STATE ENVIRONMENTAL APPRAISAL COMMITTEE, GOA

DISASTER MANAGEMENT PLAN
FOR
"PROPOSED COMMERCIAL COMPLEX"

at

PLOT NO. 35 , EDC PLOT ESTATE, PATTO PLAZA
PANJIM TOWN, TISWADI, NORTH GOA (GOA)

SUBMITTED BY

M/S DLF LIMITED

Landscape Excelsior,
Opposite to Kala Academy
DB Road
Panjim, Goa

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1 INTRODUCTION

1.1 BACKGROUND

M/s. DLF Ltd desires to set up Commercial Complex Development on Plot No. 35, EDC Plot Estate, Patto Plaza, Tiswadi Taluka, North District, Goa state. The proposed development comprises of Shops, Offices, Foodcourt and Multiplex.

Occupancy of the development will be 9907 persons who will not be familiar with the plans of the site. Hence, it becomes important that an Emergency Response Plan is prepared that allows the occupants to easily identify measures to be taken in case of possible disasters that may occur at site.

Hence, the project proponent approached M/s. Aditya Environmental Services Pvt. Ltd., Mumbai, a NABET accredited Environmental Consultancy to prepare a Disaster Management Plan.

1.2 OBJECTIVES

The overall objective of a disaster management plan is to make use of the combined resources created or available at the site and/or off-site services to achieve the following:

- To minimize the effects the accident on people and property;
- Effect the rescue and medical treatment of casualties;
- Safeguard other people, outside the project boundary
- Evacuate people to safe areas with utmost care and with minimum casualties;
- Inform and collaborate with statutory local and state authorities;
- Initially contain and ultimately bring the incident under control;
- Preserve relevant records and equipment for the subsequent enquiry into the cause and circumstances of the emergency;
- Investigate and take steps to prevent recurrence of similar incidents

2 SITE DESCRIPTION

2.1 Nature and Size of the Project

DLF Ltd are proposing to construct a Commercial Complex on Plot No 35 at EDC Patto Plaza Panjim, Goa.

The total plot area of the proposed development is 18,120.00 sq.m. The total built-up area is approximately 74,411.00 sq.m

The proposed project will comprise of Shops, Offices, Foodcourt and Multiplex. It will also have facility for parking. Extensive landscaping is also proposed.

The project will also involve internal development of basic infrastructure such as internal roads, power supply, water supply, sewer and storm water pipe network, waste management system and fire fighting system.

2.2 Project Site Location

Project site is located at Plot 35 of EDC Patto Plaza of Tiswadi Taluka, North Goa District of Goa at longitude of 73° 49'54. 85" E and latitude of 15° 29'38.11" N.

The plot for the proposed development falls under Commercial Zone as per the Regional Plan of Goa.

The site is in close proximity of the Mandovi river and the creek from the river flows along the south west side of the side. The plot lies on the landward side of the existing road. A few existing authorized structures are also located adjacent to the plot on the landward side of the river. The CRZ regulations hence do not become applicable to the site.

The area is presently developing and falls under urban development with many upcoming public and commercial building constructions in vicinity.

A core zone of 500m around the site has been considered as the core zone for studying the immediate surrounds of the site. It was observed that the site at present has a dense

undergrowth. The study area includes a buffer zone of 10sq.km. around the central co-ordinate of 73°52'25.44"E E and latitude of 15°29'56.96"N.

The photographs for site surrounding features are shown in **Figure 2.4**:

Figure 2.1 Location of Project Site on Google Image

2.3 SITE CONNECTIVITY

The site is located at the centre of Panaji city at the commercial area of Patto Plaza which houses administrative and public buildings.

The surrounding area is well urbanized.

Dabolim Airport at distance of 29 km and Karmali Railway station at 15 km.

2.4 PROJECT SITE AND SITE SURROUNDING PHOTOGRAPHS

The photographs for site surrounding features are shown in the figure below.

Figure 2.2 Photographs - Site and Surrounding Features

2.5 ENVIRONMENTAL CHARACTERISTICS

2.5.1 Climate

The climate in Goa is coastal tropical in nature - the diurnal range of temperature during the day is not large. Climate is overall warm and humid and the temperature varies from 22^0 to 32^0. May is the hottest month where the mean daily temperature increases to 33˚C. January is the coolest with a mean daily temperature of about 20˚C.

The summer season is typically from late April through early June while December to February is the winter period. The average temperature varies from a minimum of 20^0C to maximum 26^0C.

The rainfall is between June and early September. Due to south west monsoons, there are few showers in November also. Due to proximity to the Arabian Sea, humidity throughout the year is more than 60% with it ranging from 80 to 90% during the monsoon period.

2.5.2 Physiography & Geology

Physiography of the Site

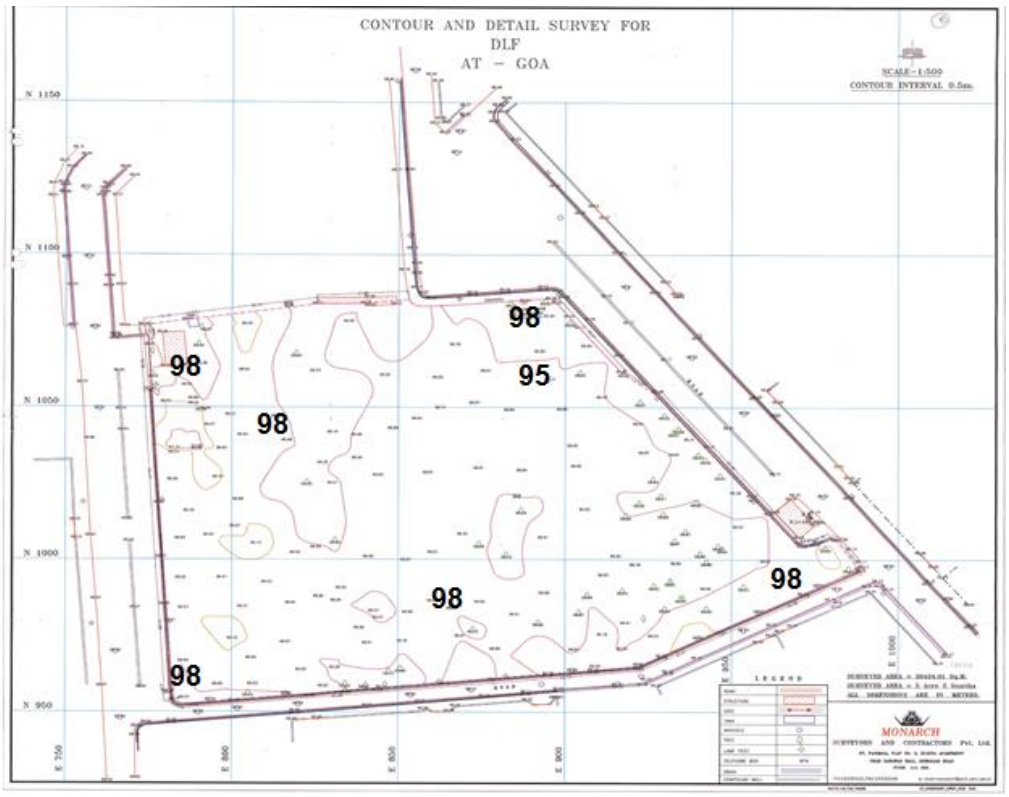

Figure 2.3 Contour Map of the site

The contour map for the site reveals an overall flat terrain of the site. The maximum and minimum contours show a difference of only 3 m. The Highest and Lowest contours are as follows:

Highest contour -98M

Lowest contour -95M

Geomorphology

Geotechnical Investigations for the site reveal the following profile:

Layer I : Fill Material

Mostly comprising silty sand, gravel, boulders etc – typically medium dense – thickness varied from 2.5 to 3.0m

Layer II : Marine Deposits (Sand and Clay)

Consists of alternate layers of Black and brown marine clay and Brown silty sand. Lower depth range from 18.5m to 26.0m below GL

Layer III : Granite Bedrock

Black granite bedrock encountered at depths between 21 m to 26m below GL, also at shallower depths approx. 19.0m at some places

Ground Water Level

2.5 to 3.9m below GL

3 RISK ASSESSMENT & VULNERABILITY ANALYSIS OF POSSIBLE DISASTERS

3.1 DEFINITIONS

Hazards

Dangerous conditions or events that threaten or have the potential for causing injury to life or damage to property or the environment is called **hazard**. Hazards can be categorized in various ways, but based on the origin, they worldwide are basically grouped in two broad headings:-

1. Natural Hazards (hazards with meteorological, geological or even biological origin) e.g. Earthquake, Tsunamis, Storms, Lightning strikes etc.

