DISASTER MANAGEMENT PLAN

1. INTRODUCTION:

This chapter covers Risk Assessment Studies for the construction and operation phase, the safety precautions that have to be taken during construction phase and the Disaster Management Plan and Emergency Preparedness Plan Onsite and Offsite.

1.1 DISASTER MANAGEMENT PLAN:

Disaster management is defined as the discipline of avoiding and dealing with natural risks. The whole process involves a preparation plan for the impending disaster, action in response to a disaster, and support and strength to rebuild a community after the occurrence of a disaster. Disaster management is very important for any building. It makes the occupant aware of the various disasters possible in a building, prevention & procedures, training in disaster management, and after-disaster procedures for building objects.

In general, disaster management is a continuous process that aims to manage and minimize hazards. Under disaster response, there are a variety of actions to take like evacuation quarantine, mass decontamination, and the like. Disaster management has its own advantages. Some of these are:

- Reduces the effects of a disaster's aftermath
- Gives the chance to survive, no matter what kind of a disaster occurs and irrespective of when it occurs
- Gives you peace of mind from the uncertainties of close encounters to unexpected and dangerous natural events
- Minimize the effects of the accident on people and property
- Initiate the rescue and medical treatment of casualties;
- 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
- Inform and collaborate with statutory local and state authorities

DMP follows the Basic structure as shown in Figure 1.1

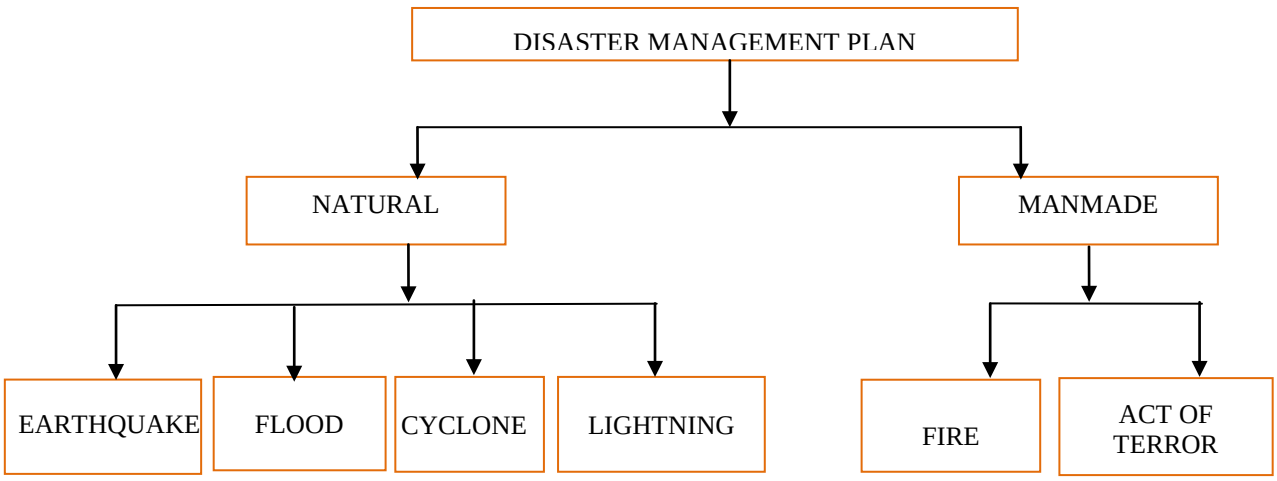


Fig. 1.1: Basic Structure of DMP

A. CONSTRUCTION PHASE

1 Risk assessment and Vulnerability analysis of possible disasters

Risk assessment study deals with identifying and evaluating the magnitude of impending risks to which the neighboring population is exposed due to occurrence of accidents involved in the project construction and development.

Hazard Identification: Physical, Chemical, Mechanical, Electrical, Vibration & occupational health hazards during construction phase

Risk of body injury, Injury to eyes, fatal accident, Fire and explosion, Hearing loss etc.

- ***Are you using (Tick Boxes)***

[√] plant/equipment
[√] portable electrical equipment
[√] hazardous substances
[√] scaffolding
[√] ladders
[√] lifts/hoists/cranes /load shifting machinery

- ***Does the project/task involve (Tick boxes)***

[√] using tools/equipment with moving part(s)
[√] using tools/equipment that vibrate
[x] working with x-rays ,or lasers
[√] electrical wiring
[x**]** asbestos removal
[√] welding
[√] hazardous waste
[√] excavation / trenches (>1.5m)
[√] working around electrical installations
[√] working near traffic
[√] working at a height (>3m)
[√] working in isolation.
[√] working in a confined space
[√] manual handling
[√] repetitive or awkward movements
[√] lifting or moving awkward or heavy objects
[x**]** demolition work

- ***Is there (Tick boxes)***

[√] noise
[√] dust/fumes/vapours/gases
[√] extreme températures
[√] risk of fire/explosion
[√] slippery surfaces/trip hazards
[x] poor ventilation/air quality
[x] a poorly designed work area for the project/task

2. Mitigation Measures & preparedness

For any projects/tasks that present a high or extreme risk, a Safe Work Method Statement must be completed.

- ***Note how you will control the risk following the priorities listed to the right. This may include controls like redesigning the workplace, using guards or barriers, ventilation, using lifting equipment or personal safety equipment.***

1. Eliminate the hazard
2. Installing Safety net for height fall
3. Keep the hazard and people apart
4. Change work methods
5. Conducting induction training, safety training & mock drills.
6. Use personal protection

- ***Note any specific risk assessments required for high-risk hazards. Check whether any hazards noted in step 2 require further assessment or action***

  [√**]** hazardous substance risk assessment **[√]** confined spaces risk assessment
  [√ **]** test and tag electrical equipment **[√]** sound level test
  [√**]** Inspection of scaffolding

- ***Note Permits/Licenses/Registration required***
  [x**]** Demolition work **[x]** Friable asbestos removal
  [√ **]** Electrical wiring **[x]** Ionizing radiation sources
  [√ **]** RMC pumps **[√]** registers for, Personal protective Equipment, training, ladders, lifting gear

- ***Note certificates of competency/licenses for operators***
  [√] Scaffolding **[x]** Pesticide application
  [x] Rigging **[√]** Crane operation
  [√] Load shifting machinery operation **[√]** Hoist operation

- ***Note emergency systems required***
  [√] first aid kit **[√]** Fire control
  [√] extended first aid kit **[x]** remote communication mechanism
  [√ **]** emergency stop button **[**√ **]** BMS System
  [√] additional emergency procedures

Table 6.3: Risk and Mitigation measures

Sr. No.	Operations	Risk	Mitigation Measures
1.	Tower Crane	Injury, Fatal accident, Contact with high voltage live wires	Certified by Competent person, Operated by trained & Certified personal, Preventive maintenance, Use work permit system, Use of PPA/PPE Safe Operating Procedures (SOP)
2.	Construction/material Hoists	Personal injury Accidents	Only approved hoist to be used by trained employees with safe area demarcation Inspection by competent person, Safe work instruction, Correct Use, Training, Testing before use for SWL Use of PPE/PPA, Fencing
3.	Passenger lift	Fatal /major Accident	Certified/approved passenger lift to be used by trained employees, With safe area demarcation, Use of PPA/PPE
4.	Portable electrical equipment	Burn/fatal	To be checked before use by Approved Electrical safety official Use of PPA/PPE
5.	Pressure vessels	Pressure air Rupture	Compressors, For Jack Hammer, AHU (Air conditioning)Ice Plant, Inspection of Safety valve, proper rubber fittings, Vibration to be

