating pressure zones) or variable frequency drive pumps or any other equivalent arrangement.

15. Provide required number of sets of pumps each consisting of two electric and one diesel pump (stand by) of capacity 2850 Lpm and two electric pump of capacity 180 Lpm (see also notes 17 and 18)

16. Provide required number of sets of pumps each consisting of one electric and one diesel pump (stand by) of capacity 1620 Lpm and one electric pumps of capacity 180 Lpm (see also notes 17 and 18)

17. One set of pumps shall be provided for each 100 hydrants or part thereof, with a maximum of two sets. In case of more than one pump set installation, both pump sets shall be interconnected at their delivery headers.

18. Alternative to provisions of additional set of pumps, the objective can be met by providing additional diesel pump of the same capacity and doubling the water tank capacity as required for one set of pumps.

19. Pump Capacity 450 Litre/min.

20. Pump Capacity 900 Litre/min.

21. Additional 450 Litres/min. to be provided if basement area exceeds 200 m2

22. Buildings above 15 m in height not to be permitted for G-3 occupancies

23. Buildings above 15 m in height not to be permitted for Group H Group J occupancies However, buildings above 45 m in height shall not be permitted for multi-level car parking (MLCP) occupancy.Minimum requirements for Fire Fighting Installations for Zone III occupancies i.e Group G, Group H and Group J occupancies should comply with NBC 2016, Part 4, Table 7.

    Note: For any further details / clarification NBC, Part 4 shall be referred. Norms and standards in Part 4 of NBC 2016 shall be overriding in any instance of variance of standards.

Annexure-C

1. Water Requirement Criterion: Unless otherwise specified in Annexure B, water requirement for fire fighting in different categories of occupancies shall be based on following.

Occupancy Category	Sprinkler Design Discharge Density (lt./min/Sqm.)	Sprinkler Design Area (Sqm.)	Max. area coverage/ Sprinkler (Sqm.)	No. of House Streams* Fully other Sprinkled	Duration of Discharge (Min.)	
					Fully Sprinkled	Wet Riser Sprinkled
LEVEL-I	02.5	084	21	24	45	45
LEVEL-II	05.0	360	12	36	60	90
LEVEL-III	10.0	225	09	36	90	90

Note: *The discharge through a standard hose stream shall be taken as 567 lt./min.*

2. Estimation of Total Water Requirements Fully Sprinklered Buildings

Occupancy Category	Sprinkler(lt.)	Riser(lt.)	Total(lt.)	Wet Riser cum Down Comer (lt.)
LEVEL-I	9,450	51,030	60,480 (60,000)	1,02060 (1,00,000)
LEVEL-II	1,08,000	1,02,060	2,10,060 (2,00,000)	2,04,120 (2,00,000)
LEVEL-III	2,02,500	1,02,060	3,04,560 (3,00,000)	3,06,180 (3,00,000)

3. Water Storage Tanks

1. The design of the water storage tanks shall be as laid down in National Building Code of India.

2. The capacity of underground water storage tank shall not be more than85% of the total water requirement.

3. The capacity of overhead tank shall not be less than 15% of the total water requirement.

4. Underground water storage tank be provided in the setback areas.

Occupancy Category	Under Ground Static Tank		Over Head Tank	
	Fully Spkd. (lt.)	Riser (lt.)	Fully Spkd. (lt.)	Riser(lt.)
LEVEL-I	50,000	85,000	10,000	15,000
LEVEL-II	1,70,000	1,70,000	30,000	30,000
LEVEL-III	2,50,000	2,50,000	50,000	50,000

4. Riser/Down comer

1. The size of the riser/ down comer shall be such that velocity of flow does not exceed 5 m/second subject to a minimum of 100 mm. diameter.

2. The number of riser/down comer shall be calculated on the basis that if 30 m. of delivery hose is laid, it reaches the farthest comer of the remotest compartment on the floor.

3. The riser/down comer shall be provided in the staircase/staircase lobby in such a manner that it does not obstruct the means of escape.

4. Only single headed hydrants shall be used on the riser/down comer.

5. The size of hose to be provided with the internal hydrants shall be 50mmdiameter and with 63 mm diameter instantaneous male/female couplings.

6. Diffuser branch shall only be provided in the hose boxes.

7. In case of partially sprinklered building tapping from the wet riser is permitted for sprinkler feed.

8. In case of fully sprinklered building separate rising mains and pumps shall bemused for sprinkler system and wet riser.

5. Selection of Pumps

1. Pumping requirement shall be met by a single pump or combination of pumps.

2. If more than one pump is installed to meet the pumping requirement they shall be so arranged that they come into operation one after another depending upon fall in pressure in the mains and the combined pumping capacity shall be 20% more than the actual pumping capacity needed.

3. Jockey pump shall be selected to give minimum 3% and maximum 5% of aggregate pumping requirement at the same pressure to that of the main pump subject to maximum discharge of 450 LPM.

4. Standard pumps shall only be used having discharge capacity as 180LPM, 2280LPM 2850 LPM & 4550 LPM.

5. The pump shall be capable of giving the pressure as shown in the table below:

Occupancy Category	**Pressure* At Terrace Level**	
	Fully Spkd. ***(Kgf. /Cm$^{2)}$***	**Riser** ***(Kgf. /Cm$^{2)}$***
LEVEL-I	3.5	3.5
LEVEL-II	3.5	5.5
LEVEL-III	3.5	7.0

* Orifice *plates shall be installed at the hydrants on rising mains / yard hydrants to ensure that the pressure does not exceed 7 Kgf. /Cm^2*

APPENDIX-I

(see clause 2.123, 3.10.1, 3.10.1.c, 3.10.1.e, 7.3, 12.5)

PROCEDURE FOR REGISTRATION OF VARIOUS STAKE HOLDERS WITH THE AUTHORITY

A. The Stake holders to be registered with the Local Authority are;
   1. Land owners who intend to apply for building licence in the plot owned by them.
   2. Promoters who are developing Real estate projects within the jurisdiction of the Authority
   3. Professionals on record for drawings (to prepare drawings for building licence and for NOCs from different departments)
   4. Professionals on record for supervision (to supervise the works executed in site - civil works and other services)
   5. Professionals who are interested in registering with the Local Authority as licensed Professionals, to verify the site plan and building plans with reference to the site conditions,
   6. Contractors intending to undertake construction activities within the jurisdiction of the Local Authority (for Civil, electrical, Plumbing and Sanitation, HVAC, Fire and Emergency services)

B. The following procedure shall be adopted by the Local Authority to register the Stake holders with the Authority;
   1. The Stake holders shall register themselves with the Local Authority by providing their identity proof, submitting an undertaking cum affidavit (in the format specified in **Form XVII**) and payment of the fees as notified by the government.
   2. The landowners who intend to apply for building licence in the plot owned by them shall submit the particulars of the site and the building proposed to be constructed on the site, while registering with the Local Authority whenever he proposes to develop a building. The registration shall be done along with the application for building licence.
   3. The Promoter who intends to develop real estate project within the jurisdiction of the Authority, shall do a onetime registration with the Authority.
   4. Professionals intending to prepare the required drawings and details (Architectural, Structural, Services and Environmental), the Professionals intending to prepare the required drawings and details for obtaining NOCs from the concerned departments and the Professionals intending to supervise the construction of the various components of the building shall do a onetime registration with the Local Authority in the respective category based on the eligibility criteria of Qualification, Experience and Competence, as specified notified by the government.
   5. Professionals who are interested in registering with the Local Authority as licensed Professionals to verify the site plan and the building plan with reference to the site conditions, shall do a onetime registration with the Local Authority in the respective category based on the eligibility criteria of Qualification, Experience and Competence, as notified by the government.
   6. Contractors intending to undertake construction activities within the jurisdiction of the Local Authority (for Civil, electrical, Plumbing and Sanitation, HVAC, Fire and Emergency services) shall do a onetime registration with the Authority.

C. The procedure for registration and allotting the registration no. for the stake holders and the fee payable for licensed professionals shall be as notified by the government.

Government Notification No. UDD 14TTP 2017 dated 30.10.2017 should be followed.

APPENDIX-II

(see clause 3.10.2)

DETAILS OF PLANS AND OTHER PARTICULARS TO BE SUBMITTED FOR SANCTION FROM THE LOCAL AUTHORITY FOR DIFFERENT TYPES OF BUILDINGS.

A – Requirements of Key Plan (see clause 3.11.1)

The key plan shall be prepared in a legible scale showing the location of the plot in the Master Plan containing the following features within 500m around the plot, namely: -

(a) Location of all existing and proposed roads of the Master Plan mentioning the existing and proposed width and hierarchy of roads;

(b) Location of all existing Storm Water Drains and other water bodies;

(c) Location / Alignment of overhead or underground HT power supply lines (High Tension Electric lines);

(d) Location / Alignment of sewerage system of ULB;

(e) Location of Railway line / Railway station within 50m from the boundary of the plot;

(f) Index of drawing as specified in **Appendix-III**.

B – Requirements of Site Plan (see clause 3.11.2)

The site plan shall be prepared in a legible scale, preferably of 1:200 or 1:500 with plan oriented in North-South direction. The site plan shall contain the following details, namely: -

(a) All site boundaries with dimensions, by superimposing the survey sketch issued by Revenue Department, the sketch attached to the title document and the survey sketch prepared by conducting physical survey of plot using Total Intelligent Station. At least 3 boundary points of all the sketches should match when superimposed. The innermost boundaries of the plot derived by superimposing all the sketches shall be considered as the boundary of the plot and the area of the plot within such boundary shall be considered as the extent of the plot as existing at site;

(b) Extent of plot, which shall be lesser of the extent as per document, revenue sketch or as existing at site (as derived from clause 'a' above);

(c) All roads abutting the plot with existing width, proposed width and center line of the road. The road widening line and building line, if any, shall be marked on the plot, if applicable, showing the portion of the plot required for road widening; (in case of varying width of the road, the survey of the road using total intelligent station shall be attached showing the average width of the road as per the provisions of the ZR)

(d) Portion of Plot to be reserved for Park and Open Spaces and Civic Amenities, if required as per Section 17 of KTCP Act,1961. (e) Land use as per Master Plan and the permitted land use as per Zonal Regulations;

(f) Contours of the plot at 1m intervals along with the levels of the adjoining plots and of the abutting roads;

(g) Location with dimensions and extent of Kharab lands within the plot;

(h) Location of roads of the Master Plan passing through the plot, if any;

(i) Location of all natural features such as trees, water bodies (including wells, ponds, storm water drains, etc.) quarries including buffer area, etc.;

(j) Location of city level sewerage and H.T. lines passing through the plot including buffer area;

(k) Eligibility for relaxation of setbacks as per Zonal Regulations;

The following additional details shall be incorporated in the site plan;

(a) Building footprint (portion of the floor plan of the building projecting above the ground) for Ground coverage and setbacks and the projections in the upper floors, beyond the footprint area (in dotted line).

(b) Details of constructions provided in the setback area of the plot, including ramps (along with slope of ramp), driveway and also the parking spaces provided in the open yard.

(c) Details of the over ground and underground services provided such as water supply, sewerage, power supply and telecommunication system and details of the rain water harvesting system (pipelines, cables, chambers, manholes, transformer and generator yard / substation, STP and pump room, solid waste management plant, etc.)

(d) Entry and exit to plot with gate and entry / exit arch details.

(e) Levels contiguous to the building and the boundaries / corners of the plot.

(f) Details for identification of neighbouring properties.

(g) Portion of the plot earmarked as unpaved areas as per clause and chapter wherever applicable.

(c) Index of drawing as specified in **Appendix-III**.

C – Requirements of Floor Plan for parking area (see clause 3.11.3)

The following details shall be provided in the plan of the floor showing parking area (for full or portion of the floor)

(a) Details of entry / exit ramps (ramp from outside the building to the parking floor and ramp between parking floors, as applicable), such as number of ramps, width of the ramp and slope.

(b) Width of all driveways in the parking area and the width of each of the parking bay abutting the driveway.

(c) Width of columns provided in the parking floors and clear spacing between the columns, location of staircases, lifts and toilets, with dimensions.

(d) Level of floor with reference to the ground level contiguous to the building or the road level whichever is considered for the height of the building.

(f) Minimum Setback line from the boundary of the plot and in case of basement floor, the distance between the boundary and the parking floor periphery.

(g) Details of any other uses proposed within the parking area / floor.

(h) no. of parking bays provided (4-wheeler and 2-wheeler), separately showing single parking, double parking (one behind the other and one above the other – mechanical parking) and automatic parking devices adopted such as car lift etc. (along with the approval of the agencies specified by the Authority or notified by the Government), as applicable.

(i) Index of drawing as specified in Index of drawing as specified in **Appendix-III.**

D – Requirements of Floor Plans of other uses (see clause 3.11.4)

(1) Residential:

Separate floor plans for each of the typical floors have to be prepared with the following details;

(a) Plan of the dwelling units with areas of sub uses such as foyer, living, dining, bedroom, study, kitchen, bathroom, WC, toilet, balcony etc. mentioned separately. The carpet area (excluding exterior wall and balcony of the dwelling unit) and plinth area (including exterior wall and balcony of the dwelling unit) of the dwelling

unit has to be mentioned. Area of exclusive balcony and terrace attached to each dwelling unit has to be mentioned.
(b) Room dimensions and details of doors, windows, ventilators, duct doors and other openings shall be shown.
(c) All common areas such as staircases and lifts, corridors / passages, service / ventilation ducts, stores, entrance lobby etc. have to be shown along with dimensions.
(d) Level of floor with reference to the ground level contiguous to the building or the road level whichever is considered for the height of the building.
(f) Minimum Setback line from the boundary of the plot and balconies projecting beyond the setback line.
(g) No. of dwelling units in each floor (details of all types of dwelling units) and no. of typical floors.
(h) Terrace floor plan with details of open terrace, covered terrace, staircase room, lift / lift machine room, overhead tank, toilets and other permitted constructions in the terrace floor. (If overhead tank and the lift machine room is located one level above the terrace floor, the same has to be specifically mentioned in the Terrace floor plan).
(i)Details of all staircases provided (width, tread, riser, landing, handrail, head room, no. of steps in each flight).
(j) Details of corridors / passage (minimum width required and width provided, parapet details)
(k) Section lines
(l) Index of drawing as specified in **Appendix-III**.

(2) Commercial:
Separate floor plans for each of the typical floors have to be prepared with the following details;
(a) Plan of the commercial premises with areas of sub uses such as retail display area, office area, work area, stores, toilet, etc. mentioned separately. The carpet area (excluding exterior wall and balcony of the premises) and plinth area (including exterior wall and balcony of the premises) of the premises has to be mentioned. Area of exclusive balcony and terrace attached to each dwelling unit has to be mentioned.
(b) Room dimensions and details of doors, windows, ventilators, duct doors and other openings shall be shown.
(c) All common areas such as staircases and lifts, corridors / passages, service / ventilation ducts, stores, entrance lobby etc. have to be shown along with dimensions.
(d) Level of floor with reference to the ground level contiguous to the building or the road level whichever is considered for the height of the building.
(f) Minimum Setback line from the boundary of the plot and balconies projecting beyond the setback line.
(g) No. of premises in each floor and no. of typical floors.
(h) Terrace floor plan with details of open terrace, covered terrace, staircase room, lift / lift machine room, overhead tank, toilets and other permitted constructions in the terrace floor. (If overhead tank and the lift machine room is located one level above the terrace floor, the same has to be specifically mentioned in the Terrace floor plan).
(i) Common toilet requirements and provisions made.
(j) Details of all staircases provided (width, tread, riser, landing, handrail, head room, no. of steps in each flight).
(k) Details of corridors / passage (minimum width required and width provided, parapet details)
(l) Section lines
(j) Index of drawing as specified in **Appendix-III**.

(3) Other non-residential and non-commercial:
All details similar to that of commercial use except details of no. of premises, carpet area and plinth area of the independent premises in the floors, within the non-residential and non-commercial uses.
Index of drawing as specified in **Appendix-III.**

E – Requirements of Sections of Building (see clause 3.11.5)

Drawings for the vertical sections cut across the floor plans of the building shall be provided in such a way that any one or more section drawings shall cut across all the main staircases connecting all the respective floors of the building.
Section drawings shall also be drawn across all the floors wherever the plan of a floor projects outward or recedes inward from the lower floor, including section cut across upper Ground floor and lower ground floor, if applicable.
The section shall also cut across maximum earth cut or fill areas of the plot showing the original ground level and the formed ground level with the proposed retaining wall details. The section shall also show the general foundation details of the building.
The section drawings shall mark all the building components and structural elements (foundation, walls, slab & beams, roof, etc.,) along with the dimensions. The type / specification of material for each component shall also be mentioned.
The section drawing shall also show the ground levels contiguous to the building, average ground level contiguous to the building and also the levels of each floor. The section drawing shall also have the floor to floor height (including mezzanine floor, if applicable) and the height of the building measured from the average ground level contiguous to the building or the road level, as the case may be, to the terrace floor level or the roof level, as the case may be.
Index of drawing as specified in **Appendix-III**.

F – Requirements of Elevation of buildings (see clause 3.11.6)

Elevation drawings shall be drawn for all side elevations showing the structural features of the building visible on each elevation such as windows and other openings, slab and other architectural projections.
Height of the building with reference to ground level or road level.
Index of drawing as specified in **Appendix-III**.

G – Requirements of Drawings for all services provided

a – Electrical system including use of alternate energy (see clause 3.11.7(a))

Electrical drawings of all floors showing the location of electrical fixtures, switch boards, etc., both inside the specific use areas and common areas along with fixture schedule and details of wiring.
Details of electrical ducts (horizontal & vertical), panel room, 11KV sub-station (transformer and other requirements) and generator facilities.
Single line diagram of the power distribution system.
Details of alternate energy sources proposed.
(as detailed in **Clause 5.3**)

b- Water Supply system (see clause 3.11.7(b))

Drawings showing Plumbing pipelines and fixtures inside the toilets of specific use areas and common areas with fixture schedules and pipeline layout.
Pipeline details in Sanitary ducts and connectivity to overhead and sump tanks and connectivity from Municipal water supply line and water pumping system.
Details of Solar water heating system
(as detailed in **Clause 5.3**)

c – Rain Water harvesting & ground water recharging system (see clause 3.11.7(c))

Drawings showing Terrace water collection, filtration and connection to sump tank or ground water recharging pits.
Ground water recharging
(as detailed in **Chapter 10**&**Clause 11.2**)

d – Sewerage system (see clause 3.11.7(d))

Drawings showing Drainage pipelines and sanitary fixtures inside the toilets of specific use areas and common areas with fixture schedules and pipeline layout.

Pipeline details in Sanitary ducts and connectivity to Inspection chambers and manholes.
Inspection chambers and manholes in the ground and connectivity to Municipal sewer lines or sewage treatment plant.
(as detailed in **Clause 5.3**)

e – HVAC system (see clause 3.11.7(e)

A. Floor Plan

1. Corresponds to submitted or previously approved building plans, including interior layout, room names & uses, wall & roof insulation R-values, door/window/skylight U-factors

2. Location, volume, and/or rates in CFM of exhaust, make-up air, outdoor air and combustion air

3. Location of equipment & appliances, fire, smoke and ceiling radiation dampers, grease duct wraps

kitchen hood exhaust duct, grease duct enclosures, suppression systems, controls, monitors, etc.

4. Duct sealing requirements stated

5. HVAC distribution via ductwork, sizing, location

a. Metal duct gauge, geometry (round, square, rectangular)

b. Flexible duct diameter, specification

c. Flexible connector diameter, length limitations

d. Underground duct construction, materials, vapours barriers, insulation (R-values), clearances, cross section, slope

e. Plenum construction materials and locations

B. Sections or Details

1. Insulation for duct or pipe; type, R-value labelling required on plans and in the field

2. Pipe: size, type, hydronic or gas

3. Exhaust rates in CFM

4. Kitchen hood construction information provided

5. Air transfer to corridors only as allowed by code

6. Clothes dryer exhaust duct distribution, length, access doors, etc.

7. Metal duct gauge, geometry, means of fastening, maximum length

8. Transition duct limitations & requirements

9. Grease duct wrap defined for manufacturer and type

10. Hydronic systems have floor assembly which meets minimum under-floor/slab insulation and testing requirements

C. Equipment Information

1. Equipment schedules or similar provided which define equipment type, capacities, efficiencies, kitchen hood suppression, as well as associated air rates in CFM

2. Listing shows compliance with ASTM/UL/NFPA/ANSI etc. standards as required to be met by the code

3. Operation, setback/demand control ventilation/operational controls/interlocks sequencing of all

equipment, and location of controls

4. Provision of economizer indicated if required as part of installation

5. Provision of make-up air

6. Platform & clearance locations for rooftop equipment defined

7. Roof access indicated on plans (if required)

8. Guardrail location and dimensions for roof equipment as required by code

9. Condensate disposal location indicated

10. Duct smoke detection system (if required)

11. Duct smoke detector locations, model defined, installation defined (on return only or return & supply), sequence of operation defined

12. Control panel location, model

13. Smoke control system

14. Apparatus used (based on submitted calculations)

15. Designate pressure classification of the duct system based on inches w.g.

16. Fire, smoke & ceiling radiation dampers defined for ratings, locations & operations

17. Hydronic systems fully defined for type of, length of, size of, flow rate in pipe; testing requirements addressed, under floor insulation (shall be addressed in building envelope calculations)

18. Structural weight of rooftop equipment listed on plan and associated structural design accounted for

D. Calculations

1. Room by room heat loss calculations, not just an overall summary

2. Heat gain calculations may be done by area served by appliance (if AC provided)

3. Transmission plus greater of infiltration or ventilation (furnace sizing)

4. Structural calculations provided to verify that weight of proposed appliances does not exceed load

bearing capability of roof, mezzanine, platform, etc.

5. Volume of exhaust and outdoor air intake are approximately the same

6. Smoke control system sizing

7. Outside air required for each room/space where different occupancies are served by one appliance

E. Ventilation Criteria

1. Mechanical ventilation rates used meet minimums listed in SPS Table 364.0403 (or as justified and

found acceptable by the Dept.)

2. Natural ventilation as allowed by SPS Table 364.0402

3. Exceptions met and clearly stated on plans or in calculations

F. Minimum Clearances

1. Exhaust & outside air intakes to property lines & buildings

2. Distance between intake to exhaust ventilation openings

3. Overhead clearances (suspended appliance)

4. Location of intakes above ground/roof

5. Combustible material clearances to heat-producing appliance

G. Type of fuel used by HVAC equipment

1. Natural Gas

2. Electricity

3. Fuel Oil

4. Wood or pellets

H. Combustion Air

1. Provide calculations used to determine if internal building air can be used, or if outside combustion air

is required to be provided

2. Define number, location and size of transfer ducts, and louver/grill openings

I. Balancing Report is Required to be On-Site

J. Maintenance & Operation Manuals are Required to be Provided to Owner

(as detailed in **Clause 5.3**)

H – Requirements of Landscape plan (see clause 3.11.8)

Landscape plan shall be enclosed with the application for building licence in case of building proposed in plots above 4000 Sqm. The following details shall be provided in the landscape plan

(a) Building foot print and all other constructions proposed in the yard including details of the over ground and underground services provided such as water supply, sewerage, power supply and

telecommunication system and details of the rain water harvesting system (pipelines, cables, chambers, manholes etc.)

(b) Details of the parking spaces and other concreted or paved areas provided in the yard.

(c) Area reserved for park and open spaces (as per the provisions of Section 17 of KTCP Act

(d) Areas proposed to be developed as green space (including in the areas reserved as park and open spaces)

(e) Type of land landscape, plantation and trees proposed.

(f) Index of drawing as specified in **Appendix-III**.
Provisions of Part 10 of NBC 2016 are applicable

I – Requirements of Circulation Plan and Traffic study & Impact (see clause 3.11.9.)
Detailed calculations of traffic studies conducted in the locality and the impact of the development proposed, on the existing traffic scenario.

J – Requirements of Structural Drawings (see clause 3.11.10)

Structural drawings show the structural support components and details of the proposed project, from the foundation to the rooftop. All structural systems for a building that is designed must be signed and sealed by a licensed engineer.

Minimum information requirements for structural drawings include, but are not limited to, the following:

- Foundation plans, pile design (with layout), details, sections and all applicable schedules e.g. (pile schedules)
- Slab-on-grade and slab plans, section and details
- Cast-in-place concrete floor plans
- Floor framing plans, sections and details
- Roof framing plans, sections and details
- Structural steel framing plans, sections and details
- Pre-engineered building design certificates and drawings
- Load bearing walls, pads, columns, beams and joists
- Pre-cast concrete plans, details and sections
- Connection details for all components
- Retaining walls
- Building mounted antennas
- Large, heavy or high signs
- Pedestrian bridges, crane runways, and other special structures

- All other requirements as detailed in Chapter 7

K – Requirements of Green Building drawings (see clause 3.11.11)
(as detailed in Chapter 11)

APPENDIX-III

(see Appendix-II)

A – Index of Key Plan

The details to be contained are as follows

1. Name and address of the Applicant and space for signature

2. Name and address of Professional on record for drawing and space for signature

3. Name and address of the Local Authority and space for signature of Commissioner

4. Title of drawing

5. Survey nos., village name, Taluk name and district name where the plot is situated.

6. Existing and proposed width of roads abutting the plot

7. Marking of North direction

8. Date of approval

B – Index of Site Plan;

The details to be contained are as follows

1. Name and address of the Applicant and space for signature

2. Name and address of Professional on record for drawing and space for signature

3. Name and address of the Authority and space for signature of CEO

4. Title of drawing

5. Survey nos., village name, Taluk name and district name where the plot is situated.

6. Existing and proposed width of roads abutting the plot

7. Extent of plot

(a) Total extent (as per document, as per site condition and considered for building licence)

(b) Extent to be surrendered for road widening (whether compensation paid – monetary of in the form of DR)

(c) Extent to be surrendered for P & OS and CA, if applicable.

(d) Net area for development

(e) Net area considered for FAR calculation

8. Land use analysis

(a) Land uses of plot as per Master Plan

(b) Permitted land uses as per Zonal regulations

(c) Existing land use of areas in the plot (% of area for roads, Park & Open Space and Civic Amenities, if applicable and % of area for development).

9. Summary of area statement of buildings with floor wise area details and FAR (permitted and proposed including DR / TDR).

10. Ground coverage (permitted and proposed)

11. Setbacks (required and provided)

12. Parking space (required and provided)

13. Public Toilet for Commercial Buildings (required and provided)

14. % of floor areas provided for community facilities, in case of Group housing.

15. Details of Means of Access, if applicable.

16. Marking of North direction

17. Date of approval

C – Index of Floor Plan for parking area
The details to be contained are as follows

1. Name and address of the Applicant and space for signature

2. Name and address of Professional on record for drawing and space for signature

3. Name and address of the Local Authority and space for signature of Commissioner

4. Title of drawing

5. Survey nos., village name, Taluk name and district name where the plot is situated.

6. Land use analysis

(a) Land uses of plot as per Master Plan

(b) Permitted land uses as per Zonal regulations

(c) Proposed land use for different specific uses in the floor (% of floor area for different specific uses in the floor, including the proportionate percentage of common areas)

6. Summary of area statement, including floor area of buildings with floor wise area details required for calculating parking space requirement.

7. Parking space (required and provided)

8. Date of approval

D – Index of Floor Plans of other uses

The details to be contained are as follows

1. Name and address of the Applicant and space for signature

2. Name and address of Professional on record for drawing and space for signature

3. Name and address of the Local Authority and space for signature of Commissioner

4. Title of drawing

5. Survey nos., village name, Taluk name and district name where the plot is situated.

6. Summary of area statement of floor with details of total construction areas, areas considered for FAR & exempted from FAR, toilet areas, specific use areas & common areas, areas considered for parking calculations and details of FAR (permitted and proposed including DR / TDR).

7. Schedule of openings

8. Carpet area and plinth area of individual dwelling units and commercial premises in the floor.

9. no. of staircases and lifts (width of each staircase and capacity of each lift)

10. Public Toilet for Commercial Buildings (required and provided)

11. % of floor areas provided for community facilities, in case of Group housing.

12. No. of seats in case of Assembly buildings and no. of beds in case of hospitals and nursing homes.

18. Date of approval

E – Index of Sections of Building

The details to be contained are as follows

1. Name and address of the Applicant and space for signature

2. Name and address of Professional on record for drawing and space for signature

3. Name and address of the Local Authority and space for signature of Commissioner

4. Title of drawing

5. Survey nos., village name, Taluk name and district name where the plot is situated.

6. Date of approval

F – Index of Elevation of buildings

The details to be contained are as follows

1. Name and address of the Applicant and space for signature

2. Name and address of Professional on record for drawing and space for signature

3. Name and address of the Local Authority and space for signature of Commissioner

4. Title of drawing

5. Survey nos., village name, Taluk name and district name where the plot is situated.

6. Date of approval

G – Index of Drawings for all services provided

The details to be contained are as follows

1. Name and address of the Applicant and space for signature

2. Name and address of Professional on record for drawing and space for signature

3. Name and address of the Local Authority and space for signature of Commissioner

4. Title of drawing

5. Survey nos., village name, Taluk name and district name where the plot is situated.

6. Summary of the particular service provided (minimum requirements and provisions made)

7. Date of approval

H Index of Landscape plan

The details to be contained are as follows

1. Name and address of the Applicant and space for signature

2. Name and address of Professional on record for drawing and space for signature

3. Name and address of the Local Authority and space for signature of Commissioner

4. Title of drawing

5. Survey nos., village name, Taluk name and district name where the plot is situated.

6. Summary of the landscape details provided (type of landscape and tree plantation made)

7. Date of approval

I – Index of Circulation Plan and Traffic study & Impact

The details to be contained are as follows

1. Name and address of the Applicant and space for signature

2. Name and address of Professional on record for drawing and space for signature

3. Name and address of the Local Authority and space for signature of Commissioner

4. Title of drawing

5. Survey nos., village name, Taluk name and district name where the plot is situated.

6. Summary of the road network provided in the development plan

7. Summary of traffic study conducted and impact (critical conditions and provisions made)

8. Date of approval

J – Index of Structural Drawings
The details to be contained are as follows

1. Name and address of the Applicant and space for signature

2. Name and address of Professional on record for drawing and space for signature

3. Name and address of the Local Authority and space for signature of Commissioner

4. Title of drawing

5. Survey nos., village name, Taluk name and district name where the plot is situated.

6. Summary of the structural design and drawings (minimum requirements and provisions made)

7. Date of approval

K – Index of Green Building drawings

The details to be contained are as follows

1. Name and address of the Applicant and space for signature

2. Name and address of Professional on record for drawing and space for signature

3. Name and address of the Local Authority and space for signature of Commissioner

4. Title of drawing

5. Survey nos., village name, Taluk name and district name where the plot is situated.

6. Summary of the Green building requirements (minimum requirements and provisions made for each category of green building requirement)

7. Date of approval

APPENDIX-IV

(see clause 3.10.1(c), 3.10.2)

DETAILS OF PLANS AND OTHER PARTICULARS TO BE SUBMITTED FOR NOCS FROM OTHER DEPARTMENTS FOR DIFFERENT TYPES OF BUILDINGS.

(as prescribed by the respective departments)

APPENDIX V

(see clause 3.10.6(1))

PROCEDURE FOR EMPANELMENT OF PROFESSIONALS BY THE LOCAL AUTHORITY AND SELECTION OF LICENSED PROFESSIONALS

The following procedure shall be adopted for empanelling the professionals by the Local Authority and to select the licensed professional for site inspection to verify the various components of buildings executed at site.

1. The eligibility of licensed professionals to verify different types of buildings, based on the qualification, experience and competence fixed as notified by the Government.
2. The Local Authority shall call Expression of Interest from eligible professionals for empanelment.
3. The Local Authority shall register the professionals for empanelment.
4. The Local Authority shall select the licensed professionals for inspecting the site and submitting site inspection report as specified in these Byelaws.
5. The licensed professional selected by The Local Authority for inspection of any building site, shall confirm his acceptance to undertake inspection work and submit site inspection report (within the timelines notified by government), on the same day of receiving intimation from The Authority, failing which The Local Authority shall select another licensed professional.

APPENDIX-VI

(see clause 3.10.2)

DETAILS OF DOCUMENTS TO BE SUBMITTED FOR BUILDING LICENCE

The following documents shall be submitted along with the application, namely: -

(a) RTC / Khata as per date of application;

(b) Extract of Mutation Register;

(c) Copy of the Title document such as Sale Deed, etc.;

(d) Copy of the registered document of GPA / authorisation letter, if applicable;

(e) Joint development Agreement or MOU and affidavit of all the owners of plots amalgamated for approval of plot, in case of amalgamated plots;

(f) Latest Encumbrance Certificate;

(g) Survey sketch issued by Revenue Department for conversion purpose or any other purpose;

(h) Plot surveyed sketch (using Electronic Total Station)

(i) Conversion Order;

(j) LAQ NOC;

(k) All applicable NOCs from other departments;

(l) Photographs of the site (minimum 4 nos., each from north, south, east and west) showing the natural and built developments within the site and also the abutting roads;

(m) Copy of the plot approval obtained (showing the extent of the plot surrendered / to be surrendered for road widening)

(n) Latest Property Tax Paid Receipt

(o) Photo and other identity proof of the applicant;

(p) Specifications of the buildings and

Any other documents specified by the Local Authority or notified by the Government;

Note: 1. In case of licence for the construction of Compound Wall for the boundary of the plot abutting the road, the documents mentioned in (a), (c), (d), (e), (g), (h), (o) only have to be submitted.

2. In case of licence for the demolition of buildings, the documents mentioned in (a), (c), (d), (e), (n), (o) only have to be submitted.

APPENDIX-VII

(see clause 3.10.2, 3.10.8(2), 3.14, 3.15.4(1), 3.15.4(3), 3.15.5(a))

VARIOUS FEES FOR SANCTION OF BUILDING LICENCE AND OTHER FEES PAYABLE AS PER THESE BYELAWS

The following fees shall be paid for sanction of building licence at the rates specified by the Local Authority or notified by the government.

1. Registration fee payable by Stakeholders
2. Scrutiny fee & Inspection fee, as applicable
3. Licence fee
4. Fee for alteration in plan
5. Infrastructure cess
6. Solid waste management cess
7. Greenery cess
8. Construction and demolition waste disposal cess
9. Labour Welfare cess
10. Refundable Security Deposit
11. Fee for revalidation of licence
12. Fees for respective NOC

Any other fees prescribed by the Local Authority as per KMC Act or as notified by the Government

Note:

1. In case of revised licence (for alteration / change of use etc.), the scrutiny fees shall be charged for the entire building. All other fees shall be charged only for the additional areas, if proposed to be constructed.

APPENDIX-VIII

(see clause 3.10.5(1 & 2), 3.10.8(1), 3.15.3, 14.2, 14.4.2, 14.4.3, 14.4.4)

TIMELINES FOR DIFFERENT ACTIVITIES FOR ISSUING BUILDING LICENCE, NOCS AND CERTIFICATION OF WORKS EXECUTED AT SITE AS PER THE CONDITIONS OF NOC, BY DIFFERENT DEPARTMENTS, FOR DIFFERENT TYPES OF BUILDING.
(As Notified by the government from time to time)

APPENDIX-IX

(see clause 3.10.6(2))

PROCEDURE FOR SITE INSPECTION BY LICENSED PROFESSIONALS AND SUBMISSION OF SITE INSPECTION REPORT. (As notified by the government)

APPENDIX-X

(see clause 3.15.4(1), 3.15.4(2))

VALIDITY PERIOD OF SANCTION AFTER COMMENCEMENT OF WORK AT SITE AND EXTENSION OF VALIDITY.

1. Validity period for commencement of work – 2 years from the date of sanction
2. Initial validity period for completion of work

a) B1, B2 and B3 buildings – 4years from the date of sanction.

c) B4 buildings – 5 years from the date of sanction for buildings upto G + 9 floors. Additional one year for every 5 floors or part thereof

b) B5 buildings – 5 years from the date of sanction.

3. Extension of validity

Extension of validity may be permitted by paying yearly revalidation fee as specified by the Local Authority or as notified by the government.

APPENDIX-XI

(see clause 3.16.5(2))

DETAILS TO BE MAINTAINED IN THE SITE/ SITE OFFICE OF THE CONSTRUCTION SITE.

The person to whom a permit is issued shall, during construction keep, posted in a conspicuous place on the property in respect of which the permit was issued

a) A copy of the building permit;

b) A copy of the approved drawings and specifications of the property in respect of which the permit was issued.

c) Where tests of any materials are made to ensure conformity with the requirements of the Byelaws, records of test data shall be kept available for inspection during the construction of the building and for such a period thereafter as required by the Authority.

APPENDIX-XII

(see clause 3.16.7(1), 3.16.9(1), 3.17.1(1))

STAGES OF INSPECTION OF VARIOUS COMPONENTS OF BUILDING EXECUTED AT SITE BY LICENSED PROFESSIONALS

1. Commencement of Mass excavation (beyond 3m depth from natural ground level) and in case of Retaining wall structures such as touch piles, sheet piling, other RCC structures etc. independent of the building
2. Commencement of foundation work (marking of orientation of building should be completed whereby the licensed professional can easily verify the perimeter of the proposed building and the RCC or masonry footing / foundation work should have commenced)
3. Completion of foundation
4. Completion of each RCC slab (floors and terrace)
5. Exterior masonry completion in each floor
6. Completion of building exterior works and common areas
7. Completion of yard works and services
8. Completion of all works

APPENDIX-XIII

EVALUATION OF POWER CONSUMPTION FOR PROJECTS

(Clause 5.3.1.1)

ELECTRICAL LOAD REQUIREMENT FOR THE BUILDING

Details of electrical load considered for electrical fittings and diversity considered for the project to be updated in chart – 1

Following details to be updated in Chart-1

1. **Type of building**
   a) Residential - (HIG, MIG, LIG B, LIG A & EWS)
   b) Commercial
   c) Other buildings

2. **Specifications of Electrical fixtures**

3. **Diversity factors**

a) Occupancy Diversity

Residential

- HIG -80%
- MIG – 90%
- LIG B – 100%
- LIG A & EWS – 100%

Commercial – 100%
Other Buildings -80%

b) Connection Diversity

Residential

- HIG, MIG & LIG B – 50%
- LIG A & EWS – 40%

Commercial (Premises) – 70%
Commercial (Common Area) - 80%
Other Buildings - 60%

c) Consumption Diversity

Residential

- HIG, MIG & LIG B – 70%
- LIG A & EWS – 80%

Commercial (Premises) – 60%
Commercial (Common Area) - 70%
Other Buildings - 50%

FOR RESIDENTIAL BUILDINGS

-Following points to be updated in Chart -1, 2a1etc for different dwelling units

Area wise Electrical fixtures details, quantity, Load of each fixtures & diversity as per building type.
Round the clock load for each fixture in each area to be updated.

Following points to be updated in Chart - 2b for common area

Area wise Electrical fixtures details, quantity, Load of each fixtures & diversity as per building type.
Round the clock load for each fixture in each area to be updated.
Summary Chart – 3.

DETAILS OF ELECTRICAL LOAD CONSIDERED FOR ELECTRICAL FITTINGS AND DIVERSITY CONSIDERED FOR THE PROJECT (Chart - 1)

Name of Project :

Type of Building :

ELECTRICAL POINTS	DESCRIPTION OF ELECTRICAL FIXTURE		QUANTITY (NOS)	LOAD/ FIXTURE (WATTS)	_____ (Type of Building) *			REMARKS
	NAME	SPECIFICATION **			OCCUPANT DIVERSITY #	CONNECTION DIVERSITY ##	CONSUMPTION DIVERSITY ###	
LIGHTS	WALL FIXING LIGHT FOR ROOMS							
	WALL FIXING LIGHT FOR TOILETS							
	WALL FIXING TUBE LIGHT							
	CEILING TUBE LIGHT							
	CEILING CHANDILIER							
	CEILING LIGHT FOR BALCONY							
	DINNING WASH LIGHT							
	STAIR CASE LANDING LIGHT							
	NIGHT LAMP							
FANS	CEILING FAN							
	TABLE FAN							
	PEDESTAL FAN							
	EXHAUST FAN FOR TOILET							
	EXHAUST FAN FOR OTHERS							
	EXHAUST POINT FOR KITCHEN HOOD -EXHAUST FAN / ELECTRIC CHIMNEY							
POWER POINTS	6 AMPS SWITCH/SOCKET							
	16 AMPS SWITCH/SOCKET							
OTHER EQUIPMENTS	CALLING BELL/ VEDIO DOOR PHONE							
	6 AMPS SWITCH/SOCKET FOR COMPUTER WITH MONITOR, PRINTER/SCANNER, WIRELESS							
	6 AMPS SWITCH/SOCKET FOR TV, SET TOP BOX/ DVD/ PLAY STATION & HOME THEATER							
	TOP BOX							
	BOX							
	16 AMPS SWITCH/SOCKET FOR FRIDGE							
	16 AMPS SWITCH/SOCKET FOR GRINDER/ MIXER							
	16 AMPS SWITCH/SOCKET FOR MICRO WAVE OVEN							
	16 AMPS SWITCH/SOCKET FOR WASHING MACHINE							
	CONDITIONER							

NOTE:

I *** TYPE OF BUILDING:**
a) RESIDENTIAL (HIG, MIG, LIG I, LIG II & EWS)
b) COMMERCIAL
c) OTHER BUILDING

II **** SPECIFICATIONS:**
a) (As per Annexure 1)

III **# MAXIMUM PERMITTED OCUPANT DIVERSITY** (based on type of building)
a) Residential (HIG) -Upto 30%
b) Residential (MIG) -Upto 20%
c) Residential (LIG I) -Upto 10%
d) Residential (LIG II & EWS) -Nil
e) Commercial -Nil
f) Other Building -Upto 20%

IV **## MAXIMUM PERMITTED CONNECTION DIVERSITY** (diversity considered for each fitting to be mentioned as per Annexure 2)
a) Residential (HIG, MIG & LIG I) -Upto 50%
b) Residential (LIG II & EWS) -Upto 60%
c) Commercial for Premises -Upto 30%
d) Commercial Common Area -Upto 20%
e) Other Building -Upto 40%

V **### MAXIMUM PERMITTED CONSUMPTION DIVERSITY** (diversity considered for each fitting to be mentioned as per Annexure 3)
a) Residential (HIG, MIG & LIG I) -Upto 70%
b) Residential (LIG II & EWS) -Upto 80%
c) Commercial for Premises -Upto 40%
d) Commercial Common Area -Upto 30%
e) Other Building -Upto 50%

VI **LED LIGHTS SHALL BE CONSIDERED**

VII **MAXIMUM STAR RATED FITTINGS AND EQUIPMENTS SHALL BE CONSIDERED**

VIII **INVERTER TYPE STAR RATED ENERGY EFFICIENT AIRCONDITIONERS SHALL BE CONSIDERED**

IX **VFD SHALL BE USED FOR THE EQUIPMENTS/ PUMPS WHERE EVER IS POSSIBLE**

PEAK LOAD CHART FOR DWELLING UNIT IN RESIDENTIAL BUILDING (Independent Houses/ Apartment Buildings)- CHART 2a1

Updated On: ----

Name of Project :

Type of Building :

SPACE	ELECTRICAL FIXTURE	QUANTIY (NOS)	LOAD/ FIXTURE # (IN WATTS)	TOTAL LOAD (IN WATTS)	DIVERSITY FOR			I -ROUND THE CLOCK LOAD (in watts) BEFORE DIVERSITY *																								II -ROUND THE CLOCK LOAD (in watts) AFTER DIVERSITY **																							
					OCCUPANT	CONNECTION	CONSUMPTION	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
MAIN ENTRAN	LIGHT																																																					
FOYER/SRVICE ENTRY	WALL FIXING LIGHT																																																				
	6 AMPS SWITCH/SOCKET																																																				
LIVING	CEILING FAN																																																				
	CEILING CHANDELIER																																																				
	WALL FIXING LIGHT																																																				
	WALL TUBE LIGHT																																																				
	6 AMPS SWITCH/SOCKET FOR TV, SET-TOP BOX/ DVD/ PLAY STATION & HOME THEATER																																																				
	6 AMPS SWITCH/SOCKET																																																				
BALCONY 1	CEILING LIGHT																																																				
	6 AMPS SWITCH/SOCKET																																																				
DINING	CALLING BELL																																																				
	CEILING FAN																																																				
	WALL FIXING LIGHT																																																				
	WALL TUBE LIGHT																																																				
	DINING WASH LIGHT																																																				
	IRON BOX - STEAM IRON																																																				
	6 AMPS SWITCH/SOCKET																																																				
KITCHEN	CEILING FAN																																																				
	WALL FIXING LIGHT																																																				
	WALL TUBE LIGHT																																																				
	EXHAUST POINT FOR KITCHEN HOOD -EXHAUST FAN / ELECTRIC CHIMNEY																																																				
	6 AMPS SWITCH/SOCKET																																																				
	16 AMPS SWITCH/SOCKET-1 FRIDGE																																																				
	16 AMPS SWITCH/SOCKET-2 MIXER																																																				
	16 AMPS SWITCH/SOCKET-3 MICRO OVEN																																																				
	6 AMPS SWITCH/SOCKET (for water purifier)																																																				
UTILITY	WALL FIXING LIGHT																																																				
	16 AMPS SWITCH/SOCKET (GRINDER/MIXER)																																																				
	16 AMPS SWITCH/SOCKET																																																				
MASTER BED	CEILING FAN																																																				
	WALL FIXING LIGHT																																																				
	WALL TUBE LIGHT-T5																																																				
	NIGHT LAMP-LED																																																				
	6 AMPS SWITCH/SOCKET (for TV, set-top box, home theatre)																																																				
	6 AMPS SWITCH/SOCKET (for LAP TOP/MOBILE)																																																				
	16 AMPS SWITCH & SOCKET (for AC)																																																				
M.BED TOILET	WALL FIXING LIGHT																																																				
	EXHAUST FAN																																																				
	6 AMPS SWITCH/SOCKET																																																				
BALCONY 2	CEILING LIGHT																																																				
	6 AMPS SWITCH/SOCKET																																																				
OTHER BED	CEILING FAN																																																				
	WALL FIXING LIGHT																																																				
	WALL TUBE LIGHT																																																				
	NIGHT LAMP-LED																																																				
	6 AMPS SWITCH/SOCKET (for TV, set-top box, home theatre)																																																				
	6 AMPS SWITCH/SOCKET (for LAP TOP/MOBILE)																																																				
	16 AMPS SWITCH & SOCKET (for AC)																																																				
OTHER TOILET	WALL FIXING LIGHT																																																				
	EXHAUST FAN																																																				
POWDER ROO	WALL FIXING LIGHT																																																				
	EXHAUST FAN																																																				
	TOTAL LOAD IN WATTS																																																				
	TOTAL LOAD IN KILO WATTS																																																				
	Total No. of Dwelling Units																																																				

ALLOTED LOAD PER DWELLING UNIT		**KW**
Peak hour Load Before Diversity per dwelling unit		**KW**
Peak hour Load After Diversity per dwelling unit		**KW**

Note:-

* Total load (in watts) shall be considered for **I** (Round the clock load (in watts) before diversity) for the assumed period for each electric fixture.

** The load (in watts) considered for each period in I shall be multiplied by all the three diversities (ocupant, connection and consumption diversity) to arrive at the lo

Load / Fixture (in watts) and values for diversity is taken from Chart 1.