2. Manmade Hazards (hazards with human-caused or technological origin)

   e.g. Fire & Explosions, Drowning, Sabotage etc.

Vulnerability

Vulnerability may be defined as the probability of exposure of a village, city or a community to a hazard. A society or project may be vulnerable to various hazards to different extents depending upon various reasons including environmental, geographical, social, economic etc.

Disaster

A disaster occurs when a hazard such as earthquake, flood or windstorm coincides with a vulnerable situation. It is hence the product of are two main components: Hazard and Vulnerability. A disaster seriously disrupts the normal functioning of a society, causing widespread human, material, economic or environmental losses that exceed the society's capability to cope without external relief.

The Indian subcontinent is highly vulnerable to floods, cyclones, droughts, earthquakes, tsunamis, etc. Twenty five states in the country are disaster prone.

3.2 LIKELY HAZARDS

On the basis of project details and plans, site contours and geographical and environmental setting of the site, the following Hazards have been identified which may possibly lead to disaster.

3.2.1 Earthquakes

There are five seismic zones in India named as I to V as details given below: Zone V: This is the most severe seismic zone and is referred here as Very High Damage Risk Zone. Zone IV: This, zone is second in severity to zone V. This is referred here as High Damage Risk Zone. Zone III: This is termed here as Moderate Damage Risk Zone. Zone II: This zone is referred to as Low Damage Risk Zone. Zone I: Here the maximum intensity is estimated as MM V or less. This zone is termed here as Very Low Damage Risk Zone. The project site falls in Zone III i.e moderate seismic zone. Fig 3.1 shows the seismic zoning of India.

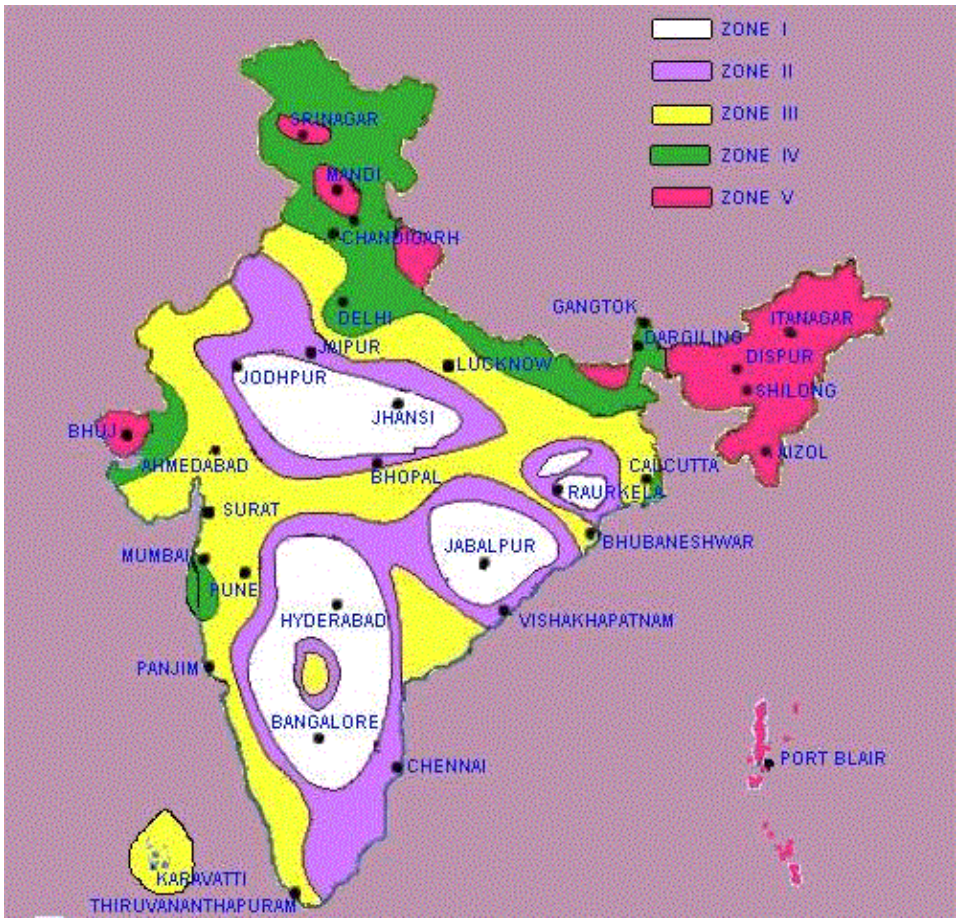

Figure 3.1 Map showing various seismic zones in India

During the last 15 years, the country has experienced 10 major earthquakes that have resulted in over 20,000 deaths. As per the current seismic zone map of the country (IS 1893: 2002), over 59% of India's land area is under threat of moderate to severe seismic hazard. Earthquake of magnitude 6.0 or more on the Richter scale usually results in a large number of casualties. 90% of casualties result directly from the collapse of buildings. Secondary events, such as landslides, floods, fires, and tsunamis, account for the remainder (10 per cent) of the casualties. Mortality increases with age, disability and degree of destruction of the structures. Many deaths can be prevented by early implementation of rescue services and medical aid.

3.2.2 Lightning strike

Lying in the path of tropical monsoon and abutting the Arabian Sea, lightning which often accompanies thunderstorms poses is a potential hazard for the proposed project. Lightning strikes have the potential to kill or injure people and cause failure of electronic equipments. Quite a large number of injuries occur from electric shock received while using fixed telephones during thunderstorms

3.2.3 Fire & Explosions

Fire & Explosions can occur at the site. Sometimes they occur in circumstances that are unexpected or unpredictable. Fire incidences can be natural or human generated.

Types of fires

1. **Natural:** Natural fires are generated by Earthquakes, Storms, Lightning and the like. Earthquake and storms can cause devastating fires due to short circuits in damaged houses, fallen power cables, ignition of spilled fuels, gas leakages, etc. Proper insulation, meticulous wiring, leak proof storage etc. should form a part of disaster preparedness.
2. **Manmade**: Faulty electrical circuits, defective electrical wiring, poor maintenance of "boilers/electrical equipment", cooking gas leakages, etc can cause fires. Similarly, accidental leakage of flammable liquids (LPG & HSD) and careless disposal of lighted cigarette butts can also cause devastating fires.

List of Major Fire Hazards:

- Flammable chemicals: Paints, Aerosols (in stores), Fuels (LPG &HSD), etc.
- Flammable substances: Furniture, Upholstery, Dry Grass, etc.
- Processes involving open flame: Cooking, Smoking, etc.
- Heat producing devices: Dryers, Heaters, Hot Plates, etc.
- Electrical equipment: Short circuits and malfunctioning equipment

3.2.4 Sabotage

Sabotage is a deliberate action aimed at weakening another entity through subversion, obstruction, disruption, or destruction. In the absence of adequate measures to secure the Complex, probability of occurrence of acts of sabotage like setting fire or causing explosions using bombs, will become high.

3.3 PRELIMINARY HAZARD ANALYSIS (PHA)

A preliminary hazard analysis of project and site components has been carried out to identify major hazards associated with the functioning of the proposed project (**Table 3.4**)

Table 3.1 Hazards, Risks and Vulnerability

Hazard Component	Potential Risk	Vulnerability/ Probability
D.G. Sets	Mechanical hazards and fire hazards in: Lube oil system Cable galleries Short circuits	**Low:** The DG sets are used only in case of power failures, which are rare. The lubrication oil and diesel are stored in small quantities.
Power Trans-formers	Fire and explosion	**Low:** Transformers are always kept in the open, with proper fencing, and isolated from buildings.
Electrical Control room	Fire in cable galleries and switches. Static electricity due to improper earthing and bonding. Fire, in earthing and bonding may result in Power failure.	**Medium:** The risk may arise from low quality of insulation material bad maintenance or alterations by untrained manpower. It may also arise from voltage fluctuations.
LPG Cylinders storage	Fire and explosion due to leakage	**Low:** Probability of cylinder related fire and explosion is low.
HSD Storage	Fire due to leakage	**Low:** Probability of fire due to Diesel leakage is low
Natural Disasters	Earthquakes and cyclones may damage the electrical system, lifts, and water/sewerage lines. It may also damage the external envelop of structures.	**Low:** Site falls in Seismic Zone III which is one of the least vulnerable zones. Goa does not have history of severe earthquakes.
Topography and Drainage	Flooding/Water logging may curtail access to daily needs and transports facilities.	**Medium:** The risk may arise only in the rare event of choking of natural and manmade storm water drainage system coupled with high tide and storm surge. Inundation of land

Hazard Component	Potential Risk	Vulnerability/ Probability
		is a possibility in case of coincidence of storm surges with High Tides
Others	Power failure, Water shortage, traffic congestion, communication failure, etc.	**Low:** Such types of risks are rarely prevalent in rural setting where the project is proposed. As remedial response is very quick and services are immediate, no problems of difficult nature are likely. Power failure will not affect the project seriously as stand by DG sets are provided for all essential services.