Sr. No.	Operations	Risk	Mitigation Measures
			avoided Use of PPE/PPA, Training
6.	Hazardous substances	Fire, explosion Toxic release Unhygienic Dust	Storage of Bulk Fuel. Paints, Plastic Plywood Combustible, Store as per HAZMST Rules, Use of PPE/PPA, Training
7.	Scaffolding	Fall from Height Fatal accident	Introduction of Working on Height permit system, PPE/ PPA/ safety belt /Training
8.	Ladders	Accident, Injury	Proper selection, Inspection, PPE/PPA, Training
9.	Material Lifts	Accidental, Injury Even Fatal	Inspection by competent person, Safe work instruction, Correct Use, Training, Testing before use for SWL, Use of PPE/PPA
10.	Material handling cranes	Accidental, Injury Even Fatal	Inspection by competent person, Ergonomic training, Use of PPE/PPA, Safety Guards
11.	Using tools/equipment with moving part(s)	Nipping, Injury to Hand , Electrical Shocks Leg Injury	Proper selection of Hand tool, Periodic Inspection, Use of proper hand glove, PPE/PPA, Training, Safety guard in case of Grinder
12.	• Using tools/equipment that vibrate • Electrical wiring • Asbestos removal • Welding	• Vibration hazard • Electrical shocks • Asbestosis • Eye, Body Burns Toxic gases inhalation	Inspection by competent person, Ergonomic training, Use of PPE/PPA, Safety Guards
13.	Working around electrical installations/working near traffic / working at a height (>3m) / Working in isolation. Working in a confined space/ demolition work	Electrical shocks, Injury, Fatal accident, Hazard of toxic, Gases inhalation	Work by Authorized trained person, Indian electrical safety rules to be followed, Work permit system, Work environment in confined space, Use of PPE/PPA
14.	Work environment 1. Noise 2. Dust/fumes/vapours/ gases 3. Extreme températures 4. Slippery surfaces/ trip hazards 5. Poor ventilation/ air quality 6. A poorly designed work area for the project/ task	Accidental Injury, Occupational Hazards, Rashes, Burn , Skin deceases	Enclose noise source, Lubrication, Min time exposure, Use of PPE/PPA, Good Housekeeping, Illumination survey, Trainings

❖ EXCAVATION ACTIVITY

➢ Excavation Risks:

- The most common hazard at any work site is the threat of cave-in. A cave-in occurs when walls of an excavation collapse
- Accidental contact with utility lines
- Crushing and striking hazards posed by mechanized equipment
- Atmospheric Conditions
- Materials/Equipment falling into excavation site
- Struck by Accidents
- Asphyxiation
- Explosion
- Fall Hazard

➢ Mitigation:

- Re-route traffic whenever possible, and keeping only the heavy; Construction equipment needed near the excavation
- Keeping the spoil pile at least 2 feet back from the edge of the excavation
- Pumping water out of the excavation before any one enters it
- Using protective systems when required
- Establish and maintain a safety and health program for the worksite
- Provide adequate systematic policies, procedures, practices
- Wear warning vests when near traffic
- Trained employees to operate heavy equipment
- Passing order to Stay away from loads being handled by lifting/digging equipment
- Use barricades, hand or mechanical signals, stop logs to keep operators safe
- Barricade or cover wells, pits, shafts
- Use appropriate PPE's.
- Trenches 4 m or more feet deep need a safe means of egress
  - Stairway
  - Ladder
  - Ramps
- Means of egress shall kept fixed and secure
- Keep surface materials approx 2 feet from the edge of excavation sites
- Emergency evacuation drill will be carried before monsoon
- Emergency lighting arrangement shall be in place

❖ OTHER CONSTRUCTION ACTIVITIES

➢ Other Risk & Hazard area during construction activities:

- Tower crane lifting
- Gas cutting & welding
- Bar Bending & Bar cutting
- Plywood cutting & drilling
- Height working
- Material storage

➢ Mitigation for other risk & hazard area:

- After safety officer inspection tower crane shall be operated under the direction of EHS engineer. Electrical cables & it's condition & working shall be examined by competent person periodically. Fork and sling will be examined by engineer and worker before operating. Certified employee will be appointed for job
- Trained & experienced employee will be appointed for gas cutting & welding activities. Appropriate safety measures will be taken for cylinder storage and its equipments. Pressure regulator valve, nozzles, blow pipe, flexible hose and flash back arrester shall be checked

by safety officer before workers operating. Appropriate PPE's shall be given to employee & also will ensure its use. Hand held helmet with filter lens shall be provided to welding/cutting operator to prevent his eye vision

- Trained & experienced employee will be appointed for bar bending & cutting activities. Sufficient space will be provided for job. Appropriate PPE's shall be given to employee & also will ensure its use
- Trained & experienced employee will be appointed for Ply cutting & drilling. Sufficient space will be provided for job. Appropriate PPE's shall be given to employee & also will ensure its use
- Safety belt, harness and lifeline with PPE's shall be provided to workers working at height. Such activities will be carried out under safety supervisor's supervision
- All noise creating machines shall be installed with insulation & rubber padding
- All the materials should be stacked on the leveled ground, all the materials should be stacked, providing good aisles between them for receiving the materials
- Diesel & Petrol above 1000 litres or 32 litres shall be stored as per The Petroleum Act

Initially with first preference Safety team had been formed to control & reduce the possible hazards and risk which may occur. A detail of safety committee is been described below:

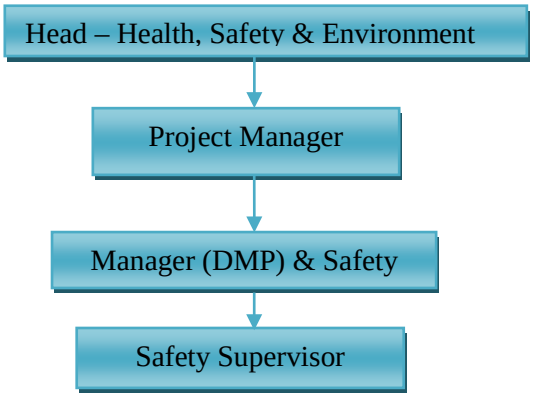


Fig 6.2: Organization chart of Safety Committee

- **Roles & Responsibilities:**

Position: Project Manager

The responsibilities and duties shall include the following:

- Responsible for completion of the project with the relevant statutory rules and regulations.
- Responsible to ensure that all staff & workmen are competent to perform their tasks safely in Disaster
- Ensuring that workmen is effectively implemented engineers solutions during evacuation process
- Establishing adequate control measures for the employee's fitness in order to avoid fatigue, stress, extended working etc.
- Make arrangement and ensure that required inventory resources are available or not to tackle disaster
- Make arrangement of fund from the management to purchase required equipment for tacking any disaster.

Position: Manager (DMP) & Safety

The responsibilities and duties shall include the following:

- Take necessary actions and decisions during an excavation

- Allotting an certified contractors for an job
- Ensure the quality and durability of all necessary equipment and aids required for construction
- Ensure the quality and durability of all necessary equipment required to tackle any disaster
- Should contact outer bodies, police, fire brigade & emergency rescue team for evacuation during any disaster
- Should prepare a team and allot the roles & responsibilities to team members for an evacuation during any Disaster
- Go through the checklist filled by an HSE Engineer to maintain the safe working

Position: Safety Supervisor

The responsibilities and duties shall include the following:

- Disseminate and Communicate HSE Policy, HSE Management System requirements to site personnel.
- Provide necessary advice, information and support in the effective implementation of the HSE Management System requirements and this HSE plan.
- Updating the HSE Plan to the requirements of the activities being carried out when there is a revision.
- Plan and conduct Internal HSE training programs, initiate drive to promote HSE awareness and performance
- Dangerous occurrences & recommend appropriate corrective measures.
- Convene HSE Committee meeting & minute the proceedings for circulation & follow-up action
- Advice & co-ordinate for implementation of Work Permit System
- Plan procurement of PPE & safety devices and inspect before use as per laid down norms.
- Facilitate screening of workmen and conduct HSE induction
- Monitoring administration of First Aid.
- Conduct Fire Drill, Procure, inspect and arrange to maintain Fire Extinguishers.
- Organize campaigns, competitions & other special emphasis programs to promote HSE in the workplace
- Record, First Aid Cases, Near Miss Cases & Accidents to all project personnel
- Maintain all HSE related documents
- Update HSE training records

All Employees

The responsibilities and duties shall include the following:

- Report all unsafe acts and condition to the immediate supervisor
- Start work only when conditions are safe and stop work when it is unsafe
- Operate equipment only when authorized and prescribed manner.(If applicable)
- Report any injury or accident immediately

Sub-Contractors

All Subcontractors/Vendor/Supplier/Third Party performing services at the Project site shall be subject to this plan requirement