PEAK LOAD CHART FOR COMMON AREAS (INCLUDING CLUB HOUSE) IN RESIDENTIAL APARTMENTS BUILDING - CHART 2b

Updated On: --------

Name of Project :

Type of Building :

SPACE	ELECTRICAL POINTS	QUANTIY (NOS)	LOAD/ FIXTURE (IN	TOTAL LOAD (IN	DIVERSITY	ROUND THE CLOCK LOAD (in watts) AFTER DIVERSITY																								
						0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
PARKING AREA	CEILING TUBE LIGHT																												
SECURITY & DRIVER'S ROOM	WALL FIXING LIGHT																												
	CEILING FAN																												
	6 AMPS																												
ELECTRICAL ROOM	CEILING TUBE LIGHT																												
	WALL FIXING LIGHT																												
	EXHAUST FAN																												
	6 AMPS SWITCH/SOCKET																												
COMMON TOILETS	WALL FIXING LIGHT																												
	EXHAUST FAN																												
COMMOM AREA	CEILING TUBE LIGHT																												
	WALL FIXING LIGHT																												
ROOMS	WALL FIXING LIGHT																												
	WALL TUBE LIGHT																												
	CEILING FAN																												
	EXHAUST FAN																												
	COMPUTER WITH MONITOR, PRINTER/SCANNER																												
	TV, SET-TOP BOX																												
	6 AMPS SWITCH/SOCKET																												
	16 AMPS																												
MAIN ENTRANCE LOBBY	CEILING LIGHT																												
	WALL LIGHT																												
	CEILING CHANDELIER																												
	CEILING FAN																												
	WALL FAN																												
	6 AMPS SWITCH/SOCKET																												
	16 AMPS																												
FIRE CONTROL ROOM / C.C.T.V ROOM	CEILING FAN																												
	WALL TUBE LIGHT																												
	WALL LIGHT																												
	FIRE PANELS																												
	16 AMPS																												
	D.V.R																												
	CAMERA																												
	MONITOR																												
MANAGER/ OFFICE ROOM	CEILING FAN																												
	WALL TUBE LIGHT																												
	COMPUTER WITH MONITOR, PRINTER/SCANNER																												
	6 AMPS SWITCH/SOCKET																												
COMMON PASSAGE/ CORRIDOR IN	CEILING LIGHT																												
TERRACE FLOOR	CEILING LIGHT																												
STAIR CASE IN ALL FLOORS	WALL / CEILING LIGHT																												
PUMPS	Domestic Water supply																												
	Domestic Water Pumps for																												
	STP Treated Water Pumps																												
	Well to Sump Pumps																												
	Pump Room Drain Pumps																												
	Basement Drain Pumps																												
	Heat Pumps for Hot Water																												
	Hot water circulation/																												
	STP Pumps (Complete set																												
	Swimming Pool Pumps																												
	Fire Pumps																												
OTHER UTILITIES	Building Focus Lights																												
	Street Lights																												
	Landscape Lights																												
	Covered Car Park Lights																												
	Driveway and Yard Lights																												
LIFTS	PASSANGER LIFT																												
	SERVICE LIFT																												
CLUB HOUSE																													
SQUASH COURT	CEILING LIGHT																												
	WALL MOUNTED LIGHT																												
	6 AMPS SWITCH/SOCKET																												
TABLE TENNIS	CEILING TUBE LIGHT																												
	WALL MOUNTED LIGHT																												
	CEILING FAN																												
	EXHAUST FAN																												
	6 AMPS SWITCH/SOCKET																												
JACUZZI (SPA)	CEILING LIGHT																												
	6 AMPS SWITCH/SOCKET																												
	16 AMPS																												
SUNA ROOM	CEILING LIGHT																												
	16 AMPS																												
STEAM ROOM	CEILING LIGHT																												
	16 AMPS																												

COMMON AREA	CEILING LIGHT																													
	EXHAUST FAN																													
	6 AMPS SWITCH/SOCKET																													
LIBRARY/READING ROOM	CEILING FAN																													
	CEILING TUBE LIGHT																													
	COMPUTER WITH MONITOR																													
	WALL TUBE LIGHT																													
	16 AMPS SWITCH &																													
	6 AMPS SWITCH/SOCKET																													
AYURVEDIC WELLNESS CENTER	CEILING FAN																													
	WALL MOUNTED FAN																													
	CEILING LIGHT																													
	WALL LIGHT																													
	CEILING LIGHT																													
	16 AMPS																													
	EXHAUST FAN																													
GYMNASIUM	CEILING FAN																													
	CEILING LIGHT																													
	WALL LIGHT																													
	16 AMPS SWITCH & 16 AMPS SWITCH & SOCKET (for Tread Mill)																													
	6 AMPS SWITCH/SOCKET																													
	EXHAUST FAN																													
SOCIETY ASSOCIATION ROOM	CEILING FAN																													
	CEILING LIGHT																													
	WALL MOUNTED FAN																													
	WALL LIGHT																													
	16 AMPS SWITCH &																													
	6 AMPS SWITCH/SOCKET																													
LADIES & GENTS BEAUTY PARLOUR	CEILING FAN																													
	CEILING LIGHT																													
	WALL MOUNTED FAN																													
	WALL LIGHT																													
	16 AMPS SWITCH &																													
	6 AMPS SWITCH/SOCKET																													
AEROBIC/ YOGA/ MEDITATION ROOM	CEILING FAN																													
	CEILING LIGHT																													
	WALL LIGHT																													
	16 AMPS SWITCH &																													
	6 AMPS SWITCH/SOCKET																													
	SPEAKAR																													
MINI THEATER	CEILING LIGHT																													
	WALL LIGHT																													
	WALL MOUNTED FAN																													
	SOUND SYSTEM/ VIEDIO																													
	PROJECTOR																													
	16 AMPS SWITCH &																													
STUDENT ACTIVITY ROOM	CEILING LIGHT																													
	WALL LIGHT																													
	WALL /CEILING FAN																													
	16 AMPS SWITCH &																													
	6 AMPS SWITCH/SOCKET																													
COFEE SHOP /PANTRY	CEILING FAN																													
	CEILING LIGHT																													
	WALL LIGHT																													
	16 AMPS SWITCH &																													
	EXHAUST FAN																													
	16 AMPS																													
	6 AMPS SWITCH/SOCKET																													
LAUNDRY	CEILING FAN																													
	CEILING LIGHT																													
	WALL LIGHT																													
	16 AMPS																													
	6 AMPS SWITCH/SOCKET																													
	EXHAUST FAN																													
PARTY HALL/ DINNING	CEILING FAN																													
	CEILING LIGHT																													
	WALL LIGHT																													
	16 AMPS SWITCH &																													
	6 AMPS SWITCH/SOCKET																													
	EXHAUST FAN																													
INDOOR GAMES (SENIOR BOARDS GAME,CARROM BOARDS GAME,BILLIARDS POOL,PLAY	CEILING FAN																													
	CEILING LIGHT																													
	WALL LIGHT																													
	16 AMPS SWITCH &																													
	6 AMPS SWITCH/SOCKET																													
	CEILING CHANDELIER																													
	EXHAUST FAN																													
TOTAL LOAD AFTER DIVERSITY IN WATTS																														
TOTAL LOAD AFTER DIVERSITY IN KILO WATTS																														

Peak Hour consumption		**KW**

Note:-

The following factors shall be considered for Common Passage Lighting for all Floors

Percentage of	TIMING From	To

The following factors shall be considered for Parking Area Lighting

Percentage of	TIMING From	To	Floor

Lift operation timing shall be considered as follows

TIMING From	To	LIFT P	S

Pumps operation timing shall be considered as follows

DESCRIPTION	TIMING From	To
Domestic Cold		
Domestic Hot		
Treated water		
Rain Water		
Drain Pumps		
Solar Pumps		
STP Pumps		
Fire Pumps		
Well Pumps		

SUMMARY OF POWER LOAD AND CAPACITY OF TRANSFORMER, DIESEL GENERATOR AND SOLAR PV PANEL FOR RESIDENTIAL APARTMENT BUILDINGS - CHART 3

Updated on: ----------

Name of Project :

Type of Building :

Sl. No.	Premises/Facilities	No. of units	Connected Load (Kw)	Total Connected Load (Kw)	Peak Hour Load (Kw)	Allotted Load (Kw)	Peak Hour Load After Diversity (Kw)	ROUND THE CLOCK LOAD (IN KW) AFTER DIVERSITY																								Total Consumption Kwh (Units) per Day	Remarks
								0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24		
1	1 BHK (Chart 2a1)																																
2	2 BHK (Chart 2a2)																																
3	3 BHK (Chart 2a3)																																
4																																	
5																																	
	Premises Load for 100% Ocupancy (A)																																
	Premises Load for 25% Ocupancy (B)																																
	Premises Load for 50% Ocupancy (C)																																
	Premises Load for 75% Ocupancy (D)																																
6	Common area & Parking including Club House (2b)																																
	Common area & Parking including Club House Load 100% (E)																																
	STAGE -1 (25% load for premises and 60% load for common areas)																																
	Total Load = [B+(E x 0.6)] Kw (F)																																
	Total Load = [F /0.85] Kva (G)																																
	D.G. Capacity = [G/0.85] Kva (H)																																
	STAGE -2 (50% load for premises and 80% load for common areas)																																
	Total Load = [C+(E x 0.8)] Kw (I)																																
	Total Load = [I /0.85] Kva (J)																																
	D.G. Capacity = [J/0.85] Kva (K)																																
	STAGE -3 (75% load for premises and 100% load for common areas)																																
	Total Load = [D+E] Kw (L)																																
	Total Load = [L/0.85] Kva (M)																																
	D.G. Capacity = [M/0.85] Kva (N)																																
	FINAL STAGE (100% load for premises and 100% load for common areas)																																
	Total Load = [A+E] Kw (O)																																
	Total Load = [O /0.85] Kva (P)																																
	D.G. Capacity = [P/0.85] Kva (Q)																																
	TOTAL NO OF DWELLING UNITS																																

SUMMARY

TOTAL PEAK LOAD CONSIDERED (**O**) K		**Kw**
TOTAL PEAK LOAD CONSIDERED (**P**) K		**Kva**
Transformer Proposed		**Kva**
Standard Transformer Sizes in KVA: 63, 100, 250, 315, 500, 630, 750, 800, 1000 KVA (check the availability of proposed sizes with MESCOM/ standard suppliers)		
DG CAPACITY REQUIRED (**Q**) Kva		**Kva**
DG LOAD CONSIDERED		**Kva**
DG PROPOSED - 1		**Kva**
DG PROPOSED - 2		**Kva**
Standard DG Sizes in KVA : 30, 35, 40, 50, 62.5, 70, 82.5, 100, 125, 140, 160, 180, 200, 225, 250, 275, 300, 320, 365, 400, 500, 600, 625, 650, 750, 810, 1010 KVA		

SOLAR PV PANEL REQUIREMENT AS PER BUILDING BYELAW (5% of the Total Power Consumption per Day is Considered)

Total Power Consumption per Day as per this Summery Load Chart		Kwh (Units)/ Day
Actual Power Consumption shall be considered as 50% of the summery		Kwh (Units)/ Day
5% of the Actual Power Consumption considered for Solar PV Panels		Kwh (Units)/ Day
Solar PV Panel Requirement (Considering 1 Kw Solar PV Panels shall produce Average 4 Kwh (Units) per Day)		**Kw**
Final Rounded Off Quantity Solar PV Panels shall be provided		**Kw**
NOTE:		

Electric lighting is a major energy consumer in a building. Enormous energy saving are possible using energy efficient equipment, effective control and careful/proper design. Using less electric lighting reduces heat gain thus saving air-conditioning energy and improving thermal comfort. Electric lighting design also strongly affects visual performance and visual comfort by aiming to maintain adequate and appropriate illumination while controlling reflection and glare.

By installing new lighting technologies, we can reduce the amount of electricity consumed and energy cost associated with lighting.

There are several types of energy efficient lighting and affordable lighting technology. The following are a few examples of energy-saving opportunities with efficient lighting.

1. Installation of Compact Fluorescent Lamps (CFLs) in place of Incandescent Lamps.

CFL use a different, more advanced technology than incandescent light bulbs and come in a range of styles and sizes based on brand and purpose. They can replace regular, incandescent bulbs in almost any light fixture including globe lamps for bathroom vanity, lamps for recessed lighting, dimming and 3 way functionality lights. CFLs use about 2/3 less energy than standard incandescent bulbs, give the same amount of light, and can last 6 to 10 times longer.

2. Installation of Energy Efficient Fluorescent Lamps in place of Conventional Fluorescent lamps.

The recommended style of fluorescent lighting is a T-8. T-8 lights are most cost effective. They usually are 30% to 40% more efficient than standard T-12 fluorescent lamps, which have poor colour rendition and cause eye strain. T-8 lamps provide more illumination, better colour and don't flicker. T-5 lamps are the most energy efficient and also tend to transmit the best colour.

Each style of fluorescent lamp cannot function without a ballast. A ballast is an electrical device used in fluorescent lamps to regulate starting and operating charecteristics of the lamp. Some ballast are magnetic whereas other are electronic. Electronic high frequency ballasts are now standard for most fluorescent lights. Due to differences in wattage between the types of lights, if converting from a t-12 to T-8 light, one must also change the type of ballast being used.

3. Installation of Energy Efficient LED Lamps in place of Conventional Fluorescent & Fluorescent lamps.

LEDs are solid state semiconductor devices and are more energy efficient than even CFLs. They produce little heat and higher quality lighting than any other lamp. At the time of inception the usage of LEDs was limited as single bulb indicators in electronic circuits. LED lamps use 75 percent less energy than traditional incandescent and 50 percent less energy than that of a CFL. They can last 8-25 times longer compared to incandescent and up to four times longer than a CFL. Unlike incandescent and CFLs, LED lamps produce no heat and hence they are cool enough to touch. But, these are more expensive; however, they are affordable over the long run.

4. Installation of Occupancy /Motion sensors to turn lights ON and OFF where appropriate.

Lighting can be controlled by occupancy sensors to allow operation whenever someone is within the area being scanned. When motion can no longer be detected, the lights shut off.

Lighting Energy Savings Potential with Occupancy Sensors

Application	Potential Energy Savings
Offices (Private)	25-50%
Offices (Open areas)	20-25%
Restrooms	30-75%
Corridors	30-40%
Storage areas	45-65%
Meeting Rooms	45-65%
Conference Rooms	45-65%
Warehouses	50-75%

Source: U S Department of Energy

5. Use an automated device, such as a key tag system, to regulate the electric power in a room.

The key tag system uses a master switch at the entrance of each guest room, requiring the use of a room key-card to activate them. Using this technique, only occupied rooms consume energy because most electrical appliances are switched off when the key-card is removed (when the guest leaves the room). Along with lighting, the heating, air conditioning, radio and television may also be connected to the master switch. This innovation has a potential savings of energy.

6. Offer Nightlights to prevent the bathroom lights from being left ON all night.

Many guests opt to have a light on while they sleep. By turning the bathroom light On and leaving the bathroom door cracked open, guests are able to find their way through an unknown room in the middle of the night. Those who are accompanied by children may often do the same to comfort their child. By offering a nightlight, the energy used to power a bathroom light during the night time can be avoided and guest will still be able to feel comfortable in unfamiliar territory.

7. Replace the Sign Boards with Light Emitting Diode (LED) Sign boards.

The development of light emitting diode (LEDs) has allowed the replacement of signage lighting with a more energy efficient alternative. Multiple LEDs, Properly configured, produce equivalent lighting and consume 95% less electricity than incandescent bulbs and 75% less than energy efficient compact fluorescent lamps. A major benefit is the 20-year life cycle rating of LEDs; they virtually eliminate maintenance.

Comparison of Three models of signages

	Incandescent	Fluorescent	LED
Input Power (Watts)	40	11	2
Yearly Energy (kWH)	350	96	18
Lamp Life (Years)	0.25-0.5	1-2	10+

8. Use High Efficiency (HID) Exterior Lighting

High Intensity discharge (HID) lighting is much more efficient and preferable to incandescent, quarts-halogen and most fluorescent light fixtures. HID types (from least to most efficient) include mercury vapor, metal halide and high pressure sodium. Mercury vapour is seldom used anymore. Both metal

halide and high pressure sodium are excellent outdoor lighting systems. High pressure sodium has a pink-orange glow and used when good colour rendition isn't critical. Metal halide, though less efficient, provides clean white light and good colour rendition.

9. Add light controls such as Photosensors or time clocks

Photo sensors controls, monitors daylight conditions and allow fixtures to operate only when needed. Photo sensor detect the quantity of light and send a signal to a main controller to adjust the lighting. Photo sensors are commonly used with outdoor lighting to automatically turn lights ON at dusk and OFF at dawn, a very cost effective control device. This helps to lower energy costs by ensuring that unnecessary lighting is not left on during daytime hours.

Time controls save energy by reducing lighting time of use through pre-programmed scheduling. Time clock equipment ranges from simple devices designed to control a single electrical load to sophisticated systems that control several lighting zones. They are one of simplest, least expensive and most efficient energy management devices available.

ENERGY EFFICIENCY IN HEATING, VENTILATION AND AIR CONDITIONING (HVAC) SYSTEMS

- **HVAC systems should comply with Karnataka Energy Conservation Building Code (ECBC) 2014, Clause 4. Refer Clause 4.2 for Mandatory Requirements like Natural Ventilation, Minimum Equipment Efficiencies, Controls, Piping, Ducts, System Balancing, and Condensers. Also refer Clause 4.3 for Prescriptive Requirements of HVAC System.**

TIPS FOR THE SELECTION OF HVAC STSTEMS

- HVAC system Heat load calculations shall be as per latest American national standards institute (ANSI)/American society for heating, refrigerating and air conditioning engineers (ASHRAE)/Indian society for heating, refrigerating and air conditioning engineers (ISHRAE).

- HVAC Systems shall be categorized as under:
  a. Small sized - "0" to "300" TR – Residential/Commercial applications.
  b. Medium sized - "300" to "1000" TR – Residential/Commercial/Industrial applications.
  c. Large sized – between "1000" to "3000" TR and above – Commercial as well as Industrial applications.

- Small sized:
  a. For Split systems up to 2 TR, minimum Energy Efficiency Ratio (EER) for the fixed speed air conditioners and Indian Seasonal Energy Efficiency Ratio (ISEER) for inverter based systems shall be mandatory. EER above 3.5 and ISEER above 4.0 shall be advised for energy rated buildings. (minimum 3 star ratings shall be used)
  b. For ducted split systems ranging from 3 TR to 17 TR an IkW of 1.2 kW per TR shall be advised. (Original Manufacturers Engineering data/ Catalogue should be checked for the efficiency of the system)
  c. VRF/VRV systems shall have a minimum Co Efficient of Performance (COP) of above 3.7 for the cooling only machines and 4.0 for heat pumps. (should check with Engineering Data/ Catalogue)

- Medium sized:
  a. Apart from aforementioned minimum criteria, an IkW of less than 1.0 kW per TR shall be mandatory.
  b. Commercial applications shall have systems with secondary refrigerants – such as chilled water – where more than 5000 Sqm of area shall be air conditioned, to achieve an IkW of less than 1.0
  c. Heat recovery shall be extensively utilized among conditioned spaces such as Hospital/Hospitality, Health care, Pharmaceuticals, Manufacturing and other Industries/applications where fresh air requirements are huge and mandatory.
  d. An exclusive diversity of 20% shall be mandatory for systems which shall cater more than 5000 Sqm's of conditioned space.
  e. HVAC systems shall be controlled by intelligent Building management systems to save on energy and to maintain IAQ. The same shall be mandatory.

- Large sized:
  a. Systems which operate on waste heat shall be installed wherever possible.
  b. Heat recovery systems shall be mandatory wherever possible.
  c. An IkW of less than 1.0 kW per TR shall be mandatory along with intelligent BMS.

- General Guidelines for Commercial and public spaces:
  a. An average indoor temperature shall be set at 24 to 26 Deg C. for summers and 21 to 23 Deg C. for extreme winter. HVAC systems shall be designed and commissioned accordingly to save on energy.
  b. A CO2 concentration of less than 1000 ppm shall be advised for public spaces. (Fresh Air supply is required)

BUREAU OF ENERGY EFFICIENCY (BEE) STAR LABELS- TIPS

- BEE Star Label – Small Label for Tv's, Computers/ laptops, fans and tube lights.
- BEE Star Label – Big Label for Refrigerators, Air conditioners, geysers and washing machines.
- Look for Stars on an appliance model, more stars means more electricity saving.
- Look for the year on the label as star ratings change periodically when standards improve. A BEE 5 star rated model in 2013 may be equivalent to BEE ¾ star model in 2014.
- Although BEE star rated appliances do comply with Indian Standards, but higher star rating does not mean better quality.
- BEE star rating is available in following home appliances: Refrigerators, Air Conditioners, Water heaters, T8 Tube Lights, 1200 mm sweep ceiling fans.

APPENDIX-XIV

A. REQUIREMENT OF NUMBER AND TYPE OF LIFTS (see clause 5.3.1.2)

PRELIMINARY DESIGN FOR LIFTS - THE PASSENGER HANDLING CAPACITY OF LIFTS (Ref: NBC 2016, PART 8 SECTION 5A, Clause 4)

Date:

Project Name	C	T. Stops	N	H*	L	D	A	B = Lift Speed**	S	t_v	t_p	t_c	t_o	T	Configuration of Lifts: Speed		RTT	INT = Quality of Service		P	Population		HC = Quantity of Service		Remarks
	C = Lift Capacity (No. of Passangers)	Total Number of Stops	N = Number of Floors above Main Terminal Floors	H = Average highest reversal floor *	L = Number of Lifts	D = Total Travel Distance in Meters above Main Terminal Floors	A = Average inter floor Distance = D/(N-1)	B = Lift Speed in mps (NBC Recommended 0.6 - 1.0 m/s up to 6 Floors, 1.0 -1.5 m/s for 7 -15 Floors, 1.5 -1.75 m/s for 16 -20 Floors, 1.75 -2.5 m/s for 21 -30 Floors, 3.0 -4.0 m/s for 31 -45 Floors, 4.0 -6.0 m/s for 46 -60 Floors, 6.0 m/s and above for Above 60 Floors]**	S = Average Number of Stops = N[1-(1-1/N) ^{P}]	Single floor transit time = average inter floor distance/rated speed =A/B	t_p = Passenger Transfer Time =2s	t_c = Door Close = 3s	t_o = Door Open = 3s	T = door operating time (t_c+t_o) + single floor flight time t_v	Full speed Up	Full speed Down	RTT =The Up Peak Round Trip Time in Seconds RTT = $2Ht_v + (S+1)(T - t_v) + 2Pt_p$	INT = Average Time Intervel in Seconds, INT = RTT/ L (r/f) For Office Buildings <25s Excellent, 25<30s Very Good, 30<35s Good, 35<40s Fair, 40<45s Poor, >45 Unsatisfactory	Average Waiting Time in Seconds (r x .8) For Office Buildings <25s Premium, 25 to 35s Regular	P = Average Number of Passengers carried in a Car (0.8 x C)	Tp = Total Population (100%)	Total population to be handled during peak morning period (0.75 x 0.8 x Tp)	HC = 5 min Lift Handling Capacity in Percentage HC =((300xPxL)x(100/Population))/(RTT) or ((300xPx(100/Population))/(INT)	Recommended Handling Capacity for Residential Buildings % = H (HIG > 8%, MIG 6 to 8%, LIG 5 to 7%), For Office Buildings 10 to 15% for Multi Tenancy and 15 to 25% for Single Tenancy	
															Nominal Travel Time (Distance/ Speed (D/B)) (NBC Recommended NTT for Office, Commercial or Hotel Buildings (1) 15 to 25s Excellent (2) >25 to 35s										
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
							0.0				2	3	3							0		0			
							0.0				2	3	3							0		0			
							0.0				2	3	3							0		0			
							0.0				2	3	3							0		0			

For more details and for Special/ Specific Buildings, refer the abstracts of NBC 2016 attached here with

** a) Considering buildings with average floor height of 3.0 m.
b) For any other building, the speed of the lifts will have to be validated against the total population and

Note: 1) Minimum one stretcher lift shall be provided in each building having height more than 30 m so as to take care of medical as well as other emergencies. This lift shall have minimum car entrance width of 800 mm and car depth of 2100 mm may be considered in residential/commercial buildings. *(clause 8.4.6)*

2) There shall be at least one fireman's lift per building. Buildings of Height 21 m and Above and below 60 m The fireman's lift shall have a floor area of minimum 1.43 m^2. It shall have loadine capacity of not less than
3) Buildings of Height 60 m and Above The fireman's lift shall have loading capacity of not less than 1000 kg and floor area not less, than 2.35 m2. (clause 7.1.2)

$$H = N - \sum_{i=1}^{N-1} (i/N)^P$$

*

** 1) Considering buildings with average floor height of 3.0 m.
2) For any other building, the speed of the lifts will have to be validated against the total population and travel height of the building.

1. Population

The population of the building is estimated using the **Net usable area (NUA).** The NUA excludes circulation areas (stairs, corridors, foyers, etc), structural instructions (columns, ducts, etc) and facilities (pantry, kitchens, toilets, conference rooms, training rooms, server rooms, storage areas, etc).

Table 1 gives typical values for the density of population.

Table 1 occupancy Area Per Person in office Buildings

Sl No.	Building type	Open Plan/Hall seating	cellular Plan/ Cabins
i	Premium	10m2	12m2
ii	Regular	8m2	10m2
iii	Low end	5m2	8m2

For certain specialized building functions such as BPO, areas ranging from 6m^2 to 10m^2 per person may be considered.

2. Quantity of Service
It is measured in terms of the total number of passengers handled during the peak 5 min period of the day.

The minimum recommended quantity of service is given in Table 2.

Table 2 Recommended Quantity of Service in Office Buildings

Sl No.	Type of Occupancy	Quantity of service percent
i	Multi Tenancy	10 to 15
ii	Single Tenancy	15 to 25

Fee
3. Quality of Service
The interval or the average time between successive arrivals of the lift cars at the main lobby is generally considered as an indicator of passenger waiting time.

Table 3 gives the quality of service based on interval.

Table 3 Recommended Quality of Service in Office Buildings (Based on Interval)

Sl No.	Quality of Service	Interval s
i	Excellent	Less than 25
ii	Very Good	25 to less than 30
iii	Good	30 to less than 35
iv	Fair	35 to less than 40
v	Poor	40 to less than 45
vi	Unsatisfactory	45 and above

Table 4 gives the quality of service measured as average waiting time.

Table 4 Recommended Quality of service in Office Buildings (Based on Average Waiting Time)

Sl No.	Class of Building	Average Waiting Time s
i	Premium	<25
ii	Regular	25 to 35

4. Traffic Analysis Equation

The classical method to size a lift installation requires the determination of the time, in second, that it takes for a single lift to make a round trip around the building during the up-peak traffic condition. This is called the round trip time and is given by:

$RTT = 2Ht_v + (S+I)(T-t_v) + 2Pt_p$
where,

N = Number of floors above main terminal floors,
H = Average highest reversal floor

$$=N-\sum_{I=1}^{N-1}\left(\frac{i}{n}\right)^{p}$$

S = Average No of stops

$N-[1-(1-1/N)^P]$
P = Average passengers carried
= 0.8 * maximum actual car capacity,
t_v = single floor transit time=average inter floor distance/rated speed,
T = door operating time (t_c+ t_o) + single floor flight time $t_f(1)$,and
t_p = Passenger transfer time.

The derivation of the round trip time equation assumes the following:
a) Traffic pattern corresponds to pure up-peak.
b) Passengers arrive according to a rectangular probability distribution.
c) Lifts, on an average, fill to 80 percent of the actual car capacity by numbers irrespective of the weight of each passenger or the space that maybe occupied
d) All floors are equally populated
e) Rated speed is achieved In a single floor jump,
f) Inter floor heights are equal
g) Door dwell time does not exceed the calculated passenger transfer time.

Interval, INT = RTT/L, where L is the number of lifts in a single group.

5 min handling capacity, HC= $\frac{300*P*L*100/Population}{RTT}$
or
$\frac{300*P*100/Population}{INT}$

The down peak round trip time is estimated as:
$RTT_{down\ peak} = Nt_v + (0.5S+1)(T - t_v) + 2Pt_p$

The mid-day round trip time is estimated as:
$RTT_{mid\text{-}day} = 2Ht_v + 2S(T - t_v) + 4Pt_p$

An estimation of interfoor performance can be obtained using:
$AWT\ i_{interfloor} = INT_{uppeak} + [o.22+1.78*\ A\ interfloor/HC_{uppeak}]$

Where $A\ i_{interfloor}$ is the number of passengers arriving during the interfloor period.

Configuration of Lifts: Number
Determination of number of lifts depends on the required quality and quantity of service. It should be noted here that grouping of lifts and location should be given adequate attention.

Configuration of Lifts: Capacity
Determination of car capacity depends on the required quality and quantity of service. A larger car, while improving the handling capacity might adversely impact the quality of service.

Configuration of lifts: Speed

In addition to the speeds derived from the calculations for handling capacity and interval, the nominal travel time is used for selecting suitable rated speeds. The higher the building, the faster lifts are needed. The recommended values for nominal travel time in case of an office, commercial or hotel building are given in Table 5.

Table 5 Recommended Nominal Travel Time for Office, Commercial or Hotel Buildings

Sl No.	Level	Nominal Travel Times
i	Excellent	15 to 25
ii	Good	> 25 to 35
iii	Satisfactory	> 35 to 45

Configuration of lifts: Layout

The width of the lift well entrance is the basis element in the determination of the best proportions.In other words, the width of the car is determined by the width of the entrance and the depth of the car is regulated by the loading per square metre permissible under this standard.

Centre opening doors are the most practicable and the most efficient entrance units for passenger lifts.Given the same door speed,the centre opening is much faster than the side opening type> For passenger lifts,wider cars are preferred as the ingress and egress efficiency is higher. For service/ freight/ stretcher lifts deeper cars are preferred, so as to easily carry the stretcher/goods.

Planning for Specific Building Features

Special Building Facilities

Facilities like cafeteria, food courts, restaurants, gymnasia, etc., in the building impact the circulation patterns in a building and should be considered for lift traffic design

Basement Service

Buildings are sometimes designed with car parks or other facilities at basement levels below the terminal floor. Such floors, if they are served by the main lifts have an adverse impact on the up-peak, down-peak and mid-day traffic patterns.

It is therefore better to provide basement service to the main lobby by a separate group of 'shuttle' lifts so as to avoid compromising the traffic handling capability of the main group.

Multiple Entry Levels

Some buildings have main entry points at more than one level. The effect of more than one main terminal is disruptive and adversely impacts effective circulation and movement. If there are more than one entrance levels, means should be provided to bring all the routes to a single terminal floor.

If this is not possible, then the lift system planning should take into account the extra times incurred stopping and loading at multiple entry floors. Another difficulty is in deciding whether the building population will use each entrance equally. In the absence of any guidance, the solution is to assume an entrance bias with an additional 10 percent and size the lifts to meet the additional required handling capacity.

The loss of lift efficiency because of multiple entry levels could be as 15 percent per additional entry level. Both basement service and multiple entry level buildings with lifts serving all floors also can impact the security of the building.

Non-Smoking Buildings

When buildings are defined as non-smoking buildings, designers need to factor in the additional load put on the lifts on account of additional trips that smokers make to go outside the building.It is appropriate to provide pressurized smoking zones at the floor level rather than require smokers to make additional trips.

Reserved lifts
When lifts have to be reserved for VIP personal movement, designers should not consider these lifts as part of the lift group.

Zoning (Vertical)/Sky Lobbies in Very Tall Buildings
As the number of floors served increases, the value of H and S also increase, adversely impacting the round trip time and performance of the lift system. This has led to the concept of zoning in tall buildings. In stacked zoning, a tall building is effectively divided into horizontal layers or stacks. RTT, quality and quantity of service can be arrived at separately for each zone. The desired level of service can be attained by adjusting two parameters in this case- the number of lifts and the number of floors in the zone. The round trip time for each zone is given by:
RTT = $2Ht_v + (S + 1)(T\text{-}t_v) + 2Pt_p + 2[t_{express} - t_{t(1)}]$

Where $t_{express}$ is the flight time from the main terminal to the express zone terminal/Sky lobby.
The round trip time for shuttle lifts serving only 2 floors-main terminal and sky lobby is given by:
RTT = $2T + 2Pt_p$

Planning For Specific Building Types
Residential Buildings
The peak traffic condition occurs during the morning down peak when many adults and children are leaving for work and school at the same time. Population assumptions would also need to consider the service staff, drivers of cars, etc. For high rise buildings the delivery of newspapers and milk and disposal of garbage are also required to be considered.
In the luxury housing segment, where the number of ratio of service staff to residents is fairly high, separate service lifts may be required for door deliveries and service staff. Typical average daily population for a residential building is given in Table 6.
The passenger handling capacity shall be as given in Table 7. The intervals shall be as per values in Table 8. Table 9 gives the recommended quality of service measured as average waiting time for residential buildings and Table 10 gives the nominal travel times. Sizing of lifts should consider the requirement to shift the stretchers, heavy material, etc and it is recommended that at least one lift in each building should be a deep car which can accommodate a regular ambulance stretcher.

Table 6 Typical Average Population for Residential Buildings

Sl No.	Type of Apartment	Number of Bedrooms Per Apartment				
		1	2	3	3 With Servent Quarters	4 With or Without Servent Quarters
i)	**High End Apartments**					
a)	Residents	2 to 3	3 to 4	5	5	5 to 6
b)	Resident Service Staff	0	0	0	1	1
c)	Floating Service Staff	1	2 to 3	3 to 4	3 to 4	4 to 5
ii)	**Mid End Building**					
a)	Residents	3	4	5	5	5 to 6
b)	Resident Service Staff	0	0	0	1	1
c)	Floating Service Staff	1	1	2 to 3	2 to 3	3 to 4
iii)	**Low End Building**					
a)	Residents	4 to 5	5 to 6	NA	NA	NA
b)	Floating Service Staff	0.5	0.5	NA	NA	NA

NOTE -- Unless separate lifts are provided for service staff, due consideration for service staff shall be given while calculating the required number of lifts.

Table 7 Recommended Handling Capacity for Residential Buildings

Sl No.	Class of Building	Handling Capacity Percent
i	High end Building	> 8
ii	Mid end Building	6 to 8
iii	Low end Building	5 to 7

Table 8 Recommended Quality of Service for Residential Buildings (Based on Time Interval)

Sl No.	Class of Building	Intervals
i	High end Building	≤ 60
ii	Mid end Building	61 to 80
iii	Low end Building	81 to 100

Table 9 Recommended Quality of Service in Residential Buildings (Based on Average Waiting Time)

Sl No.	Level	Average Waiting Time s
i	High end Building	≤ 30
ii	Mid end Building	31 to 45
iii	Low end Building	46 to 60

Table 10 Recommended Nominal Travel Time for Residential Buildings

Sl No.	Level	Nominal Travel Time s
i	High end Building	25 to 35
ii	Mid end Building	36 to 45
iii	Low end Building	46 to 60

Note - In case of super high rise buildings considering limit of speed as 10 m/s, the travel time may be longer than specified above.

Hospitals

Factors to be considered include number of staff and shift patterns, number of visitors and visiting hours, location of operation theatres, facilities, delivery of housekeeping supplies, waste disposal, evacuation

procedures and segregation of sterile areas. When carrying out traffic analysis for hospitals, designers should consider establishing average car loading by volume rather than by weight. Arrival rates may approximate 10 percent to 15 percent and interval may be 30 s to 50 s.

The sizing of the lift car and doors should be such that a standard hospital stretcher and attendant can be easily accommodated. Where the hospital bed is likely to be moved the lift car should be able to accommodate the standard hospital bed including the auxiliary support equipment like oxygen cylinders, etc.
In large hospitals it is recommended that the lifts for the patients/hospital beds (or stretchers) should be separated from the lifts for staff/visitors.

NOTE - For hospital buildings, designers should also consider that in an emergency a number of patients would require to be evacuated on stretchers

Hotels
The most demanding time is during the check in and check out period and two way traffic occurs during this period with guests going to and from rooms and restaurants and in and out of the hotel. Calculations should be made assuming an equal number of up and down stops during this period. Average room occupancy may range from 1.5 to 2 persons and arrival rates from 10 to 15 percent .Security considerations need to be taken into account whilst establishing the circulation and lift requirements. Escalators such as from the lobby to banquet/function level. Adequate number of service lifts need to be provided for service movement of housekeeping and room service staff as well as movement of material.

Retail - Malls with Multiplexes
Pedestrian movement in retail establishment like malls is generally centered on escalators, and lifts do not play a major part. However, provision should be made for movement of shopping trolleys, wheel chairs, perambulators and persons with limited mobility from one level to another. A commonly applied solution is the installation of inclined moving walks. Where lifts are provided, assumptions of lift car sizing should take into account space occupied by trolleys and shopping bags. Where multiplexes are located on the upper floors, the last movie of the day gets over after the mall is closed at which time the escalators might not be available. In such cases the lift provision has to be adequate to handle the egress of the total multiplex population.
Airports/Railway Stations
While moving walks and escalators greatly improve the building circulation, the use of lifts has to be considered for persons with limited mobility and for movement of baggage trolleys from one level to another. The RTT equation of 4.2.5 may be used, but car occupancy levels taking into account space occupied by trolleys.
Multi-Level Car Parking
Multi-level car parks may be standalone public car parks or attached to office, retail or residential complexes. These car parks may be fully automated where drivers would leave the cars inside or on a trolley at the entry floor and the car is parked and retrieved automatically. The other alternative would be for the use of car lifts and/or ramps.

When the movement of the cars is dependent on car lifts, detailed study has to be carried out to establish the required number of car lifts ensuring that average car retrieval / parking time does not exceed 2 min.The sizing of the car lifts has to be adequate to fit the largest vehicle that is intended to be transported as well as adequate space to enable evacuation of passengers in the eventuality of an entrapment. Designers will also need to take into account the probability of queues developing and provide for holding lanes.
Multi - Level Car Parking Passenger Traffic
When car lifts or ramps are the means for parking the cars, then means would ned to be provided for the movement of passengers from and to the parking floors. If the main building lifts also serve the parking floors, it is to be noted that, performance will be adversely impacted due to multiple entry floors. Additional entry floors will also affect the security of the building. It is therefore recommended that separate lifts should be considered to move passengers. If separate parking lifts are provided, the basic RTT equation of 4.2.5 may be used. Average vehicle occupancy may be considered as 1.5 per car for office car parks, 4 for airports and retail and 2 elsewhere.

Schools and Other Educational Institutions
In schools and other educational institutions, the traffic flow would consist of peak demand for short duration that would exist just before the start or after finishing of a class or lecture.It is unlikely that an economical solution can be implemented for such high peak requirements. Therefore the design of the

building has to be such that heavy stair usage is facilitated.

Buildings with 24 x 7 Operations

In buildings operating 24 x 7 (round the clock), the peak traffic conditions would not be a typical up peak but will occur during shift changes. The handling capacity should take into account the incoming as well as outgoing traffic. Calculation shall be made assuming both up and down stops during this period. Particular attention should be paid while designating the drop off points, these should be assigned to a level so as to not increase that the lifts in such buildings would have a significantly higher number of starts/stops per hour than a conventional building.

Observatory

The height at which the observatory is located and the number of people expected at the observatory level shall decide the speed and the number of lifts. The circulation logic is crucial in locating the observatory lifts. Also, if the observatory is connected with lounge/cafe/souvenir shops, etc, separate service lifts may need to be provided.

Other Considerations

Designers need to be aware that the door opening and closing times, acceleration and deceleration times, etc., would vary between the suppliers and equipment types and can impact the overall lift performance. The dispatch algorithms and controller responses would also vary between the supplier and the equipment types and can impact the actual operational results.

Lifts will breakdown as well require to be shut down for regular maintenance and repairs. Lift availability might be hampered during renovation of the building as a lift might be taken up for movement of material and debris. Designers should take into consideration the impact of such non-availability of lifts. The provision of well -located and easily accessible stairs can considerably lessen the demands on the lifts and therefore architect/engineer should consider this aspect in the layout.

Lift Speed

For passenger lifts in a building, the general recommendations as given in Table 11 may be followed.

Quiet Operation of Lifts

Every precaution should be taken with passenger lifts to ensure quiet operation of the lift doors and machinery. The insulating of the lift machine and any motor generator from the floor by rubber cushions, prevents transmission of most of the noise.

Table 11 Lift Speed

Sl No.	No. of Floors	Speed m/s
i	Up to 6	0.6 to 1.0
ii	7 to 15	1.0 to 1.5
iii	16 to 20	1.5 to 1.75
iv	21 to 30	1.75 to 2.5
v	31 to 45	3.0 to 4.0
vi	46 to 60	4.0 to 6.0
vii	Above 60	6.0 and above

NOTES

1) Above table is considering buildings with average floor height of 3.0 m.

2) For office buildings average floor height is 4.2 m (see table 5 and Table 10).

3) Finalizing the lift speed for any building depends on detailed traffic analysis because number of floors, area per floor, area per person and class of building are crucial factors, which serve as inputs for such traffic analysis.

4) Finalizing the speed for hotel depends on the number of keys per floor and similarly for an observatory depends on the number of expected footfall.

5) For any building, the speed of the lifts will have to be validated against the total population and travel height of the building.

STANDARD REQUIREMENTS FOR LIFTS (Refer: Part 8, Section 5A of NBC 2016)

Minimum floor to floor height for landings on same side for horizontally sliding door is f+750 mm, where 'f' is clear entrance height, in mm. (clause 5.10.3.2)

Civil Requirements: Requirements of Lift Well Enclosure -- Requirements of the Pit -- Requirements Associated with Machine Room and Pully Room -- (Refer: clause 6.1)

Electical Installation Requirements: Main Swtches -- Residual Current Device -- Supply Cables Wiring and Apparatus --Earthing (Refer: clause 6.2)

FIRE PROTECTION REQUIREMENTS FOR LIFTS: Fire Protection Requirements of Lifts in High Rise Buildings -- Evacuation Lifts (Refer: clause 7)

MINIMUM TECHNICAL AND SAFETY REQUIREMENTS: General Requirements -- Power and Control Systems -- Capacity and Loading -- Other Technical and Safety Requirements -- Painting at works and on Site -- Emergency Manual Rescue (Refer: clause 8)

Emergency Lights for Critical Areas Battery powered (at least 2 h rating) emergency lights should be installed at critical and strategic locations including emergency exit points. These will provide illumination by self-contained battery source even on failure of a.c. mains. On resumption of a.c. power supply, they will switch back to mains automatically and simultaneous recharge the battery to the required level.

For office buildings, it is desirable to have at least a battery of 2 lifts at two or more convenient points. If this is not possible, it is advisable to have at least two lifts side by side at the main entrance and one lift each at different sections of the building for inter-communication. When two lifts are installed side by side, the machine room shall be suitably planned. All machines and switchgear may be housed in one machine room.

Minimum-Maximum Net Car Areas for Various Rated Loads (Table 24 -Clause 8.3)

Sl No.	No. of Passengers	Minimum Rated Load	Minimum Net Inside Car Area	Maximum Net Inside Car Area
		kg	m^2	m^2
i)	4	272	0.68	0.77
ii)	5	340	0.85	0.95
iii)	6	408	1.00	1.12
iv)	7	476	1.16	1.28
v)	8	544	1.31[1)]	1.45
vi)	9	612	1.46	1.60
vii)	10	680	1.61	1.76
viii)	11	748	1.77	1.91
ix)	12	816	1.92	2.05
x)	13	884	2.06	2.20
xi)	14	952	2.23	2.34
xii)	15	1020	2.35	2.47
xiii)	16	1088	2.48	2.61
xiv)	17	1156	2.62	2.74
xv)	18	1224	2.75	2.87
xvi)	19	1292	2.88	3.00
xvii)	20	1360	3.01	3.13
xviii)	21	1428	3.14	3.25
xix)	22	1496	3.26	3.38
xx)	23	1564	3.39	3.50
xxi)	24	1632	3.51	3.61
xxii)	25	1700	3.62	3.73
xxiii)	26	1768	3.74	3.85
xxiv)	27	1836	3.86	3.96
xxv)	28	1904	3.97	4.07
xxvi)	29	1972	4.08	4.18

Minimum net car inside area for fireman lift is 1.43 m2.

RECOMMENDED DIMENSIONS OF PASSANGER LIFTS & SERVICE LIFTS

(Ref: PART 8, Section 5A, Table 12, Clause 5.10.3.1 of NBC 2016)

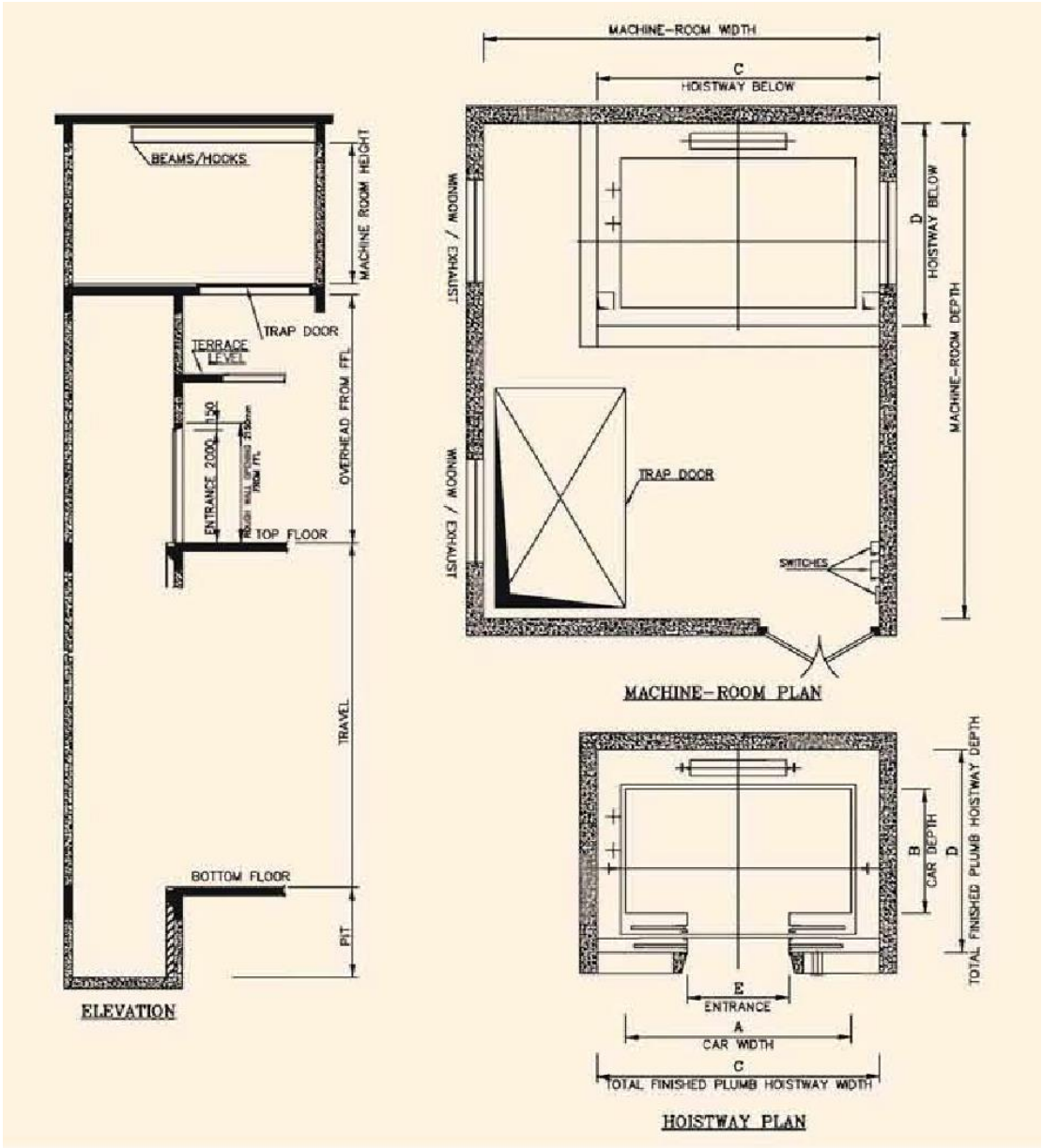


TABLE - 1

						Passenger and Service Lifts with Machine Room: Shaft Sizes													
Sl No	No. of Passengers	Rated Load	Car Size		COPD Door	Rated Speed <1 m/s		1.0 m/s ≤ Rated Speed ≤ 2.5 m/s		3.0 m/s ≤ Rated Speed ≤ 3.5 m/s		4.0 m/s ≤ Rated Speed ≤ 5.0 m/s		Rated Speed = 6.0 m/s		7.0 m/s ≤ Rated Speed ≤ 8.0 m/s		9.0 m/s ≤ Rated Speed ≤ 10.0 m/s	
						Shaft Size		Shaft Size		Shaft Size		Shaft Size		Shaft Size		Shaft Size		Shaft Size	
		kg	Width	Depth	Width	Width	Depth	Width	Depth	Width	Depth	Width	Depth	Width	Depth	Width	Depth	Width	Depth
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
i)	4	272	1100	700	800	1900	1300	1900	1300										
ii)	6	408	1100	1000	800	1900	1700	1900	1700										
iii)	8	544	1300	1100	800	1900	1900	1900	1900										
iv)	10	680	1300	1350	800	1900	2150	1900	2150										
v)	13	884	2000	1100	900	2600	1900	2600	1900										
vi)	14	952	1600	1400	900	2200	2100	2200	2100	2200	2150	2250	2150	2250	2250	2300	2300	2300	2450
vii)	16	1088	1600	1600	1000	2300	2300	2300	2300	2300	2350	2300	2350	2300	2450	2300	2500	2300	2650
viii)	18	1224	2000	1400	1100			2600	2100	2600	2150	2600	2150	2600	2250	2700	2300	2700	2450
ix)	20	1360	2000	1500	1100			2600	2100	2600	2250	2600	2250	2600	2350	2700	2400	2700	2550
x)	22	1496	2100	1600	1100			2700	2300	2700	2350	2700	2350	2700	2450	2800	2500	2800	2550
xi)	26	1768	2350	1600	1200			3000	2300	3000	2350	3000	2350	3000	2450	3050	2550	3050	2550
xii)	29	1972	2350	1700	1200					3000	2500	3000	2500	3000	2550	3050	2600	3050	2700

(All dimensions are in millimeters)

Notes:

1. All dimensions given above for lifts having centre opening power operated doors (COPD) with counterweight at rear, are recommended dimensions primarily for architects and building planners. Any variations mutually agreed between the manufacturer & the purchaser are permitted. However, variation in,
   a) Car inside dimensions shall be within the minimum and maximum area limits specified in accordance with accepted standards.
   b) Entrance width on higher side is permitted.
   c) Entrance width on lower side is permitted up to 100 mm subject to minimum of 700 mm
2. The minimum size of the lift car and all other requirements relating to accessibility, in all public buildings shall be in accordance with 13 of Part 3 'Development Control Rules and General Building requirements' of the code.