4 MITIGATION AND PREPAREDNESS

4.1 STANDARD OPERATING PROCEDURES

Standard Operating Procedures have been laid down to guide project authorities and staff to be prepared for disasters and act positively in times of disasters. As disasters can be of various types, separate standard operating procedures have been developed for each kind. These procedures have been prepared with the aim to guide the authorities and staff through the following steps with regards to disaster:

1) Precautionary measures
2) Disaster Preparedness Onsite
3) Disaster Preparedness Offsite
4) Emergency response in the event of disaster
5) Relief and Rehabilitation
6) Evacuation

4.2 PRECAUTIONARY MEASURES

Precautionary measures for any disaster are to be taken by all the users/visitors of the proposed Complex. Hence the measures mentioned below are to be meticulously followed by occupants. To be well informed about such precautions a printed booklet will be provided for all users.

4.2.1 Earthquake

- BIS codes relevant to the project site shall be adopted for building standards
- Fasten shelves securely to walls.
- All the occupiers should be made aware to place large or heavy objects on lower shelves.
- Store breakable items such as bottled foods, glass, and china in low, closed cabinets with latches.
- Hang heavy items such as pictures and mirrors away from settees and anywhere people sit.
- Brace overhead light and fan fixtures.

- Repair defective electrical wiring and leaky gas connections. These are potential fire risks.
- Secure a water heater, LPG cylinder etc., by strapping it to the wall studs and bolting it to the floor.
- Store weed killers, pesticides, and flammable products securely in closed cabinets with latches and on bottom shaves.
- Identify safe places indoors and outdoors for occupiers:
  a) Under strong dining table or bed
  b) Against an inside wall.
  c) Away from where glass could shatter around windows, mirrors, pictures, or where heavy bookcase or other heavy furniture could fall over.
  d) In the open, away from building, trees, telephone and electrical lines.
- Emergency telephone number (doctor, hospital, police, etc) would be displayed on both floors and booklet of the same should be available/ displayed prominently in all public areas.

Table 4.1 Codes, Standards and Commentaries

IS 456 – 2000	Plain and Reinforced Concrete (Code of practice)
IS 875 – 1987 (Part I to III & Part V)	Code and Practice for Design Loads (Other than earthquake) for Building and Structures like Dead, Imposed, Wind and other Loads
IS 1893 – 2002	Criteria for Earthquake resistant deign of Structures
IS 13920	Ductile detailing of Reinforced Concrete Structures subjected to Seismic forces.
IS 3370 Part I, Part II and Part IV	Code of practice for Concrete structures for the storage of liquids.
SP – 16	Design aids for Reinforced concrete Structure.
SP- 34	Handbook on Concrete Reinforcement and Detailing
IS 1786	Specification for High Strength Deformed Steel bars and wires for concrete reinforcement
IS 4326 – 1993	Earthquake resistant Design and construction of Buildings
IS 1904	Code and Practice for design and Construction of Foundations in Soils
IS 2911(Part1/Sec-2):2010	Code and Practice for Design and Construction of Pile Foundations
IS 800-1980	Code of Practice for general Construction in Steel.
IS 1343-1980	Code of Practice for Prestressed Concrete.

STRUCTURAL SYSTEM

The structural system in this project is simple beam slab system with raft foundation.

SUPERSTRUCTURE – GRAVITY SYSTEM

RCC grid form of construction has been selected for gravity loading system.

SUPERSTRUCTURE – LATERAL LOAD RESISTING SYSTEM

The project is located in a seismic zone classified as III as per IS 1893 (Part I): 2002 and as such, the design must consider minimising the structural damages resulting from an earthquake.

The lateral load resisting system for the structure will be concrete shear walls/cores and moment resisting frames that extends the full height of the building. The floors will act as a diaphragm to transfer the horizontal loads to the lateral loads resisting system

SUBSTRUCTURE

The substructure i.e. the foundation systems consisting of pile and raft foundation.

Earthquake Loading

The structure is to be designed for the minimum static seismic base shear set out by IS 1893 (Part 1): 2002 using the parameters shown in the table below. These forces are treated as ultimate forces.

Design Earthquake	10% chance of being exceeded within a 50 year return period
Seismic Zone	Zone IV
Seismic Zone Factor, Zone IV	Z = 0.24
Soil Profile Type	As per Soil Report.
Occupancy Category	Commercial Building
Seismic Importance Factor I	I = 1.0
System Co-efficient R	R = 5.0,Refer to Table 7, IS 1893
Fundamental Period of Vibration	With infill i,e, 0.09 XH/√D H – building height D-Least lateral dimension of building at plinth level
Seismic Building Weight	To include all components of Self Weight, Superimposed Dead Load, permanent equipment and 25% of LL or 50% of LL as applicable.

CONCRETE REQUIREMENTS FOR DURABILITY AND FIRE

Concrete cover requirements is governed by Indian Code. The values in the following table are appropriate for a fire rating of 4 hours for column and 3 hours for beam and slab.

The following classification also applies in the design of structural elements:

Exposure	**Classification**
Members in contact with the ground	Severe
Members in interior environments	Moderate
Members in above-ground exterior environments	Moderate

In general, adopting the minimum concrete strengths and reinforcement covers will ensure the durability and fire resistance of concrete elements. Values shown on the drawings shall not be less than the following:

Element/Location	**Minimum Cover (mm)**	**Minimum Thickness (mm)**
Cast In Place Concrete		
1. Concrete cast against and permanently exposed to earth.	50	-
2. Concrete exposed to weather and not in contact with ground (moderate)		
a.) RC slabs (continuous span)	35	-
b.) RC slabs (simply supported span)	45	
c.) RC beams (continuous span)	40	-
d.) RC beams (simply supported span)	60	
c.) RC columns/Shear Wall	40	-
3. Raft	75	

4.2.2 Floods

Flooding of basements will be prevented by taking the following measures:

Drainage of Basement

The proposed basements shall be catering to the Parking requirements for the project, and the services areas such as Plumbing & Fire Fighting Plant Room, Electrical Rooms etc. shall also be coming in the basements. Provision for drainage is also to be made in case of operation of Sprinkler System. Therefore it is necessary to do the proper planning of drainage of the basements, to cater to the following circumstances:

All necessary precautions shall be taken to prevent any external storm water from entering into the basement. The site level shall be decided in such a way that the surface flow takes place away from the entry points of ramps, staircase etc. All cutouts/openings into the basement shall be closed/ protected.

The basement shall be provided with a network of drain channels, with the following details:

- Minimum 250 – 300 MM width.
- Minimum 150 MM deep at start and a general slope of 1:250 to 1:300. Accordingly a minimum filling of approx. 450 mm is required and the final location / layout of channels shall be depending upon the architectural plans and the proposed structural details.
- Maximum length of channel shall be approx. 80 meters.
- The drain channel shall be provided with proper grating as per architectural details.

The drain channels shall be discharging into drainage sumps, which shall be having the following details:

- Minimum size of sump 1500 X 1500 x 1500
- The sump shall be equipped with fixed type submersible drainage pumps, which shall automatically operate based on a level indicator and controller system.
- The sump pumps shall discharge the drain water outside the building into the external storm water drainage system

Dedicated sumps with automatic submersible sump pumps are provided at the basement level as per requirements.

The gross pumping capacity of the sump pumps will be equal to the fire pump capacity. Each sump will be provided with two pumps (1 working + 1 standby). Normally one pump will be a standby operating on an alternate cycle. The sump pump will be provided with water level controller to operate both the pumps auto start according to the water level in the sump pit simultaneously during heavy flow as in case of a fire operation or unforeseen flooding from external sources.