- Shall understand the HSE code of conduct for subcontractors and sign the same as a token of acceptance before starting the activity
- Subcontractor, his Supervisor and his workmen shall adhere all the laid down HSE rules & Regulations while working at site, follow the instruction / advice of Safety Supervisor & Manager (DMP) & Safety from time to time

a) Prepare Inventory of Resources (Rescue equipment, medical equipment for emergencies, ambulances, hospitals, NGOs and disaster management related material and personnel

- Rescue equipment's / Safety Equipment's
  - Fall arrestor system
  - Safety belts
  - Safety Helmets
  - Safety shoes
  - Safety Net
  - Agro Safety Net – Green colored
  - Barricading tape
  - Barricading Steel poles
  - Fire Extinguishers
  - Sand Buckets
  - Fire Jackets
  - Reflective Jackets

b) Maintenance of systems/equipment necessary for tackling disasters

- Maintenance of systems/ equipment necessary for tackling disaster will be done periodically by an competent person after getting checked during mock drill

c) Warning System

- Security will do the announcement by fan horn or reflex horn speaker in the guidance of Manager (DMP) & Safety.
- Provision of fire alarm switch at security room.

e) Organize extensive training for disaster managers and assistants

- In every three months training will be arranged by Chhaganlal Khimji & Co. Ltd. for disaster managers & assistants, also for all the workers. Disaster manager such as Manager DMP & Safety, Safety Supervisors.

3. Response Plan

❖ **Emergency Preparedness and response plan for construction phase**

An emergency having medium risk (cautionary risk) to high risk (critical risk) associated with it needs to be treated as **non-tolerable** or **unacceptable**. Projects use *Periodic Management Attention* and *Continuous Management Attention* as a strategic tool to manage cautionary risk and critical risk respectively.

Accordingly, Project Specific Emergency Response Plan is evolved incorporating five components;

- Prevention
- Preparedness
- Response
- Recovery
- Mitigation

Table 6.4: Components of Emergency Preparedness & Response Plan

Components	Explanation/Associated Elements
Prevention	Prevention may not be always practical in case of natural disasters. But certain planning consideration (**refer Enclosure**) can help minimize the impacts during above emergency situation. Contrary, towards man-made emergency, prevention can be quite effective. Example- incidents and occupational diseases can be prevented by applying various controls; elimination, substitution, engineering, administrative & personal
Preparedness	It involves developing mechanism towards emergency preparedness a. Defining EPR team structure at project level b. Demarcation of roles, responsibility & authority

	c. Determining line of command and control d. Allocation of resources including training e. Developing & maintaining inventory of emergency management equipment's Preparedness also involves periodical testing through planned **Mock Drill & Table Top exercises**
Response	Response is execution of preparedness plans and typically involves, a. Put preparedness plan in execution b. Evaluate its effectiveness i.e. determine the gap between the plan and the execution c. Revisit plan and improve it in view of gap analysis (as part of Mitigation) d. Incorporate the learning's for continual improvement
Recover	Response is followed by **recovery** wherein projects need to take steps to bring back normalcy as soon as possible. The focus should be to maintain **continuity of business** by minimizing / eliminating disruptions and delays. Typically recovery involves the following (but not limited to) a. Clear up from the incident or help the people involved overcome their mental trauma b. Consultation and coordination with contractors, suppliers and internal functions to streamline the work and the supply c. Repair/renovate offices, Labour camps, stores, work fronts, machinery/equipment d. Sanitization of entire area including canteen and utilities- water supply, wash rooms, & toilets/urinals e. Pest Control f. Preventive Health Check-up & consultation g. Reorganizing workforce and re-inducting them
Mitigation	Mitigation involves taking steps to ensure no re-occurrence is possible, or putting additional plans in place to ensure less damage is done next time. This should feedback in to the preparedness stage, with updated plans in place to deal with future emergencies.

<table>
<tr><th>Plan Components</th><th><u>Incident</u></th></tr>
<tr><td>Prevention</td><td>• PPE shall be mandatory on site for all. Edge barricading to all openings on the floor, ducts and excavated places.
• Safety and warning signage shall be placed at hazardous areas. Safety induction and TBT shall be carried out on site for all workforces.</td></tr>
<tr><td>Preparedness</td><td>• Continuous supervision of safe working environment.
• Special training shall be conducted on site to deal with any type of incident.
• Sufficient stretcher shall be kept on site for immediate response during incident. Availability of first aider, first aid box and medical health center.
• Preparedness for mention incident types as per below table:
<table>
<tr><th>Type of Incident</th><th>Mock Drill</th><th>Table Top Exercise</th><th>Audit</th></tr>
<tr><td>Fall of person from height.</td><td>Yes</td><td>Yes</td><td>Yes</td></tr>
<tr><td>Structure collapse.</td><td>Yes</td><td>NA</td><td>NA</td></tr>
<tr><td>Fall of any material from height.</td><td>No</td><td>Yes</td><td>Yes</td></tr>
<tr><td>Excessive bleeding.</td><td>NA</td><td>Yes</td><td>Yes</td></tr>
<tr><td>Failure material hoist or any lifting equipment.</td><td>NA</td><td>NA</td><td>Yes</td></tr>
<tr><td>Electrical shock / Electrocution.</td><td>NA</td><td>Yes</td><td>Yes</td></tr>
</table></td></tr>
</table>

	Unconscious victim within a confined space.	Yes	NA	NA

Mock Drill (Frequency & methodology):
Incident evacuation drill shall be carried out quarterly.
line of Method :-

- Emergency siren will be blown.
- Head Count
- Rescue the victims.
- First Aid for minor injury.
- Victim will be moved to hospital.
- Emergency stopped up siren will be blown.

Response	• As to see the effectiveness of the Preparedness plan for an Incident it shall be executed at site as per the plan. • Its effectiveness shall be evaluated to understand the gap between the plan and the execution on the basis of timelines, roles and responsibilities given to EPRT members.
Recovery	• The sufferer of the incident shall be provided with adequate medical facilities to recuperate from the incident.
Mitigation	• Additional plans will be put up in place to avoid any kind of incidents on site during work.
Identify site disaster manager for handling disasters with clearly enumerated functions	• Manager (DMP) & Safety will handle disaster with his safety team with clearly enumerated functions during construction phase • M/s. Chhaganlal Khimji & Co. Ltd. will appoint an Manager (DMP) & Safety for handling disaster by keeping in view of his English knowledge, fire safety exposure, communication skill and his contact with public & local NGO's

Plan Components	**Fire**
Prevention	• All the flammable material shall be kept at a designated place. • Fire extinguishers, buckets etc. Shall be put up all across the site. • Operational Training for fire extinguishers will be given to all.
Preparedness	• Fire prevention accessories shall be maintained at site. • Installation of Fire hydrant, smoke detector & sprinkler systems on site. • Assembly point and fire exit shall be notified at a specific place for all to gather whenever the fire takes place on site. • Fire exit shall be away from debris. Contact nos. of local Fire brigade and Fire Marshalls as well as nearest hospitals shall be displayed all over the site. • The site shall be having its own First Aid Center and ambulance.

Mock Drill (Frequency & methodology) for Class A, B and C
Emergency evacuation drill shall be carried out quarterly.

- Emergency siren will be blown.
- All workers will be gathered at Assembly point.
- Head Counting
- Rescue the victims.
- Fire will be put out by fire Marshalls or fire brigade.
- Emergency stopped up siren will be blown.

Response	• As to see the effectiveness of the Preparedness plan for Fire it will be executed at site as per the plan. • Its effectiveness shall be evaluated to understand the gap between the plan and the execution on the basis of timelines, roles and responsibilities given to EPRT members.
Recovery	• To recover from the Fire; Immediate renovation shall be done for offices, Labor camps, stores, work fronts, machinery/equipment, also all this will be recovered with the help of insurance. • Immediate reorganizing of work force will be done to maintain continuity of business without any delay.
Mitigation	• Additional plans will be put up in place to ensure less destruction and losses should occur during fire. • And for this additional insurance plan will be introduced. Fire Drill will be reorganized time to time to compact with future emergencies.