TABLE – 2
Recommended Dimensions of Stretcher / Hospital Lifts
(Ref: PART 8, Section 5A, Table 13, Clause 5.10.3.1 of NBC 2016)

							Hospital Bed / Stretcher Lifts with Machine Room: Shaft Sizes													
Sl No	No. of Passengers	Rated Load	Rounded off Rated Load	Car Size		2P TSPD Door	Rated Speed <1 m/s		0.6 m/s ≤ Rated Speed ≤ 2.5 m/s		3.0 m/s ≤ Rated Speed ≤ 3.5 m/s		4.0 m/s ≤ Rated Speed ≤ 5.0 m/s		Rated Speed = 6.0 m/s		7.0 m/s ≤ Rated Speed ≤ 8.0 m/s		9.0 m/s ≤ Rated Speed ≤ 10.0 m/s	
							Shaft Size		Shaft Size		Shaft Size		Shaft Size		Shaft Size		Shaft Size		Shaft Size	
		kg	kg	Width	Depth	Width	Width	Depth	Width	Depth	Width	Depth	Width	Depth	Width	Depth	Width	Depth	Width	Depth
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
i)	15	1020		1000	2400	800	1800	3000	1800	3000										
ii)	20	1360		1300	2400	1200			2300	3000	2350	3000	2350	3000	2350	3000	2500	3000	2500	3000
iii)	26	1768	1800	1400	2550	1200			2500	3050	2500	3050	2500	3050	2500	3050	2600	3150	2650	3150
iv)	29	1972	2000	1500	2700	1400			2650	3200	2600	3200	2600	3200	2600	3200	2700	3200	2700	3200
v)	36	2448	2500	1800	2700	1400			2800	3150	2900	3200	2900	3200	2900	3200	3000	3200	3000	3200

(All dimensions are in millimeters)

Notes:

1. All dimensions given above for lifts having Two panel telescopic doors (2P TSPD) with counterweight at side, are recommended dimensions primarily for architects and building planners. Any variations mutually agreed between the manufacturer & the purchaser are permitted. However, variation in:
   a) Car inside dimensions shall be within the maximum area limits specified in accordance with accepted standards.
   b) Entrance width on higher side is permitted.
   c) Entrance width on lower side is permitted up to 100 mm subject to minimum of 700 mm.
2. Car depth of 2100 mm may be considered in residential/commercial buildings, where use of only ambulance stretcher is envisaged. The hoist-way depth may be reduced accordingly.

TABLE – 3

Recommended Dimensions of Goods Lifts with Machine Room

(Ref: PART 8, Section 5A, Table 14, Clause 5.10.3.1 of NBC 2016)

					Goods Lifts with Machine Room: Shaft Sizes											
Sl No	Rated Load	Car Size		COPD Door	0.6 m/s ≤ Rated Speed ≤ 2.5 m/s		3.0 m/s ≤ Rated Speed ≤ 3.5 m/s		4.0 m/s ≤ Rated Speed ≤ 5.0 m/s		Rated Speed = 6.0 m/s		7.0 m/s ≤ Rated Speed ≤ 8.0 m/s		9.0 m/s ≤ Rated Speed ≤ 10.0 m/s	
					Shaft Size		Shaft Size		Shaft Size		Shaft Size		Shaft Size		Shaft Size	
	kg	Width	Depth	Width	Width	Depth	Width	Depth	Width	Depth	Width	Depth	Width	Depth	Width	Depth
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
i)	1000	1400	1800	2P-tel-1200	2300	2350										
ii)	1500	1700	2000	4P-1500	2750	2550										
iii)	2000	1700	2500	4P-1500	2800	3050	2800	3050	2900	3050	3000	3050	3000	3050	3000	3050
iv)	2500	2000	2500	4P-1700	3000	3050	3000	3050	3100	3050	3200	3050	3200	3050	3200	3050
v)	3000	2000	3000	4P-1700	3000	3550	3000	3550	3100	3550	3200	3550	3200	3550	3200	3550
vi)	4000	2500	3000	6P-2100	3700	3650	3700	3650								
vii)	5000	2500	3600	6P-2100	3850	4250	3850	4250								

(All dimensions are in millimeters)

Notes:

All dimensions given above for lifts having Centre Opening power operated doors (COPD) with counterweight at side, are recommended dimensions primarily for architects and building planners. Any variations mutually agreed between the manufacturer & the purchaser are permitted. However the minimum rated load for the goods lift shall be based on a load of not less than 3.45 kN/m² of the net inside car area.

TABLE – 4

Recommended Dimensions of Machine Room Height, Overhead, Pit depth for Passenger, Goods, Stretcher/Hospital Lifts with Machine Room

(Ref: PART 8, Section 5A, Table 15, Clause 5.10.3.1 of NBC 2016)

(For speed up to 3.5 m/s)

Sl No	No. of Passengers	Rated Load	Dimensions of Pit Depth, Overhead Height (HR) and Machine Room Height (MR)																					
			0.7 m/s			1.0 m/s			1.6 m/s			2 m/s			2.5 m/s			3.0 m/s			3.5 m/s		
		kg	Pit Depth	HR	MR	Pit Depth	HR	MR	Pit Depth	HR	MR	Pit Depth	HR	MR	Pit Depth	HR	MR	Pit Depth	HR	MR	Pit Depth	HR	MR
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
i)	4	272	1350	CH+1900	2500	1500	CH+1950	2500	1600	CH+2400	2500	2200	CH+2800	2500										
ii)	6	408	1350	CH+1900	2500	1500	CH+1950	2500	1600	CH+2400	2500	2200	CH+2800	2500										
iii)	8	544	1350	CH+1900	2500	1500	CH+1950	2500	1600	CH+2400	2500	2200	CH+2800	2500										
iv)	10	680	1350	CH+1900	2500	1500	CH+1950	2500	1600	CH+2400	2500	2200	CH+2800	2500										
v)	13	884	1350	CH+1900	2500	1500	CH+1950	2500	1600	CH+2400	2500	2200	CH+2800	2500										
vi)	14	952				1500	CH+1950	2500	1800	CH+2400	2500	2200	CH+2800	2500	2500	CH+3000	2500	3000	CH+3000	3000	4500	CH+3450	3000	
vii)	16	1088/1000				1500	CH+1950	2500	1800	CH+2400	2500	2200	CH+2800	2500	2500	CH+3000	2500	3000	CH+3000	3000	4500	CH+3450	3000	
viii)	18	1224				1500	CH+1950	2500	1800	CH+2400	2500	2200	CH+2800	2500	2500	CH+3000	2500	3000	CH+3000	3000	4500	CH+3450	3000	
ix)	20	1360				1500	CH+1950	2500	1800	CH+2400	2500	2200	CH+2800	2500	2500	CH+3000	3000	3000	CH+3000	3000	4500	CH+3450	3000	
x)	22	1496/1500				1500	CH+1950	2500	1800	CH+2400	3000	2200	CH+2800	3000	2500	CH+3000	3000	3000	CH+3000	3000	4500	CH+3450	3000	
xi)	26	1768				1500	CH+1950	3000	1800	CH+2400	3000	2200	CH+2800	3000	2500	CH+3000	3000	3000	CH+3450	3000	4500	CH+3450	3000	
xii)	29	1972/2000				1600	CH+1950	3000	1800	CH+2400	3000	2200	CH+2800	3000	2500	CH+3000	3000	3000	CH+3450	3000	4600	CH+3450	3000	
xiii)		2500				1800	CH+1950	4000	1800	CH+2400	4000	2200	CH+2800	4000	2500	CH+3000	4000	3000	CH+3450	4000	4600	CH+3450	4000	

(All dimensions are in millimeters)

(For speed from 4.0 m/s to 10.0 m/s)

Dimensions of Pit Depth, Overhead Height (HR) and Machine Room Height (MR)

Sl No	No. of Passengers	Rated Load	0.7 m/s			1.0 m/s			1.6 m/s			2 m/s			2.5 m/s			3.0 m/s			3.5 m/s		
		kg	Pit Depth	HR	MR	Pit Depth	HR	MR	Pit Depth	HR	MR	Pit Depth	HR	MR	Pit Depth	HR	MR	Pit Depth	HR	MR	Pit Depth	HR	MR
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
i)	14	952	4600	CH+3450	4000	4700	CH+3450	4000	5500	CH+3800	4300	5900	CH+5000	4300	6500	CH+5800	4300	7100	CH+6500	5000	7500	CH+6900	5000
ii)	16	1088/1000	4600	CH+3450	4000	4700	CH+3450	4000	5500	CH+3800	4300	5900	CH+5000	4300	6500	CH+5800	4300	7100	CH+6500	5000	7500	CH+6900	5000
iii)	18	1224	4600	CH+3450	4000	4700	CH+3450	4000	5500	CH+3800	4300	5900	CH+5000	4300	6500	CH+5800	4300	7100	CH+6500	5000	7500	CH+6900	5000
iv)	20	1360	4600	CH+3450	4000	4700	CH+3450	4000	5500	CH+3800	4300	5900	CH+5000	4300	6500	CH+5800	4300	7100	CH+6500	5000	7500	CH+6900	5000
v)	22	1496/1500	4600	CH+3450	4000	4700	CH+3450	4000	5500	CH+3800	4300	5900	CH+5000	4300	6500	CH+5800	4300	7100	CH+6500	5000	7500	CH+6900	5000
vi)	26	1768	4600	CH+3450	4000	4700	CH+3450	4300	5500	CH+3800	4300	5900	CH+5000	4300	6500	CH+5800	4300	7100	CH+6500	5000	7500	CH+6900	5000
vii)	29	1972/2000	4600	CH+3450	4000	4700	CH+3450	4300	5500	CH+3800	4300	5900	CH+5000	5000	6500	CH+5800	5000	7100	CH+6500	5000	7500	CH+6900	5000
viii)		2500	4600	CH+3450	4300	4700	CH+3450	5000	5500	CH+3800	5000	5900	CH+5500	5000	6500	CH+6300	5000	7100	CH+7000	5000	7500	CH+7500	5000
ix)		3000	4600	CH+3600	4300	4700	CH+3600	5000	5500	CH+4000	5000	5900	CH+5500	5000	6500	CH+6300	5000	7100	CH+7000	5000	7500	CH+7500	5000

(All dimensions are in millimeters)
CH – Car clear inside height measured from Car finished floor level to false ceiling.

Notes:

1. Recommended dimensions for pit depth, overhead and Machine-Room for different lift speeds are given in the table above. These dimensions may differ in practice as per individual manufacturer's design depending upon load, speed and drive. However, the Pit Depth and Overhead shall be such as to conform to the requirements of bottom clearance and top clearance in accordance with the accepted standards.
2. In case of Goods lifts of minimum pit depth required is 1600 mm.
3. In case of lift speeds 3.5 m/s and 4.0 m/s with rear counterweight the Pit Depth requirement could be less by about 500 mm to 1000 mm.

TABLE – 5

Recommended dimensions of Automobile Lifts with Machine Room – Through Type Car (Rated Speed = 0.6 m/s or 1.0 m/s)

(Ref: PART 8, Section 5A, Table 16, Clause 5.10.3.1 of NBC 2016)

Sl No	Rated Load	Car Size		COPD Door	Shaft Size		Car Height	Overhead Height	Pit Depth	Machine Room Height
		Width	Depth	Width	Width	Depth	CH	HR	PH	MR
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
i)	2500	2500	5300	4P-2400	4000	6100	2400	5200	1800	4000
ii)	3000	2700	5400	4P-2400	4000	6200	2400	5200	1800	4000
iii)	4000	3000	5800	6P-3000	4300	6700	2400	5200	2000	4500
iv)	5000	3000	6000	6P-3000	4300	6900	2400	5200	2000	4500

(All dimensions are in millimeters)

Notes:

1. All dimensions given above for lifts having centre opening power operated doors (COPD) with counterweight at side, are recommended dimensions primarily for architects and building planners. Any variations mutually agreed to between the manufacturer and the purchaser are permitted. However, the minimum rated load for the automobile lift shall be based on a load of not less than 1.45 kN/m² of the net inside car area.

2. Dimensions of machine room height, pit depth and overload may differ in practice as per individual manufacturer's design depending upon load, speed and drive. However, the pit depth and overhead shall be such as to conform to the requirement of bottom clearance and top clearance in accordance with the accepted standards.
3. The lift car width should be selected such that in case of emergency while the automobile is in the car-lift the driver should be able to open the automobile door and come out of the automobile.

Recommended dimensions of Dumbwaiter Lifts
(Ref: PART 8, Section 5A, Table 17, Clause 5.10.3.1 of NBC 2016)

Sl No	Load	Car Inside			Lift Well		Entrance
	kg	A	B	H	C	D	E
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	100	700	700	800	1200	900	700
ii)	150	800	800	900	1300	1000	800
iii)	200	900	900	1000	1400	1100	900
iv)	250	1000	1000	1200	1500	1200	1000

(All dimensions are in millimeters)

Notes:
Entrance width 'E' is based on assumption of provision of vertical biparting doors (No car door is normally provided)

TABLE – 7
Recommended dimensions of Passenger Lifts MRL COPD
(Ref: PART 8, Section 5A, Table 18, Clause 5.10.3.1 of NBC 2016)

Sl No	No. of Passengers	Rated Load	Car Size		2 P COPD Door	1.0 m/s ≤ Rated Speed ≤ 2.0 m/s Shaft Size		Rated speed = 2.5 m/s Shaft Size		Rated speed = 3.0 m/s Shaft Size	
		kg	Width	Depth	Width	Width	Depth	Width	Depth	Width	Depth
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
i)	4	272	900	850	700	1600	1550				
ii)	6	408	1000	1100	800	2000	1700				
iii)	8	544	1300	1100	800	2150	1800				
iv)	10	680	1350	1300	800	2150	1900				
v)	13	884	1600	1400	1000	2550	1950	2550	2050	2550	2250
vi)	15	1020	1600	1550	1000	2550	2050	2550	2150	2550	2250
vii)	16	1088	1600	1600	1000	2550	2100	2550	2200	2550	2300
viii)	20	1360	1800	1700	1100	2700	2300	2700	2350	2700	2350
ix)	22	1496	1800	1900	1100	2700	2400	2750	2450	2750	2450
x)	26	1768	1900	2000	1100	2800	2450	2850	2450	2850	2500
xi)	29	1972	2350	1700	1200	3100	2200	3100	2200		

(All dimensions are in millimeters)

Notes:

1) All dimensions given above for lifts having center opening power operated doors (COPD) with counterweight at side, are recommended dimensions primarily for architects and building planners. Any variations mutually agreed to between the manufacturer and the purchaser are permitted. However, variation in,
   a) Car inside dimensions shall be within the maximum area limits specified in accordance with accepted standards.

   b) Entrance width on higher side is permitted.

   c) Entrance width on lower side is permitted up to 100 mm subject to minimum of 700 mm.

2) The minimum size of the lift car and all other requirement relating to accessibility, in all public buildings shall be in accordance with 13 of part 3 'Development Control Rules and General Building Requirements' of the Code.

TABLE – 8
Recommended dimensions of Stretcher/Hospital Lifts MRL (2P Telescopic Door/4P COPD, Speed 1.0 m/s to 2.0 m/s)
(Ref: PART 8, Section 5A, Table 19, Clause 5.10.3.1 of NBC 2016)

Sl No	Rated Load		Car Size		Door Size	Shaft Size	
	Persons	kg	Width	Depth		Width	Depth
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	15	1020	1100	2400	900	2150	2950
ii)	20	1360	1300	2400	1200	2350	2950
iii)	23	1600	1400	2400	1300	2450	2950
iv)	29	2000	1500	2700	1300	2450	3250

Notes:

1) All dimensions given above for lifts having 2 panel telescopic or 4 panel center opening power operated doors (4P COPD) with counterweight at side, are recommended dimensions primarily for architects and building planners. Any variations mutually agreed to between the manufacturer and the purchaser are permitted. However, variation in,
   i) Car inside dimensions shall be within the maximum area limits specified in accordance with accepted standards.
   ii) Entrance width on higher side is permitted.
   iii) Entrance width on lower side is permitted up to 100 mm subject to minimum of 700 mm.
2) Car depth of 2100 mm may be considered in residential/commercial buildings where use of only ambulance stretcher is envisaged. The hoist-way depth maybe reduced accordingly.

TABLE – 9
Pit Depth for Passenger/Stretcher/Hospital Lifts MRL
(Ref: PART 8, Section 5A, Table 20, Clause 5.10.3.1 of NBC 2016)

Sl No	No of Passengers	Pit Depth for Speed					
		1 m/s	1.6 m/s	1.8 m/s	2.0 m/s	2.5 m/s	3.0 m/s
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	4	1600	1800	2000	2200		
ii)	6	1600	1800	2000	2200		
iii)	8	1600	1800	2000	2200		
iv)	10	1600	1800	2000	2200		
v)	13	1600	1800	2000	2200	2500	3100
vi)	15	1600	1800	2000	2200	2500	3100
vii)	16	1600	1800	2000	2200	2500	3100
viii)	20	1800	1800	2000	2200	2500	3100
ix)	22	1800	1800	2000	2200	2500	3100
x)	26	1800	1800	2000	2200	2500	3100
xi)	29	1800	1800	2000	2200	2500	

(All dimensions are in millimeters)

Notes:

Recommended dimensions for pit depth for different lift speeds are given in the table. These dimensions may differ in practice as per individual manufacturers design depending upon load,

speed and drive. However, the pit depth shall be such as to conform to the requirements of bottom clearance and top clearance in accordance with the accepted standards.

TABLE – 10
Overhead Height for Passenger and Stretcher/Hospital Lifts MRL
(Ref: PART 8, Section 5A, Table 21, Clause 5.10.3.1 of NBC 2016)

Sl No	No of Passengers	For Speed			
		1 m/s	1.6 m/s ≤ Rated Speed ≤ 2.0 m/s	2.5 m/s	3.0 m/s
(1)	(2)	(3)	(4)	(5)	(6)
i)	4	CH + 1900	CH + 2400		
ii)	6	CH + 1900	CH + 2400		
iii)	8	CH + 1900	CH + 2400		
iv)	10	CH + 1900	CH + 2400		
v)	13	CH + 1900	CH + 2400	CH + 2600	CH + 2800
vi)	15	CH + 1900	CH + 2400	CH + 2600	CH + 2800
vii)	16	CH + 1900	CH + 2400	CH + 2600	CH + 2800
viii)	20	CH + 1900	CH + 2400	CH + 2600	CH + 2800
ix)	22	CH + 1900	CH + 2400	CH + 2600	CH + 2800
x)	26	CH + 1900	CH + 2400	CH + 2600	CH + 2800
xi)	29	CH + 1900	CH + 2400	CH + 2600	

(All dimensions are in millimeters)

Notes:

Recommended dimensions for overhead for different lift speeds are given in the table. These dimensions may differ in practice as per individual manufacturers design depending upon load, speed and drive. However, the overhead shall be such as to conform to the requirements of bottom clearance and top clearance in accordance with the accepted standards.

TABLE – 11
Recommended dimensions of Goods Lifts MRL (Speed 1.0 m/s)
(Ref: PART 8, Section 5A, Table 22, Clause 5.10.3.1 of NBC 2016)

Sl No	Rated Load	Car Size		Door Size	Telescopic Door Shaft Size		4P COPD Shaft Size		2P COPD Shaft Size		Overhead Height	Pit Depth
	kg	Width	Depth	Width	Width	Depth	Width	Depth	Width	Depth	HR	PH
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
i)	500	1300	1100	800					1950	1800	CH + 1900	1600
ii)	1000	1600	1550	1000					2250	2050	CH + 1900	1600
iii)	1600	1400	2400	1300	2550	3000	2500	3000			CH + 1900	1800
iv)	2000	1500	2700	1300	2550	3300	2550	3300			CH + 1900	1800
v)	2500	1800	2650	1700			3150	3250			CH + 2100	1800
vi)	3000	2000	2700	1800			3350	3300			CH + 2100	1800
vii)	4000	2100	3400	1800			3400	4000			CH + 2100	2100
viii)	5000	2500	2500	2200			3800	4100			CH + 2400	2200

Notes:

1) CH is the clear car height from car finished floor level to car roof (goods lifts will normally not have any false ceilings)
2) Normal range for CH is 2100 mm to 2400 mm.
3) Door height is less than or equal to the car height CH.
4) In case counterweight safety is applicable check for dimensions with lift manufacturer.

5) All dimensions given above for lifts having telescopic or centre opening power operated doors (COPD) with counterweight at side, are recommended dimensions primarily for architects and building planners. Any variations mutually agreed to between the manufacturer and the purchaser are permitted. However, the minimum rated load for the goods lift shall be based on a load of not less than 3.45 kN/m² of the net inside car area.
6) Recommended dimensions for overhead and pit depth for different lift speeds are given in the table. These dimensions may differ in practice as per individual manufacturers design depending upon load, speed and drive. However, the overhead and pit depth shall be such as to conform the requirements of bottom clearance and top clearance in accordance with the accepted standards.

TABLE – 12
Recommended Dimensions of Automobile Lifts MRL COPD (Speed 0.5 m/s to 1.0 m/s)
(Ref: PART 8, Section 5A, Table 23, Clause 5.10.3.1 of NBC 2016)

Sl No	Rated Load	Car Size		6P COPD Door Size: Opposite Entrances	Shaft Size		Overhead Height	Pit Depth
	kg	Width	Depth	Width	Width	Depth	HR	PH
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	3000	2500	5500	2200	3800	6450	4850	2500
ii)	4000	3000	6000	2700	4300	6950	4850	2500

(All dimensions are in millimeters)

Notes:

1) Car height normal range is 2100 mm to 2700 mm.
2) Overhead height shown is required for all values of car height CH shown above.
3) In case counterweight safety is applicable check for dimensions with lift manufacturer.
4) All dimensions given above for machine room less lifts with 6 panel center opening power doors (6P COPD) used for automobiles are recommended dimensions for architects and building planners. Any variations mutually agreed to between the manufacturer and the purchaser are permitted. However, the minimum rated load for the automobile lift shall be based on a load of not less than 1.45kN/m² of the net inside car area.
5) Dimensions of pit depth and overhead may differ in practice as per individual manufacturers design depending upon load, speed and drive. However, the pit depth and overhead shall be such as to conform to the requirements of bottom clearance and top clearance in accordance with the accepted standards.
6) The lift car width should be selected such that in case of emergency while the automobile is in the lift car the driver should be able to open the automobile door and come out of the automobile.

B. REQUIREMENT FOR ELECTRICAL SUB STATION (see clause 5.3.1.3)

Spaces for Electrical Installations

The spaces required for different electrical installations are given at 3.1 to 3.3

Electric Sub-station – The norms given in 3.1.1 and 3.1.2 shall be adopted for provision of space for sub-station.

AREA REQUIRED FOR TRANSFORMER ROOM AND SUBSTATION FOR DIFFERENT CAPACITIES

C-1 The requirement for area for transformer room and substation for different capacities of transformers is given below for guidance:

Capacity of Transformer (kVA)	Total Transformer Room Area, Min	Total Substation Area (Incoming, HV Panels, MV Panels, Transformer Roof but Without Generators), Min	Suggested Minimum Face Width
1 × 160	14.0	90	9.0
2 × 160	28.0	118	13.5
1 × 250	15.0	91	9.0
2 × 250	30.0	121	13.5
1 × 400	16.5	93	9.0
2 × 400	33.0	125	13.5
3 × 400	49.5	167	18.0
2 × 500	36.0	130	14.5
3 × 500	54.0	172	19.0
2 × 630	36.0	132	14.5
3 × 630	54.0	176	19.0
2 × 800	39.0	135	14.5
3 × 800	58.0	181	14.0
2 × 1000	39.0	149	14.5
3 × 1000	58.0	197	19.0

NOTES:

1 The areas given in respect of the different categories of rooms hold good, if they are provided with independent access doors in accordance with local regulations.

2 The minimum height of substation room/HV switch room/MV switch room shall be arrived at considering 1 200 mm clearance requirement from top of the equipment to the below of the soffit of the beam. In case cable entry/exit is from above the equipment (transformer, HV switchgear, MV switchgear), height of substation room/HV switch room/MV switch room shall also take into account requirement of space for turning radius of cable above the equipment height

3 Additional space will be required in cases where the load requirement calls for redundancy for enhanced reliability through addition of switchgear, such as, bus couplers, etc.

4 For transformers of other capacity, it may lead to some minor changes in dimensioning.

The break-up spaces required for different installations in a sub-station are given as below:

1. Supply company's Switchgear room and or space of meters.
2. *Transformer Rooms:* The number and size of transformer rooms shall be ascertained from the total power requirements of the company. To determine the size of transformer and clearance around a transformer, reference may be made to good practice (I.S.1887-1967 code of practice for installation and maintenance of Transformer). A 500 KVA transformer may be provided with a minimum space of 4 m. X 4 m.
   If transformer is to be installed outdoor space shall be provided on similar considerations and adequate provision for safety enclosure is to be made. For transformer having large oil content (more than 2000 lt.) soak pits are to be provided in accordance with rule 64 of Indian Electricity Rules, 1956.
3. *High Voltage Switch Rooms*: In case of sub-station having one transformer, the owner is required to provide only one high voltage switch. In the case of single point supply for two transformers, the number of switches required is 3 and for 'n' transformers the number of switches is n+1. The floor area required in case of a single switch will be roughly 4mX1m and for every additional switch the length should be increased by 1m.
4. *Low Voltage Switch Rooms*: The floor area requirement in respect of low voltage switchgear room cannot be determined by any formula.

5. *Room for Stand-by-Generator*: A room space not less than 6 m. X 9 m. may be provided for housing a standby Generator set of 50 KW.

Location of electric sub-station in basement of multi-storeyed buildings:

1 The electric sub-station should be provided in the approved/sanctioned covered area of the buildings not below the first basement level and should be on the periphery of the building with clear independent round the clock approach having proper ramp with slope.
The ramp should be designed in such a manner that in case of fire no smoke should enter the main buildings. The exit from basement electric sub-station shall have self-closing fire/smoke check doors of 2 hours. F.R. near entry to ramp. Additional exit shall be provided if travelled distance from the farthest corner of the ramp is more than 15m.

2 The electric sub-station should be totally segregated from rest of the basement having 4 hours. F.R. wall and should have adequate internal lighting and ventilation. A perfect independent ventilation system of 30 air charges per hour linked with detection as well as automatic medium velocity water spray system for individual transformer shall be located outside the building at ground floor, fire control room shall be manned round the clock and shall also have and audio system in the basement as well as in the control room. No

service such as water, sewer, air-conditioning, gas pipes or telegraphs services should pass through electric substation of the cable trench.

3. The rising mains should be of metal bus bars. The floor of electric substation should be 2 ft above the rest of basement floor and designed suitably to carry 10 tons of transformer weight on wheels also having provision of proper cable trenches 0.6 X 0.6 m. depth. Dummy floor of 0.6 m. depth be provided to facilitate laying of cables inside the building connecting to equipment. Fire retarding cables should be provided and cable trenches be filed with said cables. R.C.C. pipes at suitably places as required will be provided for cable entries to the sub-station spaces with suitable water proofing arrangement. A provision of 12 ft. clear height below Beams should be made in the electric sub-station area along with adequate arrangement for fixing chain pulley block for a load of 15 tons. Provision of sumps shall be kept in the floor so that complete volume of transformer oil in the event of spill over could be accommodated. Sufficient arrangement to prevent spread of fire to oil pumps is made.

4. Transformers room and sub-station room shall be provided with steel shutters of 8' X 8' with suitable grills. Sufficient arrangement for pumping the water out, in case of flooding should be made to minimize loss to switchgear and transformer.

5. In view of experience of installation of exhaust chimneys in the multi-storeyed buildings at undesirable locations, proper provision in the form of vertical exhaust leading to above terrace level should be made for the substation.

6. Electric sub-station space should be made available free of cost by promoters and should be free of seepage/leakage of water. There should be no combustible material kept in side or in the vicinity. Periodic inspection of electric sub-station shall be mandatory and violation of any byelaw will be dealt, sternly with penalty and immediate disconnection.

Ideal Location

(i) The ideal location for an electric sub-station for a building or group of buildings would be at the load center and shall be located on the ground floor in a separate building. Such building should have direct access through a motorable road to ensure easy access or removal of equipment. The floor level of the sub-station or switch room (in case of LT) shall be above the highest flood level of the locality.

(ii) In case the sub-station has to be located within the main building itself for unavoidable reasons, then it should be located on ground floor with easy access from outside. Location of sub-station in the basement floors should be avoided as far as possible on account of likely flooding and fi re hazard. In case it is unavoidable, then fool proof anti-flooding measures have to be taken, which includes provision of automatic dewatering pumping and construction of waterproof basement. Such portion (for sub-station) should be isolated from the rest of basement and should have easy entry and exit arrangement. Also, suitable mechanical ventilation and fi re detection/ protection system to be provided to conform to B.I.S. requirements and requirements of local fi re authority. Only dry type transformers and switchgear to be provided, unless they are installed in a separate service building separated from the main building.

(iii) Emergency power supply equipment (such as generating sets) shall not be allowed to be installed above ground floor or below first basement level of building. 10

(iv) Facility for connection from sub-station to adjoining building to feed emergency load shall be permitted.

Other Requirements for Sub-station

1. The sub-station will preferably be located on the ground level failing which it can be in the basement floor in no case at higher level.
2. The entire space will be provided at one floor in continuation.
3. The minimum width of the sub-station space shall not be less than 6 m.
4. The areas given above in respect of the different categories of rooms hold good if they are provided with windows and independent access doors.
5. All the rooms should be provided with partition up to the Ceilings and shall have proper ventilation. Special care should be taken to ventilate the transformer rooms and where necessary, louvers at lower levels and exhaust fans at higher level shall be provided at suitable locations.
6. In order to prevent storm water entering the transformer and switch rooms through the soak pits, the floor level of the sub-station shall be at least 15 cm above the highest flood water level that may be anticipated in the locality.

Cable Trenches Shafts Etc.

1. Suitable number of vertical shafts, rising mains, distribution boxes, etc. shall also be provided as per the requirements at suitable location. Cable trenches with suitable handy covers for entry of the cables up to the substation onwards up to the street adjoining other building shall also be provided as per the requirements.
   These vertical shafts, rising mains, distribution boxes, cable trenches, etc. shall be so constructed as to be accessible only to authorized personnel. The rising mains and other installations in the vertical shafts, tap off boxes distribution boxes etc. required at each floor shall be provided, installed and maintained by the owner at their own cost. Adequate enclosed space shall also be provided at each floor for installation of equipment's for distribution on respective floors such as distribution boxes, cut-out, and meter boxes and main switches.
2. Location of Switch Room: In large installations other than where a substation is provided, a separate switch room shall be provided. This shall be located as closely possible to the electrical load centre and suitable ducts shall be laid with minimum number of bends form the point of entry of the supply to the position of the main switchgear. The switch room shall also be placed in such a position that rising ducts may readily be provided there from to the upper floors of the building in one straight vertical run. In larger building, more than one rising duct and horizontal ducts may also be required for running cables from the switch room to the foot of each rising main. Such cable ducts shall be reserved for the electrical services only, which may, however, include medium and low voltage installations, such as call bell systems. Telephone installation should be suitably segregated. Power distribution shall start with suitable number of rising mains (or rising cables) for vertical distribution. A large building will be divided into suitable number of parts, each part served by a rising main. Suitable provision shall be kept for laying cables/ bus duct from switch room to feed each rising main.
3. *Location and Requirement of Distribution Panels:* The electrical gear distribution panels and other apparatus, which are required on such floor, may conveniently be mounted adjacent to the rising mains, and adequate space should be provided at each floor for this purpose.
   LT Distribution Switchgear Only following type switchboards will be used: (a) Main/Submain switchboard of cubicle type. (b) DBs – Conventional DBs of reputed makes can also be used with the approval of technical sanctioning authority in addition to prewired DB. (c) Specially designed switchboards. Also specially designed switchboards can be used with detailed specification and fabrication drawings approved by the technical sanctioning authority
   Location of Switchboards (i) Switchboards are to be located in common areas like corridors, lobby etc. and not to be located in locked room. (ii) Switchboard shall be located only in dry situation and in well-ventilated space. They shall not be placed in the vicinity of storage battery or exposed to chemical fume. 38 (iii) Switchboards shall not be erected above gas stove, or sinks or within 2.5 meter of any washing unit in washing rooms of launderings or in the bath rooms, toilets, or kitchen. (iv) As far as possible main boards shall not be located in basement. Such main boards can be located in

ground floor. (v) It is preferable to locate floor main boards in rising main shafts of adequate size, with steel doors (having ventilation) or in suitable room. (vi) Similarly DBs can be in suitable nitches in corridor walls having doors. (vii) Locating main boards under staircase or standing open in corridor is not a desirable practice, besides being highly unaesthetic. (viii) The main switchboard, which receives power to the building, should be invariably located in a switch room, having round the clock access, for emergency attendance to the switchboard

4. Location and Requirement of PBX/PABX Room: Information regarding provision and location of PBX/PABX room, telephone outlets and riser shall be ascertained form the relevant Authority.
   Adequate space should be provided for installation of Sub-Distribution Board.

GENERAL

The maintenance of the built-up space for electric sub-station, distribution equipment, vertical shafts and enclosure at each floor shall be done by the owner. The standby arrangement for electricity supply up to and including the substation equipment and distribution pillars at the sub-station shall be provided compulsorily.

APPENDIX-XV
WATER REQUIREMENT, WASTEWATER GENERATION AND TREATMENT OF WASTEWATER IN BUILDINGS

A. Classification of Buildings:

For the purpose of assessing the water requirement for buildings, the buildings are classified as follows;

I. Residential

II. Non-Residential

1. Group A: Hotels
2. Group B: Educational
3. Group C: Institutional / Hospital
4. Group D: Assembly
5. Group E: Business
6. Group F: Mercantile
7. Group G: Industrial
8. Group H: Storage
9. Group I: Hazardous
10. Traffic Terminal Stations

In case of mixed use buildings, the portion of the building proposed for each use shall be considered for assessing the water requirement for each use, as specified herein and the cumulative requirement shall be considered as the water requirement for the building;

B. Components of Project to assess Water Requirement:

The following components in the Project related to water requirement, as applicable, shall be specified for each building to assess the water requirement;

I. Source of Domestic Water Supply –

The domestic water supply for the building shall be through any of the following systems or a combination of them;

1. From MCC water supply system
2. From Well / Borewell (with or without Water Treatment Plant - WTP)
3. From Rainwater Harvesting system (with or without WTP)
4. From Water Tanker

This information is required to assess the overall water requirements in the city.

II. Domestic Water Distribution System –

The domestic water distribution system in the building shall be though any of the following systems;

1. Direct supply from Centralised Water Supply System (MCC or Private), without Over Head Tank (OHT) and Sump Tank
2. Gravity distribution System from OHT, with or without Sump Tank.
3. Pressurised distribution System through Hydro pneumatic pumping System.

III. Sewerage System and Reuse of Treated Water –

The Sewerage System for the building shall be any of the following systems, for treatment of wastewater (grey or / and black water), reuse of treated wastewater and disposal of treated and untreated wastewater.

Note:

1. *Sewage – Black Water*
2. *Sullage – Grey Water*
3. *STP – 'Sewage Treatment Plant' usually refers to Plants designed for treating grey water and black water together. STP may also be for treating exclusively black water.*
4. *SuTP – Sullage Treatment Plant refers to Plants designed for treating grey water.*
5. *UGD – City Level Under Ground Drainage System*

Various scenarios for Wastewater Treatment & Disposal are as follows;

1. Buildings where UGD is available –

a) Scenario 1:

i. 100% Sullage Treatment in SuTP for reuse of treated water & Excess Treated Water to be used for Ground Water Recharge or Disposal into Storm Water Drains as per the Water Balance Chart.

ii. 100% Sewage disposal into UGD, if permitted by MCC, as per the Water Balance Chart.

b) Scenario 2:

iii. 100% Sullage Treatment in SuTP for reuse of treated water as per the Water Balance Chart.

iv. Sewage treatment in STP/ETP to the extent of additional treated water required as per the Water Balance Chart.

v. Excess sewage disposal into UGD, if permitted by MCC, as per the Water Balance Chart.

Note: *1. This system shall be permitted where the total requirement of treated water to be reused in the building is more than the treated water generated in SuTP and additional treated water required is generated from STP/ETP.*
2.If approval for a Project is obtained under Scenario 1, but during the course of operation, it is observed (through the automated metering system installed in the project) that the total requirement of treated water to be reused in the building is more than the treated water generated in SuTP, then additional STP/ETP has to be installed in the Project as per Scenario 2.

c) Scenario 3:

100% Sullage and Sewage treatment in STP/ETP for reuse of treated water (for flushing and landscape / garden) and the excess treated water to be further treated in RO Plant for domestic use.

Note: *This system is optional for the owners of the building, if they intend to further treat the excess treated water from the STP/ETP, using RO Plant to generate potable water for domestic use.*

Additional incentives shall be provided for treatment of wastewater as per Scenario 3, as decided by MCC.

Note: *In Scenario 1 & 2 above, if MCC does not permit disposal of raw sewage into UGD, then the sewage has to be treated as specified for Scenario 3 or as specified for the buildings where UGD is not available.*

2. Buildings where UGD is not available –

a) Small Buildings

i. 100% Sullage disposed into Leach Pit as per the Water Balance Chart.

ii. 100% Sewage disposed into Septic Tank (Sewage generated upto 15 KLD) as per the Water Balance Chart.

b) Large Buildings

i. Scenario 1:

(a) 100% Sullage treated in SuTP for reuse of treated water & Excess Treated Water to be used for Ground Water Recharge or Disposal into Storm Water Drains as per the Water Balance Chart.

(b) 100% Sewage treated in STP/ETP for reuse of treated water & Excess Treated Water to be used for Ground Water Recharge or Disposal into Storm Water Drains as per the Water Balance Chart.

ii. Scenario 2:

100% Sullage and Sewage treatment in STP/ETP for reuse of treated water (for flushing and landscape / garden) and the excess treated water to be further treated in RO Plant for domestic use.

Note: *This system is optional for the owners of the building, if they intend to further treat the excess treated water from the STP/ETP, using RO Plant to generate potable water for domestic use.*
Additional incentives shall be provided for treatment of wastewater as per Scenario 3, as decided by MCC.

IV. Hot water system –

Hot water supply for the various uses in the building shall be through any of the following systems.

1. Centralised Solar Water Heating System
2. Centralised Heat Pump System
3. Gas Geyser for individual units
4. Electric Geyser for individual units

V. Water Tanks –

1. Domestic water tank –
   a) Under Ground Tank (UGT) / Sump tank
   b) Over Head Tank (OHT)
2. Fire storage tank (including all types of tanks) – (For buildings above 21 m height)
   a) UGT / Sump tank
   b) OHT
3. Treated water tank –
   a) UGT / Sump Tank
   b) OHT
4. Other Tanks

a) Hot water tank
b) RO water tank

5. WTP Tank

VI. Centralised RO Plant

VII. Domestic Water Treatment Plant (WTP)

VIII. Gym

IX. Gym with Spa (Jacuzzi, Steam, Sauna, Ayurvedic Therapy)

X. Swimming Pool

XI. Other water bodies

XII. Landscape/Garden

XIII. Cooling Towers for HVAC & DG Set

XIV. Automated Water Meters

Automated Water Meters shall be installed as follows;

1. Domestic Water Supply – Separate Meters to be installed as specified in the Water Balance Chart for Online monitoring of domestic water supplied from the following sources.

a) City Level Water Supply Source (M1)
b) Open well / Bore well (M2)
c) Rainwater Harvesting (M3)
d) Water Tankers (M4) (in case of separate tank to Sump Tank – through gravity or pumping)

2. Domestic Water Distribution – The total domestic water supplied is presumed to be used for the domestic purposes in the apartments / premises and common areas specified herein and shall also be used for the shortfall in the treated water generated, if required (for the use of treated water in the Project). Therefore, a Separate Meter (M5) has to be installed for the domestic water supplied towards the shortfall in treated water generated as specified in the Water Balance Chart for Online monitoring.

3. Treated water generated, reused and excess water disposed – Separate Meters to be installed as specified in the Water Balance Chart for Online

monitoring of treated water generated, reuse of treated water and excess treated water disposed as follows;

a) Treated water generated separately from SuTP / STP/ETP (M6)
b) Treated water reuse separately from SuTP / STP/ETP (M7)
c) Landscape Irrigation (M8)
d) Flushing (M9)
e) Excess treated water disposal separately from SuTP / STP/ETP (M10)

4. Water Meters for individual units – Separate Meters to be installed as specified herein for Online monitoring of consumption of domestic water and treated wastewater for individual units as follows;

a) Domestic water (for kitchen, dining wash basin and all toilets)
b) RO water (in case of centralised RO water supply)
c) Hot water (in case of centralised Hot water supply)
d) Treated water (in all toilets)

Note: *The installation of Water Meters for individual units is not mandatory, but optional, to claim incentives as specified herein.*

XV. Any other requirements (Specific to the project, if applicable)

C. GENERAL INFORMATION OF THE PROJECT - Table-1:

(a) **Project Information**

The following Project information shall be entered in Table-1;

1. Project Name
2. Address & Location of the Project
3. Building category
a) Residential (Any one or more type, automatically selected from the details entered in **Table-1b**, based on the various types of residential apartments mentioned in **Table-1a**)
b) Non-Residential (Any one or more type, automatically selected based on the various types of non-residential premises mentioned in **Table-1c**).

The following parameters have to be entered in **Table-1c** based on the requirements of the building (of each block, in case of multiple blocks in a project) to derive the total water requirement for the building (excluding water requirement for amenities, landscape etc.)

i. In case of hotels, the following details have to be provided;
   (a) No. of Beds
   (b) No. of restaurant seats
   (c) No. of Staff
ii. In case of Educational Building, the following details have to be provided;
   (a) Strength of school
   (b) Teaching and non-teaching staffs
iii. In case of hostels, the following details have to be provided;
   (a) No. of Beds
   (b) No. of Wardens' residences
   (c) No. of Staff

iv. In case of Hospital:
Gross Area in Sqm to be provided for;
(a) No. of beds not exceeding 100.
(b) No. of beds exceeding 100.
(c) Outpatient department (OPD)

(The water requirement includes requirement of patients, attendants, visitors and staff. Additional water requirement for kitchen, laundry and clinical water shall be computed as per actual requirements)

v. In case of Assembly Building, the following details have to be provided;
(a) Gross Area in Sqm for Concentrated use without fixed seating
(b) Gross Area in Sqm for less concentrated use without fixed seating
(c) No. of fixed seats for fixed seating building (Cinemas, Concert halls and Theatres and Multiplex)
(d) Gross Area in Sqm for Dining areas and restaurants with seating and tables
(e) Gross Area in Sqm for Food Court

vi. In case of Business Building, the Gross Area in Sqm including canteen have to be provided.

vii. In case of Mercantile Building, the following details have to be provided;
(a) Gross Area in Sqm for Street floor and sales basement
(b) Gross Area in Sqm for Upper sales floor
(c) Gross Area in Sqm for Storage/warehouse, receiving and the like.

viii. In case of Industrial Building, the following details have to be provided;
(a) Gross Area in Sqm for Factories including canteen where bathrooms are required to be provided.
(b) Gross Area in Sqm for Factories including canteen where no bathrooms are required to be provided.

ix. In case of Storage Building, the Gross Area in Sqm has to be provided.

x. In case of Hazardous Building, the Gross Area in Sqm has to be provided.

xi. In case of traffic terminal stations, average no. of users / day (total annual passenger traffic / 365) plus staff plus vendors and the facility details to be provided;
(a) Airport
(b) Railway station (Junction) with bathing facility
(c) Railway station (Junction) without bathing facility
(d) Railway station (Intermediate) with bathing facility
(e) Railway station (intermediate) without bathing facility
(f) Interstate Bus Terminals
(g) Interstate Bus Terminals/Metro Stations

Note: *1. wherever there are multiple work shifts, the no. of users within a 24-hour period may be considered as per actuals.*
Gross Area - The area of the floor within the inside perimeter of the outside walls of the floor of the building under consideration with no deduction for corridors and passages, toilets, internal walls, internal columns or other features for each occupancy. In case the common

passages are shared for different uses, then proportionate area of such common passages shall be added to the plinth area of all the premises of the respective use.
The water requirement, wastewater generation, treatment and disposal in case of factories, storage & hazardous buildings and traffic terminal stations have to be assessed separately on a case-by-case basis and are not detailed herein. The details provided herein related to the above buildings are only for general information.

c) Mixed use automatically selected based on the various types of apartments / premises mentioned in **Table-1b**&**1c.**

(b) **Components to Water Requirement Assessment** – **Table-1d** (as per **Item No. B above**)

Mark Yes / No for the Components applicable for the Project to assess water requirement.

(c) **Other information – Table-1e**

1. Height of the building (of the tallest building in case of multiple buildings in the Project) (m)
2. Largest Compartment Perimeter of Water Curtain of Car Parking Spaces in any of the Basement Floors of the Project (m)
3. Basement Area (Sqm)
4. Area of landscape and type of landscape (lawn and other plantation areas)

Note: *The water requirement for landscaping purposes is considered as,*
a) For Lawns 7 Liters/Sqm/day and
b) For Other Landscapes like Shrubs and Trees 5 Liters /Sqm/day.

1. Water Treatment Plant Tank Capacity (If provided)
2. Quantity of water stored in Swimming pool
3. Quantity of water stored in Other water bodies.

Note: *1. Make up water for Swimming Pool, Fish pond, Water fountain, etc. to be considering based on quantity of water evaporated and that required for backwash - 2% of total volume of stored water to be considered as water requirement for Pool Make up, Fish pond, Water fountain, etc.*
2. Quantity of water for initial filling of swimming pool & other water bodies and periodical replacement of swimming pool & other water bodies are not considered.

4. Capacity of Cooling tower* (Tonnage) for HVAC
5. Capacity of Cooling tower* (Tonnage) for DG Set

Note: **Water consumption for Cooling Towers shall be considered as per the manufacturer's requirement and running hours of the systems.*

6. Market cleaning area (common areas and Fresh Fish & Meat area)
7. Mall cleaning area (common areas of the Mall)
8. Any other water components, to be specified.

D. WATER REQUIREMENT ASSESSMENT FOR RESIDENTIAL BUILDINGS

I. Occupant Assessment – Table-2a

The details of **Table-2a** are automatically calculated from **Table-1b**

II. Water Requirement, Wastewater Generation, Treated Water Usage & Sewage/Excess Treated Water Disposal for Residential Buildings – Table-2b(2)

The following water requirements of the building (for all blocks together in case of multiple blocks in a project and for the residential portion of the building in case of mixed use building) in **Table-2b(2)** shall be automatically calculated from **Table-1d, Table-2a** and **Table-2b(1)**.

1. Water requirement for residential use and other uses in common area per person per day for domestic use and for treated water reuse.
2. Water requirement for Club house facilities
   a) Gym – 15 LPHD for Domestic & 10 LPHD for Flushing
   b) Gym along with Jacuzzi, Steam, Sauna, ayurvedic therapy - 20 LPHD for Domestic & 25 LPHD for Flushing.
3. Water requirement for Building management team
   1 person considered for 10 dwelling units & Water requirement considered is 25 LPHD for Domestic & 25 LPHD for Flushing
4. Other requirements (to be specifically mentioned as additional water requirement)

Note:*1. Only normal fixtures are considered, and water efficient plumbing fixtures are considered only for providing additional incentives as per these Byelaws*

2. Make up water for swimming pool & water bodies is considered based on quantity of water evaporated and that required for backwash i.e., 2% of total volume of stored water to be considered as water requirement].

3. Quantity of water for initial filling of swimming pool and water bodies and periodical replacement of swimming pool & other water bodies are not considered.

III. Storage of water for Fire Fighting Purposes – Table-2c(2) (For highrise buildings - above 21m height)

The minimum requirement of UGT & OHT for Fire Fighting shall be automatically calculated in **Table-2c(2)** from **Table-2c(1)**.

Note: *1. One set of pumps shall be provided for each 100 hydrants or part thereof, with a maximum of two sets. In case of more than one pump set installation, both pump sets shall be interconnected at their delivery headers.*

Alternative to provisions of additional set of pumps, the objective can be met byproviding additional diesel pump of the same capacity and doubling the water tank capacity as required for one set of pumps.

IV. Septic Tank /Sullage Treatment Plant/ Sewage Treatment Plant Capacity – Table-2d

1. Buildings where UGD is available

a) Capacity of SuTP for 100% Sullage Treatment -
   i. Total Sullage generated is calculated automatically from Column f (B2) of **Table-2b(2)**.
   ii. The capacity of SuTP is calculated automatically adding 20% (for contingencies) of the quantity calculated in (i) above and is rounded off to multiples of 5 KLD.

b) Capacity of 100% SuTP & STP for additional treated water required:
   i. Total Sullage generated is auto filled from Column f (B2) of **Table-2b(2)**.
   ii. The Capacity of SuTP is calculated automatically adding 20% (for contingencies)of the quantity calculated in (i) above and is rounded off to multiples of 5 KLD.
   iii. Total treated water requirement will be calculated automatically from Column j(B6) of **Table-2b(2).**
   iv. Shortfall of treated water will be calculated automatically by deducting Total treated water generated by SuTP fromthe total treated water required for the project.
   v. The Capacity of STP is calculated automatically adding 20% (for contingencies)of the quantity calculated in (iv) above and is rounded off to the multiples of 5 KLD.

c) Capacity of 100% STP with RO Plant:
   i. Total Sullage & Sewage generated is calculated automatically from Column h (B4) of **Table-2b(2)**.
   ii. Capacity of STP is calculated automatically adding 20% (for contingencies)of the quantity calculated in (i) above and is rounded off in the multiples of 5 KLD.