4.2.3 Fire & Explosions

- Good house-keeping.
- Compulsory use of ashtrays for smokers.
- Welding /Cutting jobs to be carried out under strict supervision.
- Fire Rescue drills to be carried out at regular intervals.

Since fires of different classes require specific precautionary measures to be taken in each case, precautionary measures to be taken for different classes of fires are listed below.

a) Electrical Fires

The following basic precautions are recommended:

- Install only appliances that have the label of a recognized testing laboratory.
- Switches and fuses to conform to correct rating of circuit.
- Use only surge protectors or power strips that have internal overload protection and have ISI or BEE label
- Use light bulbs that match the recommended wattage on the lamp or fixture.
- High voltage points and instruments to be secured and labeled prominently.
- Avoid putting cords where they can be damaged or pinched by furniture, under rugs and carpets, or across doorways.

- Replace any electrical tool if it causes even small electrical shocks, overheats, shorts out or gives off smoke or sparks.
- Routinely check your electrical appliances and wiring. Replace all worn, old or damaged appliance cords immediately. Do not try to repair them.
- Electrical work should be done only by a qualified electrician. Call an electrician if you have any of the following:
    - Recurring problems with blowing fuses or tripping circuit breakers
    - A tingling feeling when you touch an electrical appliance
    - Discolored or warm wall outlets or switches
    - A burning smell or rubbery odour coming from an appliance
    - Flickering lights
    - Sparks from a wall outlet
    - Cracked or broken wall outlets
- Keep clothes, curtains, and other items that can catch fire at least three feet from all portable electric space heaters.

STANDARDS AND CODES FOR PROPOSED WIRING

Table 4.2 Standards and Codes for Proposed Wiring

660/1100 V grade PVC insulated / cables for working voltage upto and including 1100 volts	IS 694 : 1990
MS conduits for electrical installation - General requirements	IS 9537 : Part I 1980
MS conduits for electrical installation – Rigid steel conduit	IS 9537 : Part II 1981
Accessories for rigid steel conduits for electrical wiring	IS 3837 : 1976
Fittings for rigid steel conduit for electrical wiring	IS 2667 : 1988
Flexible (pliable) nonmetallic conduit	IS 9537 (P-5) : 2000
Flexible steel conduits for electrical wiring	IS 3480 : 1966
Rigid nonmetallic conduit for electrical installations fittings for rigid non metallic conduit	IS 2509 : 1973 IS 3419 : 1988
Interlocking switch socket outlets	IS 4160 : 1967
Switch socket outlets	IS 4615 : 1968
3 pin plugs and socket outlets upto 250 volts rated current upto 16 amps	IS 1293 : 1988
Conductors for insulated electric cable and flexible conduit	IS 8130 : 1984
General and safety requirements for luminaries Tubular fluorescent lamp	IS 1913 Part-I : 1978
Switches for domestic and similar purposes	IS 3854 : 1997

Danger notice plates	IS 2551 : 1982
Code of practice for electrical installation fire safety of buildings	IS 1646 : 1997
Code of practice for electrical wiring installations	IS 732 : 1989
General requirements for enclosures for accessories for house hold and similar fixed electrical installations	IS 14772 : 2000
Guide for marking insulated conductor	IS 5578 : 1985
Guide for uniform system of measuring and identification of conductors and apparatus terminals	IS 11353 : 1985
General and safety requirements for fans and regulators for house hold and similar purposes	IS 12155 : 1987
Guide for safety procedure and practices in electrical works : General	IS 5216 Part-I : 1982
Recommendation on safety procedure and practices in electrical works – life saving technique	IS 5216 Part-II : 1982
Code of practice for personal hazard fire safety of building	IS 1644 : 1998

b) Earthquake Fires

- Container with water such as a flower vase or water tank will be placed away from electrical appliances as spilt water on a plug in a socket is likely to cause fire.
- Easily inflammable things will be secured and prevented from falling from shelves around gas cookers in the kitchens and villas, wherever LPG cylinder is used for cooking

c) LPG storage Fire & Explosion

The project does not envisage storage of more than 100 kgs of LPG in bulk storage. License for storge of cylinders as mandatory under Gas Rules, 2004 will be obtained. Applicable rules for LPG storage as per the license will be adopted at the proposed site. The Maximum Credible Loss Scenario (MCLS) has been worked out to be 41 metres.

d) HSD storage Fire & Explosion

Risk due to HSD storage may possibly arise from sudden rupture of transfer pump discharge pipeline. This may result in formation of a flammable atmosphere around the vicinity of the storage area. Risk analysis studies have revealed that MCLS for such an event is 29 metres.

A 25KL underground HSD tank has been provided for fuel for the DG sets and the layout has been provided in accordance with provisions of the Indian Petroleum act and explosives directives

4.2.4 Sabotage

- The complex will be fully secured all around the periphery and there will be only one entry and one exit to the entire facility.
- The entry and exit points will be manned for 24 hours with specially trained security staff fully equipped with latest security gadgets including closed circuit electronic surveillance cameras/CCTVs monitoring all sensitive areas within the Commercial Complex. A log book will be maintained to record the identities of all "vehicles/staff/guests/visitors" entering and leaving the Complex.
- All "persons/vehicles" entering the premises will be fully checked for explosives and weapons.

4.2.5 Other Disasters

Other disasters are rare and have not occurred in the region or their occurrence can easily be mitigated with routine precautions. Nevertheless the following precautions will be taken:

- Sufficient water will be stored, in excess of actual requirement, as a buffer stock to tackle the eventuality of temporary water supply shortage.
- Multiple communication channels will be maintained to tide over the situation of failure of telephone link "and/or" malfunction of main server.

4.3 DISASTER PREPAREDNESS ONSITE

The plan will include alarm equipments and other measures and the budget for capital and running cost of the plan. Onsite preparedness for all the disasters would include a disaster preparedness plan which includes provision of Control Room, an On-site team of DMP that will be responsible for majority of action taken during a disaster. The plans also consist of emergency equipment and disaster emergency kits. It also includes emergency communication plan for each household, an awareness programs for each occupant and drills frequency and formats.

4.3.1 Earmark a specific area to function as Control Room for disaster management.

Control Room plays an important role in emergency response, rescue and relief.

A specific area has to be earmarked to function as a Control Room for disaster management. A Control Room will respond immediately during an emergency situation and is equipped with State of the Art communication equipment which enables it to communicate quickly to the affected area and provide immediate support during the Golden Hour of the disaster. This room should also consist of announcing system, fire extinguishers, smoke detectors and sensors.

Following is a list of facilities/ utilities that may be provided in the Control Room:

- Reception Room
- Waiting Room
- Display Room
- Facility Management Room (with toilets)

- Rest Room (with toilets)
- Pantry Room

Apart from the above mentioned facilities, additional facilities which may be provided are as given below:

- Garden
- Fire Fighting System
- Parking
- Generator

4.3.2 Do's and Don'ts pamphlets

Prepare & disseminate pamphlets on each disaster for occupants covering Do's and Don'ts for each type of disaster.

Do's and Don'ts for each type of disaster is prepared for the occupants and are given below:

		Do's	Don'ts
1	Earthquake	• Drop, Cover, and Hold On! If you are not near a desk or table, drop to the floor against the interior wall and protect your head and neck with your arms. • Stop driving if you're in a safe place, and if outside, go into an open area. • After earthquake is over, be sure to wear shoes to avoid broken glass. If you smell gas, turn off the main gas line and get out of the building. 	• Do NOT run outside! • Don't attempt to go outside if you're not in a position to do so--you could be injured by falling debris • don't forget--aftershocks do occur, so don't assume the damage is done after the main shock has ended
2	Gas leakage 	• Do open doors & windows. • Do keep people away from the affected areas. • Do close burner and regulator knobs • Follow the evacuations given by the wing warden or IC • Evacuate the building at the earliest • Immediately inform the wing warden and 	• If you smell gas, DO not smoke or strike matches or use mobile phone • Do not turn electrical switches on or off.  

		Do's	Don'ts
		follow his instructions.	
3	Fire 	• Do not panic • Intimate safety warden of the wing  • Ring up and inform: • Security • Emergency controller • Disaster Control Room / Fire station / Police • Look for signages for direction of escape • Make use of fire sprinklers • Use fire lifts and staircase  	• Do not use normal lift • Do not try to carry any of your belongings along with you 

4.3.3 Fire Alarms/Other Measures

Fire could take place from various accidents; one of them being faulty electrical materials. Hence all electrical wiring of the proposed building would be made as per Government standards. Also maintenance of the wiring should be carried out at regular intervals through a professional electrician.