Plan Components	**Earthquake**
Prevention	• Inspect every item that could fall, spill, break or move during an earthquake. • Follow safety codes & building codes for building earthquake resistance structure when constructing a project. Project should be inspected by structural engineer. • Heavy items shall be moved away from where people work. • Fixed equipment and heavy machinery shall be secured to the floor.
Preparedness	• Disaster management accessories shall be maintained at site. • Assembly point shall be notified at an open specific place for all to gather whenever the earth quake takes place on site. • Emergency contact nos. shall be displayed all over the site. • All workforces shall follow the EPRT member's instruction.
	Mock Drill (Frequency & methodology): Emergency evacuation drill shall be carried out quarterly. line of Method :- • Emergency siren will be blown. • All workers will be gathered at Assembly point. • Head Counting • Rescue the victims. • Emergency stopped up siren will be blown.
Response	• Preparedness plan effectiveness shall be evaluated to understand the gap between the plan and the execution on the basis of timelines, roles and responsibilities given to EPRT members.
Recovery	• To recover from the Earthquake incident Check with insurance bodies for life & property damages and Immediate Repair/renovation shall be done for offices, Labor camps, stores, work fronts, machinery/equipment. • Immediate reorganizing of work force shall be done to maintain continuity of business without any delay. • Moral support shall be given to workmen to come out from the • Confrontation.
Mitigation	• Additional plans shall be put up in place to ensure less damage and losses should occur during earthquake. • Earthquake and other EPRP shall be updated time to time to deal with future emergencies.

Plan Components	Monsoon
Prevention	• Proper dewatering and drainage system shall be implemented on site to avoid flooding. • Site is under flood area or not, this shall be confirmed through the local emergency management office. • To avoid electrical hazard during monsoon ELCB system shall be used. In addition, to all the electrical cable joints shall be properly insulated.
Preparedness	• Monsoon preparedness checklist shall be circulating to all concern contractor & internal site team • Dewatering pumps shall be purchased and placed all over the site during monsoon. • Drainage system shall be specially designed for flooding so that water log jam is avoided. • All construction equipment/machinery/official documental records shall be ready to shift at a safe place where flood could damage the same. • All Electrical Distribution equipment shall keep under weather proof shade on proper elevated platform. • Emergency lighting arrangement shall be in place.
	Mock Drill (Frequency & methodology): Emergency evacuation drill will be carried before monsoon. line of Method :- • Emergency siren will be blown. • All workers will be gathered at Assembly point. • Head Counting • Rescue the victims. • Emergency stopped up siren will be blown
Response	• As to see the effectiveness of the Preparedness plan for monsoon it shall be executed at site as per the plan. • Its effectiveness shall be evaluated to understand the gap between the plan and the execution on the basis of response timelines, roles and responsibilities given to EPRT members.
Recovery	• To recover from the monsoon disaster Immediate Repair/renovation shall be done for offices, Labor camps, stores, work fronts, machinery/equipment. • Pesticides shall be used all over the flooded or water logged area to avoid any health contamination on site. • Medical check-up for all workforces shall be done to ensure and control epidemic situation on site.
Mitigation	• Additional plans (as per observation during mock drill) shall be put up in place to ensure less damage and losses should occur during monsoon. • Monsoon prevention plans shall be updated time to time to deal with future emergencies.

Plan Components	Occupational Diseases
Prevention	• Respiratory PPEs, hand gloves, face shield, ear plug etc. and other safety precautions shall be taken care of to avoid the occupational diseases. • Adequate information shall be given to all workers regarding occupational hazards and its prevention. • Educate the works for knowing the important of PPE's to understand its importance. • Special training sessions shall be conducted on site to ensure that occupational hazards are eliminated through use of proper means of safety.

Preparedness	• Adequate information shall be given to all workers regarding occupational hazards and its prevention. • Educate the works for knowing the important of PPE's to understand its importance. • Special training sessions shall be conducted on site to ensure that occupational hazards are eliminated through use of proper means of safety.
	Mock Drill (Frequency & methodology): NA
Response	• As to see the effectiveness of the EPRP for Occupational Diseases it shall be executed at site as per the plan. • Its effectiveness shall be evaluated to understand the gap between the plan and the execution on the basis of timelines, roles and responsibilities given to EPRT members.
Recovery	• To recover from the occupational diseases continuous improvement on site safety conditions shall be observed. • Periodical health checkup shall be done for specialized worker who are exposed to hazards material on daily basis.
Mitigation	• Awareness programme will be placed time to time to reduce the effect of occupational diseases.

4 . Control Room

a) Earmark a specific area to function as control room for disaster management

- Security Control Room during Construction phase is at the main entry gate:
- The traffic in the area comprises
  - Regular workers
  - Vendors

Table 6.5: The control room is at the main entry gate. Entries are controlled as follows:

i)	Regular workers	•	Recognition
		•	Distinct ID Card
		•	ID through card reader
ii)	Vendors	•	Temporary pass with time validity (with the consent of Resident)

b. Display proper maps-Telephone nos. of disaster controlling authorities showing firefighting equipments

- Fire Brigade contact number is provided below in operation phase and all contact nos. will be displayed during construction by safety committee

5. On-Site of Disaster

a) Site disaster manager to take charge and give guidance over public address system

- Project manager will take charge and give guidance over public address system
- Assembly point shall be identified and marked. Mega phone shall be used to address the emergency to employees.

b) Call for outside assistance of fire brigade, Hospital, ambulance

- Manager (DMP) & Safety will call for outside assistance of fire brigade, Hospital, ambulance.
- In absence of Manager (DMP) & safety project manager will call outside for assistance.

c) Network with State, district and ward level control rooms

- Ward level details are provided below in Operation Phase

d) Ensure adequate warning before switching off power

- All announcements will be done with good quality equipments
- Manager (DMP) & Safety will ensure with Safety Supervisor that all worker are stopped working and shut downed the machines &equipments before switching off emergency control switch.
- The main electrical switch during construction Phase will be placed at the site office.

e) Assure workers of continuous communication and take all measures to keep up their morale

- Project manager will do continuous announcements by various methods to keep up workers morale

f) Guide workers on the steps being taken for evacuation in a systematic manner

- This requirement will be handled by dedicated trained staff/volunteers.

g) Take steps to reduce/ eliminate panic

- Periodical training to internal Volunteers &Officers.
- Periodical mock drills to all Workers, Officers, volunteers and staff in every three months.

h) Liaise with Law & order Machinery

- Project manager will liaise with police Fire Brigade, Civil Defense & BEST etc.

6. Preventive Maintenance

a) Regular maintenance of Equipments& Systems

- Periodical maintenance will be carried by certified, competent and skilled employed contractors at regular intervals.

B. OPERATION PHASE

1. Risk assessment & vulnerability analysis of possible disaster

❖ **Hazard Identification And Safety Assessment**

➢ **Identification of potential structural hazards existing in the area**

- Structural safety of the building needs to be assessed with regards to its safety from hazards like earthquakes, cyclones, floods and fire.

➢ **Identification of potential non-structural hazards existing in the area**

- DMC plan should be in that position to identify the potential hazards that frequently occur in that area. It is therefore necessary for us to identify potential hazards to which the building might be exposed. For this a hazard assessment shall be conducted by taking into account the history of disasters that have occurred in that area for the last 20 - 25 years. Based on the hazard assessment, the members of the DMC will prepare the Disaster Management Plan.

➢ **Points to remember while coordinating a survey**

- Through survey of the building and surrounding area such as low lying area, nallah, pitch hill or any municipal tank etc.
- The areas which would cause problems in an earthquake, flood, cyclone, fire are identified.

❖ **Possible disasters** : Fire/ Flooding / Earthquake / Bomb Explosion / Terror Attack / Structural Problems / Lightening / Power Failure / Fire – Smoke /Electrical Fires / Manmade Emergency / Fall From Height.

❖ **Disaster Response Team**

Initially the Disaster Management Committee will be formed by the developer/society members. The Facility Manager/Security In-charge will be competent enough to handle various disasters, and will be In-charge to look after the complete process of DMC (Disaster Management Committee). DMC will be divided into three groups namely: Co-ordination group, Disaster Awareness group, and Disaster Response group. The roles and responsibilities of various groups are defined in subsequent paragraphs.

The building will have one Security In-charge/Facility Manager (and alternate), one assistant Security guard (and alternate) who will direct the evacuation of persons from their respective areas as quickly as possible in a safe and controlled manner. The list of building evacuation team members is maintained by Disaster management committee.