2. Buildings where UGD is not available

a) For Small Buildings

100% Sullage disposed into Leach Pit & 100% Sewage disposed into Septic Tank.

(Septic tanks are only recommended upto 15 KLD of Sewage generation and for small communities and institutions where UGD connection not available.)

Note:*For Size of Septic tank refer Design criteria and Construction of Septic Tanks (Ref: IS: 2470 (Part 1) – 1985) APPENDIX A, (Clause 3.4.5.2)*

b) For Large Buildings

i. Capacity of 100% SuTP & 100% STP
   (a) Total Sullage generated is calculated automatically from Column f (B2) of **Table-2b(2)**.
   (b) The Capacity of SuTP is calculated automatically adding 20% (for contingencies)of the quantity calculated in (a) above and is rounded off to the multiples of 5 KLD.
   (c) Total Sewage generated is calculated automatically from Column g (B3) of **Table-2b(2)**.
   (d) The Capacity of STP is calculated automatically adding 20% (for contingencies)of the quantity calculated in (c) above and is rounded off to the multiples of 5 KLD.

ii. TheCapacity of 100% STP with RO Plant
   (a) Total Sewage generated is auto filled fromColumn h (B4) of **Table-2b(2).**

(b) Capacity of STP is calculated automatically adding 20% (for contingencies)of the quantity calculated in (a) above and is rounded off to the multiples of 5 KLD.

V. Centralised RO Plant -Table-2e(1) (If applicable)

1. Capacity of RO plant for Drinking water supply is automatically calculated in **Table-2e(1)** from **Table-2a& Table-2b(2)**;

2. The specifications of RO Plant to be entered in **Table-2e(2)**

VI. Centralised Hot Water System with Solar Thermal Collectors or Heat Pump system- Table-2f (If applicable)

1. Centralised Hot water with Solar thermal collector system -
Capacity of Centralised Hot Water System with Solar Thermal Collector is automatically calculated in **Table-2f** from **Table-2a.**

Note: *1. If more hot water requirement* is proposed than that mentioned below, the same to be manually entered.*
** Hot water requirement per person considered as,*
- 15 Liters per Person shall be considered for MIG & supply for 12 Hrs is assumed.
- 20 Liters per Person shall be considered for HIG & supply for 15 Hrs is assumed.
2. Recommended SS hot water storage tank capacity, number of Solar Thermal Collectors of 125 Liters (Size 1 m x 2 m) and area required for installing Solar Thermal Collectors (2 Sqm per 125 Liters Collector) will be calculated automatically.

2. Centralised Hot water with Heat pump system -
Capacity of Centralised Hot Water System with Heat Pump System is automatically calculated in **Table-2f** from **Table-2a.**
Note**:** *Supply gap of 7 hours is considered to fill the entire capacity of hot water storage tank, assuming it is empty at the night after consumption.*

VII. Water Tank Capacity

1. Domestic Water Tank Capacity

a) Total Domestic UGT capacity (without SuTP or STP / with SuTP / with SuTP & STP / with STP) is automatically calculated in **Table-2g** from **Table-2b(2)**
b) Total Firefighting UGT capacity as per **Table-2c(2)**
c) Total Domestic OHT capacity (without SuTP or STP / with SuTP / with SuTP & STP / with STP) is automatically calculated in **Table-2g** from **Table-2b(2)**
d) Total Firefighting OHT capacity as per **Table-2c (2)**

2. Treated Water Tank Capacity

a) Total Treated Water UGT capacity (with SuTP / with STP) is automatically calculated in **Table-2g** from **Table-2b(2)**
b) Total Treated Water OHT capacity (with SuTP / with STP) is automatically calculated in **Table-2g** from **Table-2b(2)**

3. Water Treatment Plant Tank Capacity (If applicable) – To be entered manually.

VIII. Water Balance Chart

Water requirement quantities to be updated in each level of the Water balance chart as per the **Table-1 & Table-2** parameters.

E. WATER REQUIREMENT ASSESSMENT FOR NON-RESIDENTIAL BUILDINGS

I. Occupant Assessment & Domestic and Treated water Requirement for Non-Residential Buildings

The following water requirements of the building (for all blocks together in case of multiple blocks in a project and for the non-residential portion of the building in case of mixeduse building) in **Table-3a** shall be automatically calculated from **Table-1c and Table-1e**

1. Water requirement for Hotels (Excluding laundry, Kitchen, Staff and Water bodies), based on Star rating (upto 3 Star, 4 Star and above)
2. Water requirement for Educational Building (Without boarding facilities /With boarding facilities/ Hostels)
3. Water requirement for Institutional: Hospital
    i. *(The water requirement includes requirement of patients, attendants, visitors and staff. Additional water requirement for kitchen, laundry and clinical water shall be computed as per actual requirements)*
4. Water requirement forAssembly Building or Cinemas, Concert halls and Theatres and Multiplex, or for Dining areas and restaurants or Food Court
5. Water requirement forBusiness Building: offices including canteen.
6. Water requirement for Mercantile Building for Street floor and sales basement, Upper sales floor, Storage/warehouse.
7. Water requirement for Industrial Building for Factories including canteen with or without bathroom
8. Water requirement for Storage Building.
9. Water requirement for Hazardous Building.
10. Water requirement for traffic terminal stations, Airport, Railway station (Junction) with bathing facility, Railway station (Junction) without bathing facility, Railway station (Intermediate) with bathing facility, Railway station (intermediate) without bathing facility, Interstate Bus Terminals, Interstate Bus Terminals/Metro Stations

Note: *The water requirement for Industrial buildings, Storage & Hazardous buildings, and Traffic Terminal Stations provided herein are for understanding the principles of assessment. The water requirements for these buildings have to be calculated on a case-by-case basis.*

II. Other water requirements for non-residential buildings-Table-3b

Other water requirements of the building in **Table-3b** shall be automatically calculated from **Table-1c and Table-1e**

1. Water requirement for Club house facilities
    a) Gym – 15 LPHD for Domestic & 10 LPHD for Flushing

b) Gym along with Jacuzzi, Steam, Sauna, ayurvedic therapy - 20 LPHD for Domestic & 25 LPHD for Flushing.

2. Water requirement for Building management team
1 person considered as specified in _____ & Water requirement considered is 25 LPHD for Domestic & 25 LPHD for Flushing

3. Other requirements (to be specifically mentioned as additional water requirement)

III. Water Requirement, Wastewater Generation, Treated Water Usage & Sewage/Excess Treated Water Disposal for Non-Residential Buildings – Table-3c

The details of **Table-3c** is automatically calculated from **Table-1c, Table-1e, Table-3a and Table-3b**

IV. Storage of water for Fire Fighting Purposes- Table-3d(1) (For highrise buildings - above 21m height)

The minimum requirement of UGT & OHT for Fire Fighting shall be automatically calculatedin **Table-3d(2)** from **Table-3d(1)**.

V. Septic Tank /Sullage Treatment Plant/ Sewage Treatment Plant Capacity – Table-3e

1. Buildings where UGD is available:

a) Capacity of SuTP for 100% Sullage Treatment:
   i. Total Sullage generated is calculated automatically of **Table-3c**.
   ii. The capacity of SuTP is calculated automatically adding 20% (for contingencies) of the quantity calculated in (i) aboveand is rounded off to multiples of 5 KLD.

b) Capacity of 100% SuTP & STP for additional treated waterrequired:
   i. Total Sullage generated is auto filled from of **Table-3c**.
   ii. The capacity of SuTP is calculated automatically adding 20% (for contingencies) of the quantity calculated in (i) and is rounded off to multiples of 5 KLD.
   iii. Total treated water requirement will be calculated automatically from **Table-3c.**
   iv. Shortfall of treated water will be calculated automatically by deducting Total treated water generated by SuTP from the total treated water required for the project.
   v. The Capacity of STP is calculated automatically adding 20% (for contingencies)of the quantity calculated in (iv) above and is rounded off to multiples of 5 KLD.

c) Capacity of 100% STP with RO Plant:
   i. Total Sullage & Sewage generated is calculated automatically from of **Table-3c**.

ii. The Capacity of STP is calculated automatically adding (for contingencies) of the quantity calculated in (i) above and is rounded off to multiples of 5 KLD.

2. Buildings where UGD is not available

a) For Small Buildings

100% Sullage disposed into Leach Pit & 100% Sewage disposed into Septic Tank.

(Septic tanks are only recommended upto 15 KLD of Sewage generation and for small communities and institutions where UGD connection not available.)

***Note**: For Size of Septic tank refer Design criteria and Construction of Septic Tanks (Ref: IS: 2470 (Part 1) – 1985) APPENDIX A, (Clause 3.4.5.2)*

b) For Large Buildings

i. Capacity of 100% SuTP & 100% STP
   (a) Total Sullage generated is calculated automatically from **Table-3c**.
   (b) The Capacity of SuTP is calculated automatically adding 20% (for contingencies)of the quantity calculated in (a) above and is rounded off to multiples of 5 KLD.
   (c) Total Sewage generated is calculated automatically from **Table-3c**.
   (d) The Capacity of STP is calculated automatically adding 20% (for contingencies)of the quantity calculated in (c) aboveand is rounded off to multiples of 5 KLD.

ii. Capacity of 100% STP with RO Plant
   (a) Total Sewage generated is auto filled fromof **Table-3c.**
   (b) The Capacity of STP is calculated automatically adding 20% (for contingencies)of the quantity calculated in (a) above and is rounded off to multiples of 5 KLD.

VI. Centralised RO Plant -Table-3f(1) (If applicable)

1. Capacity of RO plant for Drinking water supply is automatically calculated based on the requirement.

2. The specifications of RO Plant to be entered in **Table-3f(2)**

VII. Centralised Hot Water System with Solar Thermal Collectors or Heat Pump system- Table-3g (If applicable)

1. Centralised Hot water with Solar thermal collector system
   Capacity of Centralised Hot Water System with Solar Thermal Collector is automatically calculated based on the requirement.
2. Centralised Hot water with Heat pump system
   Capacity of Centralised Hot Water System with Heat Pump System is automatically calculatedbased on the requirement.

VIII. Water Tank Capacity

1. Domestic Water Tank Capacity

a) Total Domestic UGT capacity (without SuTP or STP / with SuTP / with SuTP & STP / with STP) is automatically calculated in **Table-3h** from **Table-3c**
b) Total Firefighting UGT capacity as per **Table-3d**
c) Total Domestic OHT capacity (without SuTP or STP / with SuTP / with SuTP & STP / with STP) is automatically calculated in **Table-3h** from **Table-3c**
d) Total Firefighting OHT capacity as per **Table-3d**

2. Treated Water Tank Capacity

a) Total Treated Water UGT capacity (with SuTP / with STP) is automatically calculated in **Table-3h** from **Table-3c**
b) Total Treated Water OHT capacity (with SuTP / with STP) is automatically calculated in **Table-3h** from **Table-3c**

3. Water Treatment Plant Tank Capacity (If applicable) – To be entered manually.

IX. Water Balance Chart

Water requirement quantities to be updated in each level of the Water balance chart as per the **Table-1 & Table-3** parameters.

TABLE-1
GENERAL INFORMATIONS OF THE PROJECT

TO BE ENTERED
AUTO FILLED

I PROJECT INFORMATION

Date :

1 Project Name -
2 Address/Location -
3 Building Category (Residential / Non-Residentail / Mixed Use) -

DETAILS OF APARTMENTS / PREMISES

a) INPUT FOR OCCUPANT LOAD (RESIDENTIAL)

TABLE - 1a
AREA DETAILS FOR APARTMENT CATEGORIES

CATEGORY	BHK	CARPET AREA (Sqm)	
		MINIMUM	MAXIMUM
EWS	1 BHK	> 30	< 40
LIG-A	1 BHK	> 40	< 50
	2 BHK	> 45	< 60
LIG-B	1 BHK	> 50	< 60
	2 BHK	> 60	< 70
	3 BHK	> 75	< 95
MIG	1 BHK	> 60	< 70
	2 BHK	> 70	< 95
	3 BHK	> 95	< 120
HIG	1 BHK	> 70	
	2 BHK	> 95	
	3 BHK	> 120	

TABLE - 1b

BLOCKS	NO. OF APARTMENTS IN THE PROJECT UNDER VARIOUS CATEGORIES													
	1BHK					2BHK				3BHK			4 BHK & ABOVE	TOTAL
	EWS	LIG-A	LIG-B	MIG	HIG	LIG-A	LIG-B	MIG	HIG	LIG-B	MIG	HIG	HIG	
	>30 <40	>40 <50	>50 <60	>60 <70	>70	>45 <60	>60 <70	>70 <95	>95	>75 <95	>95 <120	>120	>120	
	a	b	c	d	e	f	g	h	i	j	k	l	m	n
														0
														0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0					0				0	0	0		
Percentage	#DIV/0!					#DIV/0!				#DIV/0!	#DIV/0!	#DIV/0!		

Note: Service Apartments, Studio Apartments, 4 BHK & above Apartments shall be considered in HIG Category.

b) INPUT FOR OCCUPANT LOAD (NON-RESIDENTIAL)

TABLE - 1c

i **Group A: Hotels:**

Type of Occupancy	No. of Beds	No. of Staffs	No. of Restaurant Seats	Water requirement for Laundry	Water requirement for Kitchen	No. of Kitchen Staffs	Water requirment for Water Bodies
upto 3 star rating							
4 star and above							

ii **Group B: Educational:**

Type of Occupancy	Strength of School	No. of Teaching Staff	No. of Non-Teaching Staff
Without boarding facilities			
With boarding facilities			

Type of Occupancy	No. of Beds	No. of Warden Residence	No. of Hostel Staffs
iii Hostel			

iv **Group C: Institutional: Hospital:**

Type of Occupancy	Gross Area (Sqm)
No. of beds not exceeding 100	
No. of beds exceeding 100	
Out patient department (OPD)	

v **Group D: Assembly:**

Type of Occupancy	Gross Area (Sqm)	No. of Seats
Concentrated use without fixed seating		
Less concentrated use without fixed seating		
Fixed seating (Cinemas, Concert halls and Theaters and Multiplex)		
Dining areas and restaurants with seating and table (water requirement including kitchen)		
Food court (water requirement including kitchen)		

vi **Group E: Business: (including canteen)**

Type of Occupancy	Gross Area (Sqm)
Business: (including canteen)	

vii **Group F: Mercantile:**

Type of Occupancy	Gross Area (Sqm)
Street floor and sales basement	
Upper sales floor	
Storage/warehouse, receiving and the like	

viii **Group G: Industrial:**

Type of Occupancy	Gross Area (Sqm)
Factories including canteen where bath rooms are required to be provided	
Factories including canteen where no bath rooms are required to be provided	

ix **Group H: Storage:**

Type of Occupancy	Gross Area (Sqm)
Storage	

x **Group J: Hazardous**

Type of Occupancy	Gross Area (Sqm)
Hazardous	

xi **Traffic Terminal Stations**

Type of Occupancy	Seasonal average peak passangers handled
Airports	
Railway station (Junction) with bathing facility	
Railway station (Junction) without bathing facility	
Railway station (Intermediate) with bathing facility	
Railway station (Intermediate) without bathing facility	
Interstate Bus Terminals	
Interstate Bus Terminals/Metro Stations	

II COMPONENTS OF BUILDING RELATED TO WATER REQUIREMENT (Mark 'YES/NO' in the relevant spaces below based on the requirements of the Project)

SOURCE OF DOMESTIC WATER SUPPLY		
1	From MCC Water Supply System	
2	From Private Well (With WTP)	
3	From Private Well (Without WTP)	
4	From Private Borewell (With WTP)	
5	From Private Borewell (Without WTP)	
6	Rain Water Harvesting (With WTP)	
7	Rain Water Harvesting (Without WTP)	
8	Water Tankers	

DOSMESTIC WATER DISTRIBUTION SYSTEM		
1	Direct Supply System From Centralised Water Supply System (MCC Or Private)	
2	Gravity Distribution System (From OHT)	
3	Pressurised Distribution System (Hydro Pneumatic Pumping System)	

TABLE - 1d

SEWERAGE SYSTEM		
A	**Buildings where UGD is available**	
1	100% Sullage Treatment in SuTP & Excess Treated Water to be used for Ground Water Recharge or Disposal into Storm Water Drains & 100% Sewage disposal into UGD	
2	100% Sullage Treatment in SuTP & Sewage treatment in STP/ETP to the extent of additional treated water required & Excess sewage disposal into UGD	
3	100% Sullage and Sewage treatment in STP/ETP for reuse of treated water and the excess treated water to be further treated in RO Plant for domestic use	
B	**Buildings where UGD is not available**	
1	**FOR SMALL BUILDINGS** 100% Sullage disposed into Leach Pit & 100% Sewage disposed into Septic Tank	
2	**FOR LARGE BUILDINGS** a. 100% Sullage treated in SuTP & 100% Sewage treated in STP/ETP for reuse of treated water & Excess Treated Water to be used for Ground Water Recharge or Disposal into Storm Water Drains	
	b. 100% Sullage and Sewage treatment in STP/ETP for reuse of treated water and the excess treated water to be further treated in RO Plant for domestic use	

HOT WATER GENERATION SYSTEM		
1	Centralised Heat Pump System	
2	Centralised Solar Water Heating System using Solar Thermal Collectors	
3	Gas Geyser for individual units	
4	Electric Geyser for individual units	

OTHER BUILDING COMPONENTS		
1	Centralised RO Plant	
2	Swimming Pool	
3	Other Water Bodies	
4	Landscape/Garden	
5	Other Water Components	
6	Water Treatment Plant	
7	Only Gym	
8	Gym Along With Jacuzzi, Steam, Sauna, Ayurvedic Therapy, Etc.	
9	Cooling Tower for HVAC	
10	Cooling Tower for DG Sets	

WATER TANKS						
A	**Domestic Water Tank**			**C**	**Treated Water Tank**	
1	Under Ground Tank (UGT)/ Sump Tank			1	Under Ground Tank (UGT)/ Sump Tank	
2	Over Head Tank (OHT)			2	Over Head Tank (OHT)	
B	**Fire Storage Tank**			**D**	**Other Tanks**	
1	Under Ground Tank (UGT)/ Sump Tank			1	Hot Water Tank	
2	Over Head Tank (OHT)			2	RO Water Tank	
				E	WTP Tank	

III OTHER INFORMATIONS

TABLE 1e

1	Height of the building (of the tallest building in case of multiple buildings in the Project) (m)			Meters
2	Largest Compartments Perimeter of Water Curtain of Car Parking Spaces in any of the Basement Floors in the project (If applicable)			Meters
3	Area of Basement			SqM
4	Landscape Area			
	a) Lawns			SqM
	b) Other Landscape -Shrubs and Trees			SqM
5	Water Treatment Plant Tank Capacity (If provided)			Litres
6	Water Stored in Swimming Pool			Litres
7	Water Stored in Other water bodies			Litres
8	HVAC Cooling Tower water requirement as per manufacturers standards			Litres
9	DG Set Cooling Tower water requirement as per manufacturers standards			Litres
10	Common area and Fresh Fish & meat area of markets (For Cleaning)			SqM
11	Common area in Mall (For Cleaning)			SqM
12	Any other water components, to be specified			

TABLE - 2

D WATER REQUIREMENT ASSESSMENT FOR RESIDENTIAL BUILDINGS

I OCCUPANT ASSESSMENT FOR WATER REQUIREMENT FOR RESIDENTIAL BUILDINGS

TABLE-2a

Sl No	TYPE OF DWELLING UNITS	NO. OF DWELLING UNITS	NO. OF PERSONS PER UNIT (Ref: Part 9, Section 1, Clause 4.1.a of NBC 2016)	TOTAL NO. OF PERSONS	DIVERSITY OF OCCUPANCY *	TOTAL NO. OF OCCUPANTS AFTER DIVERSITY
	a	b	c	d = b x c	e	f = d x e
1	**EWS**					
	1 Bedroom Dwelling Unit	-	4	-	1.0	-
2	**LIG-A**					
	1 Bedroom Dwelling Unit	-	4	-	1.0	-
	2 Bedroom Dwelling Unit	-	5	-	1.0	-
						-
3	**LIG-B**					
	1 Bedroom Dwelling Unit	-	4	-	1.0	-
	2 Bedroom Dwelling Unit	-	5	-	1.0	-
	3 Bedroom Dwelling Unit	-	6	-	1.0	-
						-
4	**MIG**					
	1 Bedroom Dwelling Unit	-	4	-	0.9	-
	2 Bedroom Dwelling Unit	-	5	-	0.9	-
	3 Bedroom Dwelling Unit	-	6	-	0.9	-
						-
5	**HIG**					
	1 Bedroom Dwelling Unit	-	4	-	0.85	-
	2 Bedroom Dwelling Unit	-	5	-	0.85	-
	3 Bedroom Dwelling Unit	-	6	-	0.85	-
	4 Bedroom Dwelling Unit and above	-	7	-	0.85	-
						-
	TOTAL	**0**		**0**		-
		(A1)				**(A2)**

Total No of Occupants (Rounded off) (A3 = Round off A2)	
Clubhouse amenities** (15% Occupancy considered)(A4 = A3 x 15%)	-
Building manangement team*** (A5 = A1 x 10%)	-

* ***DIVERSITY OF OCCUPANCY***

1 *HIG (85% Occupancy) =* ***0.85***
2 *MIG (90% Occupancy) =* ***0.90***
3 *LIG-B (100% Occupancy) =* ***1.00***
4 *LIG-A (100% Occupancy) =* ***1.00***
5 *EWS (100% Occupancy) =* ***1.00***

***Occupancy for using building facilities/ Club house (Excluding EWS & LIG-A) = Total No. of persons (A2) x15%. [15 percent of population considered to use the building facilities in residential buildings. (Ref: Part 9, Section 1, Clause 1.1.b Notes 2 of NBC 2016)].*

****Building menangement team (1 staff considered for 10 Units).*

II WATER REQUIREMENT, WASTE WATER GENERATION, TREATED WATER USAGE & SEWAGE/EXCESS TREATED WATER DISPOSAL FOR RESIDENTIAL BUILDINGS

TABLE-2b(1)

DOMESTIC WATER, TREATED WATER & TOTAL WATER REQUIREMENT WITH & WITHOUT WATER EFFICIENT PLUMBING FIXTURES

FOR HIG APARTMENTS (CONSIDERING 225 LPHD)

Sl No	Usage Area	Waste water recovery factor	Water Requirement per person per day (Ltrs/person/day)	* Water Requirement per person per day with water efficient plumbing fixtures (Ltrs / person / day)	* Water savings (With water efficient plumbing fixtures) (Ltrs / person / day)
a	b	c	d	d1	d2
	Residential usage				
1	Bathing (including hand wash, shaving, health faucet)	1	60	42	18
2	Toilet Flushing	1	60	60	0
3	Washing Cloths	1	20	20	0
4	Cleaning house	0.8	12	12	0
5	Washing Utensils	1	14	10	4
6	Cooking	0	7	7	0
7	Drinking	0	4	4	0
8	Toilet Cleaning	1	9	9	0
	Other usage in common areas				0
9	Corridor, Staircases, Terrace, Civic amenity spaces & other Common area cleaning	0.8	9	9	0
10	Yard Cleaning	0	5	5	0
11	Parking areas	0.2	5	5	0
12	Landscape irrigation	0	6	6	0
13	Swimming Pool makeup	0.2	5	5	0
14	Other water bodies	0.2	3	3	0
15	Car wash	0.5	6	6	0
	Grand Total		**225**	**203**	**22**

FOR MIG APARTMENTS (CONSIDERING 200 LPHD)

Sl No	Usage Area	Waste water recovery factor	Water Requirement per person per day (Ltrs/person/day)	* Water Requirement per person per day with water efficient plumbing fixtures (Ltrs / person / day)	* Water savings (With water efficient plumbing fixtures) (Ltrs / person / day)
a	b	c	d	d1	d2
	Residential usage				
1	Bathing (including hand wash, shaving, health faucet)	1	55	39	16
2	Toilet Flushing	1	58	58	0
3	Washing Cloths	1	20	20	0
4	Cleaning house	0.8	10	10	0
5	Washing Utensils	1	12	8	4
6	Cooking	0	6	6	0
7	Drinking	0	3	3	0
8	Toilet Cleaning	1	7	7	0
	Other usage in common areas				0
9	Corridor, Staircases, Terrace, Civic amenity spaces & other Common area cleaning	0.8	7	7	0
10	Yard Cleaning	0	4	4	0
11	Parking areas	0.2	3	3	0
12	Landscape irrigation	0	5	5	0
13	Swimming Pool makeup	0.2	4	4	0
14	Other water bodies	0.2	2	2	0
15	Car wash	0.5	4	4	0
	Grand Total		**200**	**180**	**20**

FOR LIG-B APARTMENTS (CONSIDERING 175 LPHD)

Sl No	Usage Area	Waste water recovery factor	Water Requirement per person per day (Ltrs/person/day)	* Water Requirement per person per day with water efficient plumbing fixtures (Ltrs / person / day)	* Water savings (With water efficient plumbing fixtures) (Ltrs / person / day)
a	b	c	d	d1	d2
	Residential usage				
1	Bathing (including hand wash,	1	53	37	16
2	Toilet Flushing	1	55	55	0
3	Washing Cloths	1	17	17	0
4	Cleaning house	0.8	7	7	0
5	Washing Utensils	1	9	6	3
6	Cooking	0	6	6	0
7	Drinking	0	3	3	0
8	Toilet Cleaning	1	5	5	0
	Other usage in common areas				0
9	Corridor, Staircases, Terrace, Civic amenity spaces & other Common area cleaning	0.8	6	6	0
10	Yard Cleaning	0	3	3	0
11	Parking areas	0.2	2	2	0
12	Landscape irrigation	0	4	4	0
13	Swimming Pool makeup	0.2	2	2	0
14	Other water bodies	0.2	1	1	0
15	Car wash	0.5	2	2	0
	Grand Total		**175**	**156**	**19**

FOR LIG-A / EWS APARTMENTS (CONSIDERING 150 LPHD)

Sl No	Usage Area	Waste water recovery factor	Water Requirement per person per day (Ltrs/person/day)	* Water Requirement per person per day with water efficient plumbing fixtures (Ltrs / person / day)	* Water savings (With water efficient plumbing fixtures) (Ltrs / person / day)
a	b	c	d	d1	d2
	Residential usage				
1	Bathing (including hand	1	53	37	16
2	Toilet Flushing	1	50	50	0
3	Washing Cloths	1	15	15	0
4	Cleaning house	0.8	5	5	0
5	Washing Utensils	1	6	4	2
6	Cooking	0	4	4	0
7	Drinking	0	2	2	0
8	Toilet Cleaning	1	4	4	0
	Other usage in common				0
9	Corridor, Staircases, Terrace, Civic amenity spaces & other Common area cleaning	0.8	4	4	0
10	Yard Cleaning	0	2	2	0
11	Parking areas	0.2	1	1	0
12	Landscape irrigation	0	3	3	0
13	Swimming Pool makeup	0.2	0	0	0
14	Other water bodies	0.2	0	0	0
15	Car wash	0.5	1	1	0
	Grand Total		**150**	**132**	**18**

Note:

1. Landscape Irrigation water requirement vary from project to project depends on landscape area provided.
2. Water consumption for operating and maintenace staffs to be considered at actual depends on the project size.
3. Water consumption for Clubhouse and amenity users to be considered at actual depending on the project size.
4. * Water requirements is considered based on normal fixtures and water efficient plumbing fixtures are considered only for providing additional incentives as per these Byelaws

TABLE-2b(2)

Sl No	Usage Area	Waste water recovery factor	Water Requirement per person per day (Ltrs/person/day) (Refer Table 1d)				Total Water requirement (Litres)	Waste Water Generation (Litres)			Water Usage if Sullage Treatment Plant (Litres)			Water Usage if Sewage Treatment Plant (Litres)		
			EWS/LIG-A	LIG-B	MIG	HIG		Grey water	Black Water	Total Sewage	Domestic	Treated Sullage	Total	Domestic	Treated Sewage	Total
a	b	c	d	d	d	d	e = d x No of Occupants	f = c x e	g = c x e	h = f + g	i = e	j = e	k = i + j	l = e	m = e	n = l + m
(i)	**RESIDENTIAL USAGE**															
1	Bathing	1.0	53.0	53.0	55.0	60.0	-	-	-	-	-	-	-	-	-	-
2	Toilet Flushing	1.0	50.0	55.0	58.0	60.0	-		-	-		-	-		-	-
3	Washing Cloths	1.0	15.0	17.0	20.0	20.0	-	-		-	-		-	-		-
4	Cleaning house	0.8	5.0	7.0	10.0	12.0	-	-		-		-	-	-		-
5	Washing Utensils	1.0	6.0	9.0	12.0	14.0	-	-	-	-	-		-	-	-	-
6	Cooking	0.0	4.0	6.0	6.0	7.0	-	-		-	-		-	-		-
7	Drinking	0.0	2.0	3.0	3.0	4.0	-	-		-	-		-	-		-
8	Toilet Cleaning	1.0	4.0	5.0	7.0	9.0	-	-		-		-	-	-		-
	OTHER USAGE IN COMMON AREAS															
9	Corridor, Staircases, Terrace, Civic amenity spaces & other Common area cleaning	0.8	4.0	6.0	7.0	9.0	-	-		-		-	-	-		-
10	Yard Cleaning	0.0	2.0	3.0	4.0	5.0	-	-		-		-	-	-		-
11	Parking areas	0.2	1.0	2.0	3.0	5.0	-	-		-		-	-	-		-
12	Landscape irrigation	0.0	3.0	4.0	5.0	6.0	-	-		-		-	-		-	-
13	Swimming Pool makeup	0.2	0.0	2.0	4.0	5.0	-	-		-	-		-	-		-
14	Other water bodies	0.2	0.0	1.0	2.0	3.0	-	-		-		-	-	-		-
15	Car wash	0.5	1.0	2.0	4.0	6.0	-	-		-		-	-	-		-
	OTHER WATER REQUIREMENTS FOR RESIDENTIAL BUILDINGS															
(ii)	Club House Facilities (See Reference 1 (i) or 1 (iii))															
	a) Gym															
	Domestic	0.8		15.0	15.0	15.0	-	-		-	-		-	-		-
	Flushing	1.0		10.0	10.0	10.0	-		-	-		-	-		-	-
	b) Gym along with Jacuzzi, Steam, Sauna, Ayurvedic therapy, etc															
	Domestic	0.8		25.0	25.0	25.0	-	-		-	-		-	-		-
	Flushing	1.0		20.0	20.0	20.0	-		-	-		-	-		-	-
(iii)	Building manangement team (1 staff considered for 10 Units)															
	Domestic	0.8	25.0	25.0	25.0	25.0	-	-		-	-		-	-		-
	Flushing	1.0	20.0	20.0	20.0	20.0	-		-	-		-	-		-	-
(iv)	Other requirements if any															

	Total						**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
							(B1)	**(B2)**	**(B3)**	**(B4)**	**(B5)**	**(B6)**	**(B7)**	**(B8)**	**(B9)**	**(B10)**
	Treated water Generation											-			-	
	Excess Treated water disposal											-			-	
	Raw Sewage Disposal											-				

REFERENCES:

1 Occupancy for using building facilities/ Club house (A4)
15 percent of population considered to use the building facilities in residential buildings. (Ref: Part 9, Section 1, Clause 1.1.b Notes 2 of NBC 2019)
Water Requirement
i. Gym - Domestic -15 lphd and Flushing 10 lphd considered.
ii. Gym along with Jacuzzi, Steam, Sauna, Ayurvedic therapy, etc.- Domestic -25 lphd and Flushing 20 lphd (Ref: Part 9, Section 1, Table 1, Sl No: x of NBC 2016)

2 Building management team
No of persons for building management team (A5), 10% of no. of dwelling units
Water Requirement
Offices (Including canteen) - Domestic -25 lphd and Flushing 20 lphd (Ref: Part 9, Section 1, Table 1, Sl No: viii of NBC 2016)

III STORAGE OF WATER FOR FIRE FIGHTING PURPOSES

(UPTO 21 Mtrs BUILDING HEIGHT, NO FIRE SERVICES REQUIRED AS PER THE KARNATAKA FIRE FORCE (AMMENDMENT) ACT 2023, DATED 27-07-2023)

TABLE-2c(1)

MINIMUM REQUIREMENTS OF UGT & OHT FOR FIRE FIGHTING

Sl No	Type of Building Occupancy	UG Static water storage tank #	Terrace Tank #	Remarks
A	Residential Buildings			
a)	**Lodging and Rooming Houses (A-1)** (see note 3)			
1)	Less than 15m in height			
i)	Upto 15 rooms	NR	5000	(see note 1)
ii)	More than 15 and upto 30 rooms	NR	5000 (5000)	(see note 2)
iii)	More than 30 rooms	NR	10000 (5000)	(see note 2)
b)	**One or two Family Private Dwellings (A-2)**	NR	NR	
c)	**Dormitories (A-3) and Apartment Houses (A-4)**			
1)	Less than 15 m in height	NR	5000 (5000)	(see note 2)
2)	15 m and above but not exceeding 35 m in height	NR	25000	
3)	Above 35 m but not exceeding 45 m in height	75000	5000	
4)	Above 45 m but not exceeding 60 m in height	150000	10000	
5)	Above 60 m in height	200000	10000	

TABLE-2c(2)

i)	Height of Building	-	Mtrs
ii)	**UNDERGROUND TANK (SUMP TANK) CAPACITY**		
	a) For Wet Riser, Yard Hydrant and Sprinklers per set of pumps [Refer Table 1f(1)]		Ltrs (C1)
	b) For Water Curtain (If applicable) **		Ltrs (C2)
	TOTAL SUMP TANK CAPACITY =	-	Lts (C3=C1+C2)
iii)	**OVERHEAD (TERRACE) TANK CAPACITY** [Refer Table 1f(1)]		Lts (C4)

NOTES AND REFERENCES:

\# Refer Table 7, Minimum Requirements for Fire Fighting Installations Part 4 Fire and Life Safety of NBC 2016

** Water requirement for water curtain nozzles for 60 minutes considering the largest compartment's perimeter out of all compartments of car parking in any of the basement. (Ref: Annex H (Clause 6.4.2.2. and 6.8.1.5), Clause H-4.c, Part 4 - Fire and life safety of NBC 2016)
Tank size required (Litres) = No. of nozzles (in the perimeter of the Largest compartment) x Flow rate per water curtain nozzle (LPM) x 60 Minutes.
(No of nozzles in largest compartment perimetre = (Largest compartment perimeter / 3.0m +1 Nos & Flow rate per nozzle = 33 LPM)

1. Required to be provided if basement area exceeds 200 Sqm
2. Additional value given in peranthesis shall be added if basement area exceeds 200 Sqm
3. Buildings above 15 m in height are not to be permitted for occupancies A-1 and A-2.
4. One set of pumps shall be provided for each 100 hydrants or part thereof, with a maximum of two sets. In case of more than one pump set installation, both pump sets shall shall be interconnected at their delivery headers. (Refer Note 22, Table 7, Minimum Requirements for Fire Fighting Installations Part 4 Fire and Life Safety of NBC 2016)
5. Alternative to provisions of additional set of pumps, the objective can be met by providing additional diesel pump of the same capacity and doubling the water tank capacity as required for one set of pumps. (refer Note 23, Table 7, Minimum Requirements for Fire Fighting Installations Part 4 Fire and Life Safety of NBC 2016)

IV SEPTIC TANK / SULLAGE TREATMENT PLANT/ SEWAGE TREATMENT PLANT CAPACITY (The recycled water should be used for Toilet Flushing, Cleaning and Landscape Irrigation purposes)

TABLE-2d

1 BUILDINGS WHERE UGD IS AVAILABLE

a) Capacity of 100% SuTP

Total Sullage generated (Table 1e(2), column f (B2) (D1)	-	Lts/day	
Add 20% extra capacity for contingencies (D2 = D1 +20%)	-	Lts/day	
Required SuTP Capacity (D3 = D2/1000)	-	**KLD**	
Recommended SuTP Capacity (Round off in multiples of 5KLD) (D4)			**KLD**

b) Capacity of 100% SuTP & STP for additional treated water required

Required SuTP Capacity (D3)	-	**KLD**	
Recommended SuTP Capacity (Round off in multiples of 5KLD) (D4)			**KLD**
Treated water generated from SuTP (D5 = D1 x 95%)	-	Lts/day	
Total treated water required [Table 1e(2), column j (B6)] (D6)	-	Lts/day	
Shortfall of SuTP Treated water (D7 = D6-D5)	-	Lts/day	
Add 20% extra capacity for contingencies (D8 = D7 +20%) (for the shortfall in treated water requirement to be treated in STP)	-	Lts/day	
Required STP Capacity (D9 = D8/1000)	-	**KLD**	
Recommended STP Capacity (Round off in multiples of 5KLD) (D10)			**KLD**

c) Capacity of 100% STP with RO Plant

Total Sewage generated [Table 1e(2), column h (B4)] (D11)	-	**KLD**	
Add 20% extra capacity for contingencies (D12 = D11 +20%)	-	Lts/day	
Required STP Capacity (D13 = D12/1000)	-	**KLD**	
Recommended STP Capacity (Round off in multiples of 5KLD) (D14)			**KLD**

2 BUILDINGS WHERE UGD IS NOT AVAILABLE

a) For Small Buildings

100% Sullage disposed into Leach Pit & 100% Sewage disposed into Septic Tank

Septic tanks are only recommended for small communities and institutions whose contributory population does not exceed 300 (Refer: NBC 2016, Part 9, Section 2, Clause 4.5.14.5.2 Septic Tanks) or Sewage/Black Water generation is less than 15 KLD whichever is higher. Refer Design criteria and Construction of Septic Tanks (Ref: IS: 2470 (Part

b) For Large Buildings

i. Capacity of 100% SuTP & 100% STP

Required SuTP Capacity (D3)	-	**KLD**	
Recommended SuTP Capacity (Round off in multiples of 5KLD) (D4)			**KLD**
Total Black water generated (Table 1e(2), column g (B3) (D15)	-	Lts/day	
Add 20% extra capacity for contingencies (D16 = D15 +20%)	-	Lts/day	
Required STP Capacity (D17 = D16/1000)	-	**KLD**	
Recommended STP Capacity (Round off in multiples of 5KLD) (D18)			**KLD**

ii. Capacity of 100% STP with RO Plant

Total Sewage generated [Table 1e(2), column h (B4)] (D19)	-	Lts/day	
Add 20% extra capacity for contingencies (D20 =D19 +20%)	-	Lts/day	
Required STP Capacity (D21 = D20/1000)	-	**KLD**	
Recommended STP Capacity (Round off in multiples of 5KLD) (D21)			**KLD**

Notes:

1. Providing Sullage/Sewage Treatement Plant is a mandatory requirement for the residential buildings having Waste water generation more that 80 KLD or 120 Nos of Flats.

2. Sullage/Sewage Treatment Plant or Septic tanks should be provided, if UGD system is not available for all Buildings (Septic Tank shall be permitted for buildings upto 300 users) (Refer, IS : 2470 (part 1) -1985 for Design criteria and Construction of Septic Tanks)

V CAPACITY OF RO PLANT FOR DRINKING WATER SUPPLY

TABLE-2e(1)

i)	No of Occupants	-	Nos
ii)	Diversity of Occupancy	0.90	
iii)	Drinking water requirement per person per day *	3.00	Litres
iv)	Total Drinking water requirement (No. of Occupants x Diversity of Occupancy x Drinking water per person per day) =	-	LPD
v)	Required RO Plant Capacity per hour (¼ th of the total drinking water requirement)** =	-	LPH
vi)	Recommended RO plant capacity (Round off in multiples of 250 LPH)=	-	LPH
vii)	RO Plant SS water storage tank capacity (Round off in multiples of 250 Lits) # =	-	Litres

RO PLANT SPECIFICATIONS

TABLE-2e(2)

Sl. No.	Description	Specifications
i)	Capacity of Plant	
ii)	Membrane Material & Size	
iii)	Water quality indicator	
iv)	Controls system	
v)	Storage Tanks Capacity	
vi)	Optional Components like Ultra Violet treatment, Ozonation, Micron Filters (0.2 Micron), pH Booster, Mineral Booster, etc.	

Notes:

* Drinking Water requirement should be assessed as per **Table 1e,** column 'd'

** 6hours/day of maximum running time of RO Plant considered (RO membrane shall be replaced every 2200 hours of running (size of each membrane is 250LPH) ie. The life of membrane is 2200/6hrs =365days = 1 year)

\# Storage tank capacity for 1 day's requirement

VI CENTRALISED HOT WATER SYSTEM WITH HEAT PUMP AND SOLAR THERMAL COLLECTORS FOR RESIDENTIAL BUILDINGS (TO CALCULATE THE CAPACITY/SIZE OF THE SYSTEM)

TABLE-2f

1. CENTRALISED SOLAR HOT WATER SYSTEM WITH SOLAR THERMAL COLLECTORS

1)	No of Occupants		-	Nos
2)	Diversity of Occupancy		0.90	
3)	Hot water requirement per person per day *			**Litres**
	* *Hot Water requirment for Residential apartment buildings*			
	a) *15 Liters per Person shall be considered for MIG & Supply for 12 Hrs is assumed*			
	b) *20 Liters per Person shall be considered for HIG& Supply for 15 Hrs is assumed*			
	Note: If more hot water requirement is proposed, the same has to be mentioned.			
4)	Total Hot water requirement (Hot water requirement per person x Total No. of Persons x Diversity of Occupancy) (E1)	=	-	**Ltrs (E1)**
5)	Add wastage of 5% (E2 = E1 + 5%)	=	-	**Ltrs (E2)**
6)	Recommended Hot Water requirement *(E3 = Rounded off value of (E2) in multiples of 125Lit.)*	=		**Ltrs (E3)**
7)	SS Hot Water Storage Tank Capacity Required# *[E4 = 80% of the Recommended Hot Water requirement (E3)]*	=	-	**Ltrs (E4)**
	# *Assuming 80% of the people will take bath at the peak hour consumption of hot water from 6:30am to 8:30am.*			
8)	Recommended SS Hot Water Storage Tank Capacity [E5 = *Rounded off value of (E4) in multiples of 125Lit]*	=		**Ltrs (E5)**
9)	Number of 125 Lit. Solar Thermal Collectors (Size 1m x 2.0m)[*E6 = E3 / 125 = No. of Collectors)*	=	-	**Nos (E6)**
10)	Area Required for installing Solar Thermal Collectors (2 SqM required / 125 Litre Solar Thermal Collector Panel (100Kg/Collector with water)) (E7= 2 SqM x E6)	=	-	**SqM (E7)**

2. CENTRALISED HOT WATER SYSTEM WITH HEAT PUMP

11)	Hot Water required per hour from Heat Pump (E8 = E4 / 7 Hours ##)	=	-	**Ltr/Hr (E8)**
	## Hot Water supply gap 7 hours considered to fill the entire capacity of Hot water storage tank, assuming it is empty at the night after consumption			
12)	Recommended Heat Pump Capacity (Refer ###)	=		**T (E9)**
13)	Electrical Power Consumption of the Heat Pump□ *(25% of the Rated output power, Refer ###)*	=		**kW (E10)**

Standards for the selection of Heat Pump with Rated Output Power and Hot Water at the Temperature of 60◦C from the ambient Temp. of 25◦C =35◦C Delta T

1 T =3.3kW =81L/Hr, 1.5T =4.9kW =120L/Hr, 2 T =6.8kW =167L/Hr, 3 T =11.2kW =275L/Hr, 5 T =18.8kW =462L/Hr, 6 T =22kW =540L/Hr, 8 T =30kW =737L/Hr, 10 T =38kW =934L/Hr, 12 T =44kW =1081L/Hr, 15 T =58kW =1425L/Hr, 20 T =75kW =1843L/Hr, 25 T =86kW =2113L/Hr. (1kW = 860Kcal is considered)

VII WATER TANK CAPACITY

TABLE-2g

1	**DOMESTIC WATER TANK CAPACITY ***							
a)	TOTAL DOMESTIC UGT CAPACITY = 66.7% of 1.2 x Requirement per day** = 0.667 x 1.2 x [Without Sewage/Sullage Treatment Plant **B1**, from **Table 1e(2**)]	-	Litres	–	Litres	**(G1)**	66.70%	100.00%
b)	TOTAL DOMESTIC UGT CAPACITY = 66.7% of 1.2 x Requirement per day** = 0.667 x 1.2 x [With Sullage Treatment Plant **B5,** from **Table 1e(2**)]	-	Litres	–	Litres	**(G2)**	66.70%	100.00%
c)	TOTAL DOMESTIC UGT CAPACITY = 66.7% of 1.2 x Requirement per day** = 0.667 x 1.2 x [With Sullage & Sewage Treatment Plant **B5,** from **Table 1e(2**)]	-	Litres	–	Litres	**(G3)**	66.70%	100.00%
d)	TOTAL DOMESTIC UG TANK CAPACITY = 66.7% of 1.2 x Requirement per day** = 0.667 x 1.2 x [With Sewage Treatment Plant **B8,** from **Table 1e(2**)]	-	Litres	–	Litres	**(G4)**	66.70%	100.00%
e)	TOTAL FIRE FIGHTING UG TANK CAPACITY AS PER Table 1f(2) **(C3)**	-	Litres	–	Litres	**(G5)**		
f)	TOTAL DOMESTIC OHT CAPACITY = 33.3% of Requirement per day** = 0.333 x 1.2 x [Without Sewage/Sullage Treatment Plant **B1,** from **Table 1e(2**)]	-	Litres	–	Litres	**(G6)**	33.30%	16.67%
g)	TOTAL DOMESTIC OHT CAPACITY = 33.3% of Requirement per day** = 0.333 x 1.2 x [With Sullage Treatment Plant **B5**, from **Table 1e(2**)]	-	Litres		Litres	**(G7)**	33.30%	16.67%
h)	TOTAL DOMESTIC OHT CAPACITY = 33.3% of Requirement per day** = 0.333 x 1.2 x [With Sullage & Sewage Treatment Plant **B5**, from **Table 1e(2**)]	-	Litres	–	Litres	**(G8)**	33.30%	16.67%
i)	TOTAL DOMESTIC OHT CAPACITY = 33.3% of Requirement per day** = 0.333 x 1.2 x [With Sewage Treatment Plant **B8**, from **Table 1e(2**)]	-	Litres	–	Litres	**(G9)**	33.30%	16.67%
j)	TOTAL FIRE FIGHTING OVERHEAD TANK CAPACITY AS PER Table 1f(2) **(C4)**	-	Litres	–	Litres	**(G10)**		
2	**TREATED WATER TANK CAPACITY ***							
a)	TOTAL TREATED WATER UGT CAPACITY = 66.7% of Requirement per day = 0.667 x 1.2 x [With Sullage Treatment Plant **B6** from **Table 1e(2**)]	-	Litres	–	Litres	**(H1)**	66.70%	100.00%
b)	TOTAL TREATED WATER UGT CAPACITY = 66.7% of Requirement per day = 0.667 x 1.2 x [With Sewage Treatment Plant **B9** from **Table 1e(2**)]	-	Litres	–	Litres	**(H2)**	66.70%	100.00%
c)	TOTAL TREATED WATER OHT CAPACITY = 33.3% of Requirement per day = 0.333 x 1.2 x [With Sullage Treatment Plant **B6** from **Table 1e(2)]**	-	Litres	–	Litres	**(H3)**	33.30%	16.67%
d)	TOTAL TREATED WATER OHT CAPACITY = 33.3% of Requirement per day = 0.333 x 1.2 x [With Sewage Treatment Plant **B9** from **Table 1e(2)]**	-	Litres	–	Litres	**(H4)**	33.30%	16.67%
3	**WATER TREATMENT PLANT TANK CAPACITY (If applicable)**	-	Litres	–	Litres	**(I)**		

NOTES & REFERENCES:

***** General guide lines for calculation of capacity of these storage tanks are as follows (Ref: Part 9, Section 1, Clause 4.4.10 of NBC 2016)

a) In case only OHT is provided, it maybe taken as 33.3 to 50 percent of 1.2 times of one day's requirement;

b) In case only UGT is provided, it maybe taken as 50 to 150 percent of 1.2 times ofone day's requirement; and

c) In case combined storage is provided, it maybe taken as 66.7 percent UGT and 33.3 percent OHT of 1.2 times of one day's requirement.

****** In case Hydropneumatic system used, it maybe taken as 100 percent for UGT of one day's requirement and 16.65 percent OHT of 1.2 times of one day's requirement.