Fire and smoke alarm must be installed in every office, foodcourt, multiplex and in all common areas. An alarm system will be developed so that visitors are informed and all the staff will be informed and trained with regard to the actions taken and operations necessary to efficiently use the system. Appropriate measures would be taken for their proper functioning.

To meet the requirements, the following provisions are proposed:

FIRE HYDRANT, SPRINKLER, AUTOMATIC FIRE DETECTION AND ALARM SYSTEM

1.0 Concept

Providing fire suppression system in a building is an attempt to extinguish the fire while it is small, or to limit its growth in order to prevent it from becoming large and spreading other parts of the building. Water is the most common and convenient fire-extinguishing

agent. However, the most suitable extinguishing system whether water, powder or gases will depends on the nature of the combustible materials.

2.0 Material

- For Sprinkler System Mild steel Heavy class confirming to IS: 1239 shall be used.
- For Hydrant System GI Pipe class 'C' tubes confirming to IS: 1239 shall be used.

3.0 Hydrant Station (Fire Hose Cabinet)

- A hydrant station will be provided for an area of 900-950 M^2.
- One no single headed hydrant valve.
- 2 nos., 63mm dia and 15m long rubberized fabric lined hose pipe as per I.S:636 type-II.
- One No. female instantaneous type coupling as per I.S:903 with I.S. specifications.
- One No. branch pipe with nozzle as per I.S:903.
- First-aid fire hose reels with 20 mm dia 36.5m long with 5 mm bore nozzle as per I.S:884 - 1969.
- Fireman's axe.
- Hydrant stations in the apartments will be located in the staircase lobby and also near fire exits in basements.

4.0 Sprinkler System

- The sprinkler system shall therefore be provided for all areas, including basements. Standard response pendant sprinklers shall be provided, and each sprinkler will be provided to cover a maximum area of app 12 M^2 on upper floors and 9 M^2 on basement floor area. Upright pendant sprinklers shall also be provided for the concealed spaces of more than 750 mm. The sprinkler system shall be designed as per IS: 15105.
- Sprinkler system will be provided in Entire basement and upper floors of building except electrical rooms, D.G room etc.
- Server & UPS rooms (if any) will be provided with special gas based protection system as per individual user's requirement.

5.0 Portable Fire Extinguishers

- Fire extinguishers will be provided on all floors as per latest IS: codes.

6.0 Other Safety Measures

- Safety measures with respect to access, around and to the building the usage and architectural aspects and structural fire safety will be take care by the Architects.

- Measures with respect to electrical installation, communications, smoke and heat detectors etc. will be taken care by the electrical consultant.

Table 4.3 List of IS Codes For Reference of Fire Fighting Design

S.No	ISI No.	Description
1	SP 7: Part IV - 2005	National building code – Fire protection
2	IS: 1239 –1990 (Part I & II)	Specifications for mild steel tubes, tubular and other wrought steel fittings.
3	IS: 3589 -2001	Specifications of steel pipes for water and sewage (168.3 to 2540mm outside diameter)
4	IS: 778 -1984	Specifications for copper alloy gate, globe and check valves for water works purposes.
5	IS: 14846 -2000	Specifications for sluice valves for water work purposes (50 to 1200 mm size).
6	IS: 5312 – 1984	Specifications for swing check type reflux (Non return) valve.
7	IS: 5290 – 1983	Specifications for landing valves.
8	IS: 884 – 1985	Specifications for first-aid hose reel for fire fighting.
9	IS: 903 – 1984	Specifications for fire hose delivery couplings branch pipe, nozzles and nozzles spanner.
10	IS: 2190 – 1992	Code of practice for selection, installation and maintenance of portable first-aid fire extinguishers.
11	IS: 2878 – 1986	Specifications for fire extinguisher Carbon-dioxide type.
12	IS: 3844 – 1989	Code of practice for installation and maintenance of internal fire hydrants and hose reels on premises.
13	IS: 2189 – 1999	Code of practice for selection and maintenance of automatic fire detection and alarm system.
14	IS: 9668 – 1999	Code of practice for provision and maintenance of water supplies for fire fighting.
15	IS: 1538 – 1993	Specifications for cast iron fittings for pressure pipes for water, gas and sewage.
16	I.S:15683	Portable Fire Extinguishers-Performance and Construction - Specification

ELECTRICAL HAZARDOUS MANAGEMENT PLAN

The Contractors shall, at their own expense, arrange for safety provisions as per safety codes of Indian Standards Institution, Indian Electricity Act and such other Rules, Regulations and Laws as may be applicable and as indicated below, in respect of all labour, directly or indirectly employed in the work for performance of the Contractors' part of this agreement.

- No inflammable materials shall be stored in places other than the rooms specially constructed for this purposes in accordance with the provisions of Indian Explosives Act. If such storage is unavoidable, it shall be allowed only for a short period. Special precautions IN storing materials away from wiring and switchboards, giving electric supply for a temporary period etc with due permission of Engineer-in-charge shall be taken.

- Protective and safety equipment such as rubber gauntlets or gloves, earthing rods, line men's belt, portable artificial respiration apparatus etc. should be provided in easily identifiable locations. Where electric welding or such other nature of work is undertaken, goggles shall also be provided.

- Necessary number of caution board such as "Man on Line, Don't switch on" should be readily available in easily identifiable locations.

- Standard first aid boxes containing materials as prescribed by the St. John Ambulance Brigade or Indian Red Cross should be provided in easily identifiable locations and should be readily available. Periodical examination of the first aid facilities and protective and safety equipment provided shall be undertaken and proper records shall be maintained for their adequacy and effectiveness.

- Charts (one in English and one in regional language) displaying methods of living artificial respiration to a recipient of electrical shock shall be prominently displayed at appropriate places.

- A chart containing the names, addresses and telephone numbers of nearest authorized medical practitioners, hospitals, Fire Brigade and also of the officers in charge shall be displayed prominently alongwith the First Aid Box.

- Steps to train supervisory and authorized persons of the Engineering staff in the First Aid Practices, including various methods of artificial respiration with the help of local authorities such as Fire Brigade, St. John's Ambulance Brigade, Indian Red Cross or other recognized institutions equipped to impart such training shall be taken, as prompt rendering of artificial respiration can save life at time of electric shock.

- No work shall be undertaken on live installations, or on installations which could be energized unless one another person is present to immediately isolate the electric supply in case of any accident and to render first aid, if necessary.

- No work on live L.T. busbar or pedestal switchboards should be handled by a person below the rank of a Wireman and such a work should preferably be done in the presence of the Engineer-in -charge of the work. When working on or near live installations, suitably insulated tools should be used, and special care should be taken to see that those tools accidentally do not drop on live terminals causing shock or dead short.

- Before starting any work on the existing installation, it should be ensured that the electric supply to that portion in which the work is undertaken is preferably cut off. Precautions like displaying "Men at Work" cautions boards on the controlling switches, removing fuse carrier from theses switches and these fuse carriers being kept with the person working on the installation, etc. should be taken against accidental energization. "Permit to Work" should, be obtained form the Engineer-in-charge. No work on H.T. main should be undertaken unless it is made dead and discharged to earth with an earthing lead of appropriate size. The discharge operation shall be repeated several times and the installation connected to earth positively before any work is started.

- Before energizing on an installation after the work is completed, it should be ensured that all tools have been removed and accounted, not person is present inside any enclosure of the switch board etc. any earthing connection made for doing the work has been removed, "Permit to Work" is received back duly signed by the person to whom it was issued in token of having completed the work and the installation being ready for re-energizing and "Men at Work" caution boards removed.

- In case of electrical accidents and shock, the electrical installation on which the accident occurred should be switched off immediately and the affected person should be immediately removed from the live installation by pulling him with the help of him coat, shirt, wooden rode, broom handle or with any other dry cloth or paper. He should be removed from the place of accident to a nearby safe place and artificial respiration continuously given as contained in BIS. Code and Standard prescribed by St. John Ambulance Brigade or Fire Brigade.