The given figure 6.3 demonstrates the structure of organization structure of the Disaster Management Committee.

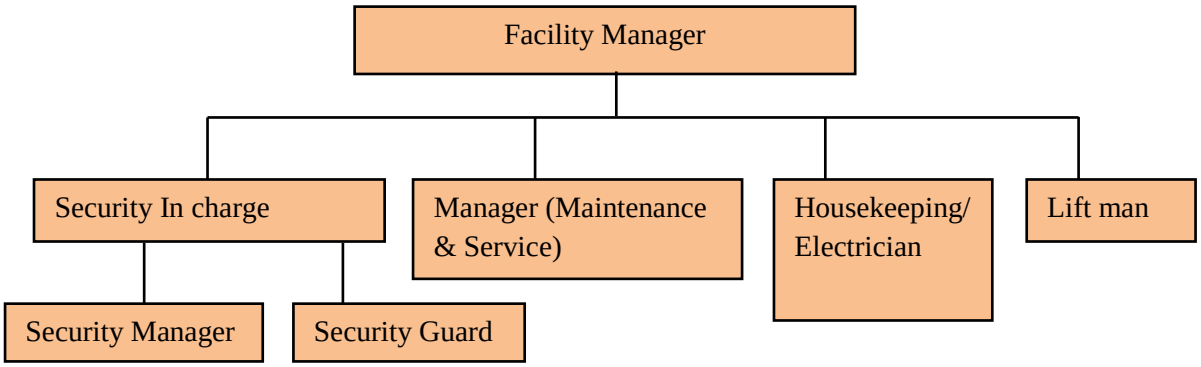


Fig 6.3: Organization chart of the Disaster Management Committee

➢ **Roles And Responsibilities Of Disaster Management Committee**

- Look into the structural safety requirements of the building for various hazards (earthquake, fire, floods, cyclone, etc.) Get the buildings assessed for the hazards identified and take prompt remedial measures, as required
- The members of the DMC shall have an understanding of the disaster management policy and planning principles
- Evaluation of the Disaster Management plan
- Carrying out the mock drill twice a year
- Updating of the plans at regular intervals (at least once a year, and after any significant disaster) to ensure that the plan is workable
- Earmark fund arrangements for carrying out preparedness and mitigation measures in the building
- Declaring emergencies and implementing the emergency plan
- Implementing evacuation procedures
- Contacting emergency services (fire, police, ambulance) and utilities
- Establishing a command post, chain-of-command and reporting procedures
- Assessing and obtaining emergency services, supplies and equipment
- Ensuring the safety of staff and volunteers at all times during an emergency
- Arranging for off-site storage and work facilities
- Arranging the transfer of collections to a safe site
- Recording the movement of collections
- Implementing and supervising salvage procedures for collections
- Contacting, training and supervising volunteers

- Documenting all aspects of the response / recovery procedures
- Meeting with the press
- Preparing post-emergency reports

➢ **Facility Manager**

- Ensures that the appropriate outside emergency agencies have been notified
- Coordinates the activities of all building emergency staff and floor in-charge
- Coordinates all occupant notification and makes sure that any necessary evacuation or relocation begins
- Ensures adequate monitoring and control of all building life safety systems and equipment
- Confirms that any investigation of the fire or source of the fire alarm, or initial suppression of a fire, is performed
- Arranges for responding emergency personnel to be met at the designated entrance of the building and give an up-to-date report on the incident (including its location and any reported injuries), the status of security and building fire life safety systems, and the location and status of all evacuees and building emergency staff addressing the incident (building information forms, notification of specific hazards, floor plans, essential keys and access cards, etc., also should be readily available)
- Ensures that every incident is thoroughly documented and that required notifications and reports to the appropriate authorities are carried out

Table 6.6: Responsibility Matrix

Goal: To keep the disaster management plan up to date 24X7		
Objectives: To safeguard the occupants and neighbors in the event of disaster		
Scenario	**Who is responsible**	**When to contact and how**
Lift failure	Facility Manager/Security In-charge/lift man	Lift does not move. From the lift, use the alarm. If outside use phone (internal) or reverse alarm system (not running on electricity or battery backup
Fire in building (limited area)	Security In-charge, Facility Manager	Press the nearby fire alarm or call to control room
Fire in large area (floor)	Security In-charge, Facility Manager	Press the on floor and down floor fire alarm or call to control room
Fire in utility areas	Security In-charge	Press the utility area fire alarm or call to control room
Electrical failure	Electrician	If power goes off only of your floor then call to the control room for electrician
Water supply interruptions	Security In-charge, Maintenance & Service manager	If water don't come to only your home then contact control room
Building damage (minor)	Security In-charge, Maintenance & Service manager	If any leakages to your floor or home then contact control room and note complaint and also raise the point in general society meeting
Building damage (major)	Facility Manager	If any fall of plaster to your floor or outside home, major cracks then contact control room and note complaint and also raise the point in general society meeting
Audible and Visible Alarms	Facility Manager	If alarm doesn't work during periodical checkup then call control room and note complaint

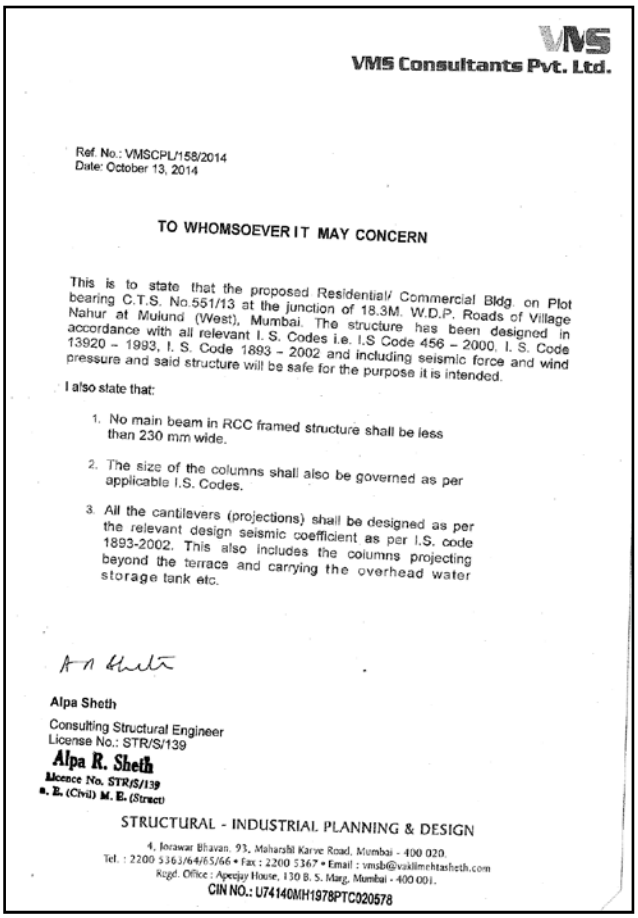
Emergency Staff	Security In-charge	If any disaster occurs then call control room for help

I. NATURAL DISASTER:

❖ Earthquake: Seismic Environment & Precautions

Mitigation Measure:

- As per the Seismic Zoning Map of India, Mumbai region falls under Seismic Zone-III. The structural design is base on following Indian Standard Codes of practice and shall render the buildings safe and stable.
  1. IS 456-2000-Code of practice for plain and reinforced concrete
  2. IS 13920-1993
  3. IS 1893- 2002- Code for Earthquake resistant Design of Structure



VMS
VMS Consultants Pvt. Ltd.

Ref. No.: VMSCPL/158/2014
Date: October 13, 2014

TO WHOMSOEVER IT MAY CONCERN

This is to state that the proposed Residential/ Commercial Bldg. on Plot bearing C.T.S. No.551/13 at the junction of 18.3M. W.D.P. Roads of Village Nahur at Mulund (West), Mumbai. The structure has been designed in accordance with all relevant I. S. Codes i.e. I.S Code 456 – 2000. I. S. Code 13920 – 1993, I. S. Code 1893 – 2002 and including seismic force and wind pressure and said structure will be safe for the purpose it is intended.