VIII WATER BALANCE CHART

TABLE - 3

E WATER REQUIREMENT ASSESSMENT FOR NON-RESIDENTIAL BUILDINGS

I OCCUPANT ASSESSMENT & WATER REQUIREMENT FOR NON RESIDENTIAL BUILDINGS

TABLE-3a

DOMESTIC AND TREATED WATER REQUIREMENT FOR NON RESIDENTIAL BUILDINGS (Ref: Part 9, Section 1, Table 1 of NBC 2016)

Sl No	TYPE OF OCCUPANCY	Occupant Load Factor (M^2/Person) (Ref: Part 4,Table 3 of NBC 2016)	Gross Area in Sqm (See Note 1)	Seating Capacity (No. of persons)	Total Occupants /No of Persons	Visitors/ floating population (See Table 3i)	Owners / Staff (See Table 3i)	Water Requirement /Person /Day for Visitors & Floating population			Water Requirement /Person /Day for Owners & Staffs			Total Water Requirement / Day in Litres			
								Domestic			Domestic			Visitors/ floating population		Owners/ Staffs (e x g)	
								Normal Fixtures	Water Efficient Fixtures *	Flushing	Normal Fixtures	Water Efficient Fixtures *	Flushing	Domestic #	Flushing	Domestic ##	Flushing
	a	b	c1	c2	d = c/b	e	f	g (a)	g (b)	g (c)	h (a)	h (b)	h (c)	I (a) = e x g(a) or g(b)	I (b) = e x g(c)	j (a) = f x h(a) or h(b)	j (b) = f x h(c)
A	**Group A: Hotels: (Excluding laundry, Kitchen, Staff and Water bodies) (See Note 2)**																
	a) Hotel (Upto 3 Star)	(See Note 2a and 2b)		0.00	0	0	0	5	3	10	120	72	60	0	0	0	0
	b) Hotel (4 Star and above)	(See Note 2a and 2b)		0.00	0	0	0	5	3	10	260	156	60	0	0	0	0
B	**Group B: Educational:**																
	a) Without boarding facilities	(See Note 3a and 3b)		0.00	0	0	0	10	6	5	25	15	20	0	0	0	0
	b) With boarding facilities	(See Note 3a and 3b)		0.00	0	0	0	10	6	5	90	54	45	0	0	0	0
	c) Hostels	(See Note 3a and 3b)		0.00	0	0	0	10	6	5	90	54	45	0	0	0	0
C	**Group C: Institutional: Hospital: (The water requirement includes requirement of patients, attendants, visitors and staff. Additional water requirement for kitchen, laundry and clinical water shall be computed as per actual requirements)**																
	a) No. of beds not exceeding 100 (See Note 4a and 4b)	15	0.00		0	0	0	5	3	10	230	138	110	0	0	0	0
	b) No. of beds exceeding 100 (See Note 4a and 4b)	15	0.00		0	0	0	5	3	10	300	180	150	0	0	0	0
	c) Out patient department (OPD) (See Note 4a and 4b)	10	0.00		0	0	0	10	6	5	25	15	20	0	0	0	0
D	**Group D: Assembly: (See Note 5a and 5b)**																
	a) Concentrated use without fixed seating	0.65	0.00		0	0	0	4	2.4	6	25	15	20	0	0	0	0
	b) Less concentrated use without fixed seating	1.4	0.00		0	0	0	4	2.4	6	25	15	20	0	0	0	0
	c) Fixed seating (Cinemas, Concert halls and Theaters and Multiplex)	1.2		0.00	0	0	0	5	3	10	25	15	20	0	0	0	0
	d) Dining areas and restaurants with seating and table (water requirement including kitchen)	1.8	0.00		0	0	0	55	33	15	25	15	20	0	0	0	0
	e) Food court (water requirement including kitchen)	1.8	0.00		0	0	0	25	15	10	25	15	20	0	0	0	0
E	**Group E: Business: (including canteen) (See Note 6a and 6b)**	10	0.00		0	0	0	5	3	10	25	15	20	0	0	0	0
F	**Group F: Mercantile: (See Note 7a and 7**																
	a) Street floor and sales basement	3	0.00		0	0	0	5	3	10	25	15	20	0	0	0	0
	b) Upper sales floor	6	0.00		0	0	0	5	3	10	25	15	20	0	0	0	0
	c) Storage/warehouse, receiving and the	20	0.00		0	0	0	5	3	10	25	15	20	0	0	0	0
G	**Group G: Industrial: (See Note 8a and 8**																
	a) Factories including canteen where bath rooms are required to be provided	10	0.00		0	0	0	5	3	10	30	18	15	0	0	0	0
	b) Factories including canteen where no bath rooms are required to be provided	10	0.00		0	0	0	5	3	10	20	12	10	0	0	0	0
H	**Group H: Storage:** (See Note 9a and 9b)	30	0.00		0	0	0	5	3	10	25	15	20	0	0	0	0
I	**Group J: Hazardous** (See note 10a and 1	10	0.00		0	0	0							0	0	0	0
J	**Traffic Terminal Stations** (See Note 11)																
	a) Airports	(See Note 11a)		0.00	0	0	0	40	24	30	25	15	20	0	0	0	0
	b) Railway station (Junction) with bathing	(See Note 11b)		0.00	0	0	0	40	24	30	25	15	20	0	0	0	0
	c) Railway station (Junction) without bath	(See Note 11c)		0.00	0	0	0	30	18	15	25	15	20	0	0	0	0
	d) Railway station (Intermediate) with bat	(See Note 11d)		0.00	0	0	0	25	15	20	25	15	20	0	0	0	0
	e) Railway station (Intermediate) without	(See Note 11e)		0.00	0	0	0	15	9	10	25	15	20	0	0	0	0
	f) Interstate Bus Terminals	(See Note 11f)		0.00	0	0	0	25	15	20	25	15	20	0	0	0	0
	g) Interstate Bus Terminals/Metro Statio	(See Note 11g)		0.00	0	0	0	10	6	5	25	15	20	0	0	0	0
	TOTAL												**TOTAL - A**	**A 1**	**A 2**	**A 3**	**A 4**
								Total Domestic Water Requirement (DWS) (A1+A3)								**0**	Ltrs/day
								Total Flushing Water Requirement (FWS) (A2+A4)								**0**	Ltrs/day
								Total Water Requirement (DWS+FWS) (A=A1+A2+A3+A4)								**0**	Ltrs/day

* Water requirement per person per day considered using water efficient plumbing fixtures
\# If Normal plumbing fixtures used consider g (a) and if Water Efficient plumbing fixtures used consider g (b)
\## If Normal plumbing fixtures used consider h (a) and if Water Efficient plumbing fixtures used consider h (b)

NOTES AND REFERENCES:

1 Gross Area - The area of the floor within the inside perimeter of the outside walls of the floor of the building under consideration with no deduction for corridors and passages, toilets, internal walls, internal columns or other features for each occupancy. In case the common passages are shared for different uses, then proportionate area of such common passages shall be added to the plinth area of all the premises of the respective use.

2 Hotels:
a. Occupant Load is considered Number of Beds + Staff + Requirement of restaurant seats (Ref: Part 9, Section 1, Clause -4.1.b of NBC 2016)
b. Upto 3 Star - Domestic 120 lphd and Flushing 60 lphd (Ref: Part 9, Section 1, Table 1, (Clause 4.1.2) Sl No. vi of NBC 2016)
4 star and above - Domestic 260 lphd and Flushing 60 lphd (Ref: Part 9, Section 1, Table 1, (Clause 4.1.2) Sl No. vii of NBC 2016)

3 Educational:
a. Occupant Load:
ii) Schools Occupant Load - Strength of school + Teaching and non-teaching staff (Ref: Part 9, Section 1, Clause 4.1.b of NBC 2016)
iii) Hostel Occupant Load - Number of beds + 4.5 x (warden's residence) + staff (Ref: Part 9, Section 1, Clause 4.1.b of NBC 2016)
b. Water Requirement
i) Without boarding facilities - Domestic 25 lphd and Flushing 20 lphd (Ref: Part 9, Section 1, Table 1, (Clause 4.1.2) Sl No. xiii.a of NBC 2016)

ii) With boarding facilities - Domestic 90 lphd and Flushing 45 lphd (Ref: Part 9, Section 1, Table 1, (Clause 4.1.2) Sl No. xiii.b of NBC 2016)

4 Institutional/ Hospital:
a. Occupant Load:
i. Indoor patients area is 15.0 SqM per person (Ref: Part 4, Table 3, Sl No: iii.a of NBC 2016)
ii. Outdoor patients area is 10.0 SqM per person (Ref: Part 4, Table 3, Sl No: iii.b of NBC 2016)
b. Water Requirement :
i. Number of beds not exceeding 100 - Domestic 230 lphd and Flushing 110 lphd (Ref: Part 9, Section 1, Table 1 (Clause 4.1.2), Sl No. iii.a of NBC 2016)
ii. Number of beds exceeding 100 - Domestic 300 lphd and Flushing 150 lphd (Ref: Part 9, Section 1, Table 1 (Clause 4.1.2), Sl No. iii.b of NBC 2016)
iii. Out patient department (OPD) - Domestic 10 lphd and Flushing 5 lphd (Ref: Part 9, Section 1, Table 1 (Clause 4.1.2), Sl No. iii.c of NBC 2016)

5 Assembly:
a. Occupant Load:
i. Concentrated use without fixed seating area is 0.65 SqM per person (Ref: Part 4, Table 3, Sl No: vi.a of NBC 2016)
ii. Less concentrated use without fixed seating is 1.40 SqM per person (Ref: Part 4, Table 3, Sl No: vi.b of NBC 2016)
iii. Fixed Seating - In case of assembly occupancy having fixed seats, the occupant load shall be determined by multiplying the number of seats by 1.2 (Ref: Part 4, Table 3, Sl No: vi.c (see note 4) of NBC 2016)
iv. Dining areas and restaurants with seating and table is 1.80 SqM per person (Ref: Part 4, Table 3, Sl No: vi.d of NBC 2016)
b. Water Requirement :
i. Concentrated use without fixed seating area/Stadium - Domestic 4 lphd and Flushing 6 lphd (Ref: Part 9, Section 1, Table 1, Sl No: xi of NBC 2016)
ii. Less concentrated use without fixed seating/Stadium - Domestic 4 lphd and Flushing 6 lphd (Ref: Part 9, Section 1, Table 1, Sl No: xi of NBC 2016)

iii. Fixed Seating (Cinemas, concert halls and theaters and multiflex) - Domestic 5 lphd and Flushing 10 lphd (Ref: Part 9, Section 1, Table 1, Sl No: xii of NBC 2016)
iv. Restaurants (water requirement including kitchen) - Domestic 55 lphd and Flushing 15 lphd (Ref: Part 9, Section 1, Table 1, Sl No: ix.a of NBC 2016)

v. Food Court (water requirement including kitchen) - Domestic 25 lphd and Flushing 10 lphd (Ref: Part 9, Section 1, Table 1, Sl No: ix.b of NBC 2016)

6 Business: (Offices -including canteen)
a. Occupant Load - 10.00 SqM per person (Ref: Part 4, Table 3, Sl No: vi of NBC 2016)
b. Water Requirement -Domestic 25 lphd and Flushing 20 lphd (Ref: Part 9, Section 1, Table 1, Sl No: viii of NBC 2016)

7 Mercantile:
a. Occupant Load:
i) Street floor and sales basement - 3.00 SqM per person (Ref: Part 4, Table 3, Sl No: v.a of NBC 2016)
ii) Upper sales floor - 6.00 SqM per person (Ref: Part 4, Table 3, Sl No: v.b of NBC 2016)
iii) Storage/warehouse, receiving and the like - 20.00 SqM per person (Ref: Part 4, Table 3, Sl No: v.c of NBC 2016)
b. Water Requirement : Street floor and sales basement/Shopping and retail (Mall)
i) Staffs -Domestic 25 lphd and Flushing 20 lphd (Ref: Part 9, Section 1, Table 1, Sl No: xiv.a of NBC 2016)
ii) Visitors -Domestic 5 lphd and Flushing 10 lphd (Ref: Part 9, Section 1, Table 1, Sl No: xiv.b of NBC 2016)

8 Industrial
a. Occupant Load - 10.00 SqM per person (Ref: Part 4, Table 3, Sl No: vii of NBC 2016)

b. Water Requirement
i) Factories including canteen where bath rooms are required to be provided -Domestic 30 lphd and Flushing 15 lphd (Ref: Part 9, Section 1, Table 1, Sl No: i of NBC 2016)

ii) Factories including canteen where no bath rooms are required to be provided -Domestic 20 lphd and Flushing 10 lphd (Ref: Part 9, Section 1, Table 1, Sl No: ii of NBC 2016)

iii) Water requirement should be assessed on a case to case basis.

9 Storage
a. Occupant Load - 30.00 SqM per person (Ref: Part 4, Table 3, Sl No: viii of NBC 2016)
Car parking area under occupancy other than storage shall also be 30.00 SqM per person (Ref: Part 4, Table 3, Sl No: viii, (see Note 5) of NBC 2016)
b. Water Requirement -Domestic 25 lphd and Flushing 20 lphd (Ref: Part 9, Section 1, Table 1, Sl No: viii of NBC 2016)

10 Hazardous
a. Occupant Load - 10.00 SqM per person (Ref: Part 4, Table 3, Sl No: ix of NBC 2016)
b. Water Requirement should be assessed on a case to case basis.

11 Traffic terminal stations

Occupant Load - The number of persons shall be determined by average number of passengers handled by stations, with due considerations given to the staff and vendors who are using these facilities. Consideration should be given for seasonal average peak requirements. (Ref: Part 9, Table 1, Notes 3 and 4 of NBC 2016)

Water Requirement:
a) Airports -Domestic 40 lphd and Flushing 30 lphd (Ref: Part 9, Section 1, Table 1, Sl No: xv.a of NBC 2016)
b) Railway station (Junction) with bathing facility -Domestic 40 lphd and Flushing 30 lphd (Ref: Part 9, Section 1, Table 1, Sl No: xv.b of NBC 2016)
c) Railway station (Junction) without bathing facility -Domestic 30 lphd and Flushing 15 lphd (Ref: Part 9, Section 1, Table 1, Sl No: xv.c of NBC 2016)
d) Railway station (Intermediate) with bathing facility -Domestic 25 lphd and Flushing 20 lphd (Ref: Part 9, Section 1, Table 1, Sl No: xv.d of NBC 2016)
e) Railway station (Intermediate) without bathing facility -Domestic 15 lphd and Flushing 10 lphd (Ref: Part 9, Section 1, Table 1, Sl No: xv.e of NBC 2016)
f) Interstate Bus Terminals -Domestic 25 lphd and Flushing 20 lphd (Ref: Part 9, Section 1, Table 1, Sl No: xv.f of NBC
g) Interstate Bus Terminals/Metro Stations -Domestic 10 lphd and Flushing 5 lphd (Ref: Part 9, Section 1, Table 1, Sl No: xv.g of NBC 2016)

TABLE-3b

II OTHER WATER REQUIREMENT FOR NON RESIDENTIAL BUILDINGS

Sl No	PURPOSE	QUANTITY	UNIT	Water Requirement (Liters/ Day/ Unit)			Total Water Requirement (Liters/ Day/ Unit)				Notation	Sullage Genaration	Remarks
				Domestic	Sullage Treated	Treated	Domestic	Sullage Treated	Treated	Total			
1	Building Facilities/ Club House (See Note 1)												
	a) Gym	-	Persons	15		10	-		-	-	(a1)	-	
	b) Gym along wth Jacuzzi, Steam, Sauna, Ayurvedic therapy, etc	-	Persons	25		20	-		-	-	(a2)	-	
2	Pool make up - Swimming Pool (See Note 2)	-	Litres	2%			-			-	(a3)	-	
3	Other Water Bodies (Fish Pond, Water Fountains, etc.)	-	Litres		2%			-		-	(a4)	-	
3	**Landscape**												
	a) Lawns (See Note 4a)	-	Sqmt			7			-	-	(a5)		
	b) Other Landscape -Shrubs and Trees (See Note 4b)	-	Sqmt			5			-	-	(a6)		
4	HVAC Cooling Tower (See Note 4)	-	Litres						-	-	(a7)		
5	DG Set Cooling Tower (See Note 4)	-	Litres						-	-	(a8)		
6	Market Cleaning (Common area and stall area) (See Note 6a)	-	Sqmt		10			-		-	(a9)	-	
7	Mall Cleaning (Common area) (See Note 6b)	-	Sqmt		5			-		-	(a10)	-	
8	Other requirements						-	-	-	-	(a11)		
			TOTAL (B)				**-**	**-**	**-**	**-**		**-**	
							(a12)	(a13)	(a14)	**(a)**		(a15)	

NOTES AND REFERENCES:

1 Population of 15 percent shall be considered for likely to use the building facilities.

Water Requirement

i. Clubhouse (Gym, Jacuzzi, Steam, Sauna, Ayurvedic therapy, etc.)- Domestic -25 lphd and Flushing 20 lphd (Ref: Part 9, Section 1, Table 1, SI No: x of NBC 2016)

ii. Gym - Domestic -15 lphd and Flushing 10 lphd considered.

2 Pool Make up, Fish pond, Water fountain, etc considered 2% of Total volume of stored water.

3 The water requirement for landscaping purposes is generally taken as 6 to 8 Litre/SqM/day for lawns. For shrubs and trees the above value can be reduced considerably. (Ref: Part 9, Section 1, Clause 4.1.5.2 of NBC 2016).

a) For Lawns 7 Litre/SqM/day shall be considered.

b) For Other Landscapes like Shrubs and Trees 5 Litre/SqM/day shall be considered.

4 Water consumption for cooling towers shall be considered as per the manufacturers requirement and also consider the daily running hours of the systems.

5 Water consumption for Ice Plant shall be considered as per the manufacturers requirement and also consider the daily running hours of the systems.

6 a) Non Veg and Veg Market Cleaning water shall be considered as 10 Liters per Sqm of Market area (10 liters x Area = Liters/day)

b) Mall Cleaning water shall be considered as 5 Liters per Sqm of Common area of the mall (5 liters x Area = Liters/day)

III WATER REQUIREMENT, WASTE WATER GENERATION, TREATED WATER USAGE & SEWAGE/EXCESS TREATED WATER DISPOSAL FOR RESIDENTIAL BUILDINGS

TABLE-3c

Total Water requirement (Litres)	(B = A + a)	-	Litres
Waste Water Generation (Litres)			
Grey water	(B1 = A1+A3+a15)	-	Litres
Black Water	(B2 = A2+A4+a1+a2)	-	Litres
Total Waste Water	(B3 = B1+B2)	-	Litres
Water Usage if Sullage Treatment Plant (Litres)			
Domestic	(B4 = A1+A3+a12)	-	Litres
Treated Sullage	(B5 = A2+A4+a13+a14)	-	Litres
Treated water disposal	(B5(1) = (B1x95%)-(B5)	-	Litres
Water Usage if Sewage Treatment Plant (Litres)			
Domestic	(B6 = A1+A3+a12+a13)	-	Litres
Treated Sewage	(B7 = A2+A4+a14)	-	Litres
Treated water disposal	(B7(1) = (B3x90%)-(B7)	-	Litres

IV STORAGE OF WATER FOR FIRE FIGHTING PURPOSES

(UPTO 21 Mtrs BUILDING HEIGHT, NO FIRE SERVICES REQUIRED AS PER THE KARNATAKA FIRE FORCE (AMMENDMENT) ACT 2023, DATED 27-07-2023)

TABLE-3d(1)
MINIMUM REQUIREMENTS OF UGT & OHT FOR FIRE FIGHTING

Sl No	Type of Building Occupnacy	UG Static water storage tank #	Terrace Tank #	Remarks
A	**Residential Buildings**			
a)	Lodging and Rooming Houses (A-1) (See note 3)			
i)	Less than 15m in height			
i)	Upto 15 rooms	NR	5000	(see note 1)
ii)	More than 15 and upto 30 rooms	NR	5000 (5000)	(see note 2)
iii)	More than 30 rooms	NR	10000 (5000)	(see note 2)
b)	Hotels (A-5)			
i)	Less than 15m in height			
i)	Floor area not exceeding 300Sqm on any of the Floor	NR	5000 (5000)	(see note 6)
ii)	Floor area exceeding 300Sqm but not more than 1000 Sqm on any of the Floor	10000 for every 500 Sqm floor area subject to minimum of 50000 (See Note 7)	10000 (5000)	(see note 6)
iii)	Floor area exceeding 1000Sqm on any of the Floor	100000 (see Note 8)	10000 (See Note 4)	
2)	15m and above but not exceeding 30m	150000	20000	
3)	above 30m in height	200000	20000	
c)	Hotels (A-6)	250000	20000	
B	**Educational Buildings**			
1)	Less than 15m in height			
i)	Ground plus one or more storeys	NR	10000 (5000)	(see note 6)
2)	15m and above but not exceeding 24m in Height	NR	25000	
3)	above 24m but not exceeding 30m in height	50000	5000	(see note 6)
C	**Institutional Buildings**			
a)	Hospitals, Sanatoria and nursing homes			
1)	Less than 15m in height with Plot area upto 1000Sqm			
i)	Upto Ground plus one storey, with no beds	NR	5000	(see note 6)
ii)	Upto Ground plus one storey, with beds	NR	5000 (5000)	(see note 6)
iii)	Ground plus two or more storeys, with no beds	NR	10000 (5000)	(see note 6)
iv)	Ground plus two or more storeys, with beds	75000	10000	
2)	Less than 15m in height with Plot area more than 1000Sqm	100000	10000	
3)	15m and above but not exceeding 24m in Height	150000	20000	
4)	above 24m but not exceeding 45m in height	200000	20000	
b)	Custodial, Penal & Mental			
1)	Less than 10m in height			
i)	Upto 300 person	NR	10000 (5000)	(see note 6)
ii)	More than 300 person	NR	15000 (5000)	(see note 6)
2)	10m and above but not exceeding 15m in Height	100000	5000 (5000)	(see note 6)
3)	15m and above but not exceeding 24m in height	150000	10000	
4)	24m above but not exceeding 30m in height	200000	20000	
D	**Assembly Buildings**			
a)	Buildings D-1 to D-5*			
1)	Less than 10m in height			
i)	Upto 300 person	NR	20000 (5000)	(see note 6)
ii)	More than 300 person	NR	25000 (5000)	(see note 6)
2)	above 10m and but not exceeding 15m in Height	100000	5000 (5000)	(see note 6)
3)	above 15m and but not exceeding 24m in Height	150000	10000	
4)	above 24m and but not exceeding 30m in Height	200000	20000	
b)	D-6*	200000	20000	
c)	D-7* (Refer Clause no 6.4.4 of Part 4, NBC 2016)			
E	**Business Buildings**			
1)	Less than 10m in height	NR	10000 (5000)	(see note 6)
2)	above 10m and but not exceeding 15m in Height	50000	5000 (5000)	(see note 6)
3)	above 15m and but not exceeding 24m in Height	100000	10000	
4)	above 24m and but not exceeding 30m in Height	150000	20000	
5)	above 30m in height	200000	20000	
F	**Mercantile Buildings**			
a)	F-1 & F-2 (See Note 9)			
1)	Less than 15m in height			
i)	Ground plus one storey, with total of all floor area not exceeding 500Sqm	NR	5000 (5000)	(see note 6)
ii)	Ground plus one storey and total of all floor area exceeding 500Sqm	NR	20000 (5000)	(see note 6)
iii)	More than Ground plus one storey	NR	25000 (5000)	(see note 6)
2)	above 15m and but not exceeding 24m in Height	100000	10000	
3)	above 24m and but not exceeding 30m in Height	200000	20000	
b)	Underground shopping complex	150000	10000	
G	**Industrial Buildings**			
a)	Low Hazard (See note 10)			
i)	Covered area upto 100 Sqm	NR	5000	(see note 5)
ii)	Covered area more than 100Sqm and upto 500 Sqm	NR	20000 (5000)	(see note 6)
iii)	Covered area more than 500Sqm (For building height upto 15m)	NR	20000 (5000)	(see note 6)
iv)	Covered area more than 500Sqm (For building height above	75000	5000	(see note 6)
b)	Moderate Hazard (see note 10)			
i)	Covered area upto 100 Sqm	NR	10000	
ii)	Covered area more than 100Sqm and upto 500 Sqm	NR	20000	
iii)	Covered area more than 500Sqm and upto 1000Sqm (For building height upto 15m)	NR	50000	
iv)	Covered area more than 1000Sqm (For building height above 15m)	100000	10000	
v)	Covered area more than 1000Sqm	150000	10000	
c)	High Hazard (see note 11)			
i)	Covered area upto 50 Sqm	NR	10000	
ii)	Covered area more than 50Sqm and upto 150 Sqm	NR	25000	
iii)	Covered area more than 150Sqm and upto 300Sqm	50000	10000	
iv)	Covered area more than 300Sqm and upto 500Sqm	100000	20000	
v)	Covered area more than 5000Sqm	150000	20000	
H	**Storage Buildings**			
1)	Below 15m in height and Covered area less than 250Sqm	NR	25000	
2)	Below 15m in height and Covered area more than 250Sqm			
i)	Ground Floor only	50000	10000	
ii)	Ground plus one floor	75000	10000	
iii)	More than Ground plus one floor	100000	10000	
3)	Multilevel car parking (MLCP)	150000	10000	
J	**Hazardous Buildings**			
1)	Upto 15m in height			
i)	Single storey building	Minimum 240 min Fire fighting requirments	NR	
ii)	more than one floor building but not exceeding 15m	Minimum 240 min Fire fighting requirments	50000	

TABLE-3d(2)

i)	Height of Building	-	Mtrs
ii)	**UNDERGROUND TANK (SUMP TANK) CAPACITY**		
	a) For Wet Riser, Yard Hydrant and Sprinklers per set of pumps [Refer Table 2c]		Ltrs (C1)
	b) For Water Curtain (If applicable) **		Ltrs (C2)
	TOTAL SUMP TANK CAPACITY =	-	Lts (C3=C1+C2)
iii)	**OVERHEAD (TERRACE) TANK CAPACITY** (Refer Table 2c)		Lts (C4)

NOTES AND REFERENCES:

\# Refer Table 7, Minimum Requirements for Fire Fighting Installations Part 4 Fire and Life Safety of NBC 2016

* D-1: Buildings having a theatrical or motion picture or any other stage and fixed seats for over 1000 persons
D-2: Buildings having a theatrical or motion picture or any other stage and fixed seats upto 1000 persons
D-3: Buildings without a permanent stage having accomodation for 300 or more persons but no permanent seating arrangement
D-4: Buildings without a permanent stage having accomodation for less than 300 persons with permanent seating arrangement
D-5: All other structures including temporary structures designed for assembly of people not coverved by subdivision D-1 to D-4, at ground level
D-6: Buildings having mixed occupancies of Assembly & Merchantile(for example, Shopping Malls providing facilities such as shopping, cinema theatres, multiplexes & restaurants / Food Courts.
D-7: Underground and elevated mass rapid transit system

** Water requirement for water curtain nozzles for 60 minutes considering the largest compartment's perimeter out of all compartments of car parking in any of the basement. (Ref: Annex H (Clause 6.4.2.2. and 6.8.1.5), Clause H-4.c, Part 4 - Fire and life safety of NBC 2016)
Tank size required (Litres) = No. of nozzles (in the perimeter of the Largest compartment) x Flow rate per water curtain nozzle (LPM) x 60 Minutes.
(No of nozzles in largest compartment perimetre = (Largest compartment perimeter / 3.0m +1 Nos & Flow rate per nozzle = 33 LPM)

1 MOEFA System shall also include talk-back system and public address system for the occupancies given in the table for (d) (I) (iii) under A-5, (a) (I) (iv) and (a) (2) under C-I, and (a) (2) under D-I to D-5, in all buildings 15 m and above in height, except for A-3 and A-4 occupancies where these shall be provided for buildings of height 24 m and above. These shall also be provided in car parking areas more than 300 m2 and in multi-level car parking irrespective of their areas.
2 Automatic detection and alarm system is not required to be provided in car parking area. Such detection system shall however be required in other areas of car parking such as electrical rooms, cabins and other areas.
3 Buildings above 15 m in height are not to be permitted for occupancies A-I and A-2.
4 Required to be installed in basement, if area of basement exceeds 200 Sqm.
5 Required to be provided if basement area exceeds 200 Sqm.
6 Additional value given in peranthesis shall be added if basement area exceeds 200 Sqm
7 Required to be provided for birildings with more than two storeys (Ground + One).
8 Required to be provided for birildings with more than one storey.
9 Buildings above 30 m in height not to be permitted for Group B, Group C, Group D and Group F occupancies.
10 Buildings above 18 m in height not to be permitted for G-I and G-2 occupancies.
11 Buildings above 15 m in height not to be permitted for G-3 occupancies.

1 One set of pumps shall be provided for each 100 hydrants or part thereof, with a maximum of two sets. In case of more than one pump set installation, both pump sets shall shall be interconnected at their delivery headers. (Refer Note 22, Table 7, Minimum Requirements for Fire Fighting Installations Part 4 Fire and Life Safety of NBC 2016)
2 Alternative to provisions of additional set of pumps, the objective can be met by providing additional diesel pump of the same capacity and doubling the water tank capacity as required for one set of pumps. (refer Note 23, Table 7, Minimum Requirements for Fire Fighting Installations Part 4 Fire and Life Safety of NBC 2016)

V SEPTIC TANK / SULLAGE TREATMENT PLANT/ SEWAGE TREATMENT PLANT CAPACITY (The recycled water should be used for Toilet Flushing, Cleaning and Landscape Irrigation purposes)

TABLE-3e

1 BUILDINGS WHERE UGD IS AVAILABLE

a) Capacity of 100% SuTP			
Total Sullage generated (D1 = B1 from Table 3c)	-	Lts/day	
Add 20% extra capacity for contingencies (D2 = D1 +20%)	-	Lts/day	
Required SuTP Capacity (D3 = D2/1000)	-	**KLD**	
Recommended SuTP Capacity (Round off in multiples of 5KLD) (D4)			**KLD**
b) Capacity of 100% SuTP & STP for additional treated water required			
Required SuTP Capacity (D3)	-	**KLD**	
Recommended SuTP Capacity (Round off in multiples of 5KLD) (D4)			**KLD**
Treated water generated from SuTP (D5 = D1 x 95%)	-	Lts/day	
Total treated water required (D6 = B4 from Table 3c)	-	Lts/day	
Shortfall of SuTP Treated water (D7 = D6-D5)	-	Lts/day	
Add 20% extra capacity for contingencies (D8 = D7 +20%)	-	Lts/day	
(for the shortfall in treated water requirement to be treated in STP)			
Required STP Capacity (D9 = D8/1000)	-	**KLD**	
Recommended STP Capacity (Round off in multiples of 5KLD) (D10)			**KLD**
c) Capacity of 100% STP with RO Plant			
Total Sewage generated [B3 from Table 3c] (D11)	-	**KLD**	
Add 20% extra capacity for contingencies (D12 = D11 +20%)	-	Lts/day	
Required STP Capacity (D13 = D12/1000)	-	**KLD**	
Recommended STP Capacity (Round off in multiples of 5KLD) (D14)			**KLD**

2 BUILDINGS WHERE UGD IS NOT AVAILABLE

a) For Small Buildings
100% Sullage disposed into Leach Pit & 100% Sewage disposed into Septic Tank

Septic tanks are only recommended for small communities and institutions whose contributory population does not exceed 300 (Refer: NBC 2016, Part 9, Section 2, Clause 4.5.14.5.2 Septic Tanks) or Sewage/Black Water generation is less than 15 KLD whichever is higher. Refer Design criteria and Construction of Septic Tanks (Ref: IS: 2470 (Part 1) – 1985)

b) For Large Buildings

i Capacity of 100% SuTP & 100% STP			
Required SuTP Capacity (D3)	-	**KLD**	
Recommended SuTP Capacity (Round off in multiples of 5KLD) (D4)			**KLD**
Total Black water generated (B2 from Table 3c) (D15)	-	Lts/day	
Add 20% extra capacity for contingencies (D16 = D15 +20%)	-	Lts/day	
Required STP Capacity (D17 = D16/1000)	-	**KLD**	
Recommended STP Capacity (Round off in multiples of 5KLD) (D18)			**KLD**
ii Capacity of 100% STP with RO Plant			
Total Sewage generated [B3 from Table 3c] (D19)	-	Lts/day	
Add 20% extra capacity for contingencies (D20 =D19 +20%)	-	Lts/day	
Required STP Capacity (D21 = D20/1000)	-	**KLD**	
Recommended STP Capacity (Round off in multiples of 5KLD) (D21)			**KLD**

Notes:
1. Providing Sullage/Sewage Treatement Plant is a mandatory requirement for the residential buildings having Waste water generation more that 35 KLD or 5000Sqm Builtup area.

2. Sullage/Sewage Treatment Plant or Septic tanks should be provided, if UGD system is not available for all Buildings (Septic Tank shall be permitted for buildings upto 300 users) (Refer, IS : 2470 (part 1) -1985 for Design criteria and Construction of Septic Tanks)

VI CAPACITY OF RO PLANT FOR DRINKING WATER SUPPLY

TABLE-3f(1)

i)	Total Drinking water requirement (as per requirment)		LPD
ii)	Required RO Plant Capacity per hour (¼ th of the total drinking water requirement)** =	-	LPH
iii)	Recommended RO plant capacity (Round off in multiples of 250 LPH)=		LPH
iv)	RO Plant SS water storage tank capacity (Round off in multiples of 250 Lits) # =	-	Litres

RO PLANT SPECIFICATION

TABLE-3f(2)

Sl. No.	Description	Specifications
i)	Capacity of Plant	
ii)	Membrane Material & Size	
iii)	Water quality indicator	
iv)	Controls system	
v)	Storage Tanks Capacity	
vi)	Optional Components like Ultra Violet treatment, Oxonation, Micron Filters (0.2 Micron), pH Booster, Mineral Booster, etc.	

Notes:
* Drinking Water requirement as per requirment
** 6hours/day of maximum running time of RO Plant considered (RO membrane shall be replaced every 2200 hours of running (size of each membrane is 250LPH) ie. The life of membrane is 2200/6hrs =365days = 1 year)
\# Storage tank capacity for 1 day's requirement

VII CENTRALISED HOT WATER SYSTEM WITH HEAT PUMP AND SOLAR THERMAL COLLECTORS FOR RESIDENTIAL BUILDINGS (TO CALCULATE THE CAPACITY/SIZE OF THE SYSTEM)

TABLE-3g

1. CENTRALISED SOLAR HOT WATER SYSTEM WITH SOLAR THERMAL COLLECTORS

1)	Total Hot water requirement (E1)	=		**Ltrs (E1)**
2)	Add wastage of 5% (E2 = E1 + 5%)	=	-	**Ltrs (E2)**
3)	Recommended Hot Water requirement *(E3 = Rounded off value of (E2) in multiples of 125Lit.)*	=		**Ltrs (E3)**
4)	SS Hot Water Storage Tank Capacity Required[4] *[E4 = 80% of the Recommended Hot Water requirement (E3)]* *# Assuming 80% of the people will take bath at the peak hour consumption of hot water from 6:30am to 8:30am.*	=	-	**Ltrs (E4)**
5)	Recommended SS Hot Water Storage Tank Capacity [E5 = *Rounded off value of (E4) in multiples of 125Lit]*	=		**Ltrs (E5)**
6)	Number of 125 Lit. Solar Thermal Collectors (Size 1m x 2.0m)*(E6 = E3 / 125 = No. of Collectors)*	=	-	**Nos (E6)**
8)	Area Required for installing Solar Thermal Collectors (2 SqM required / 125 Litre Solar Thermal Collector Panel (100Kg/Collector with water)) (E7= 2 SqM x E6)	=	-	**SqM (E7)**

2. CENTRALISED HOT WATER SYSTEM WITH HEAT PUMP

9)	Hot Water required per hour from Heat Pump (E8 = E4 / 7 Hours ##)	=	-	**Ltr/Hr (E8)**
##	Hot Water supply gap 7 hours considered to fill the entire capacity of Hot water storage tank, assuming it is empty at the night after consumption			
10)	Recommended Heat Pump Capacity (Refer ###)	=		**T (E9)**
11)	Electrical Power Consumption of the Heat Pump *(25% of the Rated output power, Refer ###)*	=		**kW (E10)**
###	*Standards for the selection of Heat Pump with Rated Output Power and Hot Water at the Temperature of 60◦C from the ambient Temp. of 25◦C +25◦C Delta T* 1 T =3.3kW -81L/Hr, 1.5T =4.9kW =120L/Hr, 2 T =6.8kW =167L/Hr, 3 T =11.2kW =275L/Hr, 5T =18.8kW =462L/Hr, 6 T =22kW =540L/Hr, 8 T =30kW =737L/Hr, 10 T =38kW =934L/Hr, 12 T =44kW =1081L/Hr, 15 T =58kW =1425L/Hr, 20 T =75kW =1843L/Hr, 25 T =86kW =2113L/Hr. (1kW = 860Kcal is considered)			

VIII WATER TANK CAPACITY

TABLE-3h

1	**DOMESTIC WATER TANK CAPACITY ***						
a)	TOTAL DOMESTIC UGT CAPACITY = 66.7% of 1.2 x Requirement per day** = 0.667 x 1.2 x [Without Sewage/Sullage Treatment Plant **B**, from **Table 3C**]	- Litres	–	Litres	**(G1)**	66.70%	100.00%
b)	TOTAL DOMESTIC UGT CAPACITY = 66.7% of 1.2 x Requirement per day** = 0.667 x 1.2 x [With Sullage Treatment Plant **B4,** from **Table 3C**]	- Litres	–	Litres	**(G2)**	66.70%	100.00%
c)	TOTAL DOMESTIC UGT CAPACITY = 66.7% of 1.2 x Requirement per day** = 0.667 x 1.2 x [With Sullage & Sewage Treatment Plant **B4,** from **Table 3C**]	- Litres	–	Litres	**(G3)**	66.70%	100.00%
d)	TOTAL DOMESTIC UG TANK CAPACITY = 66.7% of 1.2 x Requirement per day** = 0.667 x 1.2 x [With Sewage Treatment Plant **B6,** from **Table 3C**]	- Litres	–	Litres	**(G4)**	66.70%	100.00%
e)	TOTAL FIRE FIGHTING UG TANK CAPACITY AS PER Table 3d(2) **(C3)**	- Litres	–	Litres	**(G5)**		
f)	TOTAL DOMESTIC OHT CAPACITY = 33.3% of Requirement per day** = 0.333 x 1.2 x [Without Sewage/Sullage Treatment Plant **B,** from **Table 3C**]	- Litres	–	Litres	**(G6)**	33.30%	16.67%
g)	TOTAL DOMESTIC OHT CAPACITY = 33.3% of Requirement per day** = 0.333 x 1.2 x [With Sullage Treatment Plant **B4**, from **Table 3C**]	- Litres		Litres	**(G7)**	33.30%	16.67%
h)	TOTAL DOMESTIC OHT CAPACITY = 33.3% of Requirement per day** = 0.333 x 1.2 x [With Sullage & Sewage Treatment Plant **B4**, from **Table 3C**]	- Litres	–	Litres	**(G8)**	33.30%	16.67%
i)	TOTAL DOMESTIC OHT CAPACITY = 33.3% of Requirement per day** = 0.333 x 1.2 x [With Sewage Treatment Plant **B6**, from **Table 3C**]	- Litres	–	Litres	**(G9)**	33.30%	16.67%
j)	TOTAL FIRE FIGHTING OVERHEAD TANK CAPACITY AS PER Table 3d(2) **(C4)**	- Litres	–	Litres	**(G10)**		
2	**TREATED WATER TANK CAPACITY ***						
a)	TOTAL TREATED WATER UGT CAPACITY = 66.7% of Requirement per day = 0.667 x 1.2 x [With Sullage Treatment Plant **B5** from **Table 3C**]	- Litres	–	Litres	**(H1)**	66.70%	100.00%
b)	TOTAL TREATED WATER UGT CAPACITY = 66.7% of Requirement per day = 0.667 x 1.2 x [With Sewage Treatment Plant **B7** from **Table 3C**]	- Litres	–	Litres	**(H2)**	66.70%	100.00%
c)	TOTAL TREATED WATER OHT CAPACITY = 33.3% of Requirement per day = 0.333 x 1.2 x [With Sullage Treatment Plant **B5** from **Table 3C]**	- Litres	–	Litres	**(H3)**	33.30%	16.67%
d)	TOTAL TRAETED WATER OHT CAPACITY = 33.3% of Requirement per day = 0.333 x 1.2 x [With Sewage Treatment Plant **B7** from **Table 3C]**	- Litres	–	Litres	**(H4)**	33.30%	16.67%
3	**WATER TREATMENT PLANT TANK CAPACITY (If applicable)**	- Litres	–	Litres	**(I)**		

NOTES & REFERENCES:

* General guide lines for calculation of capacity of these storage tanks are as follows (Ref: Part 9, Section 1, Clause 4.4.10 of NBC 2016)
a) In case only OHT is provided, it maybe taken as 33.3 to 50 percent of 1.2 times of one day's requirement;
b) In case only UGT is provided, it maybe taken as 50 to 150 percent of 1.2 times ofone day's requirement; and
c) In case combined storage is provided, it maybe taken as 66.7 percent UGT and 33.3 percent OHT of 1.2 times of one day's requirement.

** In case Hydropneumatic system used, it maybe taken as 100 percent for UGT of one day's requirement and 16.65 percent OHT of 1.2 times of one day's requirement.

TABLE-3i

(to Table 3a of Notification for Water Demand & Water Balance Chart)

Additional visitors / floating population for different uses shall be

TYPE OF OCUPANCY	Visitors/ floating population	Owners / Staff
Group A: Hotels:		
a) Hotel (Upto 3 Star)	10%	90%
b) Hotel (4 Star and above)	10%	90%
Group B: Educational:		
a) Without boarding facilities	5%	95%
b) With boarding facilities	5%	95%
c) Hostels	5%	95%
Group C: Institutional: Hospital:		
a) No. of beds not exceeding 100	10%	90%
b) No. of beds exceeding 100	10%	90%
c) Out patient department (OPD)	85%	15%
Group D: Assembly:		
a) Concentrated use without fixed seating	85%	15%
b) Less concentrated use without fixed seating	85%	15%
c) Fixed seating (Cinemas, Concert halls and Theatres and Multiplex)	85%	15%
d) Dining areas and restaurants with seating and table (water requirement including kitchen)	85%	15%
e) Food court (water requirement including kitchen)	85%	15%
Group F: Mercantile:		
a) Street floor and sales basement	90%	10%
b) Upper sales floor	90%	10%
c) Storage/warehouse, receiving and the like	10%	90%
Group E: Business: (including canteen)	10%	90%
Group G: Industrial:		
a) Factories including canteen where bath rooms are required to be provided	10%	90%
b) Factories including canteen where no bath rooms are required to be provided	10%	90%
Group H: Storage:	10%	90%
Group J: Hazardous	10%	90%
Traffic Terminal Stations:		
a) Airports	90%	10%
b) Railway station (Junction) with bathing facility	90%	10%
c) Railway station (Junction) without bathing facility	90%	10%
d) Railway station (Intermedite) with bathing facility	90%	10%
e) Railway station (Intermedite) without bathing facility	90%	10%
f) Interstate Bus Terminals	90%	10%
g) Interstate Bus Terminals/Metro Stations	90%	10%

Notes and References:

1. Polpulation of 5 to 15 percent, depending on the usage of building, shall be considered for visitors and floating population likely to use the building facilities. (Ref: Part 9, Section 1, Clause 4.1.b -Notes 2 of NBC

ANNEXURE-XVA

Design criteria and Construction of Septic Tanks (Ref: IS : 2470 (Part 1) – 1985)

1. SCOPE – This code lays down recommendations for the design, layout, construction and maintenance of septic tanks. It is applicable to houses, flats, residential housing colonies, hostels and boarding schools where the number of users does not exceed 300 persons.

2. TERMINOLOGY

3. DESIGN CONSIDERATIONS

3.3 Location of Septic Tank

3.3.1 Septic tank should be located at a place open to sky, as far away as possible from the exterior of the wall of building and should not be located in swampy areas or areas prone to flooding. It should also be accessible for cleaning.

3.4 Septic Tank Design

3.4.1 Sewage flow

3.4.1.1 The maximum flow to the tank is based on the number of plumbing fixtures discharging simultaneously. For this purpose various sanitation facilities are equated in terms of fixtures units. Fixtures equivalents are given in **Table 1.**

Note – Fixtures unit is a quantity in terms of which the load producing effect of different plumbing fixtures on the plumbing system are expressed on some arbitrarily chosen scale. In the design of septic tank, it is taken as 9 litres per minute.

TABLE 1

FIXTURE EQUIVALENT (Clause 3.4.1.1)	
FACILITY	EQUIVALENT FIXTURE UNIT
Water closet	1
Bath	½
Wash basin/kitchen sink	½
Urinal (with auto flush)	1
Urinal (without auto flush)	½
Slop sink	1
Laboratory sink	2
Combination fixture	1
Shower bath	1
Bath tub	2
Drinking fountain	½
Ablution tap	½
Dish water	½

3.4.1.2 The estimated number of fixture units and the number of fixture units that contribute to the peak discharge in small installations serving up to 20 persons, for residential housing colonies up to 300 persons and for hostels and boarding schools are given in Tables 2 to 4

TABLE 2

ESTIMATED PEAK DISCHARGE FOR SMALL TANKS UPTO 20 USERS			
NUMBER OF USERS (1)	NUMBER OF FIXTURE UNITS (2)	PROBABLE NUMBER OF FIXTURE UNITS DISCHARGING SIMULTANEOUSLY (3)	PROBABLE PEAK DISCHARGE 1pm (4)
5	1	1	9
10	2	2	18
15	3	2	18
20	4	3	27

NOTE 1- Number of fixture units is based on the assumption that each house consisting of 5 persons may have one WC which will discharge into septic tank.

NOTE 2 – Probable number of fixture units are based on 70 percent fixture units discharging simultaneously.

TABLE 3

ESTIMATED PEAK DISCHARGE FOR RESIDENTIAL COLONIES (Clause 3.4.1.2)			
No. OF USERS (1)	NUMBER OF HOUSEHOLDS (2)	NUMBER OF FIXTURE UNITS (3)	PROBABLE PEAK DISCHARGE 1pm (4)
50	10	20	108
100	20	40	216
150	30	60	324
200	40	80	432
300	60	120	648

NOTE 1- Probable peak discharge is based on 60 percent fixtures units discharging simultaneously.

NOTE 2 – Each household consisting of 5 persons may have 1 WC, 1bath and 1 wash basin/ kitchen sink.

TABLE 4

ESTIMATED PEAK DISCHARGE FOR HOSTELS AND BOARDING SCHOOL (Clause 3.4.1.2)					
No. OF USERS (1)	W.C (2)	BATH (3)	WASH BASIN / KITCHEN SINK (4)	NO OF FIXTURE UNITS (5)	PROBABLE PEAK DISCHARGE 1pm (6)
50	6	6	6	12	76
100	12	12	12	24	130
150	19	19	19	38	205
200	25	25	25	50	270
300	37	37	37	74	400

NOTE – Probable peak discharge is based on 70 percent of fixture units discharging simultaneously.

3.4.2 Sedimentation

3.4.2.1 The surface area of the tank required will be 0.92 m^2 for every 10 litres per minute of peak flow rate at a temperature of 25°C.

3.4.2.2 A minimum depth of sedimentation shall be 250 to 300mm.

3.4.3 Sludge Digestion

3.4.3.1 Per capita suspended solids entering the tank may be taken as 70g/day.

3.4.3.2 The capacity required for sludge digestion is 0.033 m^3 per capita at 25°C.

3.4.3.3 Volume of digested sludge is normally 0.00021 m3 per capita per day.

3.4.4 Detention Time

3.4.4.4 Aseptic tank designed on the basis of 3.4.1, 3.4.2 and 3.4.3 provides a detention period of 24 to 48 hours based on an average daily flow of sewage.

3.4.5 Dimensions of Septic Tank

3.4.5.1 Septic tank shall have minimum width of 750mm, minimum depth of one metre below water level and a minimum liquid capacity of 1000 litres.

3.4.5.2 For rectangular septic tanks, the length of the tank shall be 2 to 4 times the width. Suitable sizes of septic tanks are given in Appendix A

3.4.5.3 For circular tanks the minimum diameter shall not be less than 1.35m and operating depth shall not be less than 1.0m

4. SEPTIC TANK CONSTRUCTION

4.1. Floor – It is essential that the floor of the tank be water tight and of adequate strength to resist earth movement and to support the weight of the tank walls and contents.

4.1.1 The floor may be of cement concrete of minimum M 15 grade (see IS : 456) and a minimum slope of 1 : 10 may be provided towards the sludge outlet to facilitate desludging.

4.2 Walls – The walls should be of such thickness as to provide adequate strength and watertightness.

4.2.1 Walls built out of brick should not be less than 200 mm thick and should be plastered to a minimum thickness of 12 mm inside and outside with cement mortar not weaker than 1 : 3; where they are built out of the stone masonary. They should have a minimum thickness of 370 mm.

5. SLUDGE WITHDRAWAL

5.1. Half yearly or yearly desludging of septic tank is lesirable. Small domestic tanks, for economic reasons, may be cleaned at least once in 2 years provided the tank is not overloaded due to use by more than the number for which it is designed.

NOTE - Frequent desludging inhibits the anaerobic action in the tank. Normally, the tanks are cleaned when the sum of the depth of the scum and the sludge is observed to exceed half the depth of the tank.

5.2. A portion of sludge not less than 25 mm in depth should be left behind in the tank bottom which acts as the seeding material for the fresh deposits.

5.3. The digested sludge should be withdrawn through a dip pipe of not less than 150 mm dia under a hydrostatic pressure of at least 450 mm. The sludge pipe shall deliver the sludge to the sump and be provided with a delivery valve to draw the sludge as required. Portable pumps may also be used for desludging in which case there will be no need for sludge pipe or sludge pump. Manual handling of sludge should be avoided.