7.0 Measures proposed in basement

1 BASIS OF DESIGN – VENTILATION

Basement Car a) Ventilation 12 air changes per hour

Parking	
STP Room	30 Air changes per hour
Transformer Room	15 Air changes per hour
LT Panel Room	15 Air changes per hour
Pump Room	15 Air changes per hour
DG Room	As per recommendation of DG manufacturers
Lift Well	To maintain positive pressure of 50 Pa
Lift Lobby	To maintain positive pressure of 25 Pa
Staircase	To maintain positive pressure of 50 Pa
Atrium & Audi Smoke Extraction	12 Air changes per hour

2 SYSTEM DESCRIPTION – VENTILATION

Car Parking Ventilation system

Mechanical ventilation for car parking shall be designed to permit 12 ACPH , The mechanical ventilation system for car parking shall comprise of exhaust air fans, exhaust air distribution system (ducting).

For Basement Ventilation system, Zone area considered is approx. 3000sq.m. Axial Fans are proposed for Ventilation system with ducting in normal /Fire case.

Fresh air ingress is proposed through Axial Fan@12 ACH at various locations in the Basement through ducting. Exhaust air is proposed through Axial Fan @ 12 ACH at various locations in Basement through ducting and exhaust air to be collected from ceiling level below beam with ducting system and exhausted to atmosphere at Ground Level through louvers.

	As per National Building Code. The Ventilation fans (Exhaust fans) shall have motors with Class H insulation rated for 250 Deg C for 2 hours as per BS 7346 Part II. All the axial fans shall be mounted directly on the exhaust air shafts.
STP Room	Axial type exhaust fans with ducting & grills shall be provided.
Pressurization system	All fire escape routes shall be provided with Pressurization system, consisting of supply air fans installed on roof top floor. Atrium & Multiplex shall be ventilated in case of fire, Lift wells and staircase shall also be provided with pressurization by supplying the air through supply air fans installed on roof top.. Fans shall be sized for calculated air quantity and/or to maintain minimum positive pressure of 50 Pa across the door. All enclosed Lift lobbies of Block shall be provided with Pressurization system, consisting of supply air fans installed on Terrace floor. These fans shall be connected to respective supply air ducts for supplying air at each Lift lobby, for achieving positive pressure of 30 Pa for pressurization.
Fire damper	Combination type smoke and fire dampers, 90 minute fire rated, in supply/return air passage . UL stamped/certified. To be interlocked with buiding fire detection system to trip the AHU of the zone and close the fire dampers.
Grills/ Diffusers	Supply and return air registers and ceiling terminals shall be made of extruded aluminum section. All register and grills shall be provided with a soft continuous rubber gaskets between their periphery and the surface on which these have to be mounted
Toilet Ventilation system	Toilet Ventilation Fan shall be proposed on terrace. The cabinet type centrifugal fan connects with ducting and vertical duct risers at each offices/retails shall be connect to each toilet with grills or diffusers.
Pressurization System	All fire escape routes shall be provided with Pressurization system, consisting of supply air fans installed on roof top floor. We are considering two door open for staircase, lift lobby pressurization calculation and one door open for lift well pressurization calculation
Lift well pressurization	Lift wells shall also be provided with pressurization by supplying the air through supply air fans installed on roof top. Fans shall be sized for calculated air quantity and/or to maintain minimum positive

pressure of 50 Pa across the door.

Lift Lobby pressurization — All Lift lobbies of Towers/Basements shall be provided with Pressurization system, consisting of supply air fans installed on Terrace floor. These fans shall be connected to respective supply air ducts for supplying air at each Lift lobby, for achieving positive pressure of 30 Pa for pressurization.

Stair well pressurization — All Stairwells of Basements/Towers shall be provided with Pressurization system, consisting of supply air fans installed at Ground floor level. These fans shall be connected to respective supply air ducts installed in vertical risers for supplying air at each staircase, for achieving positive pressure of 50 Pa for pressurization.

Smoke Extraction System for Common area — Smoke extraction system at 12 air change per hour in case of fire is proposed. Dedicated axial fan shall be provided for smoke extraction at atrium roof level. Fans shall start automatically in case of fire through signal from smoke sensors.

Smoke Extraction System for Auditorium — Smoke extraction system at 12 air change per hour in case of fire is proposed. AHUs ducting shall be used for exhaust and supply air . Dedicated axial fan shall be provided for smoke extraction at roof level. Fans shall be start automatically in case of fire.

Work by others — The following work have been excluded and are to be provided by other agencies.

a) All civil work like foundations for the equipment, breaking and making good of openings for the ducts, pipes and cables

b) Main power of 415 V 3 Phase 50 Hz supply duly earthed terminating in MCCB at each fan panel.

c) All false ceiling works

4.3.4 Onsite DMP Team

The structure of the team is given below. During the operational phase of the project, name of the authority and their contact details will be included in the following chart given in Figure 4.1. This will be part of DMP kit which should prominently placed and accessible to all.

4.3.5 Emergency Equipments

The site security officer will maintain a list of emergency handling equipment including details of fire extinguishers their validity and potency, protective clothing, and personal protective equipment for emergency handlers etc. Details of fire management services available at Panjim and details of nearby hospitals will be available with site security officer in his operating checklist. The major hospitals, clinics, emergency services shall be kept in the knowledge of all concerned. Fire fighting related water tank with adequate water quantity and system with fire hoses will be kept readily available. All the location of fire extinguisher will be displayed by a notice board.

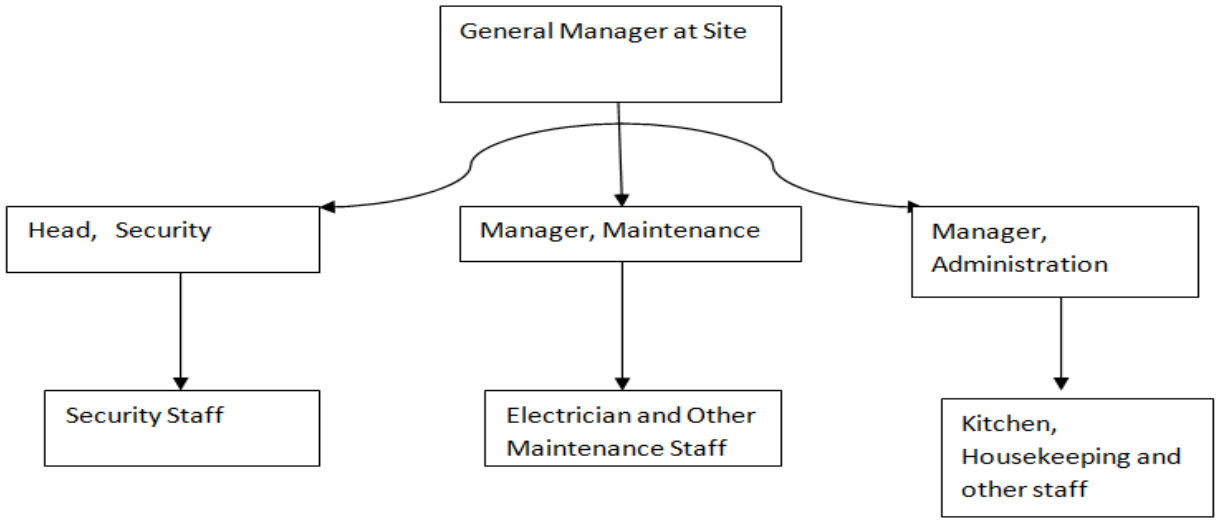

Figure 4.1 Structure of the DMP team

4.3.6 Disaster Emergency Kit

An emergency kit will be prepared which will have following items:

Table 4.4 Emergency Kit and Items and Numbers

Emergency kit items	Numbers
First Aid Kit, and Whistle	1 for each shopping zone/commercial zone/ multiplex hall/ food court: 1 in each common lobby
Portable Fire Extinguishers	As specified
Safety Ropes	5

The emergency kit will be augmented frequently after its check regularly. The project proponent will provide a disaster emergency kit which would consist of:

1. Battery operated torch

2. Extra batteries
3. Battery operated radio
4. First aid kit and manual
5. Candles and matches in a waterproof container
6. Knife
7. Chlorine tablets or powdered water purifiers.
8. Can opener
9. Essential medicines
10. Thick ropes and cords
11. Sturdy shoes

4.3.7 Medical and Related Resources

The medical managements for the possible emergency situation essentially consist of First Aid facility. The Security manager must maintain the staff including sweepers, security persons, etc. so that during medico emergency equal weight age would be given to all the visitors of the complex. Also Security manager should keep the numbers of emergency. Hospitals, so that doctors could be connected at the earliest at the time of medical emergency. These numbers must be prominently displayed on the notice board and can be accessed by the members in absence of Security manager.