I also state that:

1. No main beam in RCC framed structure shall be less than 230 mm wide.
2. The size of the columns shall also be governed as per applicable I.S. Codes.
3. All the cantilevers (projections) shall be designed as per the relevant design seismic coefficient as per I.S. code 1893-2002. This also includes the columns projecting beyond the terrace and carrying the overhead water storage tank etc.

Alpa Sheth
Consulting Structural Engineer
License No.: STR/S/139
Alpa R. Sheth
Licence No. STR/S/139
B. E. (Civil) M. E. (Struct)

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CIN NO.: U74140MH1978PTC020578

Fig. 6.4: Structural Stability certificate

❖ Floods:

Particularly in Mumbai, areas having poor drainage characteristic get flooded by accumulation of water from heavy rainfall.

Mitigation measures would be taken by Proponents to manage flood disasters:

- Minimizing the incremental runoff from the site with the help of 3 rain water harvesting tanks of total capacity 154 KL.
- Proper management of channelization of storm water from site and outside catchment area by using proper internal SWD system and 2 discharge points of having adequate capacity (0.55

m^3/sec)

- Use of screens and silt traps to SWD
- Proper maintenance of storm water drainage to avoid choking of drains and flooding on site
- Ensure discharge of storm water from the site is clear of sediment and pollution
- Provision of 8 nos. of sump pumps
- Existing external drain of adequate capacity (0.84 m^3/sec)

Fig 6.5: SWD Layout

❖ **Cyclones:**

Cyclones are caused by atmospheric disturbances around a low-pressure area distinguished by swift and often destructive air circulation. They are usually accompanied by violent storms and bad weather.

There is no history of any cyclone in this area. However in such an instance the occupants should be advised to stay in the shelter in tightly secured windows and doors. The glass of windows etc. should be covered with paper/cardboards to avoid glass breaking due to flying objects outside.

❖ **Lightning:**

Lightning is an atmospheric electrostatic discharge accompanied by thunder which typically occurs during thunderstorms and sometimes during volcanic eruptions or dust storms. It often leads to physical damage to the building and occupants. It can also lead to short circuits, failure of power supply and fire.

Mitigation measure:

- Lightning arrestor systems shall be provided for entire project to abate the impact of lightning hazard.

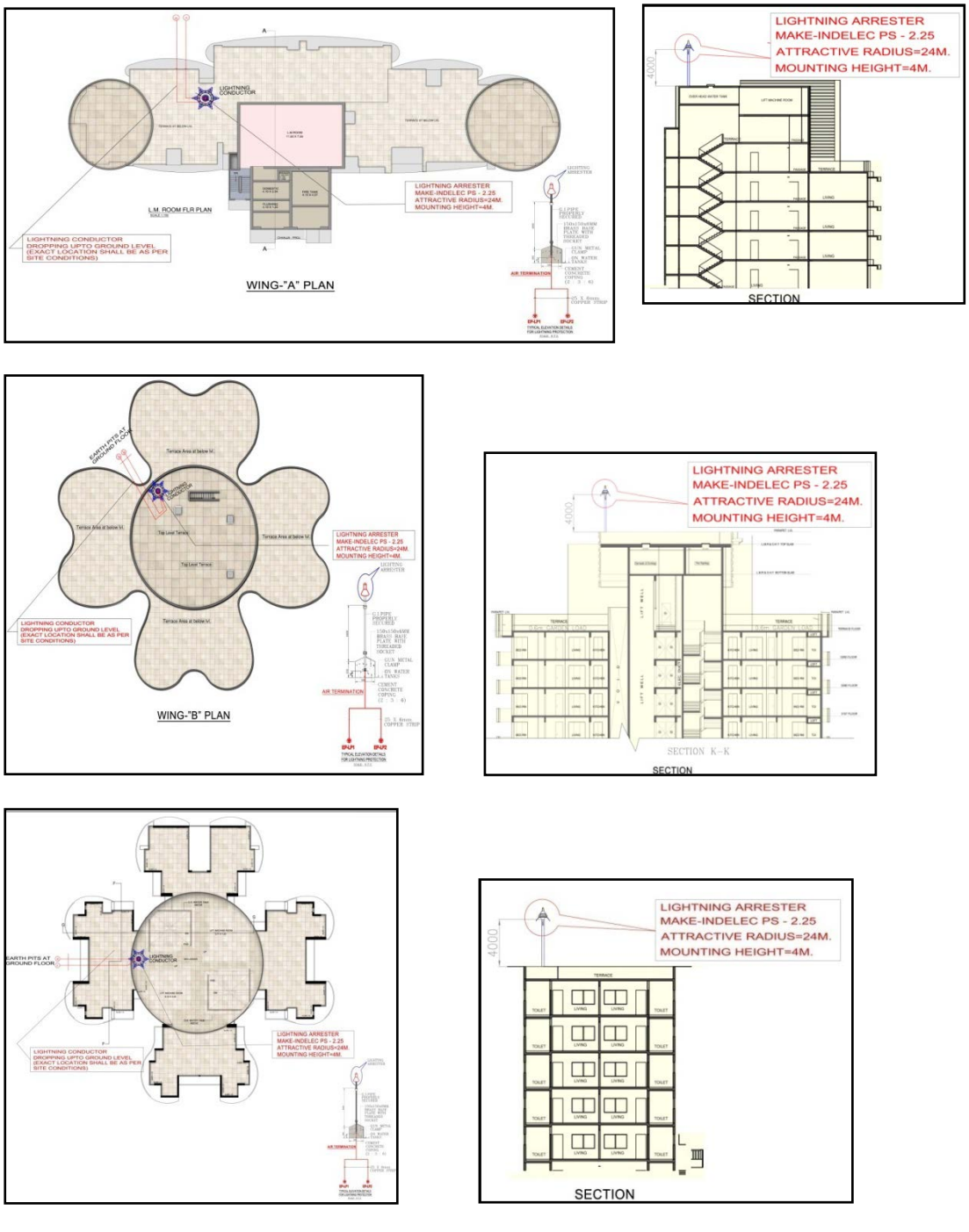

Fig 6.6: Lightning arrestor plan

II. Man Made Disaster

❖ Bombs & Other Terrorist Activities

Bombs can be constructed to look like almost anything and can be placed or delivered in any number of ways. The probability of finding a stereotypical- looking bomb is almost nonexistent. The only common denominator among bombs is that they are designed to explode. Most bombs are homemade. Only the imagination of and the resources available to the bomber limit their design. When searching for a bomb, suspect anything that looks unusual. Let the trained technician determine what is or is not a bomb. Follow the checklist given below:

- Addressee unfamiliar with name and address of sender
- Improper or incorrect title, address, or spelling of name of addressee

- Handwritten or poorly typed address
- Return address and postmark are not from same area
- Excessive postage or unusual stamps used versus metered postage
- Special handling instructions on package (special delivery, to be opened by addressee only, foreign mail, and air mail, etc)
- Restrictive markings (personal, confidential, etc)
- Excessive securing material such as wrapping, tape, or string
- Oddly shaped or unevenly weighted packages
- Bulky, lumpy, or rigid envelopes
- Protruding wires or metal, strange odors
- Mail arrives before or after a telephone call from an unknown person who asks whether the recipient has opened it or who requests that he or she opens it

This is only a general checklist. When an item is in question, the best protection is to make personal contact with the sender of the package or letter but not to open it.

Mitigation Plan

- **Safety Procedure**

To cope with a bomb incident, it is necessary to develop two separate but interdependent plans. The bomb incident plan provides the detailed procedures to be implemented when a bombing attack is threatened or executed. A physical security plan, which is covered in detail in the next section, provides protection of property, personnel, facilities, and material against unauthorized entry, traces pass, damage, or other illegal or criminal acts.

To carry out these plans, a definite chain of command must be established to instill confidence and avoid panic. This is easy if there is a simple structure, or one business, in the building. However, in a multiple-tenant building a representative from each tenant should attend a planning conference. A leader—the Facility Manager, Security In-charge—should be appointed and a clear line of succession delineated. This chain of command should be printed and circulated to all concerned parties. There should also be a command center to act as a focal point for telephone or radio communications. The management personnel assigned to operate the center should have the authority to decide what action is to be taken during the threat. Only those with assigned duties should be permitted in the center, and alternates need to be appointed in case some-one is absent when a threat is received. In addition, an updated blueprint or floor plan of the building should be obtained and kept in the command center.