5.3.1. When removal of the sludge is carried out the scum in the first tank should not be disturbed more than necessary, this scum is needed to ensure efficient operation.

5.4. Sludge from septic tanks may be delivered into covered pits or into a suitable vehicle for removal from the site. Spreading of sludge on the ground in the vicinity should not be allowed.

6. COMMISSIONING OF SEPTIC TANK

6.1. The sewage system should be complete and ready for operation before connection is made to the building.

6.2. The tank should be filled with water to its outlet level before the sewage is left into the tank. It should, preferably, be seeded with small quantities of well digested sludge obtained from septic tanks or sludge digestion tanks. In absence of digested sludge a small quantity of decaying organic matter, such as digested cow dung may be introduced.

(Clause 3.4.5.2)

SIZES OF SEPTIC TANK

A - 1. Recommended sizes of septic tanks for 20 users are given in Table 5.

TABLE 5 RECOMMENDED SIZES OF SPECIFIC TANK FOR 20 USERS

NO. OF USERS	LENGTH	BREADTH	LIQUID DEPTH (CLEANING INTERVAL OF)	
			1 YEAR	2 YEAR
(1)	(2)	(3)	(4)	(5)
	m	m	m	m
5	1.5	0.75	1.0	1.05

10	2.0	0.90	1.0	1.40
15	2.0	0.90	1.3	2.00
20	2.3	1.10	1.3	1.80

NOTE 1 - The capacities are recommended on the assumption that discharges from only WC will be treated in the septic tank.

NOTE 2 - A provision of 300 mm should be made for free board.

NOTE 3 - The sizes of septic tank are based on certain assumptions (see 3.4), while choosing the size of septic tank exact calculations shall be made.

* Code of practice for installation of septic tank : Part 2 Secondary treatment and disposal of septic tank effluent (second revision).

A - 2. Recommended sizes of septic tanks for housing colonies (up to 300 persons) and for hostels and boarding schools are given in Table 6 and 7 respectively.

TABLE 6 RECOMMENDED SIZES OF SPECIFIC TANK FOR RESIDENTIAL COLONIES

NO. OF USERS	LENGTH	BREADTH	LIQUID DEPTH (CLEANING INTERVAL OF)	
			1 YEAR	2 YEAR
(1)	(2)	(3)	(4)	(5)
	m	m	m	m
50	5.0	2.0	1.0	1.24
100	7.5	2.65	1.0	1.24
150	10.0	3.0	1.0	1.24
200	12.0	3.3	1.0	1.24
300	15.0	4.0	1.0	1.24

NOTE 1 - A provision of 300 mm should be made for free board.

NOTE 2 - The sizes of septic tank are based on certain assumptions (see 3.4), while choosing the size of septic tank, exact calculations shall be made.

NOTE 3 - For population over 100, the tank may be divided into independent parallel chambers for ease of maintenance and cleaning.

TABLE 7 RECOMMENDED SIZES OF SPECIFIC TANK FOR HOSTELS AND BOARDING SCHOOLS

NO. OF USERS	LENGTH L	BREADTH B	LIQUID DEPTH (CLEANING INTERVAL OF)	
			Once in 1 Year	Once in 2 Years
(1)	(2)	(3)	(4)	(5)
	m	m	m	m
50	5.0	1.6	1.3	1.4
100	5.7	2.1	1.4	1.7
150	7.7	2.4	1.4	1.7
200	8.9	2.7	1.4	1.7
300	10.7	3.3	1.4	1.7

NOTE 1 - A provision of 300 mm should be made for free board.

NOTE 2 - The sizes of septic tank are based on certain assumptions (see 3.4), while choosing the size of septic tank, exact calculations shall be made.

NOTE 3 - For population over 100, the tank may be divided into independent parallel chamber for ease of maintenance and cleaning.

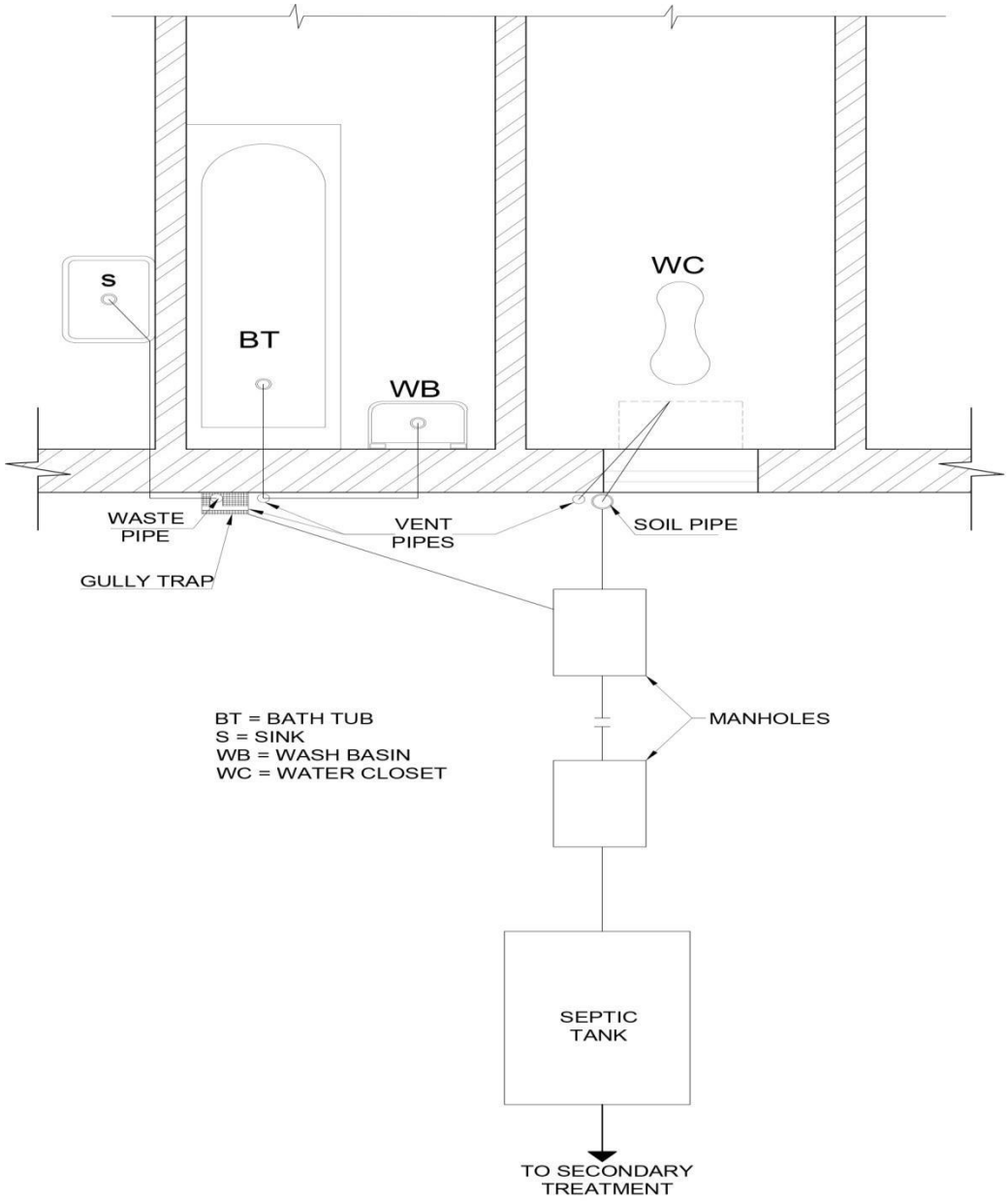
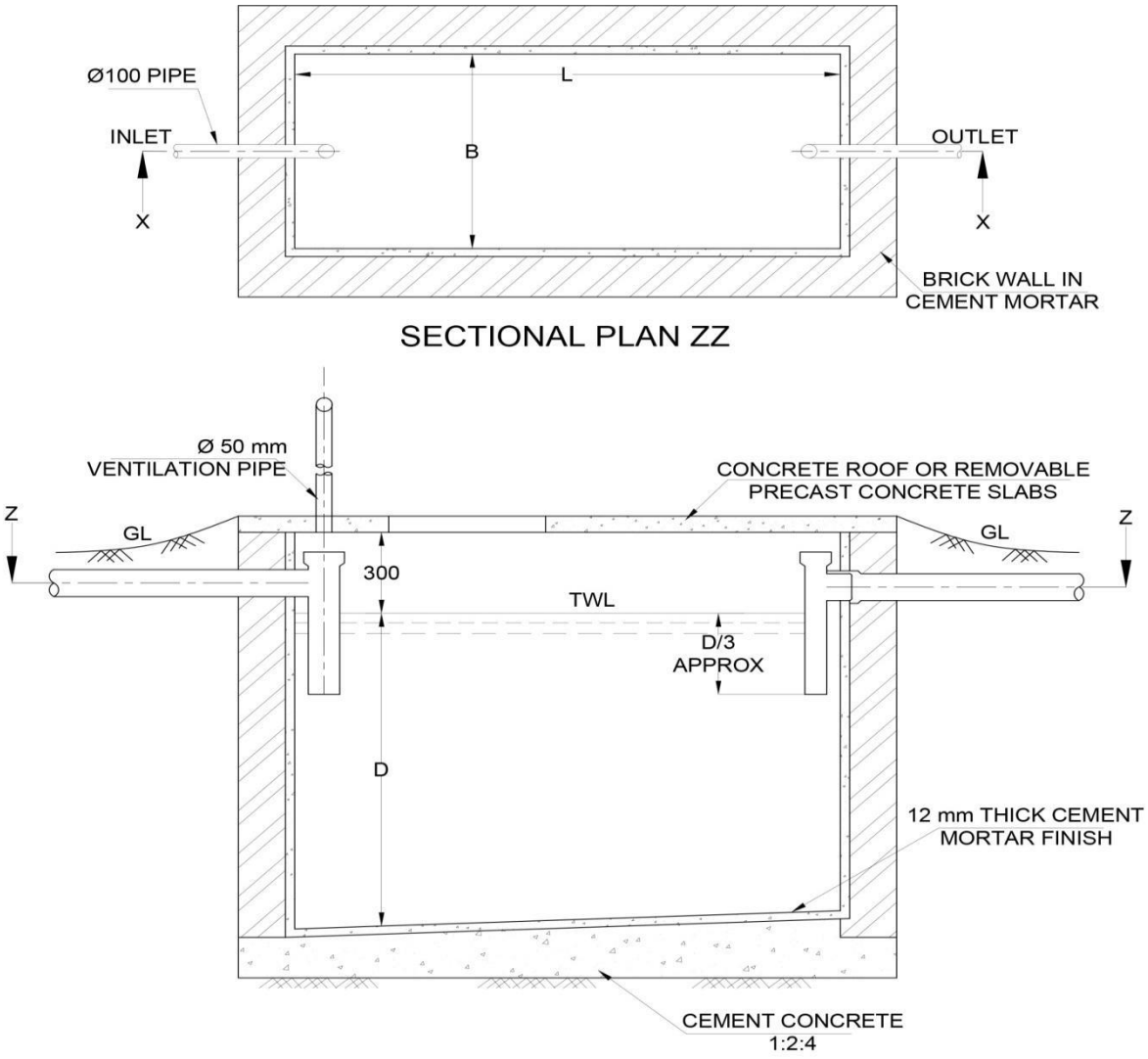


FIG. 1 TYPICAL LAYOUT OF A SEPTIC TANK SEWERAGE SYSTEM



All dimension in millimeter

FIG. 2 TYPICAL SKETCH OF SINGLE COMPARTMENT SEPTIC TANK UP TO 20 USERS

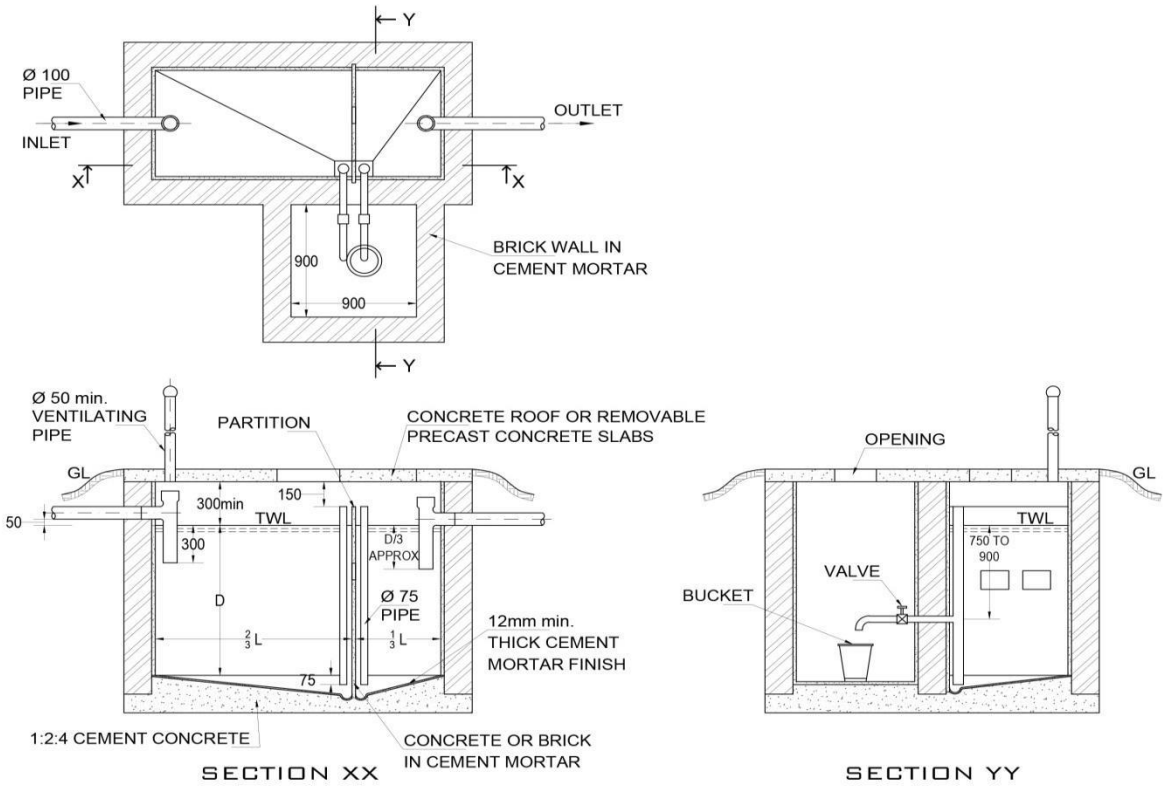
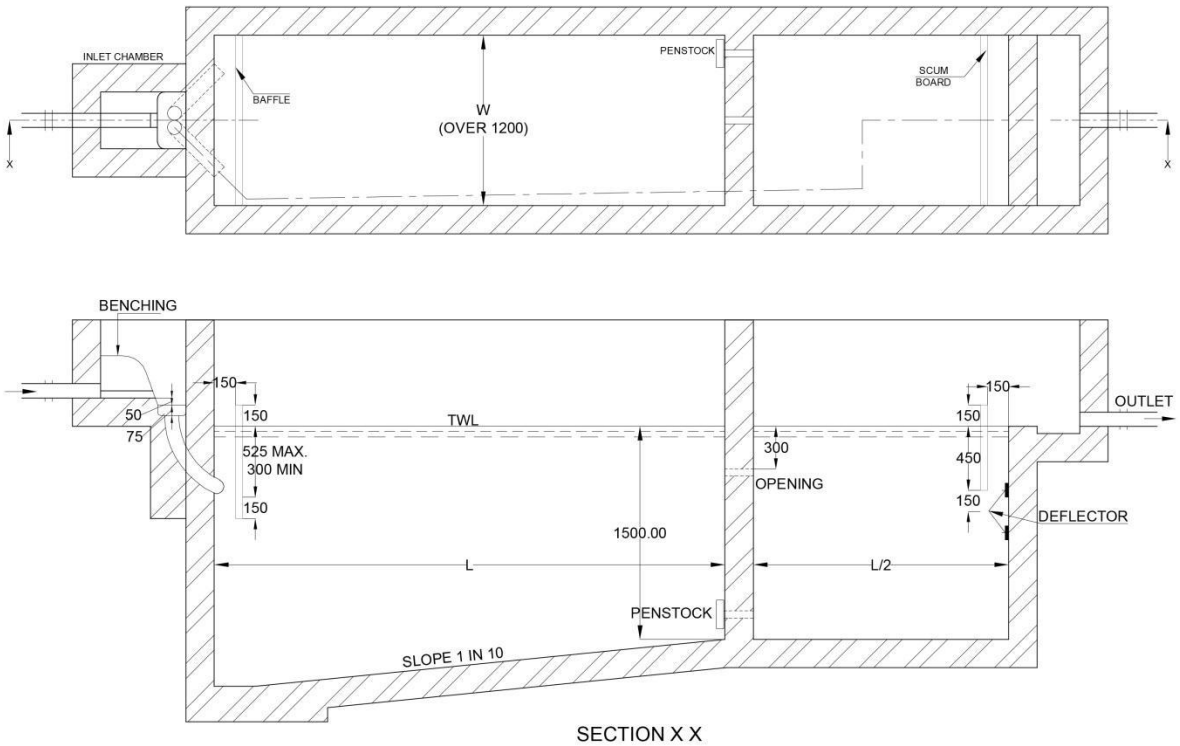


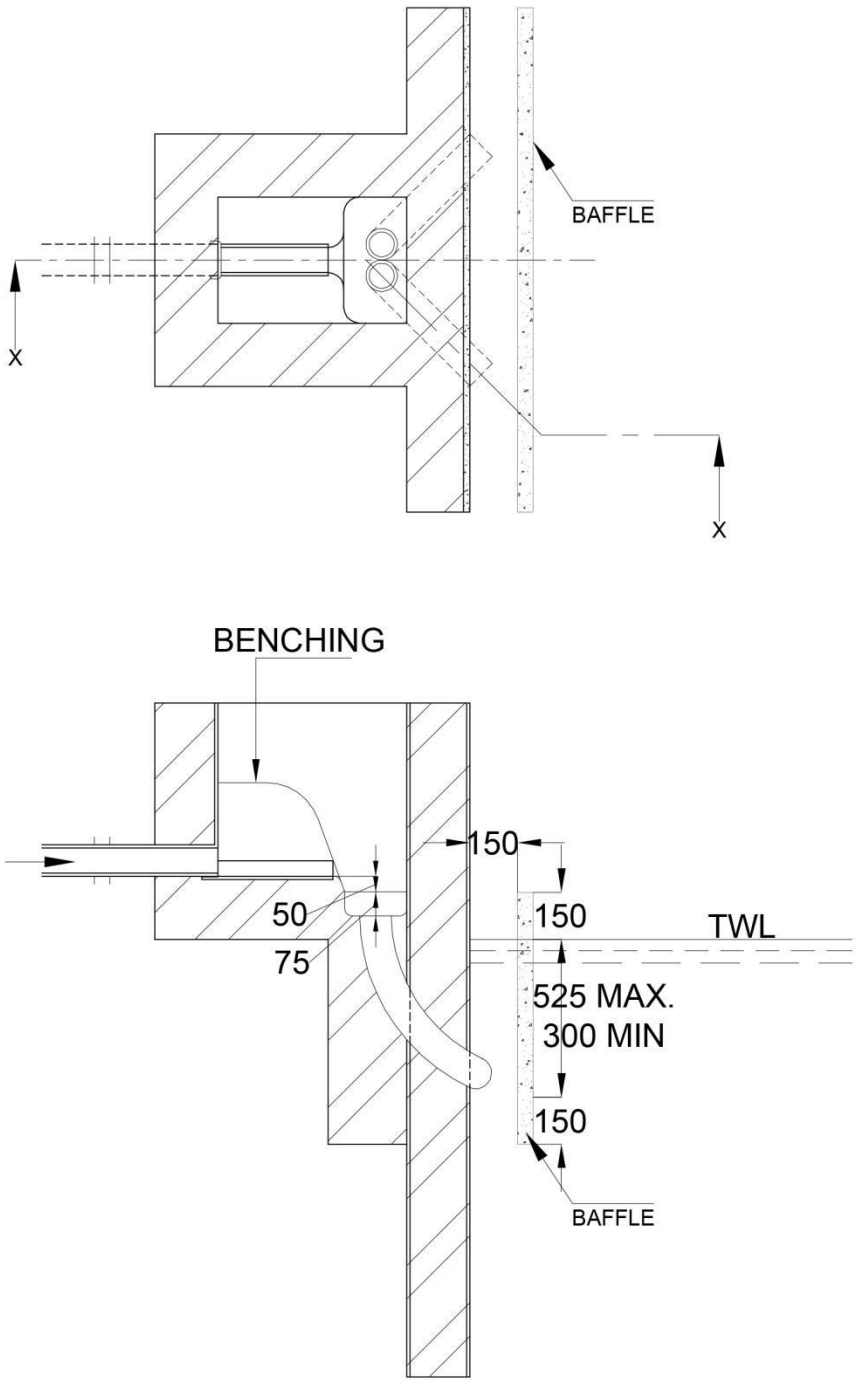
FIG.3 TYPICAL SKETCH OF TWO COMPARTMENT SEPTIC TANK FOR POPULATION UP TO 50



SECTION X X

All dimension in millimeter

FIG.4 TYPICAL SKETCH OF TWO COMPARTMENT SEPTIC TANK FOR POPULATION OVER 50



SECTION X X

All dimension in millimeter

FIG.5 TWIN INLET FOR TANKS IN EXCESS OF 1200mm WIDE

SECONDARY TREATMENT AND DISPOSAL OF SEPTIC TANK EFFLUENT (Ref: IS : 2470 (Part 2) – 1985)

4. METHODS OF TREATMENT AND DISPOSAL OF EFFLUENT

4.1 The following methods of disposal are described in this Code:

a) Soil absorption system,
b) Up flow anaerobic filters

4.2 Depending on the position of the subsoil water level, soil and subsoil conditions, the recommended method of disposal of the effluent **is given in** Table I.

TABLE I RECOMMENDED METHOD OF DISPOSAL FOR SEPTIC TANK EFFLUENT

(Clauses 4.2, 6.0 **and 7.0)**

POSITION OF THE SUBSOIL WATER LEVEL FROM GROUND LEVEL	**SOIL AND SUBSOIL CONDITION**		
	Porus Soil with Percolation Rate		**Dense and clays soil with percolation rate exceeding 60 min**
	Not exceeding 30 min	Exceeding 30 min but not exceeding 60 min	
Within 1.8 m	Dispersion trench located partly or fully above ground level in a mound	Dispersion trench located partly or fully above ground level in a mound	Biological filter partly or fully above ground level with under-drains or up flow anaerobic filter and the effluent led into a surface drain or used for gardening
Below 1.8 m	Seepage pit or dispersion trench	Dispersion trench	Subsurface biological filter with under drains or up flow anaerobic filter and the effluent led into a drain or used for gardening

NOTE - Where the above mentioned methods are not feasible and **where the** effluent has to be discharged into open drain it should be disinfected.

5.2Construction of the Soil Absorption System – Two types of soil absorption system have been covered:

a) Seepage pit, and
b) Dispersion trench.

5.2.1 Seepage Pit - The seepage pit may be of any suitable shape with the least cross-sectional dimension of 0.90 m and not less than 1.0 m in depth below the invert level of the inlet pipe. The pit may be lined with stone, brick or concrete blocks with dry open joints which should be backed with at least 75 mm of clean coarse aggregate (see Fig. 2A). The lining above the inlet level should be finished with mortar. In the case of large dimensions, the top portion may be narrowed to reduce the size of the RCC cover slabs. Where no lining is used, especially near trees, the entire pit should be filled with loose stones. A masonry ring may be constructed at the top of the pit to prevent damage by flooding of the pit by surface run-off (see Fig. 2B). The inlet pipe may be taken down to a depth of 0·90 m from the top as an anti-mosquito measure. Illustrations of typical constructions of seepage pit are given in Fig. 2

TABLE 2 ALLOWABLE RATE OF EFFLUENT APPLICATIONS TO SOIL ABSORPTION SYSTEM

(Clause 5.1)

PERCOLATION RATE Min	**MAXIMUM RATE OF** EFFLUENT APPLICATION 1/m'/day
1 or less	204
2	143
3	118
4	102
5	90
10	65
15	52
30	37
45	33
60	26

NOTE 1- The absorption areafor a dispersion trench is the trench bottom area.

NOTE 2- The absorption area for seepage pits is the effective side wail area, effective depth being measured from 150 mm below invert level of inlet pipe to the bottom of the pit (see Fig. 2).

NOTE 3-If the percolation rate exceeds 30 minutes, the soil is unsuitable for soak ways. If the percolation rate exceeds 60 minutes, the soil is unsuitable for any soil absorption system.

5.2.2 Dispersion Trench -Dispersion trenches shall be 0.5 to 1'0 m deep and 0'3 to 1.0 m wide excavated to a slight gradient and shall be provided with 150 to 250 mn of washed gravel or crushed stones. Open jointed pipes placed inside the trench shall be made of unglazed earthen-ware clay or concrete and shall have minimum internal diameter of 75 to 100 mm. Each dispersion trench should not be longer than 30 m and trenches should not be placed closer than 2.0 m.

6. BIOLOGICAL FILTERS

6.0 Biological filters are suitable for treatment of septic tank effluent where the soil is relatively impervious (see Table 1), water logged areas or where limited land area is available. In a biological filter, the effluent from septic tank is brought into contact with a suitable medium, the surfaces of which become coated with an organic film. The film assimilates and oxidizes much of the polluting matter through the agency of micro-organisms. The biological filter requires ample ventilation and an efficient system of under drains leading to an outlet.

6.1 Construction - The depth of medium should be 1 400 mm but never less than 900 mm. The medium should be retained in position by walls of adequate trench. The filter should have a concrete floor, laid to falls with a system of under drains laid on it **and** consisting of fiend drains half channels laid upside down and open jointed or special tiles discharging to the outlet.

6.3 Filter Media -- The filter sand and gravel shall conform to IS: 8419 (Part **1)**-1977*.

6.5 Volume of Filter - It is essential that the volume of filter medium provided is sufficient to allow for sewage flow which occurs with small installations, such variation being more pronounced it the smaller number of persons are served. For populations of up to 10 persons the volume should be 1 m3 of medium per head, of resident population for 10 and up to 50 persons, 0.8 m3 and for over 50 and up to 300 persons, 0.6 m3.

If pumping of the septic tank effluent forms part of scheme, recirculation of final effluent to dilute the septic **tank** effluent may be introduced to reduce the volume of the filter.

6.6 Treatment of Filter Effluent -- The filter effluent is either discharged into surface drain or evenly distributed over a grass plot from the system of channels. Where the effluent is likely to contaminate the watercourse, the effluent should be adequately disinfected.

7. UPFLOW ANAEROBIC FILTER

7.0 Up flow type of filters (reverse filter) operating under submerged conditions is a method for disposal of septic tank effluents in areas where dense soil condition (see Table 1), high water table and limited availability of open land are factors to be considered for successful disposal of effluents by secondary treatment. The septic tank effluent is introduced from the bottom and the microbial growth is retained on the stone - media making possible higher loading rates and efficient digestion. The capacity of the unit is 0·04 to 0'05 m= per capita or 1/3 to 112 the liquid capacity of the septic tank it serves. BOD removals of 70 percent can be expected and the effluent is clear and -free from odour and-nuisance. The flow sheets of the filter system are shown in Fig. 5.

7.1 Types - Up flow anaerobic filters are of the following types:

a) Single chambered rectangular type,
b) Double chambered rectangular type, and
c) Circular type.

7.2 Construction Features - In an up flow filter, the tank effluent enters at the bottom through a system of under drains, flows upwards through a layer of coarse material generally 0.6 to 1.2 m deep and is discharged over a weir

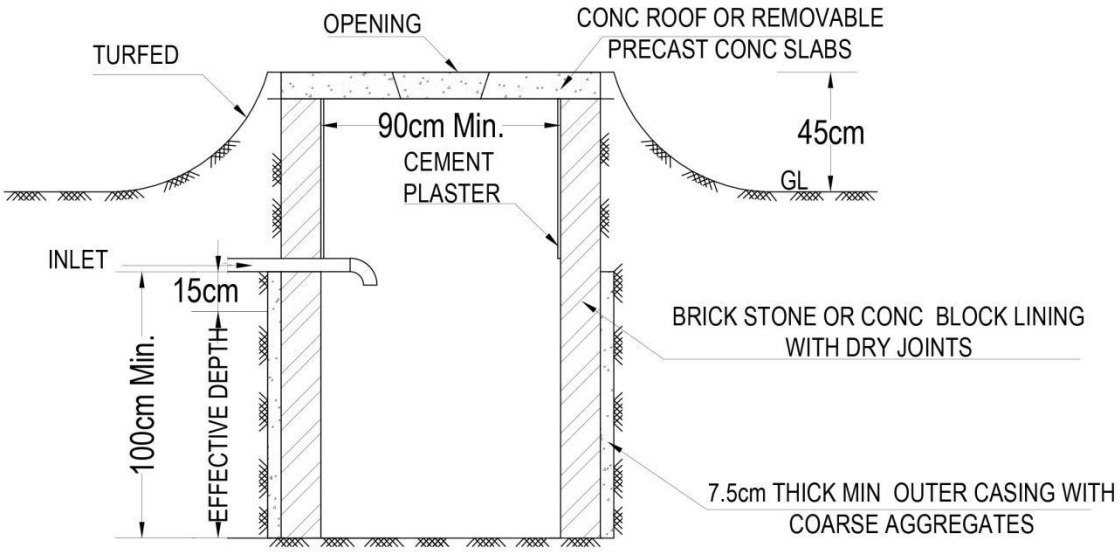
or trough at the top. The driving head in the filter, that is, the difference between the water level and the filter may be as low as 25 to 150 mm during normal functioning.

7.2.1 Single Chambered Rectangular Type - In this type (Fig. 6) an up flow filter with a rectangular chamber is constructed to treat the effluent from a normal domestic septic tank. The chamber is packed with coarse material and the size of the packing media should be 20 mm. The medium rests on a perforated concrete false bottom slab. The effluent from septic tank enters the bottom of the filter chamber through a 150 mm pipe and is distributed upward through the media from a perforated slab at the bottom.

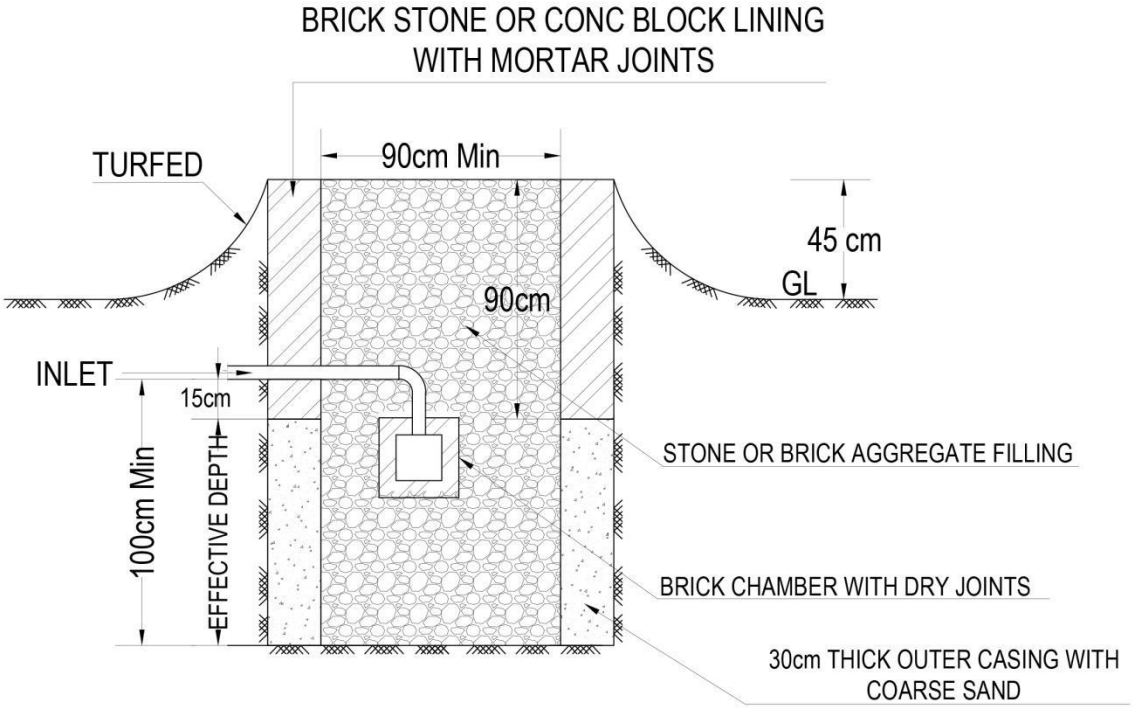
The vertical inlet is fitted with a tee at the bottom, one branch of which leads to the filter and the other branch is kept plugged while the filter functions. The plug can be removed to facilitate emptying into an adjoining chamber and cleaning the filter where required. The effluent from the top of the bed is allowed to escape over a V-notch. The sill level is kept 150 mm above the top of the medium.

7.2.2 Double Chambered Rectangular Type - The filter consists of two interconnected compartments (Fig. 7). The first chamber is filled to a depth of 0·55 m with 20 mm coarse medium. The second chamber is filled to a depth of 0·45 m with 20 mm size coarse aggregate. The septic tank effluent falls through a perforated tray over the medium in the first compartment and enters the second compartment directly from the bottom. The effluent passes up through the medium in the second chamber and escapes over a V-notch placed 75 mm above the top of the medium. By this arrangement, the time of travel of the effluent through the filter is lengthened. The two chambers are each fitted at the bottom with a 75mm galvanized iron pipe leading to an adjacent chamber. A valve in these pipes allows the filters to be partly desludged into the collecting chamber.

7.2.3 Circular Filter – A circular filter 0.9m in dia may also be constructed. Medium of aggregate of uniform size 20mm should be packed to rest on a perforated concrete slab. The effluent may be made to escape over the top of the medium through equally placed notches along the periphery of the filter. The sill level is usually 100mm above the top of the medium.



2A EMPTY PIT WITH LINING



2B PIT WITH FILLING WITHOUT LINING

FIG.2 TYPICAL ILLUSTRATIONS OF SEEPAGE PITS

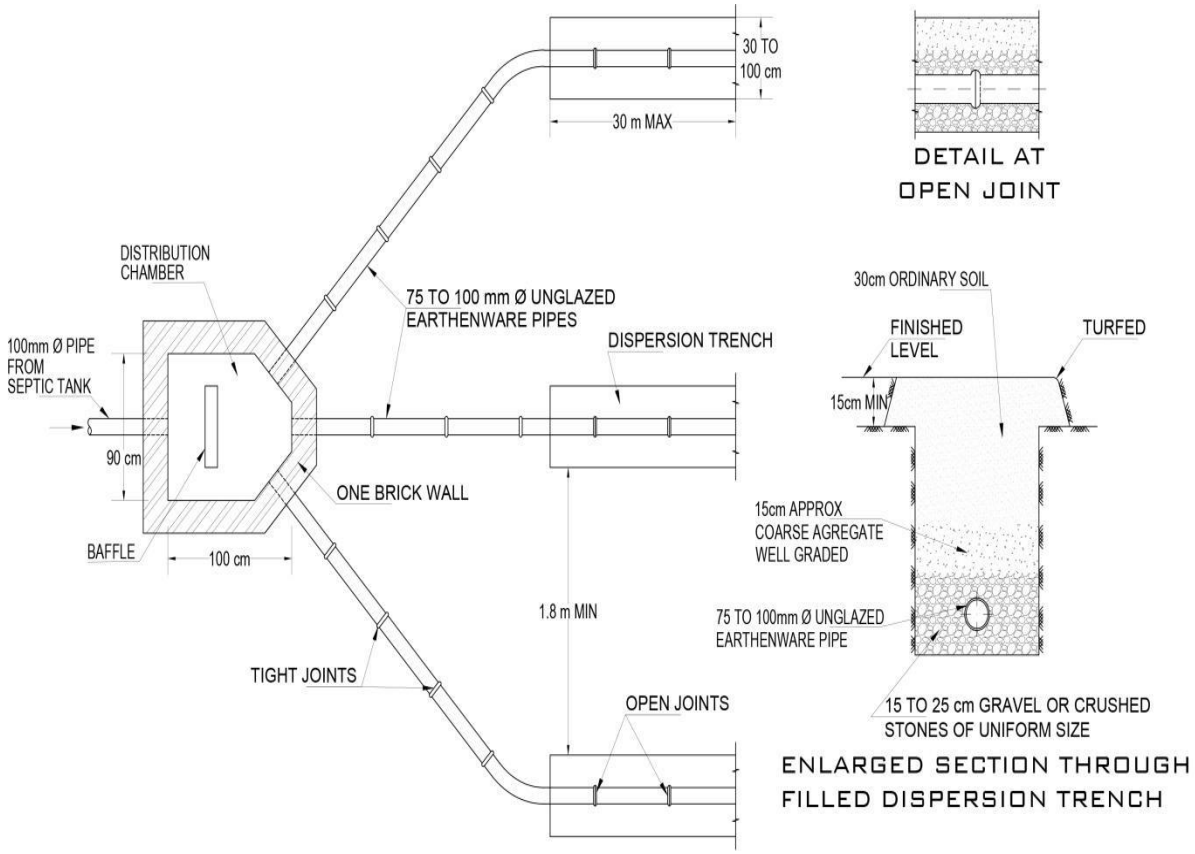


FIG.3 TYPICAL SOIL ABSORPTION SYSTEM WITH DISPERSION TRENCHES

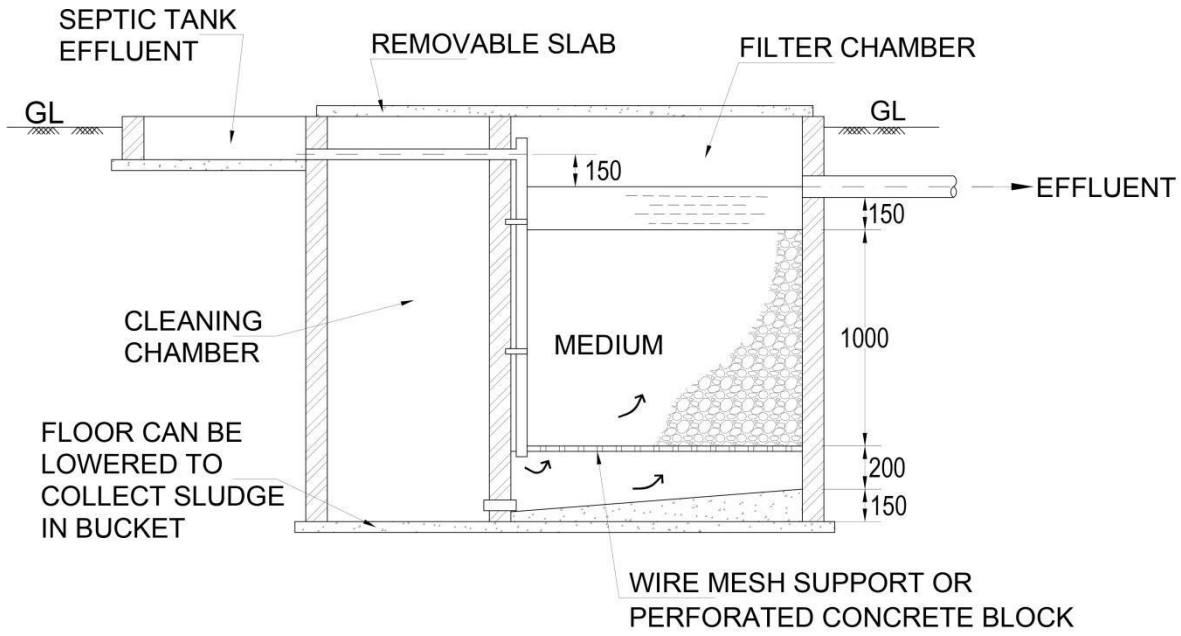


FIG.6 UPFLOW ANAEROBIC FILTER (SINGLE CHAMBERED RECTANGULAR TYPE)

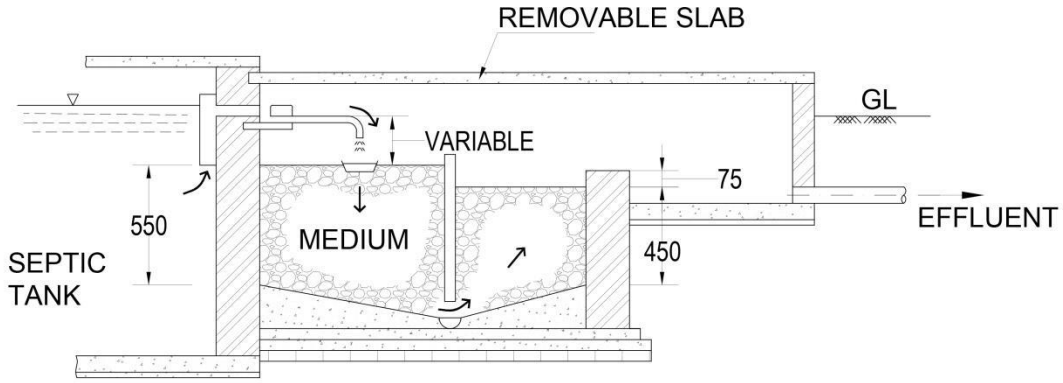


FIG.7 UPFLOW ANAEROBIC FILTER (DOUBLE CHAMBERED RECTANGULAR TYPE)

APPENDIX-XVI

(see clause 9.12)

PROVISION FOR DIFFERENTLY ABLED

1. Definitions

Ambulant Disabled People: Disabled who are able to walk but who may depend on prostheses (Artificial Limbs) or those (Callipers), Sticks, crutches or walking aids.

Non-Ambulant Disabled People: Disabled people with impairments that confine them to wheelchair.

Wheel Chair: Chair used by disabled people for mobility.

i. Size of small wheel chair: 750 x 1050 mm

ii. Size of large wheel chair: 800 x 1500 mm

2. Scope

These Byelaws are applicable to public buildings and exclude domestic buildings.

Building which shall provide access to ambulant disable and Non-Ambulant disabled are listed below. Distinction is made for buildings to be designed for the use of large wheel chairs and small wheel chair.

3. Building to be designed for Ambulant Disabled People Higher Secondary School, Conference Hall, Dance Halls, Youth Centres, Youth Clubs, Sport Centres, Sport Pavilions, Boat Club Houses, Ice Rinks, Bowling Centres, Swimming Pools, Police Stations, Law Courts, Courts Houses, Sport Stadiums, Theatres, Concert Halls, Cinemas, Auditoria's, Small Offices (the maximum plinth area 1400 sq.mt) Snack Bars, Cafes and banqueting rooms (for capacity above 50 dinners).

Note:

i. In sport stadiums provisions shall be made for non-ambulant spectators (small wheel chair)

ii) @ 1:1000 up to 10,000 spectators and @ 1:2000 for spectators above 10,000.

iii) In Theatres, Concert Halls, Cinemas and Auditoria provisions shall be made for non-ambulant spectators (Small Wheel Chairs) @ 1/250 up to 1000 spectators and 1/500 for

spectators above 1000.

4. Building to be designed for Non-Ambulant Disabled People:

Schools for physically handicapped, cremation, buildings as mentioned in 3, Botanical Gardens, Religious Buildings, Old People Clubs, Village Halls, Day Centres, Junior Training centres, Post Offices, Banks, Dispensaries, Railway Stations, Shops, Super Markets, and Departmental Stores.

Notes: Large wheel chair criteria shall be applicable on ground floors of the following building, post offices, banks, dispensaries, railway station, shops, supermarkets, and departmental stores

5. Building to be designed for Non-Ambulant People (using small wheel chairs) Public lavatories in Tourist Sports, Clubs Motels, Professional and Scientific Institution, Museum, Art Galleries, Public Libraries, Laboratories, Universities, Collage for further Education, Teachers Training Colleges, Technical

College, Exhibition Halls Dentist Surgeries, Administrative Department of the Hospitals, Service Stations, Car Parking, Buildings Airports Terminals, Bus Terminals, Factories Employing Handicapped for Sedentary Works, Large Offices, (with plinth area abode 1400 sq.mt.), Tax Offices, Passport Offices, Pension Offices, and Labour Offices, Cafes, Banqueting Rooms and Snack Bars (For capacity above 100 dinners).

6. Buildings Requirements:

All Building requirements for building projects proposed under this category shall be conforming to Annex D, Part 3 of NBC 2016

APPENDIX-XVII

(see clause 10(1))

CALCULATION FOR RAINWATER HARVESTING

RAIN WATER HARVESTING CALCULATION		
DATE		
SI No.	**Soil Type**	**Infiltration rate cm/hr**
1	High (Sandy soil)	1.25 - 2.54
2	Intermediate (Loam-clay-silt)	0.25 - 1.25
3	Low (clay-clay loam)	0.025 - 0.25
(Source:ASCE Manual of Engg. Practice No.28)		
Rain water recharge pit calculation		
Permeable factor=		m/hr
Diameter of the recharge pit =		1.5 m
Height of the recharge pit =		3 m
Area of percolation pit		
a. Bottom (a) =	3.14 x (1.5/2) x (1.5/2) =	1.77 Sqm
b. Side wall (13)	3.14 x 1.5 x 3.0 =	14.13 Sqm
Total area of percolation = a + b	1.77+ 14.13 =	15.90 Sqm
Quantity of water percolation per hour	0.0125 x 15.90 =	Cum
Quantity of water percolation per day (c) =	0.20 x 24 =	Cum
Storage capacity in recharge pit		
Diameter of recharge pit =		1.5 m
Depth of storage		0.5 m
Storage capacity (d)	3.14 x (1.5/2)x (1.5/2) x 0.5 =	0.88 Cum
Total recharge per day per pit = c+ d =		0.88 Cum
Sump Tank capacity considered *		86 Cum

Sl.No	Area Type	Area in sqm	Normal rain fall in mtr. Year**	Runoff co-efficient #	Total runoff available in cubic mtr/annum	Runoff at hourly rainfall intensity of 40 mm/hour
1	Roof top		3.631		-	-
2	Roads		3.631		-	-
3	Paved area		3.631		-	-
4	Parks & Green Belts		3.631		-	-
	Total					
	Total recharge per day per pit					
	No. of recharge pits required.					
					Rounded off to	**Nos**

Notes

* To be calculated as per 1 day's requirement.

\# Runoff coefficient for various surfaces be taken from Table 10.1

** : DISTRICT / TALUK / HOBLI – ANNUAL RAINFALL PATTERN -2021

District/Taluk/Hobli	Annual Rainfall 2021 (1st January to 31st December)		
	Normal (mm)	Actual (mm)	%DEP
DAKSHINA KANNADA	4006	3963	-1
Beltangadi	4426	4427	0
Belthangady	4426	4383	-1
Kokkada	4261	4499	6
Venur	4117	4262	4
Bantwal	3856	3369	-13
Bantwal	3856	3559	-8
Pane Mangalore	3885	3361	-13
Vittal	3984	3153	-21
Mangaluru	3609	3486	-3
Mangaluru_A	3609	3382	-6
Mangaluru_B	3631	3366	-7
Gurpur	3801	3458	-9
Mulki	3788	3602	-5
Suralkal	3834	3422	-11
Puttur	4058	3592	-12
Puttur	4058	3609	-11
Uppinangadi	3939	3472	-12
Sulya	3592	3885	8
Sullia	3592	3741	4
Panaje	4015	4136	3
Mudabidri	4010	3873	-3

Rain water available from roof top harvesting can be calculated as per Table 24 PART 9 Section 2 of NBC 2016 based on the rain fall data. The capacity of the storage tank should be decided as per requirement in Chapter 15. Calculation of storage tank dimension capacity can be referred from CPWD Rain water harvesting manual or any manual published by competent Authority.

APPENDIX- XVIII

(see Table 11.2(4))

SOLID WASTE MANAGEMENT (SWM) IN BUILDINGS

ZERO WASTE CITY:

To achieve the concept of 'Zero Waste City', the principles of 3-Rs (Reduce-Reuse-Recycle) have to be adopted by all responsible citizens in their lifestyle. Some of the measures that can be adopted by the citizens to achieve this concept are;

1. Reuse bags and containers.
2. Reuse bottles, coffee mugs, plates, cutlery, storage containers, etc.
3. Skip on individually wrapped items, specifically food in snack packs or single serving containers (prepacked salads, sandwiches, dressing, yoghurts, etc.)
4. Avoid single use items (plastic cutlery, straws, plates, cups, etc.)
5. Pay bills online.
6. Go paperless in kitchen.
7. Use own reusable grocery bags and shop locally.
8. Drink loose leaf tea.
9. Cook your own food.
10. Don't waste food.
11. Prepare your meal plan to avoid wastage.
12. Go vegetarian / vegan, if possible.
13. Grow your own vegetables.
14. Join a vegetable box scheme.
15. Use Silicone Mats instead of Parchment Paper or foil.
16. User menstrual cups / cotton pads.
17. Reduce buying non-essential stuff.
18. Buy reduced items available at discounted rate (before it is thrown away by the supermarket).
19. Use more durable cloths instead of fast fashion cloths which you tend to discard soon.
20. Don't replace electronic items just because new model has arrived, unless it is essential.
21. Say no to trends (new trend in fashion / gadgets / games etc.)
22. Repair items before buying new ones.
23. Make your own furniture, home decorations from waste materials.
24. Dispose your waste properly and don't litter.