4.3.8 Drills

Mock drills activating the Disaster Preparedness Plan will be conducted periodically for ensuring its efficiency during emergency as well as refinement and updation. These drills based on the plan will help achieve its objectives. Head, Security shall be the main coordinator for making people aware of the situation and emergency condition response.

Fire extinguishers would be placed on all floors. Every member of staff would be given training on how to use these fire extinguishers. Working of these fire extinguishers would be evaluated every year by a qualified and trained person. If any faulty equipment is observed or any further improvement is needed then it would be repaired. Proper evacuation plan would be chalked for the project.

The map for the evacuation plan for each floor would be displayed in the common area. A mock demonstration for evacuation would be carried out at interval of every six months. These mock drills would be performed in presence of qualified professional. Information would be given to all the members of staff on how react in case of disaster.

4.4 Disaster Preparedness Offsite

A list of contact numbers of institutions, offices, officials and emergency services which may be used in times of emergency is given in Annexure 1.

5 EMERGENCY RESPONSE IN THE EVENT OF DISASTER

5.1 Emergency Response Plan

In case of emergency due to any type of disaster a quick and immediate response is essential. This response depends on the actions taken by individuals to avoid or mitigate the adverse effects of a disaster and to undertake search and rescue operations.
Following are the actions which will be taken in various emergent situations.

5.1.1 Action in the event of Fire

Extinguishing fires: A small fire at the point of leakage will be extinguished by enveloping it with a water spray or a suitable smothering agent such as CO_2 or DCP (Dry Chemical Power). Trained staff will be engaged in combating fire. Fire fighting personnel working close to un-ignited vapour clouds or close to fire, will be protected continuously by water sprays.

5.1.1.1 Response Sequence during Event of Fire

Any person noticing the fire will attempt to isolate and extinguish the fire with readily available equipment and inform or arrange to inform the Security Head in-charge regarding:

- Location of fire
- Type of material burning
- Extent of fire
- Caller's name and phone number
  Security Personnel will:
- Sound the siren as per the Siren Code.
- Will cordon off the area and call the local Fire Department.
- Will direct all occupiers/visitors to evacuate and assemble in designated fire shelter spaces

5.1.2 Lightning strike

Apply immediate heart massage and mouth-to-mouth resuscitation to lightening victims until medical help arrives.

5.2 Relief and Rehabilitation

Relief authorities at the site will:

- Encourage self-help in every activity of their day-to-day living.
- Provide assistance for identification/assessment of human and material loss.
- Provide assistance in maintenance of law and order.
- Provide assistance in maintaining sanitation standards and in disposal of waste.
- Promote cultural and recreational activities for mental health.

Measures during Earthquake

- Relief authorities will: Conduct a week-long survey to locate quake related hazards/damages in the Complex.
- Work with local emergency services and officials to help affected people and those likely to be affected.
- Provide tips for conducting earthquake drills.

Actions to be taken to prevent impact of Cyclone

- Visitors will be advised to stay tuned to weather advisories broadcast on radio or TV. Radios and TVs in lobbies/restaurants etc. will also be activated for the benefit of visitors/guests.
- All windows and external doors of the complex will be shut and appropriately secured to withstand high wind speeds.
- Extra food, which can be eaten without cooking, and surplus drinking water will be stocked for the benefit of visitors/guests to tide over long power failures and damage to F&B infrastructure.
- Hurricane lanterns, torches and other emergency lights will be made available.
- All loose and unsecured materials which can fly and cause damage due to strong winds, will be removed to safe locations and/or securely fastened.
- Electrical mains will be switched off except for emergency utilities.
- The management will be continuously in touch with the State Disaster Management Authority and scrupulously follow its instructions with respect to the need for evacuation of the complex or any other eventuality.

5.3 Evacuation Plan

A standard response plan that is to be following by any personal that comes across an emergency situation such as fire needs to follow RACE.

RACE method of Evacuation Plan:

R *Remove All Persons In Danger!*

A *Always Pull The Alarm and Call the Emergency Services*.

C *Contain The Fire By Closing the Windows and Doors.*

E *Extinguish the Fire Only if You Are Trained and Confident*.

Followed by this primary response, the evacuation of public vulnerable to fire hazard is the most important step during any emergency fire. Proper co-ordination, prior basic knowledge on how to act is a situation is also essential. The guidelines given below are for the local evacuators and evacuees as well as planners and designers of the emergency response.

- Guidelines for Evacuation In-charge
- Evacuation and Exit Routes for each floor, common area, food court, office area, multiplex
- Planning Guide For Assembly (Temporary Shelter) Place
- Evacuation Preparedness and Assessment Checklist

An assigned on-duty employee will be evacuation in-charge who will command and coordinate the situation.

5.3.1 Guidelines for Evacuation In-charge

The General Manager (or Manager nominated by him) will act as the Evacuation In-charge.

- Has to designate one evacuation supervisor per 20 persons.
- Will possess evacuation route maps, primary and secondary assembly points clearly marked AND if possible, location of key systems and control panels.
- Ensure a headcount at every assembly point.
- Safeguard sensitive or hazardous material.
- Will carry Disaster emergency Kit.
- Co-ordinate with local hospitals, police and fire departments as appropriate to assist in rescue operations
- Trained fire expert to handle emergency and nurse (male and/or female) to attend medical emergencies should be immediately pressed into action

IMPORTANT: Ensure evacuation notification systems, plans, and equipment incorporates the evacuation of persons with special needs or disabilities.

On occurrence of a disaster, the Site Disaster Manager will take the following actions:

- Intimating and give guidance over public address system to the staff about the disaster.
- Prepare an instant mitigation plan and intimate all concerned.
- Network with State, district and ward level control rooms
- Ensure adequate warning before switching off power
- Guide the staff on safe evacuation process.
- Evacuate the staff to a safer place.

- Assure occupants of continuous communication and take all measures to keep up their morale.
- Guide occupants on the steps being taken for evacuation in a systematic manner.
- Take steps to Reduce/eliminate panic.
- Liaise with Law & Order machinery
- Intimate all external agencies like Police, Hospital, and Fire Brigade, NGOs about the likelihood of occurrence and evacuation plan and seek help.

When prior indication is not there and disaster happens all of a sudden following actions will be taken. At this situation only relief and rehabilitation will have to be done as soon as possible.

- Take relief measures
- Provide medical help
- Provide safe access to rehabilitation camp
- Provide food and drinking water
- Intimate all external agencies like Police, Hospital, and Fire Brigade, NGOs about the evacuation plan well in advance.

5.3.2 Evacuation & Exit Routes

A continuous and unobstructed path of exit travel from any point within a workplace to a place of safety

- Will have at least 2 evacuation exits from every location inside the facility.
- Consists of three parts:
    - Exit access
    - Exit
    - Exit discharge
- An exit will be separated by fire resistant materials.
- Openings into an exit will be limited to those necessary to allow access to the exit or to the exit discharge.
- An opening into an exit will be protected by an approved self-closing fire door that remains closed or automatically closes in an emergency.
    - the size of the building,
    - its occupancy, or
    - The arrangement of the structure.
- The number of exit routes will be adequate, normally two or more depending on: Exit discharge will lead directly outside or to a street, walkway, refuge area, public way, or open space with access to the outside and the area will be large enough.
- Exit stairs that continue beyond the level on which the exit discharge is located will be interrupted at that level by doors, partitions, or other effective

means that clearly indicate the direction of travel leading to the exit discharge.

- Exit doors will be able to open from the inside at all times without keys, tools, or special knowledge.
- Exit route will support the maximum permitted occupant load for each floor served.
- Capacity must not decrease in the direction of exit route travel to the exit discharge.
- Ceiling will be at least 7-1/2 ft. high with no projection reaching a point less than 6 ft. - 8 in. from floor.
- An exit access will be at least 28 in. wide at all points.
- Objects that project into the exit route will not reduce the width of the exit route to less than the minimum width requirements for exit routes.
- The assembly point has sufficient area to accommodate persons (0.3 m^3/person)
- The plans given below shows the refuge area that can be preferred and the service area that can be useful as a junction for escape route.
- The terrace area shown in the plan is open to sky that can accommodate sizable people in case of disaster, also the fire escape passage is provided as an exit route.