Contact the police department, fire department, or local government agencies to determine if any assistance is available for developing a physical security plan or bomb incident plan. If possible, have police or fire department representatives and building and tenant staff inspect the building for areas where explosives are likely to be concealed; make a checklist of these areas for inclusion in command center materials.

- **Other Security Mitigation Measures to Reduce the Threat of Bombs**

Controls should be established to positively identify personnel who have authorized access to critical areas and to deny access to unauthorized personnel. These controls should include inspection of all packages and materials being taken into critical areas, as well as the following:

- Security and maintenance personnel should be alert for people who act in a suspicious manner, as well as objects, items or parcels that look out of place or suspicious. Surveillance should be established to include potential hiding places (e.g., stairwells, restrooms, and any vacant space) for unwanted individuals. Designated patrols of such areas will assist in this endeavor.
- Doors or access ways to certain areas—mechanical rooms, mailrooms, computer rooms, data centers, switchboards, and elevator control rooms— should remain locked when not in use. It is important to establish a procedure to keep track of keys. If keys cannot be accounted for, locks should be changed.

- Good housekeeping also is vital. Trash or dumpster areas should remain free of debris. A bomb or device can easily be concealed in the trash. Combustible materials should be properly disposed of, or protected if further use is anticipated.
- Detection devices may be installed at entrances to high-risk tenant areas, and CCTV should be used in areas identified as likely places where a bomb may be placed. This, coupled with posting signs indicating that such measures are in place, is a good deterrent.
- Perhaps entrances and exits can be modified with a minimal expenditure to channel all visitors through someone at a reception desk. Individuals entering a building after normal business hours would be required to sign a register indicating the name and suite or floor number of the person they wish to visit. Employees at these reception desks could contact the person to be visited and advise him or her that a visitor, by name, is in the lobby.
- Security Control Panel with Video Door Phone, Gas Leak Detection, Panic Switch for each hotel rooms.

➢ **Responding to Bomb Threats**

Instruct all personnel, especially those at telephone switchboards, on what to do if a bomb threat call is received. It is always best if more than one person listens in on the call. To do this, a covert signaling system should be implemented, perhaps by using a predetermined signal to a second reception point.

A calm response to the bomb threat caller could result in obtaining additional information. This is especially true if the caller wishes to avoid injuries or deaths. If told that the building is occupied or cannot be evacuated in time, the bomber may be willing to give more specific information on the bomb's location, components, or method of initiation.

➢ **Vital Actions**

The person making the threat is the best source of information about the bomb. When a bomb threat is called in, the person taking the call should do the following:

- Keep the caller on the line as long as possible. Ask him or her to repeat the message. Record every word spoken by the person. (Some building managers and individual tenants may provide audio recorders for this purpose; others by policy do not)
- Pay particular attention to background noises such as motors running, music playing, and any other noise that may give a clue as to the location of the caller
- Listen closely to the voice (male or female), voice quality (calm or excited), accent, and any speech impediment. Immediately after the caller hangs up, report the threat to the person(s) designated by management to receive such information
- Report the information immediately to the police department, fire department, and other appropriate agencies. The sequence of notification should be established in the bomb incident plan
- When a written threat is received, save all materials, including any envelope or container. Once the message is recognized as a bomb threat, further unnecessary handling should be avoided. Every possible effort must be made to retain evidence such as fingerprints, handwriting or typewriting, paper, and postal marks. These will prove essential in tracing the threat and identifying the writer. Although written messages usually are associated with generalized threats and extortion attempts, a written warning about a specific device may occasionally be received. It should never be ignored.

❖ **Aircraft Collisions:**

A building is vulnerable to the remote possibility that an aircraft flying off-course could collide with it or aircraft collide chances may occur. Obviously, the additional height, as compared with other structures, makes them more susceptible. To prevent such collide aircraft warning light shall be installed.

➢ **Aircraft Warning Lights**

- Aircraft warning lights are high-intensity lighting devices that are attached to tall structures that are used as collision avoidance measures. Such devices make structures more visible to passing aircraft and are usually used at night, although they may be used during the day as well. These lights need to be of sufficient rightness in order to be visible for miles around the structure.

➢ **The lights generally come in two forms:**
- Red lamps that are either constantly illuminated or turn on and off slowly in a cycle of a few seconds.
- The luminaires will have an effective intensity of required candelas
- All luminaires will be supplied with minimum capacity required Volt A.C. powers connected to the emergency maintained system.

a) Prepare Inventory of Resources (Rescue equipment, medical equipment for emergencies, ambulances, hospitals, NGOs and disaster management related material and personnel

- All the resources available in the building need to be listed out like: Fire Control System, Sensors.

Table 6.7: List of Inventory of Resources – Operation Phase

Sr. No.	Description	Resource	Location
1.	Rescue Equipment	Steel ropes, ropes, chains, breathing apparatus, harness, torches, radium signal & symbol sign boards, walky talky, dust masks, tyres, Hammer, shovel, spade, mud pan etc.	Society Office room at ground floor shall be provided.
2.	Medical Equipments for emergencies	Wheel chairs, Stretchers, First aid box containing general medicines and equipments	At Society Office room of building. First aid box also provided in Security room.
3.	Other emergency tools	Spare Fire extinguishers, hydraulic jacks, crab winch, pulleys	At Fire control room at Ground floor level.
4.	Other basic utilities and needs	Plastic bucket, plastic glass, plastic plates, blankets, some utensils and required food grains	At Fire control room and Society office room
5.	Other details of the building configuration	Total number of floors in the building The total number of rooms in the building Open areas where evacuation is possible Stairs and lifts locations and uses Open verandas and roof tops	Appropriate info will be displayed at each floor and same sheets will also be kept in Fire control room & Society office for use during emergency. Appropriate signs and symbols will be displayed on each floor for evacuation & exit

b) Maintenance of systems/ equipment necessary for tackling disaster
- All the life saving appliance such as breathing apparatus, Fire extinguishers, Alarm & Public address system to be maintain properly and effectiveness of these should be checked during Mock Drill.

c) Warning Systems
- Facility Manager will announce audio warning in case of fire, lightning or likely flood situation. Each family head will be informed by Security section for preparation by telephone.

- Sirens would be tested at noon on the first Saturday of each month. If you hear the sirens at any other time, than following steps should be taken:

Shelter	Go inside your room or your car and shelter inside to avoid exposure
Shut	Shut doors and windows. Building ventilation systems should be shut off if possible
Listen	Go to near the information source for building emergency information

➢ **Fire, Warning system & Mitigation measures**

- Fire is mainly caused due to negligence, short circuits and malfunctioning of gas regulator, tube and such related products. Hence, all the electrical works and material of the building would adhere to the standards. Fire extinguisher equipment would be evaluated periodically to ensure that it is in working conditions by security manager. If any faulty equipment is observed then it would be repaired or replaced by Society. The map for the evacuation plan would be provided to all the occupants.

- **Fire Alarm & Detection System (warning System)**
  - The Building shall be provided with manual fire alarm system with main control panel at ground floor and pill boxes and hooters at each floor level. The layout of fire alarm system shall be in accordance to relevant I.S. specification.

d) Devise system for two-way communication with the affected persons in the building especially in lifts and rooms

- The entire building shall be provided with the public address system as per the rules.
- Internal Phone in Lift will be available. Intercom in residential/ commercial units

e) Organize extensive training for disaster managers and assistants

- **Training Program:** Regular mock drill will be conducted and same will be reported to Disaster Management Committee

Table 6.8: Safety Drill and Maintenance Needs Updates

Sr. No.	Types of Drills	Frequency of drill	Who must attend	Date of drill and any issues : Log book
1	Earthquake safety	6 months	All occupiers	Log book
2	Fire safety	3 months	All occupiers	Log book
3	Fire and any other equipment maintenance	3 months	Security, Maintenance & Service manager	Must report to Security In-charge and maintain a log book
4	Lift security	3 months	Security, Maintenance & Service manager	Must report to Security In-charge and maintain a log book
5	Water management	3 months	Security, Maintenance & Service manager	Must report to Security In-charge and maintain a log book
6	Safety kit check	6 months	Security, Maintenance & Service manager and Members.	Maintain Log book