Other than the above-mentioned conscious changes in the lifestyle, the Municipal Solid Waste (MSW) generated in buildings (generators) have to be treated at source (Insitu Treatment) to the extent possible, depending upon the type of waste generated and the type of generator.

Additionally, the following guiding principle for solid waste management should be followed.

Solid Waste Management Planning Facilities that generate waste should categorize their waste according to composition, source, types of wastes produced, generation rates, or according to local regulatory requirements. Effective planning and implementation of waste management strategies should include

Review of new waste sources during planning, siting, and design activities, including during equipment modifications and process alterations, to identify expected waste generation, pollution prevention opportunities, and necessary treatment, storage, and disposal infrastructure. collection of data and information about the process and waste streams in existing facilities, including characterization of waste streams by type, quantities, and potential use/disposition. establishment of priorities based on a risk analysis that takes into account the potential environmental, health and safety (EHS) risks during the waste cycle and the availability of infrastructure to manage the waste in an environmentally sound manner. identify opportunities for at source reduction, as well as reuse and recycling detail procedures and operational controls for onsite storage. definition of options/procedures/operational controls for treatment and final disposal

Substituting raw materials or inputs with less hazardous or toxic materials, or with those where processing generates lower waste volumes. Applying manufacturing process that convert materials efficiently, providing higher product output yields, including modification of design of the production process, operating conditions, and process controls. Instituting good housekeeping and operating practices, including inventory control to reduce the amount of waste resulting from materials that are out-of-date, off specification, contaminated, damaged, or excess to building/equipment/plant needs. Instituting procurement measures that recognize opportunities to return usable materials such as containers and which prevents the over ordering of materials. Minimizing hazardous waste generation by implementing stringent waste segregation to prevent the commingling of non-hazardous and hazardous waste to be managed

Evaluation of waste production processes and identification of potentially recyclable materials. Identification and recycling of products that can be reintroduced into the manufacturing process or industrial activity at the site. Investigation of external markets for recycling by other industrial processing operations located in the neighbourhood or region of the facility (for example, waste exchange).

COMPONENTS OF SWM:

The various components of Solid Waste Management (SWM) System in buildings are as follows;

1. Categorisation of buildings generating Municipal Solid Waste
2. Categorisation of Solid Waste generated in buildings
3. Quantification of Solid Waste in buildings
4. Primary Segregation of Waste at Source
5. Collection of Waste from apartments / premises
6. Secondary Segregation at Treatment Yard in buildings
7. Treatment of Waste
8. Use of Treated Waste
9. Disposal of Untreated Waste
10. Reports & Registers to be maintained

The detailed activities involved in the above components of SWM System are as follows;

I. Categorisation of Buildings Generating Municipal Solid Waste:

The quantity of solid waste generated varies for different types of buildings, based on the use of the building. In case of mixed-use buildings, the area of each of the following uses are considered separately for implementing SWM system in the building.

For the purpose of implementing SWM system in the building, the buildings are categorised into;

1. Residential {including apartment buildings)
   a) High Income Group (HIG)
   b) Middle Income Group (MIG)
   c) Low Income Group (LIG) & Economic Weaker Section (EWS)

2. Non-Residential
   a) Mercantile (Wholesale & Retail)
   b) Business (Offices)
   c) Hotels (excluding restaurant & kitchen area)
   d) Educational
   e) Assembly
   f) Restaurants / Fast food outlets
   g) Hospitals
   h) Markets (including supermarkets and hypermarkets)
   i) Industrial (including storage & hazardous)

Note: *the type and quantity of waste generated in Industrial building depends upon the type of industry and hence SWM system to be adopted in Industrial buildings has to be assessed on a case-to-case basis and hence not specified in these byelaws.*

II. CATEGORISATION OF SOLID WASTE:

The Solid waste generated in the Units of the **PROJECT** (including residential apartment buildings) are categorised as follows and the same shall be managed as specified herein;

1. Organic Waste

a) **Wet waste**

e.g. Raw vegetable, meat & fish waste, Leftover cooked or uncooked food, Eggshells, Minced wheat or other flour, Rotten rice, wheat and other grains, Coffee Powder, pet poop / waste & litter etc.

Note: *pet poop / waste litter should be put in the WC and the litter can be put along with wet waste if the litter used is biodegradable.*

b) Dry waste

i. Combustible (non-recyclable / non-reusable with low calorific value). This is further sub divided into;

(a) Dry waste from Wet waste

e.g. Fruit peels (Orange, Lemon, pomegranate, Watermelon, pineapple etc.), Sugarcane husk, etc.

(b) Other Combustible Organic Dry Wastes.

e.g. curry leaf plant stem / coconut husk / coconut shell / used tender coconut husk / Used Tea Bags / Paper cups, plates & spoons / Pieces of Waste paper and cartons / Pieces of Rags and ropes / pieces of waste cloth / face mask / hair, etc.

ii. Reusable/Recyclable waste

e.g. Carton boxes (wooden, cardboards, etc.) / Rags & Ropes / Papers (including newspapers) etc.

2. Inorganic Waste

a) Dry waste

i. Combustible (non-recyclable / non-reusable) waste with low calorific value

e.g., Food wrapping boxes and plastic foils / Composite paper items (including takeaway food packing boxes), Dry food packets (e.g., of bread, biscuits, ready to eat items, without food items) etc.,

ii. Combustible (non-recyclable / non-reusable) waste with high calorific value

e.g., RDF / Rubber (including worn out tyres) / Thermocol / Broken Plastic Carton Boxes / Foam items, etc.

iii. Reusable/Recyclable waste

e.g. Plastic items (including milk covers, water bottles & other bottles, Broken Stationery like pen, pencil, eraser etc.) / Glass items (including broken glasses) / Broken or unusable utensils / Tin items (including aluminum wraps) / PoP / Electric wires etc.

b) Sanitary waste

e.g. Ladies, Children and Adult Napkins

c) Biomedical waste

e.g. Bandages / Needles or syringes / medicines etc.

d) E-waste

e.g. CFL and tube lights / Computer and accessories waste (including printer cartridges) / Other electronic items.

e) Hazardous waste

e.g. Paints, batteries, solvents, cleaning agents, pesticides, waste oil (of generator) etc.

3. Inert Waste

e.g. Soil, sand, broken stones, waste mortar, hardened cement, etc.

4. Garden waste

Garden waste (branches & roots and leaves & flowers)

For segregation of Solid waste into different categories at source and storage Solid Waste Management Model bye laws 2019 shall be followed.

III. QUANTIFICATION OF SOLID WASTE:

The estimated quantities of waste generated from various types of buildings are as follows;

1. Residential Buildings (including apartment buildings):

a) Assumption made for Solid waste generated for Residential buildings (as per NBC 2016, Part 9, Section 3, Solid Waste Management)

Per capita Solid waste generated (kg/person/day)

HIG	MIG	LIG & EWS
0.45 Kg	0.40 Kg	0.35 Kg

b) The diversity in occupancy is also considered for assessing the quantity of waste generated in apartment buildings as follows;

HIG	MIG	LIG & EWS
80%	90%	100%

c) The estimated quantity of various types of wastes generated in residential buildings is provided in **Annexure-XVIII-A**;

2. Non-Residential Buildings:

The estimated quantity of various types of wastes generated in Non-Residential buildings (except for Industrial buildings) is provided in **Annexure-XVIII-B**

3. Garden Waste:

Garden waste is estimated to be 3 Kgs / Sqm of garden / landscape area per year, out of which 10% is considered as branches & roots and 90% considered as leaves and flowers.

Garden waste per day = Landscape area in Sqm x 3 kg per Sqm per year / 365.

NBC 2016Part 9 Plumbing services, section 5, the following municipal refuse generation rates are recommended:

a)	Residential refuse	: 0.3 to 0.6 kg/capita/day
b)	Commercial refuse	: 0.1 to 0.2 kg/capita/day
c)	Street sweepings	: 0.05 to 0.2 kg/capita/ day
d)	Institutional refuse	: 0.05 to 0.2 kg/capita/ day

Out of the total solid waste generated, 40 percent may be taken as organic waste and 60 percent as inorganic waste approximately. Estimation of waste generation based above table and diversity in occupancy is provided in **Annexure-XVIII-A & B.**

IV. PRIMARY SEGREGATION OF WASTE AT SOURCE:

The waste generated in the building have to be segregated by the occupants of the residential apartments / commercial premises / other buildings and the waste generated in the common areas and yard of the building should be segregated by the concerned staff of the Building Management, as follows;

1. The wet waste **[II(1)(a)]** [including the dry waste from the wet waste – **II(1)(b)(i)(a)**] shall be kept in the designated bin (without plastic cover).
2. All types of dry wastes {**II(1)(b)** [excluding **II(1)(b)(i)(a)**]**& II(2)(a)**} shall be kept in the designated bin (without plastic cover).
3. Sanitary waste **[II(2)(b)]** shall be wrapped in paper.
4. Biomedical waste **[II(2)(c)]** shall be kept in plastic cover.
5. E-waste **[II(2)(d)]** shall be kept in plastic cover or stored separately.
6. Hazardous waste **[II(2)(e)]** shall be kept in plastic cover or stored separately.
7. Inert waste **[II(3)]** shall be kept in plastic cover.
8. Garden waste **[II(4)]** shall be segregated into leaves & flowers and branches & roots and kept in separate sacks / gunny bags.

   Note: *Premises mentioned in this document refers to premises in non-residential buildings such as retail shops, offices, restaurants, etc.*

V. COLLECTION OF WASTE:

1. **Collection of Wet Waste –**

   The waste collection staff shall collect the wet waste [including the dry waste from the wet waste – [**II(1)(b)(i)(a)**] every day from the residential apartments / non-residential premises (at prefixed time, preferably in the morning and in case of markets and food outlets, both morning and evening). The occupant of the apartment / premises shall put the wet waste (from the bin kept in the apartment / premises) into the waste trolley brought by the waste collection staff.

2. Collection of Dry Waste –

The waste collection staff shall collect the dry waste twice a week (or as preferred by the occupants) from the apartments / premises. The occupant of the apartment / premises shall put the dry waste (from the bin kept in the apartment / premises) into the waste trolley brought by the waste collection staff.

3. Collection of Sanitary Waste –

The Occupant of the apartment / premises shall deliver the Sanitary waste (wrapped in paper) to the waste collection staff daily along with the wet waste. The Sanitary waste shall be placed in the designated plastic bag tied to the waste trolley.

4. Collection of Biomedical Waste –

The Occupant of the apartment / premises shall deliver the Biomedical waste (placed in plastic cover) to the waste collection staff at the time of delivering the dry waste. The Biomedical waste shall be placed in the designated plastic bag tied to the waste trolley.

5. Collection of e-Waste –

a) The Occupant of the apartment / premises shall deliver the e-waste (placed in plastic cover) to the waste collection staff at the time of delivering the dry waste. The e-waste shall be placed in the designated plastic bag tied to the waste trolley.
b) The Occupant shall deliver large size e-waste to the waste treatment yard of the building (to place it in the designated area).

6. Collection of Hazardous Waste –

The Occupant of the apartment / premises shall deliver the hazardous waste (placed in plastic cover or in any suitable form) to the waste treatment yard of the building (to place it in the designated area).

7. Collection of Inert Waste –

The Occupant of the apartment / premises shall deliver the Inert waste (placed in plastic cover) to the waste collection staff at the time of delivering the wet waste. The Inert waste shall be placed in the designated plastic bag tied to the waste trolley.

8. Collection of Garden Waste –

The Gardner shall deliver the segregated garden waste (branches / roots and leaves / flowers) to the waste treatment yard every day in sacks / gunny bags.

For collection of waste from apartment / premises general Refuse chute system is a convenient and safe mode of transportation and collection of domestic solid wastes from buildings exceeding 5 storeys from floors at different heights.

Notes:

1. The wet waste shall not be wrapped in plastic or any other cover while putting in the waste trolley. No other waste shall be mixed with wet waste.

2. Wastes shall not be kept outside the apartment / premises even if the occupant is not available during the collection time, to avoid foul smell and littering in the common corridors of the building.

3. If the occupant cannot deliver the wastes to the waste collection staff at the designated time or has any additional waste to be delivered, he shall deliver the waste to the waste treatment yard of the building (place it in the designated area).

4. For the buildings where insitu treatment of wet waste, dry waste and sanitary waste is not done, the respective wastes shall be disposed to the decentralised / centralised treatment yard or handed over to the collection agency authorised by the local authority, after segregation.

VI. SECONDARY SEGREGATION AT TREATMENT YARD

The secondary segregation is done at the treatment yard provided in the project and in the decentralised and centralised treatment yards of the local authority.

1. **Wet Waste Segregation**
   a) The wet waste collected shall be dumped in the segregation tank of the treatment yard and rechecked for any inorganic material or other types of wastes. Any such material / wastes found in the wet waste shall be removed, cleaned and placed in the respective category of waste.
   b) The dry waste from wet waste specified in **[II(1)(b)(i)(a)]** shall be removed from the wet waste and placed in the designated place (for incineration), after cleaning & drying.
   c) The wet waste shall be put in bins for use as animal feed (to be delivered to the respective agencies, if required) and the balance wet waste shall be stored in bins for treatment.

2. **Dry Waste Segregation**
   a) The Dry waste collected shall be dumped in the designated sorting area of the treatment yard to segregate the waste into Combustible Dry Waste of low calorific value [**II(1)(b)(i)**, **II(2)(a)(i)** and **II(4)**], Dry Waste of high calorific value **[II(2)(a)(ii)]** and Reusable / Recyclable Dry Waste [specified in **II(1)(b)(ii)** and **II(2)(a)(iii)**].
   b) All the incinerable wastes [**II(1)(b)(i)**, **II(2)(a)(i)** and **II(4)**] shall be put in sacks / gunny bags and stored separately in the treatment yard for incineration.
   c) The Reusable / Recyclable Dry Waste shall be put in sacks / gunny bags separately, based on the type of waste and stored in the treatment yard, to be disposed to the recyclers.

3. **Other Waste Segregation**

All other wastes collected shall be checked to ascertain that the wastes are segregated as per the categories mentioned above and stored separately and handed over to the agencies authorised by the local authority.

The segregation by manual or machinery, dry waste segregation MRF facility and other waste by authorised vendors as notified by KSPCB or Government should be followed.

VII. TREATMENT OF WASTE

The following wastes are treated in the Insitu facility (of generators) or in the decentralised treatment yard or in the centralised treatment yard;

1. Wet Waste **[II(1)(a)]**
2. Dry Waste **[II(1)(b)(i) & II(2)(a)(i)(ii)]**
3. Sanitary waste **[II(2)(b)]**
4. Garden waste **[II(4)]**

The above wastes are treated in the following manner;

1. **Wet Waste [II(1)(a)] –**
   a) It is preferred that wet waste is treated Insitu for all types and sizes of buildings.
   b) Buildings having total construction area above 5000.00 Sqm shall compulsorily have Insitu facility of treatment of wet Waste.
   c) The various types of suggested treatments for wet waste are provided in **Appendix-XVIII-A**

2. **Combustible Dry Waste of low calorific value [II(1)(b)(i) & II(2)(a)(i)]**
   a) Non-Recyclable & Non-Reusable Dry Waste of low calorific value shall be permitted to be incinerated as per the guidelines specified by CPCB.
   b) Buildings having total construction area above 50000.00 Sqm shall compulsorily install such incinerators in the project.
   c) The requirements / specification of incinerators are provided in **Appendix-XVIII-B**

3. **Combustible Dry Waste of high calorific value [II(2)(a)(ii)]**
   a) Non-Recyclable & Non-Reusable Dry Waste of high calorific value shall be used for Pyrolysis Plants or any other Waste to Energy (WtE) plants installed in the Centralised Treatment Plant.
4. **Sanitary Waste [II(2)(b)] –**
   a) The Sanitary Waste shall be permitted to be incinerated as per the guidelines specified by CPCB.
   b) Buildings having total construction area above 50000.00 Sqm shall compulsorily install such incinerators in the project.

The treatment of waste should be carried out as per Karnataka Solid Waste Management Model Bye laws 2019 or as notified by the competent Authority.

VIII. USE OF TREATED WASTE

The treated wet waste (after each cycle) shall be dried and sieved to be used as Manure. The Manure (generated in the Project and in the decentralised / centralised treatment yard) shall be used for the gardens / landscape areas and the excess manure may be sold to prospective purchasers and shall comply with SWM model bye laws, 2019 and IS 16556 2016 manure quality generation.

VIII. DISPOSAL OF WASTE

The wastes that are not treated Insitu or in the decentralised / centralised yards of the local authority shall be disposed off as follows;

1. **Reusable / Recyclable Dry Waste**

   The Reusable / Recyclable Dry Waste [specified in **I(1)(b)(ii)** and **I(2)(a)(iii)**] shall be disposed off to vendors approved by the local authority.

2. **Biomedical Waste, E-Waste and Hazardous Waste**

   These waste which are stored separately (insitu or in the decentralised / centralised treatment yard) shall be disposed off to the collection centres of the local authority periodically (depending upon the quantity of waste generated).

3. **Inert Waste**

   The inert waste shall be dumped in authorised landfill sites by the authorised transporters.

Note: *The plastic covers shall be cleaned and stored separately in the treatment yard. The apartment / premises owners can reuse these covers for storing the wastes.*

All waste disposal must adhere to the Karnataka Municipalities Solid Waste Management Model Bye-Laws, 2019.

REPORTS TO BE GENERATED / REGISTERS TO BE MAINTAINED

The formats of all the reports to be generated / Registers to be maintained by the generators are provided as **Annexure -XVIII-E**.

ASSESSMENT AND MANAGEMENT OF MSW FOR NEW BUILDINGS

1. The details of the new building shall be entered in the format provided as **Annexure-XVIII-F1** (for residential buildings) and **Annexure-XVIII-F2** (for non-residential buildings) for assessing the quantity of MSW generated in the building and for proposed management system of MSW.
   a) **For Residential buildings** (for each block, in case of multiple blocks in a project and for the residential portion of the building in case of mixed-use building)**:**
      i. The following general information of the Project to be entered in **Table-1** of **Annexure-XVIII-F1**
         - Project Name
         - Address & Location of the project
         - Select Building category (HIG, MIG, LIG / EWS)
         - Diversity of Occupancy
      ii. The following details to be entered in **Table-2** of **Annexure-XVIII-F1**
         - No. of dwelling units (for each type of dwelling units)
         - Landscape area provided in the project.

iii. Based on the quantities of various types of wastes generated in the project as per **Table-3** of **Annexure-XVIII-F1**, propose the necessary treatments and disposal of wastes, as specified in **Appendix-XVIII-A, Appendix-XVIII-B** and as per **Clause VIII** of this **Appendix**.

b) **For Non-Residential buildings** (for each type of non-residential block, in case of multiple blocks in a project and for the each type of non-residential portion of the building in case of mixed-use building)**:**

i. The following general information of the Project to be entered in **Table-1** of **Annexure-XVIII-F - XVIII-F2**

- Project Name
- Address & Location of the project
- Building Use / Type of Building
- Diversity of Occupancy

ii. The following details to be entered in **Table-2** of **Annexure-XVIII-F2**

- Premises Area
- Landscape area provided in the project.

iii. Based on the quantities of various types of wastes generated in the project, as per **Table-3** of **Annexure-XVIII-F2**, propose the necessary treatments and disposal of wastes, as specified in **Appendix-XVIII-A , Appendix-XVIII-B** and as per **Clause VIII** of this **Appendix**.

Quantity and characteristics of municipal solid waste - Dependable long-term data on quantity and characteristics of Muncipal solid waste is essential for effective planning. The Local Authority should chalk out a plan for quality and quantity check round the year, so that seasonal variations are captured. This should be repeated once in 3 years. After the first year, data collection would get streamlined and become easier for subsequent years.

ANNEXURE - VIIIA

ESTIMATED QUANTITY OF VARIOUS TYPES OF WASTE GENERATED IN RESIDENTIAL BUILDINGS

Sl No	Type of Building	Organic Waste (1)				Inorganic Waste (2)							Inert Waste (3)	Total Waste	Total Combustible Dry Waste	Garden Waste (4)		Total Combustible Dry Waste including garden waste
			Dry Waste (1.b)			Dry Waste (2.a)			Sanitary Waste (2.b)	Biomedical waste (2.c)	E-Waste (2.d)	Hazardous Waste (2.e)						
		Wet Waste (1.a)	(Combustible)		(Reusable / Recyclable) (1.b.ii)	Combustible (non-recyclable/non-reusable) waste with Low calorific	Combustible (non-recyclable/non-reusable) waste with High calorific	Reusable / Recyclable waste (2.a.iii)								Branches /roots	Leaves	
			From wet waste (1.b.i.a)	Other combustible wastes (1.b.i.b)														
		A	B	C	D	E	F	G	H	I	J	K	L	M =A+B+C+D +E+F +G+H+I+J +K+L	N = B + C+	O	P	Q = N + O
1	HIG	54.00%	6.00%	8.50%	9.00%	4.50%	3.00%	6.00%	6.25%	0.75%	0.25%	0.13%	1.62%	100.00%	19.00%	Garden waste considered 3kg per Sqm per Year, in which 10% considered		
2	MIG	62.00%	5.00%	7.00%	7.00%	4.25%	2.50%	4.75%	5.00%	0.40%	0.10%	0.01%	1.99%	100.00%	16.25%			
3	LIG & EWS	66.00%	4.00%	6.50%	6.50%	4.00%	2.00%	4.50%	4.00%	0.35%	0.05%	0.01%	2.09%	100.00%	14.50%			

1 **Organic Waste**

1.a Wet Waste - Raw vegetable, Meat & Fish waste, Leftover cooked or uncooked food, Eggshells, Minced wheat or other flour, Rotten rice, wheat and other grains, Coffee powder, pet poop/waste & litter, etc.

1.b Dry waste

1.b.i.a Form wet waste - Fruit peels (Orange, Lemon, pomegranate, Watermelon, pineapple etc.), Sugarcane husk, etc.

1.b.i.byclable/ non-reusable) - Curry leaf plant stem/ coconut husk/ coconut shell/ used tender coconut husk/ Used tea bags/ Paper cups, plates & spoons/ Pieces of waste paper and cartons/ P

1.b.ii Dry waste - (reusable/ recyclable) -Carton boxes (wooden, cardboards, etc.) / Rags & Ropes / Papers (including newspaper) etc.

2 **Inorganic Waste**

2.a Dry waste

2.a.i Combustible (non-recyclable/ non-reusable)(waste with low calorifc value) -Food wrapping boxes and plastic foils/ Composite paper items (including takeaway food packing

2.a.ii Combustible (non-recyclable/ non-reusable)(waste with high calorific value) -RDF / Rubber (including worn out tyres) / Thermocol / Broken Plastic Carton Boxes / Foam items,

2.a.iii Reusable/ recyclable - Plastic items (Including milk covers, water bottles & other bottles, Broken stationary like pen, pencil, eraser etc)/ Glass items including broken glasses) / Broken or unusable utensils / Tin items (including aluminum wraps) / POP/ Electric wires, etc.

2.b Sanitary Waste - Ladies, Children and Adult Napkins

2.c Biomedical waste - Bandages, Needles or syringes, Medicines, etc.

2.d E-Waste - CFL and tube lights, Computer and accessories waste (including printer cartridges), Other electronic items

2.e Hazardous Waste - Paints, Batteries, Solvents, Cleaning agents, Pesticides, waste oil (of Generator), etc

3 Inert Waste - Soil, Sand, Broken stones, waste mortar, hardened cement, etc

4 **Garden Waste**

Garden waste considered 3kg per Sqm per Year, inwhich 10% considered as branches/ roots and 90% considered as leaves.

Garden waste per day (Landscape area x 3kg per Sqm per year / 365)

ANNEXURE - VIIIB

ESTIMATED QUANTITY OF VARIOUS TYPES OF WASTE GENERATED IN NON-RESIDENTIAL BUILDINGS (EXCEPT INDUSTRIAL BUILDING)

Sl No	Type of Building	Organic Waste (1)				Inorganic Waste (2)							Inert Waste (3)	Total Waste	Total Combustible Dry Waste	Garden Waste (4)		Total Combustible Dry Waste including garden waste
		Wet Waste (1.a)	Dry Waste (1.b)			Dry Waste (2.a)			Sanitary Waste (2.b)	Biomedical waste (2.c)	E-Waste (2.d)	Hazardous Waste (2.e)				Branches /roots	Leaves	
			(Combustible)															
			From wet waste (1.b.i.a)	Other combustible wastes (1.b.i.b)	(Reusable / Recyclable) (1.b.ii)	Combustible (non-recyclable/ non-reusable) waste with	Combustible (non-recyclable/non-reusable) waste with High	Reusable / Recyclable waste (2.a.iii)										
		A	B	C	D	E	F	G	H	I	J	K	L	M =A+B+C+D +E+F +G+H+I+J +K+L	I = B + C+	O	P	Q = N + O
1	Mercantile (Wholesale & Retail)													0.00%	0.00%	Garden waste considered 3kg per Sqm per Year, inwhich 10% considered as branches/ roots and 90% considered as leaves. Garden waste per day (Landscape area x 3kg per Sqm per year / 365)		
2	Business (Offices)													0.00%	0.00%			
3	Hotels (Excluding restaurant & kitchen area)													0.00%	0.00%			
4	Educational													0.00%	0.00%			
5	Assembly													0.00%	0.00%			
6	Restaurants / Fast food outlets													0.00%	0.00%			
7	Hospitals													0.00%	0.00%			
8	Markets (including supermarkets and hypermarkets)													0.00%	0.00%			
9	Industrial (including storage & hazardous)													0.00%	0.00%			

1 **Organic Waste**

1.a Wet Waste - Raw vegetable, Meat & Fish waste, Leftover cooked or uncooked food, Eggshells, Minced wheat or other flour, Rotten rice, wheat and other grains, Coffee powder, pet poop/waste & litter, etc.

1.b Dry waste

1.b.i.a Form wet waste - Fruit peels (Orange, Lemon, pomegranate, Watermelon, pineapple etc.), Sugarcane husk, etc.

1.b.i.b Dry waste - Combustible (non-recyclable/ non-reusable) - Curry leaf plant stem/ coconut husk/ coconut shell/ used tender coconut husk/ Used tea bags/ Paper cups, plates & spoons/ Pieces of waste paper and cartons/ Pieces of Rags and ropes/ hair, etc.

1.b.ii Dry waste - (reusable/ recyclable) -Carton boxes (wooden, cardboards, etc.) / Rags & Ropes / Papers (including newspaper) etc.

2 **Inorganic Waste**

2.a Dry waste

2.a.i Combustible (non-recyclable/ non-reusable)(waste with low calorifc value) -Food wrapping boxes and plastic foils/ Composite paper items (including takeaway food packing boxes), Dry food packets (e.g, of bread, biscuits, ready to eat items without food items), etc.

2.a.ii Combustible (non-recyclable/ non-reusable)(waste with high calorific value) -RDF / Rubber (including worn out tyres) / Thermocol / Broken Plastic Carton Boxes / Foam items, etc.

2.a.iii Reusable/ recyclable - Plastic items (Including milk covers, water bottles & other bottles, Broken stationary like pen, pencil, eraser etc)/ Glass items including broken glasses) / Broken or unusable utensils / Tin items (including aluminum wraps) / POP/ Electric wires, etc.

2.b Sanitary Waste - Ladies, Children and Adult Napkins

2.c Biomedical waste - Bandages, Needles or syringes, Medicines, etc.

2.d E-Waste - CFL and tube lights, Computer and accessories waste (including printer cartridges), Other electronic items

2.e Hazardous Waste - Paints, Batteries, Solvents, Cleaning agents, Pesticides, waste oil (of Generator), etc

3 Inert Waste - Soil, Sand, Broken stones, waste mortar, hardened cement, etc

4 **Garden Waste**

Garden waste considered 3kg per Sqm per Year, inwhich 10% considered as branches/ roots and 90% considered as leaves.

Garden waste per day (Landscape area x 3kg per Sqm per year / 365)

Appendix-XVIII-A

VARIOUS TYPES OF SUGGESTED TREATMENTS FOR WET WASTE

Option-1 (Using Bins for composting with larvae of Black Soldier Flies)

Wet Waste is treated with Larvae of Black Soldier Flies (BSF) in Bins of various sizes. The usual sizes of Bins are 15 Kgs, 30 Kgs and 45 Kgs. For large generators, concrete structures of suitable sizes may constructed. The procedure followed for the treatment and disposal of Wet Waste is as follows;

a) The Wet Waste is properly segregated at source (Primary Segregation inside the premises / apartments) and rechecked in the treatment yard segregation tank.

b) The orange and lemon peels, banana leaves, stems of curry leaf plant, coconut husk etc. are removed from the wet waste, washed and dried separately for incineration.

c) The Wet Waste and the dried items of (b) above are weighed separately and entered in the register.

d) The Wet Waste is then Shredded for reducing the volume and for easy decomposition / consumption by the Larvae. Shredding reduces the volume of waste by about 20 %.

e) The Wet Waste has to be dumped in each pair of bins (the bins have to be numbered Bin A1 & A2 / B1 & B2 …. etc.) – To be marked on the Bin) as follows;

Sl. No.	**Days**	**Quantity of Waste in Bin A1 / B1 / … etc. (Kgs)**			**Quantity of Waste in Bin A2 / B2 / … etc. (Kgs)**			**Remarks**
		15 Kgs	**30 Kgs**	**45 Kgs**	**15 Kgs**	**30 Kgs**	**45 Kgs**	
1	Day 1 to Day 15	12	24	36	0	0	0	3kgs, 6kgs and 9kgs of Wet Waste is dumped in the additional bin for the bin sizes of 15 kgs, 30 kgs and 45 kgs respectively, for the waste in excess of 12kgs, 24kgs and 36kgs.s
2	Day 16 to Day 30	15	30	45	0	0	0	
3	Day 31 to Day 45	3	6	9	12	24	36	

4	Day 46 to Day 60	0	0	0	15	30	45	50% of waste to be removed from Bin A1 on 55th& 60th day
5	Day 61 to Day 75	12	24	36	3	6	9	
6	Day 76 to Day 90	15	30	45	0	0	0	50% of waste each to be removed from Bin A2 on 85th & 90th day
7	Day 91 to Day 105	3	6	9	12	24	36	
8	Day 106 to Day 120	0	0	0	15	30	45	50% of waste each to be removed from Bin A1 on 115th & 120th day
9	Day 121 to Day 135	12	24	36	3	6	9	
10	Day 136 to Day 150	15	30	45	0	0	0	50% of waste each to be removed from Bin A2 on 145th& 150th day
The process to be repeated in the above sequence								

Note: *10% of cocopeat by weight of the wet waste has to be spread on the wet waste dumped in the Bin.*

1. The waste removed from the bin (25% to 50% removed each time) has to be weighed and recorded. Thereafter, the removed waste has to be dried in drying trays (covered with tarpaulin, if required, to avoid getting wet during rains) for five days. Ensure that all the larvae of BSF are dead. The waste in the drying trays has to be stirred 3 times a day for faster drying.
2. The dried waste has to be sieved (using sieve) and the fine waste (manure) has to be weighed and stored in gunny bags (after recording), to be used as manure.
3. The residue of sieved manure (with the dead Larvae) shall be further shredded in the Shredder and sieved to get additional quantity of manure and the final residue shall be incinerated or used for gardening (after recording the weight).
4. Excess manure may be sold to required persons.

Option-2 (Using Automatic / Semi-Automatic Bio-Converter)

- **a)** The wet waste has to be placed in the Bio-Converter and mixed with saw dust or dry manure (of the previous day's) to achieve reasonable dryness to the waste to be treated.
- **b)** The wet waste is processed for a period of 4 hours to 8 hours or as per the manufacturer's specification, till the manure of required consistency is achieved.
- **c)** The treated waste is removed from the Bio-Converter and dried in open air till the manure is fully dry.

d) The waste from the Bio-Converter is sieved (using sieve) and the fine waste (manure) has to be weighed and stored in gunny bags (after recording), to be used as manure.

e) The residue of sieved manure (with the dead Larvae) shall be further shredded in the Shredder and sieved to get additional quantity of manure and the final residue shall be incinerated or used for gardening (after recording the weight).

f) Excess manure may be sold to required persons.

Appendix-XVIII-B

REQUIREMENTS / SPECIFICATION OF INCINERATORS

Standards for incineration:

The Emission from incinerators /thermal technologies in Solid Waste treatment/disposal facility shall meet the following standards, namely:

Parameter	**Emission Standard**	
(1)	(2)	(3)
Particulates	50 mg/Nm³	Standard refers to half hourly average value
HCl	50 mg/Nm³	Standard refers to half hourly average value
SO_2	200 mg/Nm³	Standard refers to half hourly average value
CO	100 mg/Nm³	Standard refers to half hourly average value
	50 mg/Nm³	Standard refers to daily average value
Total Organic Carbon	20 mg/Nm³	Standard refers to half hourly average value
HF	4 mg/Nm³	Standard refers to half hourly average value
NOx (NO and NO_2 expressed as NO_2)	400 mg/Nm³	Standard refers to half hourly average value
Total dioxins and furans	0.1 ng TEQ/Nm³	Standard refers to 6-8 hours sampling. Please refer guidelines for 17 concerned congeners for toxic equivalence values to arrive at total toxic equivalence.
Cd + Th + their compounds	0.05 mg/Nm³	Standard refers to sampling time anywhere between 30 minutes and 8 hours.
Hg and its compounds	0.05 mg/Nm³	Standard refers to sampling time anywhere between 30 minutes and 8 hours.
Sb + As + Pb + Cr + Co + Cu + Mn + Ni + V + their compounds	0.05 mg/Nm³	Standard refers to sampling time anywhere between 30 minutes and 8 hours.
Note: All values corrected to 11% oxygen on a dry basis.		

Note:

1. Suitably designed pollution control devices shall be installed or retrofitted with the incinerator to achieve the above emission limits.
2. Waste to be incinerated shall not be chemically treated with any chlorinated disinfectants.
3. Incineration of chlorinated plastics shall be phased out within two years.
4. If the concentration of toxic metals in incineration ash exceeds the limits specified in the Hazardous Waste (Management, Handling and Trans boundary Movement) Rules, 2008, as amended from time to time, the ash shall be sent to the hazardous waste treatment, storage and disposal facility.
5. Only low sulphur fuel like LDO, LSHS, Diesel, bio-mass, coal, LNG, CNG, RDF and bio-gas shall be used as fuel in the incinerator.
6. The CO2 concentration in tail gas shall not be more than 7%.

7. All the facilities in twin chamber incinerators shall be designed to achieve a minimum temperature of 950°C in secondary combustion chamber and with a gas residence time in secondary combustion chamber not less than 2 (two) seconds.
8. Incineration plants shall be operated (combustion chambers) with such temperature, retention time and turbulence, as to achieve total Organic Carbon (TOC) content in the slag and bottom ash less than 3%, or the loss on ignition is less than 5% of the dry weight.
9. Odour from sites shall be managed as per guidelines of CPCB issued from time to time.

Ref: Solid waste management Rules, 2016 (MoEF&CC Notification dated 08th April 2016).

Operating Standards:

(Ref: CPCB website – Standards - Common HW Incinerators - Annexure 1)

1. All the facilities shall be designed to achieve a minimum temperature of 1100°C in secondary combustion chamber and with a gas residence time in secondary combustion chamber not less than 2 (two) seconds.
2. The incineration facilities after initial operation of minimum one year, as per the guidelines and standards, can submit a proposal for relaxation in temperature and retention time requirement if it can be demonstrated that the flue gas standards and operation standards can be complied with at lower temperatures and residence times. The State Pollution Control Board / Pollution Control Committee, upon successful demonstration of compliance with flue gas standards by the facility, can recommend the proposal made by the incineration facility for relaxation in temperature and residence time, but in any case not less than 950oC and 1.5 seconds, for the consideration and approval of the Central Board.
3. Incineration plants shall be operated (combustion chambers) with such temperature, retention time and turbulence, so as to achieve Total Organic Carbon (TOC) content in the slag and bottom ashes less than 3%, or their loss on ignition is less than 5% of the dry weight of the material.
4. Guidelines published by the Central Board from time to time for common incineration facilities shall be referred for implementation.
5. All the project proposals submitted for establishment of the common incineration facilities shall be examined and cleared by the Task Force constituted by the Central Board.
6. Notification of compliance: The operator of the incinerator shall undertake comprehensive performance test. Within 90 days of completion of comprehensive performance test, the operator shall issue a notification of compliance documenting compliance or non-compliance, as the case may be, for public information / notice.

All norms of Incinerators and operation and maintenance standards should be followed time to time as notified by the competent authority.

Processing of Domestic Hazardous Waste including Sanitary Waste.-The Domestic Hazardous Waste shall be processed through TSDF (Treatment Storage Disposal Facility) authorised by the KSPCB, incineration and/or any other suitable method determined by the KSPCB/CPCB. Sanitary Waste will be processed at the nearest common biomedical treatment facility and/or incinerators in the Local Authority along with other Bio-medical Waste generated within the Local Authority. If it is not processed through these methods, it shall be transported to Sanitary Landfills.

ANNEXURE - VIII - E

QUANTITY OF VARIOUS TYPES OF WASTE GENERATED IN BUILDING

Project:							Location:														Month:	

DATE	No of Flats/ Premises (Waste Collected)	Organic Waste (1)						Inorganic Waste (2)							Inert Waste (3)	Total Waste	Total Combustible Dry Waste	Garden Waste (4		Total Combustible Dry Waste including garden waste	Supervisor		Remarks
		Wet Waste (1.a)			Dry Waste (1.b) (Combustible)			Dry Waste (2.a)			Sanitary Waste (2.b)	Biomedical waste (2.c)	E-Waste (2.d)	Hazardous Waste (2.e)							Name	Sign	
		Weight (In kgs)	Volume (In Litres)	Volume After Shredding (in litres)	From wet waste (1.b.i.a)	Other combustible wastes (1.b.i.b)	(Reusable / Recyclable) (1.b.ii)	Combustible (non-recyclable/non-reusable) waste with Low calorific	Combustible (non-recyclable/non-reusable) waste with High calorific value (2.a.ii)	Reusable / Recyclable waste (2.a.iii)								Branches /roots	Leaves				
		A	A1	A2	B	C	D	E	F	G	H	I	J	K	L	M =A+B+C+D+E+F+G+H+I+J+K+L	I = B + C+	O	P	Q = N + O			
TOTAL		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			

1 **Organic Waste**

1.a Wet Waste - Raw vegetable, Meat & Fish waste, Leftover cooked or uncooked food, Eggshells, Minced wheat or other flour, Rotten rice, wheat and other grains, Coffee powder, pet poop/waste & litter, etc.

1.b Dry waste

1.b.i.a Form wet waste - Fruit peels (Orange, Lemon, pomegranate, Watermelon, pineapple etc.), Sugarcane husk, etc.

1.b.i.b Dry waste - Combustible (non-recyclable/ non-reusable) - Curry leaf plant stem/ coconut husk/ coconut shell/ used tender coconut husk/ Used tea bags/ Paper cups, plates & spoons/ Pieces of waste paper and cartons/ Pieces of Rags and ropes/ hair, etc.

1.b.ii Dry waste - (reusable/ recyclable) -Carton boxes (wooden, cardboards, etc.) / Rags & Ropes / Papers (including newspaper) etc.

2 **Inorganic Waste**

2.a Dry waste

2.a.i Combustible (non-recyclable/ non-reusable)(waste with low calorifc value) -Food wrapping boxes and plastic foils/ Composite paper items (including takeaway food packing boxes), Dry food packets (e.g, of bread, biscuits, ready to eat items without food items), etc.

2.a.ii Combustible (non-recyclable/ non-reusable)(waste with high calorific value) -RDF / Rubber (including worn out tyres) / Thermocol / Broken Plastic Carton Boxes / Foam items, etc.

2.a.iii Reusable/ recyclable - Plastic items (Including milk covers, water bottles & other bottles, Broken stationary like pen, pencil, eraser etc)/ Glass items including broken glasses) / Broken or unusable utensils / Tin items (including aluminum wraps) / POP/ Electric wires, etc.

2.b Sanitary Waste - Ladies, Children and Adult Napkins

2.c Biomedical waste - Bandages, Needles or syringes, Medicines, etc.

2.d E-Waste - CFL and tube lights, Computer and accessories waste (including printer cartridges), Other electronic items

2.e Hazardous Waste - Paints, Batteries, Solvents, Cleaning agents, Pesticides, waste oil (of Generator), etc

3 Inert Waste - Soil, Sand, Broken stones, waste mortar, hardened cement, etc

4 **Garden Waste**

Garden waste considered 3kg per Sqm per Year, inwhich 10% considered as branches/ roots and 90% considered as leaves.

Garden waste per day (Landscape area x 3kg per Sqm per year / 365)

ANNEXURE XVIII - F1

SOLID WASTE ASSESSMENT AND MANAGEMENT FOR RESIDENTIAL BUILDINGS

DATE:

TABLE - 1

Project:	
Address/Location:	
Building Category: (HIG / MIG / LIG / EWS)	
Diversity of Occupancy *	

TABLE - 2

DETAILS OF DWELLING UNITS

Type of Dwelling Units	No. of Dwelling Units		No. of Persons per Unit	Total No. of Persons	Total No. of Persons after Diversity
1 Bedroom			4	0	0
2 Bedroom			5	0	0
3 Bedroom			6	0	0
4 Bedroom			7	0	0
TOTAL	**0**			**0**	**0**
	ROUND OFF				

** **DIVERSITY OF OCCUPANCY***

1 HIG (80% Occupancy) = 0.8

2 MIG (90% Occupancy) = 0.9

3 LIG & EWS (100% Occupancy 1.0

Assumptions made for Solid Waste generated for Residential Buildings:

Per capita Solid Waste generated (kg/person/day) = 0.3 to 0.6 kg/capita/day (As per Part 9, Section 3, Solid Waste Management of NBC 2016)

1	HIG	(kg/capita/day)	**0.45**
2	MIG	(kg/capita/day)	**0.40**
3	LIG & EWS	(kg/capita/day)	**0.35**

Landscape area provided in the project (Sqm)	

*# **Garden Waste***

Garden waste considered 3kg per Sqm per Year, inwhich 10% considered as branches/ roots and 90% considered as leaves.

Garden waste per day (Landscape area x 3kg per Sqm per year / 365)

It is proposed to treat some of the wastes generated in the Project site itself using Bins for composting with Larvae of Black Soldier Flies method (or Bio-converters machines) and Incinerator and the remaining wastes shall be disposed to the various facilities of MCC as mentioned below.

TABLE - 3

Solid waste from Residential Buildings during operation phase are classified as follows for segregation and treatment:

Sl. No	Type of Waste		Quantity of Waste (%) (refer Annexure 1)	Quantity of Waste (Kgs)**	Frequency of Treatment / Disposal	Type of Treatment					
						Insitu facility			MCC Facility		Others
						Bins for Composting with Larvae of BSF method / Bio-converters	Incinerator	Garden Mulching ##	Delivered to C & D waste disposal yard	Delivered to Ward level collection centre	Recycling agency
1	**Organic Waste**										
1.a	Wet Waste	Raw vegetable, meat & fish waste, Leftover cooked or uncooked food, Eggshells, Minced wheat or other flour, Rotten rice, wheat and other grains, Coffee Powder, Pet poop/waste & litter, etc.		0.00	Daily	0.00					
1.b	Dry Waste										
1.b.i	Combustible (non recylcable / non reusable)										
1.b.i.a	From Wet waste	Fruit peels (Orange, Lemon, pomegranate, Watermelon, pineapple etc.), Sugarcane husk, etc.		0.00	Daily		0.00				
1.b.i.b	Other combustible wastes	Curry leaf plant stem/ coconut husk/ coconut shell/ used tender coconut husk/ Used tea bags/ Paper cups, plates &		0.00	Daily		0.00				
1.b.ii	Reusable/Recyclable	Carton boxes (wooden and cardboards, etc) / Rags & Ropes / Papers (including newspapers) etc.		0.00	Daily						0.00
2	**Inorganic Waste**										
2.a	Dry waste										
2.a.i	Combustible (non recyclable / non reusable) with low calorific value	Food wrapping boxes and plastic foils/ Composite paper items (including takeaway food packing boxes), Dry food		0.00	Daily		0.00				
2.a.ii	Combustible (non recyclable / non reusable) with high calorific value	RDF / Rubber (including worn out tyres) / Thermocol / Broken Plastic Carton Boxes / Foam items, etc.		0.00	Daily		0.00				
2.a.iii	Reusable / Recyclable waste	Plastic items (including milk covers, water bottles & other bottles, Broken Stationery like pen, pencil, eraser etc.) / Glass items (including broken glasses) / Broken or unusable utensils / Tin items (including aluminium wraps) / POP / Electric wires, etc		0.00	Weekly						0.00
2.b	Sanitary Waste	Ladies, Children and Adult Napkins		0.00	Daily		0.00				
2.c	Biomedical waste	Bandages / Needles or syringes / medicines, etc.		0.00	Fortnightly					0.00	
2.d	E-Waste	CFL and tube lights / Computer and accessories waste (including printer cartridges) / Other electronic items		0.00	Fortnightly					0.00	
2.e	Hazardous Waste	Paints, batteries, solvents, cleaning agents, pesticides, waste oil (of generator) etc.		0.00	Fortnightly					0.00	
3	**Inert Waste**	Soil, sand, broken stones, waste mortar, hardened cement, etc		0.00	Weekly				0.00		
4	**Garden Waste #**										
	Garden Waste	a. Branches /roots (10% of total garden waste)	0.001	0.00	Daily			0.00			
		b. Leaves (90% of total garden waste)	0.007	0.00	Daily			0.00			
	Total Quantity of Waste Generated / Day (kg)			**0.00**		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

** Quantity of waste = Total No. of persons after diversity x Waste per capita per day (for the building category) x % waste (for the building category as per Annexure 1)

Only fresh leaves & flowers have to be used for garden mulching. Dry leaves and roots/branches to be used for incinerarion if available or to be sent to MCC facility.

ANNEXURE XVIII - F2

SOLID WASTE ASSESSMENT AND MANAGEMENT FOR NON-RESIDENTIAL BUILDINGS

DATE:

TABLE - 1

Project:	
Address/Location:	
Type of Building:	
Diversity of Occupancy *	

TABLE - 2

DETAILS OF PREMISES & OCCUPANTS

Type of premises use	Premises area			Total No. of Persons	Total No. of Persons after Diversity
				0	0
				0	0
				0	0
				0	0
TOTAL	**0**			**0**	**0**
	ROUND OFF				

Assumptions made for Solid Waste generated for Residential Buildings:

Per capita Solid Waste generated (kg/person/day) = 0.3 to 0.6 kg/capita/day (As per Part 9, Section 3, Solid Waste Management of NBC 2016)

1	HIG	(kg/capita/day)	**0.45**
2	MIG	(kg/capita/day)	**0.40**
3	LIG & EWS	(kg/capita/day)	**0.35**

Landscape area provided in the project (Sqm)	

\# ***Garden Waste***

Garden waste considered 3kg per Sqm per Year, inwhich 10% considered as branches/ roots and 90% considered as leaves.

Garden waste per day (Landscape area x 3kg per Sqm per year / 365)

It is proposed to treat some of the wastes generated in the Project site itself using Bins for composting with Larvae of Black Soldier Flies method (or Bio-converters machines) and Incinerator and the remaining wastes shall be disposed to the various facilities of MCC as mentioned below.