5.3.3 Planning Guide for Assembly (Emergency Shelter) Place:

An assembly point was critically chosen taking into consideration the following points:

- It should be an open to sky area.
- It should be away from the main structure but not too far to be inaccessible.
- It should be easily accessible to all the occupants.
- It should be easily visible from maximum locations.
- The area should be well-lighted with emergency power back-up
- From the assembly point, the outside main roads should be accessible.
- The assembly place should have water source in place.
- The place should not be congested and should be spacious enough to accommodate maximum occupants possible.

An Assembly Place is a room/place that can act as a barrier between people and potential danger and/or contamination in case of any emergency. As per the proposed layout, the Complex has been assigned an assembly point at the central open space. This point will be clearly identified with a sign.

The evacuation In-charge should assign responsibilities considering following points.

- Assign one person for each assembly point
- Evacuation In-charge should account for personnel.

- Must have assembly point map with identified shelter location(s) and:
    - Identify key utility systems
    - Identify control panels
- Establish procedures for assembly point notification system.
- Notification system should allow for communication with hearing-impaired and for those who do not speak Location/Regional/Common Language.
- Evacuation In-charge will designate persons responsible for:
    - Shutting down utility systems and control panels
    - Locking exterior doors, air vents, and closing all windows, window blinds, shades and curtains.
    - Checking offices, bathrooms and other spaces.
    - Coordinating personnel with special needs or disabilities and movement of visitors and customers.
- Ensure a headcount at Assembly point.
- Safeguard sensitive or classified material.
- Ensure reporting from personnel in-charge of each assembly point

IMPORTANT: Ensure evacuation notification systems, plans, and equipment incorporates the evacuation of persons with special needs or disabilities.

5.3.4 Evacuation Preparedness and Assessment

A timely assessment of all the involved aspects in case of fire is essential. If not maintained for evaluated, may cause extremities and convert a small situation in to a dangerous situation resulting in more than expected casualties. A checklist is to be prepared that needs regular inspection.

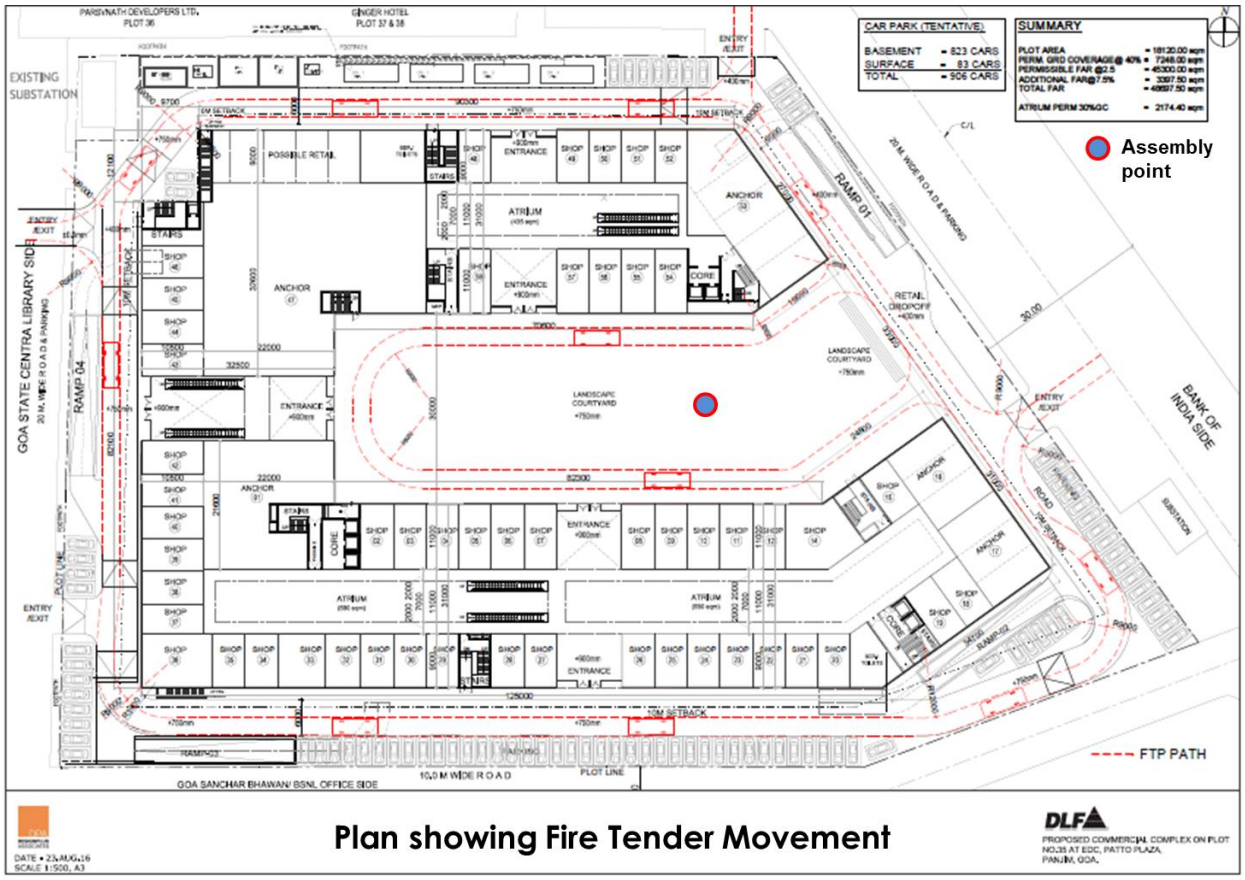

Figure 5.1 Fire tender movement plan with assembly points

5.4 PREVENTIVE MEASURES

- As per the CFO NOC, regular inspection of the equipment and systems provided to be carried out.
- Assembly points marked and displayed at regular intervals
- Mock drills undertaken regularly to train the occupants for emergency.

Following could be suggested to build for Structural and Material Requirement:

Table 5.1: Suggestions for Structural and Material Requirement

Sr. No.	Structure/ Material	Purpose
1	Perimeter fencing	For access control
2	Perimeter floodlighting	For intrusion control
3	Metal Detector gates	For access control
4	Hand-held metal detectors	For access control
5	Speed breakers along the vehicle access route/ ramp	Accident prevention

Sr. No.	Structure/ Material	Purpose
6	Traffic blinker lights	Accident prevention
7	Reflector mirrors at turning along the vehicle approaches	Accident prevention
8	Fire alarms	For fire-fighting
9	Fire Extinguishers (Different types) Foam types in the parking and a mix of all types in all the buildings, Sprinklers in common area, Pressurized wet risers, Fire lifts and pressurized shaft, Fire resistant doors	For fire-fighting

Annexure 1

LIST OF EMERGENCY SERVICES

Category	Institution/ Authority/ Emergency Services		Contact Details
Collector's office	Collector/ Dy. Collec. Mamladar Panjim Goa		0832-2426758 / 0832-2425533
Commissioner	Corporation of City of Panjim		Deepak Dessai 0832-2223339
Taluka's Office	Mamlatdar/ Executive Magistrate		0832-2513014
Zilla Parishad	Block Development Officer		2741966
Police Station	Superintendent of Police		7875756022
Police Station	Police Inspector Panjim Police station		0832-2428482 0832-2428488, 89 100
Fire: Assistant Divisional Officer North Zone Panaji)	Sub Divisional Incident Commander North Zone Panaji		Ajit kamat -9763717053 Email: adodfspfire.goa@nic.in
Fire Emergency	Fire stations	St.Inez Panjim-Goa Approx 1.5 Km	0832 2225500 0832 2423101 08322232902 101 Emergency Service
Govt Hospital Goa Medical College & Hospital, Bamboli Panjim Goa	Approx 1 km from site		0832-2458728 08322458700 08322495000
Asilo Hospital, Mapusa Goa	Approx 6 Km		0832-2262372
Private Hospital 1. Manipal Hospital 2. Talaulikar Memorial clinic	Dona Paula Panjim Dist of 3 km Dada Vaidya Road Panjim		088887 02222 0832 242 5625
Disaster management		Panaji	1077 Emergency Call 0832-2225383
Water Supply	Water Resource Dept., Panjim		0832-2226446
Power Outages	Electricity Department, Panjim		0832-2225835 0832-2420042
Central Exise & Customs	Customs Inspector, EDC complex patto (10 meters from site)		0832-2437116
Transport	Station Manager, S.T. Stand (Bus), Panaji		0832-2438029
Light House	Headlight keeper		0832-2703119
Weather Emergency	Regional Meteorological Dept.		0832-2425547