TABLE - 3

Solid waste from Residential Buildings during operation phase are classified as follows for segregation and treatment:

						Type of Treatment					
						Insitu facility			MCC Facility		Others
Sl. No	Type of Waste		Quantity of Waste (%) (refer Annexure 2)	Quantity of Waste (Kgs)**	Frequency of Treatment / Disposal	Bins for Composting with Larvae of BSF method / Bio-converters	Incinerator	Garden Mulching ###	Delivered to C & D waste disposal yard	Delivered to Ward level collection centre	Recycling agency
1	**Organic Waste**										
1.a	Wet Waste	Raw vegetable, meat & fish waste, Leftover cooked or uncooked food, Eggshells, Minced wheat or other flour, Rotten rice, wheat and other grains, Coffee Powder, Pet poop/waste & litter, etc.		0.00	Daily	0.00					
1.b	Dry Waste										
1.b.i	Combustible (non recylcable / non reusable)										
1.b.i.a	From Wet waste	Fruit peels (Orange, Lemon, pomegranate, Watermelon, pineapple etc.), Sugarcane husk, etc.		0.00	Daily		0.00				
1.b.i.b	Other combustible wastes	Curry leaf plant stem/ coconut husk/ coconut shell/ used tender coconut husk/ Used tea bags/ Paper cups, plates &		0.00	Daily		0.00				
1.b.ii	Reusable/Recyclable	Carton boxes (wooden and cardboards, etc) / Rags & Ropes / Papers (including newspapers) etc.		0.00	Daily						0.00
2	**Inorganic Waste**										
2.a	Dry waste										
2.a.i	Combustible (non recyclable / non reusable) with low calorific value	Food wrapping boxes and plastic foils/ Composite paper items (including takeaway food packing boxes), Dry food		0.00	Daily		0.00				
2.a.ii	Combustible (non recyclable / non reusable) with high calorific value	RDF / Rubber (including worn out tyres) / Thermocol / Broken Plastic Carton Boxes / Foam items, etc.		0.00	Daily		0.00				
2.a.iii	Reusable / Recyclable waste	Plastic items (including milk covers, water bottles & other bottles, Broken Stationery like pen, pencil, eraser etc.) / Glass items (including broken glasses) / Broken or unusable utensils / Tin items (including aluminium wraps) / POP / Electric wires, etc		0.00	Weekly						0.00
2.b	Sanitary Waste	Ladies, Children and Adult Napkins		0.00	Daily		0.00				
2.c	Biomedical waste	Bandages / Needles or syringes / medicines, etc.		0.00	Fortnightly					0.00	
2.d	E-Waste	CFL and tube lights / Computer and accessories waste (including printer		0.00	Fortnightly					0.00	
2.e	Hazardous Waste	Paints, batteries, solvents, cleaning agents, pesticides, waste oil (of generator) etc.		0.00	Fortnightly					0.00	
3	**Inert Waste**	Soil, sand, broken stones, waste mortar, hardened cement, etc		0.00	Weekly				0.00		
4	**Garden Waste #**										
	Garden Waste	a. Branches /roots (10% of total garden waste)	0.001	0.00	Daily			0.00			
		b. Leaves (90% of total garden waste)	0.007	0.00	Daily			0.00			
	Total Quantity of Waste Generated / Day (kg)			**0.00**		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

** Quantity of waste = Total No. of persons after diversity x Waste per capita per day (for the building category) x % waste (for the building category as per Annexure 1)

Only fresh leaves & flowers have to be used for garden mulching. Dry leaves and roots/branches to be used for incinerarion if available or to be sent to MCC facility.

APPENDIX-XIX

(see clause 15(3))

ACCREDITATION OF ENVIRONMENTAL AUDITORS (QUALIFIED BUILDING AUDITORS)

The Ministry of Environment, Forest and Climate Change (MoEFCC), through qualified agencies shall accredit the Qualified Building Environment Auditors (QBEAs). The Qualified Building Environment Auditors could be a firm /organization or an individual expert, who fulfils the requirements. The Ministry will implement this process of accreditation through Quality Council of India (QCI), National Productivity Council or any other organization identified by the Government. The organizations like Indian Green Building Council, Bureau of Energy Efficiency etc. can also be associated in the process of accreditation, training, and renewal. The environmental consultants accredited by the QCI for building sector will be qualified as QBEAs. The QBEAs will meet the following criteria. The accrediting agency can improvise on these criteria.

Qualifications of the Auditor:

a. Education: Architect (Degree or Diploma), Town Planners (Degree), Civil Engineer / Mechanical Engineer (Degree or Diploma), PG in Environmental Science or any other qualification as per the scheme of the accreditation.
b. Training: Mandatory training to be given by the accreditation body or their approved training providers. This will be as per the scheme of the accreditation.
c. Experience: At least 3 years of work experience in the related field or building sector Environment Impact Assessment consultants accredited by QCI or any other experience criteria as per the scheme of the accreditation.
d. Infrastructure and equipment: As per the scheme of the accreditation
e. Renewal: The accreditation will be valid for 5 years and will be renewed as per the process developed under the accreditation scheme.

Accountability/Complaint redressal mechanism: Any complaints regarding the quality of the work of QBEAs shall be made to the accreditation body. The accreditation body shall evaluate the complaint and take appropriate action including black listing or cancellation of the accreditation with wide public notice. This will be in addition to the action at the level of local authority for penalty and blacklisting. The Ministry can also take such action in case of specific complaint or feedback.

APPENDIX-XX

(see clause 15(7))

ENVIRONMENTAL MONITORING CELL AT THE LEVEL OF THE AUTHORITY

An Environmental Cell shall be setup at the Local Authority level to support compliance and monitoring of environmental conditions in buildings. The Cell shall also provide assistance in environmental planning and capacity building within their jurisdiction. The responsibility of this cell would be monitoring the implementation of this notification and providing an oversight to the Third-Party Auditing process. The cell will operate under the local authority.

Constitution of the cell:

The cell shall be chaired by the Commissioner of the Local Authority and, TPO shall be the Member Secretary of the cell.

The cell will comprise of at least 3 dedicated experts in any of the following fields, for every three years period:

a. Waste management (solid and liquid)

b. Water conservation and management

c. Resource efficiency including Building materials

d. Energy Efficiency and renewable energy

e. Environmental planning including air quality management.

f. Transport planning and management.

The Cell shall induct at least two outside experts as per the requirements and background of dedicated experts for every three years period. The Cell shall also have Works committee chairman and two members (one Ruling party Corporator and another Opposition party Corporator) from the Council of the Authority.

Financial Support:

An additional fee may be charged along with processing fee for building License for integrating environmental conditions and it's monitoring. The local authority can fix and revise this additional fee from time to time. The amount of this fee shall be deposited in a separate bank account and used for meeting the requirement of salary / emoluments of experts and running the system of online application, verifications and the Environmental Cell.

Functions of the Cell:

1. The cell shall be responsible for assessing and appraising the environmental concerns of the area under their jurisdiction where building activities are proposed. The Cell can evolve and propose additional environmental conditions as per requirements. These conditions may be area specific and shall be notified in advance from time to time. These additional conditions shall be approved following a due consultation process. These environmental conditions will be integrated in building Licenses by the sanctioning authority.
2. Develop and maintain an online system for application and payment of fees. The Cell shall maintain an online database of all applications received, projects approved, the compliance audit report,

random inspections made. The Cell shall maintain a portal for public disclosure of project details including self-certification and compliance audit reports filed by the Qualified Building Environment Auditors for public scrutiny of compliance of environmental conditions by the project.

3. Monitoring the work of Environmental Audit process carried by the Qualified Building Auditors.
4. The Cell shall review the applications; finalize the additional environmental conditions if required within 15 days of the submission of the application to the local authority.
5. The Cell shall adopt risk based random selection of projects for verifying on site for certification of QBA, compliance of environmental conditions and yearly audit report.
6. The Cell shall recommend to the local authority for financial penalty for non-compliance of environmental conditions by the project proponent.
7. The Cell shall recommend to the accrediting body and the local authority against any Qualified Building Environment Auditor, if any lapse is found in their work.

APPENDIX- XXI

(see Table 14.3 (note i))

CATEGORIES OF MATERIALS OF STORAGE OF WAREHOUSE AS PER COMBUSTION RISK.

A. Non-combustible materials:

Articles (which are Non- Combustible, Non -Flammable, Non -Corrosive, Non -toxic, Non-poisonous, Non-Explosive) such as Cement, brick, mortar, hardware items, metals in solid bar/metal goods (excluding those having melting point below 1000 ◦ C)

B. Combustible Materials in following 4 sub categories

Category	**Material Specifications**	**Stacking Height**	
		Medium (in m)	**High (in m)**
Category I	Articles such as Carpets, Non-synthetic/synthetic yarn and fabrics. Mechanical and electrical goods (dominantly metal parts), Glassware and crockery, fiberboards, groceries, metal goods, Papers other than those listed under categories Moderate and High, Powdered and canned foods, Plastic/glass bottles containing non-flammable liquids, etc.	**4**	**6.5**
Category II	Articles such as Batteries, Baled cotton/synthetic fibers, Books, Baled cork, Baled waste paper, Cartons containing alcohols (in cans/bottles), Cartons of canned lacquers which dry by solvent evaporation, Chipboard, Cardboard rolls (horizontally Stored), Cereals/Grains/Foodstuff/ Flour/Sugar in sacks, Cellulose/Cellulose pulp, Electrical goods other than those stated in Category low, Flammable liquids in non-combustible containers, Leather goods, Palletized liquor stocks, Plastics (non-foamed, other than cellulose nitrate), Rolled pulp and paper and asphalted paper (Horizontal	**3**	**5.5**

	storage), Veneer sheets, Wooden patterns, Metal/wooden furniture with plastic seats, etc.		
Category III	Articles such as Bitumen/Wax coated paper, Candles, Carbon black, Card board rolls (vertically stored), Charcoal, Coal> cellulose nitrate, Foamed plastic and foam rubber products, Flammable liquids in combustible containers, Linoleum products, Matches, Plastics other than those stated in Category Moderate, Rolled pulp and paper and asphalted paper (vertical storage), Rubber goods including tyres and tubes, Sawn timber, Ventilated wood stacks, Waxed and asphalt coated papers and containers in cartons, Wood wool, wooden pallets and flats (idle), Ail materials having wrappings or pre-formed containers of foamed plastics, etc.	**2**	**4.5**
Category IV	Off cuts and random pieces of foamed plastic or rubber rolls of sheets of foamed plastic or foamed rubber, Foam mattress, Expanded polystyrene packaging, Foam upholstery, etc.	**1.25**	**3.5**

Explanations:

# The deflector of the sprinkler fitted in the ceiling shall be at more than 1.5 m from the goods stored below. However, in case of jute storage, no jute stock shall reach within 2 m of the deflectors of the sprinkler heads. # In case of storage in racks or shelves, if the height of storage is more than what is specified, intermediate sprinklers shall be provided for each shelf/rack in addition to the ceiling sprinklers and overall design density and AMAO shall be maintained as per Table 5 of IS: 15105. # The aisle width between the storage stacks shall not be less than 2.5 m and the maximum area of each storage stack shall not be more than 15.0m2. If these parameters are exceeded, the design density applicable shall be loaded by 2.5 L/min/m2. # In case of mixed storage (both moderate and high hazard storage) in buildings, the parameters will be governed by the most hazardous occupancy	Goods stored not higher than what is stated above for the appropriate category or not higher than the eaves height of the roofs or within 1 m of a flat ceiling Whichever is the lowest shall be regarded as moderate hazard storage. If the above conditions are not met, the risk shall be regarded as high hazard storage

Notes:

1. Any new use which increase the number of occupants to a figure comparable with other classes of occupancy shall change the classification of the building to that of the new use (for example, Warehouse used \ for office purposes).

2. Ware house buildings shall not include any article which is highly combustible or explosive materials or products which are liable to bum with extreme rapidity and or which may produce poisonous fumes or explosions for storage, handling and which involve highly corrosive, toxic or noxious alkalis, acids or other liquids or chemicals producing flame, fumes and explosive, poisonous, irritant or corrosive gases; and for the storage, handling of any material producing explosive mixtures of dust which result in the division of matter in to fine particles subject to spontaneous ignition as such buildings fall in Hazardous Building Category.

FORMS

FORM-I

(see clause 3.10.2, 3.13, 3.16.10(1))

DETAILS TO BE CONTAINED AND TO BE ATTACHED TO THE APPLICATION FORM FOR BUILDING LICENCE AND OTHER COMMON DETAILS REQUIRED FOR ALL NOCS.

A. General Information to be provided (Common for Building Licence and other NOCs):

1. Particulars of Applicant:

    a) Name –
    b) Address –
    c) Contact details –
        i. Phone No. (office) –
        ii. Phone No. (mobile) –
    d) Identification proof (Aadhaar / Voter ID / Driving Licence / Passport) –
    e) Whether the Applicant is –
        i. The owner of the plot -
        ii. GPA holder
        iii. Promoter, representing the Owner

2. Project Name & Address:

3. Particulars of land:

    a) Survey No. –
    b) Revenue Ward / Village No. –
    c) Taluk –
    d) District –
    e) PID no. (if available) –
    f) Boundary (Checkbandi) –
        i. North –
        ii. East –
        iii. West –
        iv. South –
    g) Land Use –
    h) Total Extent of Plot –
        i. As per Document (Sqm / Cents) –
        ii. As per Revenue Records (Sqm / Cents)–
    i) Extent of Karaab land if any –
    j) Extent surrendered for road widening –
        i. As per Document (Sqm / Cents) –
        ii. As per Enjoyment (surveyed using ETS) (Sqm / Cents) –
    k) Net Extent considered –
        i. For Development (as per document) –
        ii. For Development (as per enjoyment) –
        iii. For Development (for Statutory Approval) –
    l) Extent considered for FAR (for Statutory Approval) –
    m) Market value of the plot (as per guideline value published under the Karnataka Stamp Act);

i. Value (in Rs./Sqm) –
ii. Reference No. (as per the published list) –

4. Particulars of Approach Road:

a) No. of Roads abutting the plot (Road 1, Road 2, Road 3, Road 4) –
Note: Roads including lanes from which approaches may not be taken for the plot.

b) No. of Roads from which approach to the plot is considered (from the total no. of roads abutting the plot) –
c) Details of roads abutting the plot –
Road 1 –

i. Road Name and limits –
Note: As specified by MCC and for areas outside MCC limits, as specified in the list published under Section 4B of Karnataka Stamp Act.

ii. Road Code –
Note: As specified by MCC and for areas outside MCC limits, as specified in the list published under Section 4B of Karnataka Stamp Act.

iii. Existing road width (m) –
Note: Average width and minimum width to be mentioned in case of varying width of road.

iv. Proposed road width (m) –
Note: Proposed width as per Master Plan or as proposed by MUDA or as proposed by MCC, to be mentioned.

Note: Similar details have to be provided for all roads abutting the plot.

d) Details of exclusive means of access (as per Clause No.4.2 of the ZR), if applicable –

5. Particulars of Building:

a) No, of Building Blocks –
Note: specify the following details for each block, in case of multiple blocks of buildings

b) Type of Development proposed for Building Licence (New Construction / Reconstruction - Addition – Alteration / Revised Licence:
c) Type of Building (B1, B2, B3, B4, B5) –
d) Use of Building (Residential / commercial / mixed use / other uses) –
e) No. of Floors (Basement + Ground + upper floors) –
Note: Specify no. of basement floors, lower ground floor & upper ground floor and mezzanine floor as applicable

f) Floor wise details of occupancy / use [as per clause 2(21) of BBL]–

iii. Basement Floor –
Note: Separately to be provided in case of more no. of basement floors

iv. Ground Floor –
Note: Separately to be provided in case of Lower Ground Floor & Upper Ground Floor

v. Mezzanine Floor (if applicable in case of Commercial Buildings) –

vi. First Floor –
vii. Second Floor –
viii. Third Floor –
ix. Fourth Floor –
x. Fifth Floor –
Note: Separate Annexure to be provided in case of more no. of floors.

g) For residential apartment buildings only -

Sl. No.	**Floor**	**No. of Apartments**					
		I BHK	**II BHK**	**III BHK**	**IV BHK**	**V BHK**	**Total**
1							
2							
3							
	Total						

h) Height of the Building –
i. Height considered (from road / from average level of the ground contiguous to the building) –
ii. Height of the Building (m) –

i) Plot Coverage –
i. Permitted –
ii. Actual –

j) Summary of Parking Facility (Detailed calculations provided in Table-1) –

Sl. No.	**Particulars**	**Parking provisions**			
		Required	**Provided**		
			Within the Building (Covered Parking)	**In the Yard**	
				Covered	**Open**
1.	4-Wheelers				
2.	4-Wheeler Visitors				
3.	2-Wheelers				
4.	Autorickshaws				

5.	Lorries				
6.	Buses				

k) Summary of Power Supply (Detailed calculations provided in _____):
   i. Total Power required - _____ KVA
   ii. Source (MESCOM / GENERATOR / RENEWABLE ENERGY) –
   iii. Transformer capacity - ____ KVA / Not Applicable
   iv. Diesel Generator capacity - _____ KVA / Not Applicable
   v. Power generated through renewable energy - _____ KVA

l) Summary of Water Supply (Detailed calculations provided in _____):
   i. Source (Open Well / Bore Well / MCC) –
   ii. Total Freshwater requirement - ____ KLD
   iii. Total Treated water requirement - _____ KLD

m) Summary of Water tanks (Detailed calculations provided in _____):

Sl No	**Tank**	**Sump Capacity (Litres)**	**OHT capacity (Litres)**
1	Fire Reserve (including water curtain)		
2	Domestic		
3	Treated water		

n) Staircase details:

Sl. No.	**Staircase Description**	**Staircase Width (m)**	**No. of Steps (nos.)**		**Tread Width (m)**	**Riser Height (m)**	**Head Room Height (m)**	**Handrail Height (m)**
			Flight 1	**Flight 2**				
1.								
2.								

Note: Details of each staircase of the building have to be provided

o) Lift Summary (Detailed calculations provided in _____):

Sl. No.	Lift	Lift Well Size	Speed (MPS)	Capacity (Persons/KG)
1	Passenger Lift 1			
2	Passenger Lift 1			
3	Passenger Lift 1			
4	Service Lift 1			
	Service Lift 1			

6. Details of Professionals on Record (PoR):

    b. For drawings
    c. For supervision
    d. For structural design
    e. For MEP

    Note: Specify any other PoR appointed for the project, as per the Building Byelaws

B. General Documents to be Attached (Common for Building Licence and other NOCs)

1. Copy of the Title document such as Sale Deed, etc.;
2. Copy of the registered document of GPA / authorisation letter, if applicable;
3. Photo and other identity proof of the applicant;
4. RTC or Khata as on date of application;
5. Property Tax paid receipt
6. Joint development Agreement or MOU and affidavit of all the owners of plots amalgamated for approval of plot;
7. Survey sketch issued by Revenue Department for NA conversion or any other purpose;
8. NA Conversion Order;
9. Structural Stability Certificate from the Structural Engineer
10. Google Location showing project boundaries & coordinates
11. Photographs of the site (minimum 4 nos., each from north, south, east and west) showing the natural and built developments within the site and also the abutting roads;
12. Copy of the plot approval obtained
13. Project Costing – Table 3
14. Specification of the Building – Table 4
15. Any other documents specified by the Local Authority or notified by the Government;

C. General Drawings to be Attached(Common for Building Licence and other NOCs)

1. Key Plan
2. Site Plan
    a) As per Document

b) As per enjoyment (surveyed using ETS)
c) As per Drone Survey Map
d) As per Revenue Records
e) Superimposed sketch of all the above site plans and showing the boundaries of the final site plan considered for statutory approval.
f) Final Site Plan considered for statutory approval.

3. All Floor plans for Parking areas and other uses (Basement floors, Ground floors, upper floors and terrace floor)
4. Sections of the Building
5. Elevations of the Building

D. General Checklists to be Attached(Common for Building Licence and other NOCs)

(manual checklist is not required since the checking is done online)

E. General Calculation Sheets to be Attached (for Building licence and other NOCs)

1. Table 1

AREA CALCULATION FORMAT FOR COMMERCIAL / RESIDENTIAL PROJECT													
FLOOR AREA DETAILS IN sqm													
FLOOR	TOTAL CONSTRUCTION AREA	EXEMPTED AREA					COMMERCIAL			RESIDENTIAL			NET FLOOR AREA
		STAIRCASE / LIFT LOBBY	LANDSCAPE	DUCTS/ CUTOUT	PARKING	SUB TOTAL	SHOP AREA	TOILET AREA	TOTAL	FLOOR AREA	CIVIC AMINITES	TOTAL	
TOTAL													
CAR PARKING CALCULATION													
COMMERCIAL PARKING REQUIREMENTS													
SHOPS AREA FOR PARKING CALCULATION									=			SQM	
CARPARK REQUIREMENT FOR SHOP AREA (1 NO. FOR 50 SQM OF AREA)									=			NOS. (SAY --- NOS)	
25% OF TWO WHEELER PARKING REQUIRED									=			NOS.(SAY -- NOS)	

SL. NO.	AREA OF APARTMENT	NO. OF APARTMENT	MULTIPLY FACTOR AS PER Z.R.	CAR PARKING REQUIRED AS PER Z.R.
1	<75		0.5	
2	75 TO 175		1	
3	175>		2	
TOTAL				

10 % VISITORS PARKING FOR RESIDENTIAL APARTMENTS	
TOTAL PARKING REQUIRED	
25% TWO WHEELER PARKING REQUIRED	
TOTAL No.OF PARKING REQUIRED FOR RESIDENTIAL & COMMERCIAL	
TOTAL No.OF PARKING PROVIDED	
TOTAL No.2 WHEELER REQUIRED FOR RESIDENTIAL & COMMERCIAL	
TOTAL No.OF 2 WHEELER PROVIDED	

3. Table 3

PROJECT COST

APPROXIMATE COST OF CONSTRUCTION OF THE

PROPOSED RESIDENTIAL BUILDING "-----' ON LAND SY.NO. --- AT ---- VILLAGE NO----,

MANGALURU TALUK, D.K. DIST.

Total Construction area - m²

Cost of Building

Ground Floor Construction area - m^2

Cost @ Rs. -----/ m^2 = Rs.

Upper Floors Construction area - m^2

Cost @ Rs. ----/ m^2 = Rs.

Total cost of building = Rs

ROUNDED OFF TO Rs. ----------ONLY

LAND COST PER CENT = --------PER CENT (S.L NO----- OF SUB REGISTRAR BOOK, MANGALURU CITY/ THALUK - 2018-19)

LAND COST FOR --- CENTS = Rs.

ROUNDED OFF TO Rs. ---------- ONLY

TOTAL PROJECT COST = Rs. -

ROUNDED OFF TO Rs. ---------- ONLY

4. Table 4

SPECIFICATIONS OF COMPONENTS OF BUILDING

The minimum specifications of the various components in different types of buildings shall be specified along with the application for building licence, selected from the list mentioned herebelow or specified separately.

Sl. No.	**Component of Building**	**Standard Specifications**	**Specification for the building**
1.	Foundation	Masonry / RCC / Others	
2.	Load bearing superstructure	Fully RCC / Fully Masonry / RCC columns and Masonry infill / others	
	Roof	Tiles / RCC / Others	
	Main Door Frame	Teak wood / Jungle wood / Aluminum / UPVC / Steel / Concrete / Others	
	Inside Door Frame		
	Toilet Door Frame		
	Main Door Shutter		
	Inside Door Shutter		
	Toilet Door Shutter		
	Window Frame		
	Window Shutter		
	Flooring for common areas*		
	Flooring for specific premises*		
	Flooring for common toilets *		
	Flooring for toilets in specific areas*		
	Wall cladding for common toilets*		
	Wall cladding for toilets in specific premises*		
	Wall cladding for kitchen		
	Wall cladding for other areas (specify areas) *		
	Plumbing Fittings for common toilets*		
	Sanitary fittings for common toilets*		
	Plumbing Fittings for toilets in specific areas*		
	Sanitary fittings for toilets in specific areas*		
	Ceiling painting in Car Parking areas		
	Ceiling painting in Common areas		
	Ceiling painting in Specific areas		
	wall painting in Car Parking areas		

	wall painting in Common areas		
	wall painting in Specific areas		
	Yard Pavement works		
	Lift		
	Transformer		
	Generator		
	Water Source		
	Sewerage System		
	Fire Fighting System	Not Applicable / Applicable (if applicable, details of NOC)	
	Green cover and tree plantation	Not Applicable / Applicable (if applicable, details to be annexed)	
	Rain water harvesting system	Not Applicable / Applicable (if applicable, details to be annexed)	
	Low water consumption plumbing fixtures	Not Applicable / Applicable (if applicable, details to be annexed)	
	Waste water treatment and reuse	Not Applicable / Applicable (if applicable, details to be annexed)	
	Reduction of Hardscape	Not Applicable / Applicable (if applicable, details to be annexed)	
	Solar water heating system	Provided (if provided, details to the annexed) / Not provided (if not provided, details of alternate hot water system provided and the details of additional PV panels provided have to be specified and annexed)	
	Solar Photovoltaic panels	Not Applicable / Applicable (if applicable, details to be annexed)	
	Low energy consumption electrical fixtures		
	Energy efficiency in HVAC systems		
	Lighting of common areas by LED devices		
	Organic waste management		
	Compliance with ECBC norms		
	Construction & demolition waste management		
	Additional Specifications**	Specification has to be specified for the respective component	

Note:

1. In case of 'others', the specification has to be clearly mentioned.

2. If any of the items are not provided by the Promoter / Owner and the same has to be done by the purchaser as per his choice, then it has to be mentioned specifically as 'Purchaser Supply'.

3. In case of ceramic or vitrified or any other tiles used for flooring and dadoing, the minimum size of the tiles have to be mentioned.

4. '*' if specifications are different for different areas of the Premises or Common areas of the building, details have to be specified separately.

5. '**' in case of additional specifications for Common areas of the building or Premises, details have to be specified separately.

6. If any changes have to be made in the specifications, the same has to be informed to the Local Authority and RERA, before executing such changes and after fulfilling the conditions of RERA.

Specifications of the Building

1. Super Structure of the Building
   a) Foundation * (Masonry / RCC / Others)
   b) Load bearing superstructure * (Fully RCC / Fully Masonry / RCC columns and Masonry infill / others)
   c) Roof * (Tiles / RCC / Others)
   d) Finishing of external surface * (Plastered surface / Granite or Tile cladding / Texture finish / Glass / ACP or combination of any of the above) – In case of combination, specify the respective combinations
2. Internal Finishes of the Building
   a) For Common Areas
      i. Main area Flooring * (Cement Mortar / Cement tiles with polishing / Ceramic tiles / Vitrified tiles / Marble / Granite / Others)
      ii. Toilet Flooring * (Cement Mortar / Cement tiles with polishing / Ceramic tiles / Vitrified tiles / Marble / Granite / Others)
      iii. Electrical switches (Type of switches – preferred brand name may be mentioned)
      iv. Electrical fixtures (lights / fans / exhaust fans / other fixtures)
      v. Plumbing fixtures (Type of fixtures – preferred brand name may be mentioned)
      vi. Sanitary fixtures (Type of fixtures – preferred brand name may be mentioned)
      vii. Painting (type of painting for ceiling and walls) / Purchaser's Scope
      viii. Painting (type of painting for ceiling and walls) / Purchaser's Scope
      ix. Railing for passages * (Glass / S.S / S.S & Glass / Wooden / Aluminium / M.S / Other)
      x. Railing for staircase * (Glass / S.S / S.S & Glass / Wooden / Aluminium / M.S / Other)
   b) For Premises
      i. Entrance Door Frame (Teak wood / Jungle wood / Aluminum / UPVC / Steel / Concrete / Others / Purchaser's Scope)
      ii. Entrance Door Shutter (Teak wood / Jungle wood / Aluminum / UPVC / Steel / Concrete / Glass / Others / Purchaser's Scope)
      iii. Internal Door Frame (including door to balcony) * (Teak wood / Jungle wood / Aluminum / UPVC / Steel / Concrete / Others / Purchaser's Scope)
      iv. Internal Door Shutter (including door to balcony) * (Teak wood / Jungle wood / Aluminum / UPVC / Steel / Concrete / Glass / Others / Purchaser's Scope)
      v. Toilet Door Frame * (Teak wood / Jungle wood / Aluminum / UPVC / Steel / Concrete / Others / Purchaser's Scope)
      vi. Internal Door Shutter * (Teak wood / Jungle wood / Aluminum / UPVC / Steel / Concrete / Glass / Others / Purchaser's Scope)
      vii. Main area Flooring * (Cement Mortar / Cement tiles with polishing / Ceramic tiles / Vitrified tiles / Marble / Granite / Others / Purchaser's Scope)
      viii. Balcony Flooring * (Cement Mortar / Cement tiles with polishing / Ceramic tiles / Vitrified tiles / Marble / Granite / Others / Purchaser's Scope)
      ix. Toilet Flooring * (Cement Mortar / Cement tiles with polishing / Ceramic tiles / Vitrified tiles / Marble / Granite / Others / Purchaser's Scope)
      x. Electrical switches (Type of switches – preferred brand name may be mentioned) / Purchaser's Scope
      xi. Electrical fixtures (lights / fans / exhaust fans / other fixtures) / Purchaser's Scope

xii. Plumbing fixtures (Type of fixtures – preferred brand name may be mentioned) / Purchaser's Scope
xiii. Sanitary fixtures (Type of fixtures – preferred brand name may be mentioned) / Purchaser's Scope
xiv. Railing for balconies * (Glass / S.S / S.S & Glass / Wooden / Aluminium / M.S / Other)
xv. Painting (type of painting for ceiling and walls) / Purchaser's Scope
xvi. Kitchen platform (Granite / Kadaba / others / Purchaser's Scope)
xvii. Kitchen Sink (S.S / Granite / Others / Purchaser's Scope)
xviii.

3. For vertical circulation
   a) Elevators (specify the nos. and capacity of each passenger elevator and service elevator)
   b) Escalators / Travellators (specify the nos. and the connecting floors)
4. Hot water system (Solar / Solar with Heat Pump / Heat Pump) – mention the capacity of solar hot water panels / Heat pump
5. Hot water tank capacity
6. Water pumps (Gravity flow pumps / Hydro pneumatic pumps)
7. Water reducing plumbing fixtures
8. Sewerage System and disposal arrangement
   i. Sewer disposal system (City level UGD / Septic Tank / STP / STP and
   ii. Dual pipeline system for flushing / gardening / cooling towers (in case of STP)
9. Provisions for Alternate Energy usage
   i. Solar PV Panels (5% of the estimated / consumed power load)
10. Rainwater harvesting system
    i. For consumption of rainwater
    ii. For Ground water recharging
11. Firefighting system
    i. Automatic Sprinklers
12. Green building provisions
    a) Total extent of Open Spaces (other than the coverage area)
    b) Total extent of Green Cover / Landscape area (20% of the Open Space)
    c) Total no. of trees planted (@ 1 tree for every 80 Sqm of the net extent of plot, after deducting the portion surrendered for road widening)
13. Other Amenities / Facilities
    a) Gym
    b) Swimming Pool
    c) Shuttle Badminton Court (indoor / outdoor)
    d) Tennis Court
    e) Basket Ball Court
    f) Squash Court
    g) Table Tennis (indoor)
    h) Other Club house facilities (Board games room / Coffee shop / Saloon / Massage parlour / Spa / Creche / Medical centre)
    i) Children's play area with equipment
    j) Senior Citizen's Park with equipment
    k) Video Door Phone (with / without Intercom facility)
    l) Electric fixtures of lights and fans in the premises
    m) Cable TV / DTH
    n) Reticulated / City Gas connection to kitchen
    o) Centralised RO plant
    p) Telephone connection

FORM-II

(see clause 3.10.2, 3.17.2)

DETAILS TO BE CONTAINED AND TO BE ATTACHED TO THE APPLICATION FOR NOCS FROM DIFFERENT DEPARTMENTS (as specified by the concerned department)**, IN ADDITION TO THE DETAILS REQUIRED FOR BUILDING LICENCE IN FORM-I (COMMON APPLICATION FORM)**

IIa. **From Department of Fire and Emergency Services**

(wherever required and as specified by the department)

IIb. **From Environment Monitoring Cell** (see clause 15.1.2)

(till the time of approval of the Byelaws by the GOI and permission is granted to obtain EC from the Environment Monitoring Cell of the Authority, EC has to be obtained from MoEF&CC and CFE & CFO from KSPCB)

(wherever required and as specified by the department)

IIc. From Airport Authority of India

(in cases where it is required as specified in the ZR and as specified by the department)

IId. From Coastal Regulation Zone Authority

(wherever required and as specified by the department)

IIe. From Indian Railways

(wherever required and as specified by the department)

IIf. From Heritage conservation committee

(as specified by the government)

IIg. From National Monuments Authority

(as specified by the government)

IIh. From Urban Arts Commission

(as specified by the government)

After completion of the works at site as per the conditions of NOC, the applicant shall apply for clearance certificate / certificate of approval of works from the departments which have issued NOCs, in Form II by filling the relevant portions of the Form (only in cases where a condition for obtaining such clearance certificate / certificate of approval of works, is mentioned in the NOC).

FORM-III

(see clause 3.10.3)

DETAILS TO BE CONTAINED IN THE ENDORSEMENT ISSUED BY THE LOCAL AUTHORITY TO THE APPLICANT REGARDING DISCREPANCY IN THE DOCUMENTS SUBMITTED

1. Name and address of the Applicant;
2. Details of the application for building licence;
3. Document having discrepancy;
4. Details of discrepancy; and
5. Details of rectification proposed, if any

FORM-IV

(see clause 3.10.4(2))

DETAILS TO BE CONTAINED IN THE ENDORSEMENT ISSUED BY THE LOCAL AUTHORITY TO THE APPLICANT REGARDING DISCREPANCY IN THE PLANS AND DETAILS SUBMITTED FOR SANCTION OF BUILDING LICENCE

1. Name and address of the Applicant;
2. Details of the application for building licence;
3. Drawings having discrepancy (specify for each drawing separately);
4. Details of discrepancy in drawings (specify for each drawing separately);
5. Details of discrepancy in the conditions for obtaining NOCs from other departments; and
6. Details of rectification proposed, if any;

FORM-V

(see clause 3.10.6(1))

DETAILS TO BE CONTAINED IN THE INTIMATION LETTER OF THE LOCAL AUTHORITY TO LICENSED PROFESSIONAL FOR SITE INSPECTION AND SUBMISSION OF SITE INSPECTION REPORT FOR APPROVAL OF SITE PLAN

1. Name and address of the Applicant;
2. Details of the application for building licence;
3. Name and address of the Professional on record for preparing drawing;
4. Details of the building site in which building licence is applied for;
5. Copies of the relevant documents;
6. Details of the site plan and other technical drawings & details submitted;

FORM-VI

(see clause 3.10.6 (2))

DETAILS TO BE CONTAINED IN THE SITE INSPECTION REPORT

1. Name and the address of the Applicant;

2. Name and the address of the professional on record for drawings;

3. Name and the address of the licensed professional or designated officer;

4. Particulars of the Plot;
5. Date of inspection;
6. Noting of site inspection;
7. Acknowledgement of applicant and professional on record

8. Date of submission of report;

FORM-VII

(see clause 3.10.7)

DETAILS TO BE CONTAINED IN THE ENDORSEMENT ISSUED BY THE LOCAL AUTHORITY TO THE APPLICANT REGARDING DISCREPANCY IN THE SITE INSPECTION REPORT

1. Name and address of the Applicant;
2. Details of the application for building licence;
3. Name and address of the Professional on record for preparing drawing;
4. Name and address of the licensed professional who has submitted the inspection report;
5. Drawings having discrepancy (specify for each drawing separately);
6. Details of discrepancy in drawings (specify for each drawing separately);
7. Details of rectification proposed, if any;

FORM-VIII

(see clause 3.15.1, 15.1.1)

DETAILS TO BE CONTAINED IN THE BUILDING LICENCE

1. Name and address of Local Authority with logo

2. Type of building licence

3. Building licence no. and date

4. . Plot approval details

5. Particulars of Plot

6. Name and address of Applicant

7. Name and address of Professionals on record for drawings

8. . Name and address of Professionals on record for supervision

9. Particulars of the building (floor area, construction area, parking details, etc.,)

10. . NOCs received

11. Various fees paid

12. Licence validity period

13. Other Terms and conditions of licence

14. Seal and signature of Commissioner

FORM-VIIIA

(see clause 3.16.4(3))

DETAILS TO BE CONTAINED IN THE COMMENCEMENT CERTIFICATE

1. Name and address of Local Authority with logo
2. Type of building licence
3. Building licence no. and date
4. Name and address of Applicant
5. Name and address of Professionals on record for drawings
6. . Name and address of Professionals on record for supervision
7. Particulars of the building (floor area, construction area, parking details, etc.,)
8. . Reference of Site Inspection Report of licensed Professional
9. Initial Validity period of Licence
10. Other Terms and conditions of licence
11. Seal and signature of Commissioner

FORM-IX

(see clause 3.16.5 (1))

DETAILS TO BE DISPLAYED OUTSIDE THE CONSTRUCTION SITE.

1. Name and address of the Applicant;
2. Details of the building licence (extent of site, existing and proposed width of roads abutting the road and name of roads as per the records of the Authority, no. of building blocks and for each block – no. of floors, all-round setbacks, no. of basement floors, total floor area eligible and proposed – permissible, premium and TDR, no. of 4-wheeler and 2-wheeler parking required and provided, including visitors parking – within the building and outside the building, both covered and open)
3. Details of Professionals on Record to prepare the drawings;
4. Details of Professionals on Record to supervise the works;
5. Site plan
6. 3D view of the building (if proposed in any advertisement of the promoter)

FORM-X

(see clause 3.16.7(3&4), 3.16.9(1), 3.17.2(10&11))

DETAILS TO BE CONTAINED IN THE SITE INSPECTION REPORT OF LICENSED PROFESSIONAL, STATING THE DEFECTS / DEVIATIONS IN WORKS EXECUTED AT SITE.

1. Name and address of the Applicant.
2. Name and address of the professional on record for supervision

3. Name and address of contractor executing work
4. Name and address of licensed professional
5. Name and address of the Authority
6. Particulars of the Plot
7. Noting of site inspection (stating the defects / deviations in works executed, from the approved plans, specifying the related drawing)
8. Acknowledgement of applicant and professional on record
9. Date of inspection
10. Date of submission of report

FORM-XI

(see clause 3.16.7(5))

DETAILS TO BE CONTAINED IN THE ENDORSEMENT ISSUED BY THE LOCAL AUTHORITY TO THE APPLICANT TO RECTIFY THE DEFECTS IN WORKS EXECUTED.

1. Name and address of the Applicant;
2. Details of the application for building licence;
3. Name and address of the Professional on record for supervision;
4. Name and address of the licensed professional who has submitted the inspection report;
5. Works having defects / deviations from approved drawings (specify for each drawing separately);
6. Details of discrepancy in works executed (specify for each drawing separately);
7. Details of rectification proposed, if any;

FORM-XII

(see clause 3.16.7(9&11), 3.17.2(8), 3.17.2(10))

DETAILS TO BE CONTAINED IN INSPECTION REPORT OF COMMISSIONER REGARDING OBJECTIONS RAISED BY THE APPLICANT AGAINST THE INSPECTION REPORT OF LICENSED PROFESSIONAL OR DEPARTMENT ISSUING NOCs.

1. Name and address of the Applicant.
2. Name and address of the professional on record for supervision
3. Name and address of contractor executing work
4. Name and address of licensed professional
5. Name and address of the Authority
6. Name and address of the Department which issued NOC (if objection is raised against such department)
7. Particulars of the Plot
8. Noting of site inspection (stating the changes to be made by the applicant in works executed, if applicable, or certifying the works executed)
9. Acknowledgement of applicant, professional on record and designated officer of the department (if applicable)

10. Date of inspection
11. Date of submission of report

FORM-XIII

(see clause 3.17.1(1), 3.18)

DETAILS TO BE CONTAINED IN COMPLETION REPORT SUBMITTED BY THE LICENSED PROFESSIONAL, SUPERVISING THE WORKS.

1. Name and address of Local Authority with logo
2. Type of building licence issued
3. Building licence no. and date
4. Plot approval details
5. Particulars of Plot
6. Name and address of Applicant
7. Name and address of Professionals on record for drawings
8. Name and address of Professionals on record for supervision
9. Particulars of the building (floor area, construction area, parking details, etc.,) as built in site
10. Details of certification by licensed professional
11. Signature of Professional on record for supervision

FORM-XIV

(see clause 3.18)

DETAILS TO BE CONTAINED IN THE OCCUPATION CERTIFICATE.

1. Name and address of Local Authority with logo
2. Type of building licence issued
3. Building licence no. and date
4. Plot approval details
5. Particulars of Plot
6. Name and address of Applicant
7. Name and address of Professionals on record for drawings
8. Name and address of Professionals on record for supervision
9. Particulars of the building (floor area, construction area, parking details, etc.,)

10. Approvals received from other departments which issued NOCs
11. Details of completion certificate
12. Details of certification by licensed professional
13. Other Terms and conditions of occupation
14. Date and no. of occupation certificate
15. Seal and signature of Commissioner

FORM-XV

(see clause 3.17.1(1), 7.1.6)

DETAILS TO BE CONTAINED IN THE CERTIFICATE OF STRUCTURAL SAFETY IN DESIGN (to be provided by LICENSED STRUCTURAL ENGINEER)

1. Name and the address of the Applicant;
2. Particulars of the Plot;
3. Building license sanctioned date;
4. A statement, certifying that the structure of the building has been designed as per the relevant standards satisfying the soil investigation report submitted by Licensed Professional and for the loads expected on the building and that the building will be structurally safe if constructed accordingly.

FORM-XV A

(see clause 7.1.7.2)

DETAILS TO BE CONTAINED IN THE CERTIFICATE OF STRUCTURAL SAFETY IN CONSTRUCTION (to be provided by Licensed Professional)

1. Name and the address of the Applicant;
2. Particulars of the Building site;
3. Building license sanctioned date;
4. A statement, certifying that the building is structurally safe and the construction is in accordance with the specified designs and drawings provided by SER

FORM-XVI

(see clause 7.1.8.2)

DETAILS TO BE CONTAINED IN THE CERTIFICATE OF QUALITY CONTROL

1. Name and the address of the Applicant;
2. Particulars of the Plot;
3. Building licence sanctioned date;

4. Date of inspection;
5. Details of materials and other specifications inspected
6. written statement submitted by Building Quality Auditor (BQA) affirming that the building meets the standard specification

FORM-XVII

(see Appendix IB)

FORMAT OF THE AFFIDAVIT / UNDERTAKING BY STAKEHOLDERS

AFFIDAVIT

(from Promoter)

We, M/s. _____, being represented by its _____ **Mr.** _____, S/o. _____aged _____ years, R/o. _____,[Aadhar No._____], being registered as Promoter of the building/s under the regulations of building byelaws of Mangaluru City Corporation (MCC), do hereby submit an undertaking Affidavit in favour of the Commissioner, Mangaluru City Corporation (MCC) that;

1. We have applied for Building licence for the proposed construction of _____ consisting of _____comprised in _____ situated at _____, Mangaluru and MCC, vide application No._____.

2. We hereby declare and confirm that, we have studied the Building Byelaws, Zoning Regulations of Master Plan and all other applicable laws related to the development of land and building.

3. We hereby authorise the Commissioner, MCC to enforce the terms and conditions of Building byelaws for issuing the Building Licence and for the sanction of building plans. In case of any violations of the terms and conditions of the sanctioned plan granted/permitted to us vide Building Licence No. _____ dated _____, to initiate demolition proceedings in respect of the violated / deviated portion without any intimation and if any such action is initiated by the commissioner, MCC for the violations committed by us, we have no objection of whatsoever nature.

4. We hereby undertake to indemnify and keep harmless at all the time, MCC and its Commissioner / officers / employees against any litigation arising in future regarding the noncompliance of requirements under the provisions of the Building byelaws, Zoning Regulations of Master Plan and all other Acts, Rules and Regulations for the construction of the proposed buildings, as applicable and all other conditions laid down while granting development permission and also towards the cost that will be incurred for the same by MCC or its representatives.

5. We hereby further declare and confirm that in case the above information provided by us not to be true, we shall be held personally responsible and be liable for punishment under the provisions of applicable Acts.

All the above is true.

DEPONENT

Solemnly affirmed and signed before me on this _____day of September 2023 at _____

AFFIDAVIT

(From Professionals)

I, **Mr.** _____, S/o. _____aged _____ years, R/o. _____,[Aadhar No._____], being registered as *Architect / Consulting Engineer* under the regulations of building byelaws of Mangaluru City Corporation (MCC), do hereby submit an undertaking Affidavit in favour of the Commissioner, Mangaluru City Corporation (MCC) that;

1. I have been appointed as an Architect / a Consulting Engineer for the proposed construction of the building on R.S._____ at, _____Village of Mangaluru City Corporation and the Owner has applied for Building licence for the proposed construction of _____ consisting of _____comprised in _____ situated at _____, Mangaluru and MCC, vide application No._____.

2. We hereby declare and confirm that, we have studied the Building Byelaws, Zoning Regulations of Master Plan and all other applicable laws related to the development of land and building.

3. We hereby authorise the Commissioner, MCC to enforce the terms and conditions of Building byelaws for issuing the Building Licence and for the sanction of building plans. In case of any violations of the terms and conditions of the sanctioned plan granted/permitted to us vide Building Licence No. _____ dated _____, to initiate demolition proceedings in respect of the violated / deviated portion without any intimation and if any such action is initiated by the commissioner, MCC for the violations committed by us, we have no objection of whatsoever nature.

4. We hereby undertake to indemnify and keep harmless at all the time, MCC and its Commissioner / officers / employees against any litigation arising in future regarding the noncompliance of requirements under the provisions of the Building byelaws, Zoning Regulations of Master Plan and all other Acts, Rules and Regulations for the construction of the proposed buildings, as applicable and all other conditions laid down while granting development permission and also towards the cost that will be incurred for the same by MCC or its representatives.

5. We hereby further declare and confirm that in case the above information provided by us not to be true, we shall be held personally responsible and be liable for punishment under the provisions of applicable Acts.

All the above is true.

DEPONENT

Solemnly affirmed and signed before me on this _____day of September 2023 at _____

FORM-XVIII

DETAILS TO BE CONTAINED IN THE APPLICATION FOR REGISTRATION OF PROFESSIONAL (PoR for Drawing & Supervision and licensed Professional

(as specified by the Authority)

FORM-XIX

FORMAT OF AGREEMENT BETWEEN OWNER / PROMOTER AND PROFESSIONAL ON RECORD (for Drawing & Supervision)

(as specified by the Authority)

FORM-XX

FORMAT OF LETTER OF CONSENT FROM PROFESSIONAL ON RECORD (for Drawing & Supervision)

(as specified by the Authority)

FORM - XXI

SPECIFICATIONS OF COMPONENTS OF BUILDING

The minimum specifications of the various components in different types of buildings shall be specified along with the application for building licence, selected from the list mentioned herebelow or specified separately.

Sl. No.	Component of Building	Standard Specifications	Specification for the building
1.	Foundation	Masonry / RCC / Others	
2.	Superstructure	Fully RCC / Fully Masonry / RCC columns and Masonry infill / others	
3.	Roof	Tiles / RCC / Others	
4.	Main Door Frame	Teak wood / Jungle wood / Aluminium / UPVC / Steel / Concrete / Others	
5.	Inside Door Frame		
6.	Toilet Door Frame		
7.	Main Door Shutter		
8.	Inside Door Shutter		
9.	Toilet Door Shutter		
10.	Window Frame		
11.	Window Shutter		
12.	Flooring for common areas*		
13.	Flooring for specific premises*		
14.	Flooring for common toilets *		

15.	Flooring for toilets in specific areas*		
16.	Wall cladding for common toilets*		
17.	Wall cladding for toilets in specific premises*		
18.	Wall cladding for kitchen		
19.	Wall cladding for other areas (specify areas) *		
	Plumbing Fittings for common toilets*		
	Sanitary fittings for common toilets*		
	Plumbing Fittings for toilets in specific areas*		
	Sanitary fittings for toilets in specific areas*		
	Ceiling painting in Car Parking areas		
	Ceiling painting in Common areas		
	Ceiling painting in Specific areas		
	wall painting in Car Parking areas		
	wall painting in Common areas		
	wall painting in Specific areas		
	Yard Pavement works		
	Lift		
	Transformer	Not Applicable / Applicable (if applicable, details to be annexed)	
	Generator	Not Applicable / Applicable (if applicable, details to be annexed)	
	Water Source		
	Sewerage System		
	Fire Fighting System	Not Applicable / Applicable (if applicable, details of NOC)	
	Green cover and tree plantation	Not Applicable / Applicable (if applicable, details to be annexed)	
	Rainwater harvesting system	Not Applicable / Applicable (if applicable, details to be annexed)	
	Low water consumption plumbing fixtures	Not Applicable / Applicable (if applicable, details to be annexed)	
	Wastewater treatment and reuse	Not Applicable / Applicable (if applicable, details to be annexed)	
	Reduction of Hardscape	Not Applicable / Applicable (if applicable, details to be annexed)	
	Solar water heating system	Provided (if provided, details to the annexed / Not provided (if not provided, details of alternate hot water system provided and the details of additional PV panels provided have to be specified and annexed)	

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	Solar Photovoltaic panels	Not Applicable / Applicable (if applicable, details to be annexed)	
	Low energy consumption electrical fixtures	Not Applicable / Applicable (if applicable, details to be annexed)	
	Energy efficiency in HVAC systems	Not Applicable / Applicable (if applicable, details to be annexed)	
	Lighting of common areas by LED devices	Not Applicable / Applicable (if applicable, details to be annexed)	
	Solid waste management	Not Applicable / Applicable (if applicable, details to be annexed)	
	Compliance with ECBC norms	Not Applicable / Applicable (if applicable, details to be annexed)	
	Construction & demolition waste management	Not Applicable / Applicable (if applicable, details to be annexed)	
	Additional Specifications**	Specification has to be specified for the respective component	

Note: 1. In case of 'others', the specification has to be clearly mentioned.

2. '*' if specifications are different for different areas of the building, details have to be specified separately.

3. '**' in case of additional specifications for common areas of the building or specific premises, details have to be specified separately.

(Ravichandra Naik, K.A.S)

Commissioner

Mangaluru City Corporation

ಮುದ್ರಕರು ಹಾಗೂ ಪ್ರಕಾಶಕರು : ಸಂಕಲನಾಧಿಕಾರಿಗಳು, ಕರ್ನಾಟಕ ರಾಜ್ಯಪತ್ರ, ಸರ್ಕಾರಿ ವಿಭಾಗೀಯ ಮುದ್ರಣಾಲಯ, ಮೈಸೂರು.

VIJAY NELAMANGALA MUNIDALAPPA