Mock drills are conducted to train building occupant and to test the various elements of your response plan in order to evaluate and revise it. During a disaster, life-protecting actions must be taken immediately. There will not be time to decide what to do next; everyone must already know how to react appropriately. After a disaster, further life protecting actions such as emergency evacuation or first aid administration may be necessary; well trained staff will guarantee that these crucial steps are

taken as quickly as possible. Drills and exercises are an extremely important part of the preparedness plan because they

- Teach the occupants of a building how to respond to the complications of an actual disaster
- Helps to evaluate how well all parts of the emergency plan work together and how well the occupants have been trained

➢ **Earthquake**

- Follow the mitigation plan as given in Earthquake section of this DMP
- Practice drop, cover, and hold
- Evacuate building in less than 4 minutes using different exits
- Look out for colleagues, friends, etc.
- Stay away from weak areas
- Help those who need assistance

➢ **Fire / Chemical Accident / Drill**

- Follow the mitigation plan as given in Fire & Fire Alarm section of this DMP
- The need to prepare for sudden accidents needs awareness and sufficient knowledge
- To know Why and how to handle an accident is important
- Information
- Practice mock drills every month

➢ **Flood Drill**

- Follow the mitigation plan as given in Flood section of this DMP
- Listen to flood warning and recognize changes in weather
- Make announcements about precautionary measures
- Provide food, water, sheets, and beds in the place where people will assemble
- Explain how to remain safe outdoors
- Shift money and other valuables
- Put off electricity
- Remove or close down gas connections

3. Response Plan

a) Identify site disaster manager for handling disaster with clearly enumerated functions

- Facility Manager will operate building with clearly enumerated functions during operation phase form Society office room located at stilt floor level

M/s. Chhaganlal Khimji & Co Ltd. will select a Site disaster manager for handling disasters with clearly enumerated functions by keeping in view the following qualification:

Qualification required for Disaster Manager (Facility Manager) to be selected and appointed

- He should be resident of colony
- Must be trained in civil defense
- Should have knowledge about human management
- Should have Technical knowledge about Fire Fighting
- He should know local language to contact mutual help from Fire, MSEDCL. Police Hospital, Nearby NGO, Industries etc Officials

4. Control Room

a) Earmark a specific area to function as control room for disaster management

- Provision Fire control room at at stilt floor level
- Provision of Society Office room shall be provided.
- Provision of Security room at entry/exit of commercial building & watchman cabin at entry/exit gate of residential building.

Security room & watchman cabin during operation phase is at the entry & exit gate of each buildings:

The traffic in the area comprises

- Family members of residents
- Staff of Commercial building
- Regular servants
- Vendors
- Visitors to the residents/ offices
- Representatives of public bodies, couriers companies etc.
- The traffic could be mobile or pedestrian

Surveillance Security System (SSS):

At project site CCTV at common areas & lobby with 24 hour DVR backup, will be provided.

The controlling & processing of CCTV in common areas should be performed through a web based management system on a separate Ethernet network in the building. Main operation work space shall be in the back building Society office room.

b) Display proper maps Telephone nos. of disaster controlling authorities showing fire fighting equipments, refuge floors, sprinklers system etc.

- **Safeguard Requirements for Natural and Manmade Disasters:**
  - List of nearest clinics and hospitals shall be maintained for medical emergency as also any other eventuality. The table below will be ready and will be distributed to all members within the building and later for off-site plan to neighborhood. These information need to be updated every six months before safety drills. The information thus updated should also be shared with occupants.

Table 6.9: Emergency numbers surrounding "Project Site"

Hospital		
Thane Civil Hospital	Approx 6.2 km	---
ESIS Hospital	Approx 1.4 km	+91 22 2564 5521
Hira Mongi Navneet Hospital	Approx 1.2 km	+91 22 2591 5577
Swatantryaveer V.D. Savarkar Brihanmumbai Municipal Corporation Hospital	Approx 3.4 km	+91 99 30 468580
Police Station		
Mulund Police Station	Approx 3.0 km	+(91)-22-25684535
Police (Traffic)		
Mulund Police Thane Check Naka	Approx 2.6 km	+91 22 25689844
Fire Station		
Mulund Fire Station	Approx 0.90 km	+91 22 2568 7637
Electricity Board		
MSEDCL Bhandup Zone Office BSES station	Approx 2.0 km Approx 14.4 km	+(91)-22-25663982, 25663983
Ambulance Service		
Siddhivinayak Ambulance	Approx 5.1 km	+91 22 2581 0751
Life Line Cardiac Ambulance	Approx 8.1 km	+91 98 69 50909
Chintamani Ambulance Services	Approx 5.6 km	+91 98 92 657440
Railway station		
Mulund Railway Station	Approx 1.6 km	

BEST (Transport)		
Assistant Traffic Superintendent of Mulund Bus station	Approx 1.5 km	022 - 25614642
MTNL		
Area Manager, Mulund Exchange	Approx 4.3 km	(022) 25680111

➢ **Fire fighting equipments, fire extinguishers, sprinklers system etc.**

Hazard occurrence may result in on-site implications like:

- Fire and/or explosion through electric fire;
- Leakage of flammable material and leading to fire;

The following are the types of fire protection system proposed for all building premises as per NBC 2005 - Part IV Fire and Life Safety &Local Fire Authority Norms.

- Fire extinguishers at dedicated location
- Photo luminescent safety signage
- Fire Officer & trained Staff appointed on full time basis for looking after the fire prevention, Escapes, repairs Evacuation, drills, maintains & upkeep of fire protection & firefighting equipment
- Providing adequate drinking water provision at each refuge floor
- An alternative source of power supply from separate substation as well as trough diesel generator with change over switch shall be provided for fire pumps, fire lifts , staircase and corridor lighting
- Fire detection system is proposed to provide automatic fire detection and alarm system in the basements, podium, and lift lobby areas
- Public address system is proposed to provide public address system in the basements, podium, lift lobby areas
- In case of leakage of LPG without fire and inability to stop the flow, precautions should be taken to avoid ignition of source

➢ **Type of Systems Proposed:**

Following are the various Fire Protection systems proposed:

- **Fire Fighting Tank:**
  - 50KL Overhead fire fighting tank has been provided for each wing.
  - 100 KL Underground fire fighting tank has been provided.

- **Pumping System:**
  - Provided fire hydrant pump i.e. 2800 LPM @ 260 M Head & 270 HP
  - Provided fire fighting sprinkler pump i.e 2800 LPM @ 260 M Head & 270 HP
  - Booster pump of 900 litres/min capacity giving a pressure of not less than 3.2 kgs./sq.cms at the topmost hydrant outlet of the wet riser shall be provided at the terrace level.
  - A sprinkler pump of suitable capacity along with jockey pump shall be provided for sprinkler system.
  - Electric supply (normal) to these pumps shall be on independent circuit.

- **External Hydrant System:**
  - Six external hydrants shall be provided at ground level within the confines of the site on the wet riser at locations marked on the plan.
  - Twelve hydrant shall be provided at each level i.e. ground floor, first podium to third podium, within the confines of the site on the wet riser at location marked on the plan.

- **Smoke detector**

- Automatic smoke detection system shall be provided in each office on each floor with console panel at ground level.

- **Fire Sprinkler Systems**
  - Automatic sprinkler system shall be provided in the lobby/ common passages at each floor level; in all offices as both level basement as per the standard laid down by TAC or relevant I.S. Specification.

- **Provided fire check floors**

- **Portable Fire Extinguishers**

  Portable fire extinguishers are intended as a first line of defense to cope with fires of a limited size. They are needed even if the property is equipped with automatic sprinklers, standpipe and hose, or other fixed protection equipment. The fire protection guidelines are general in nature and are not intended to abrogate specific requirements of other codes and/or policies and procedures. The following general rules apply to most facilities:
  - A fire extinguisher must be within 75 feet travel distance to any area of a building (does not have to be in a room). Travel distance cannot include stairs, steps, or locked doors
  - Fire extinguishers must be of the appropriate type for the area. For this reason, fire extinguishers must be removed, relocated, purchased, serviced, and installed by the building's fire equipment technicians
  - Fire extinguishers must be visible or signs posted to identify location. Access to fire extinguishers cannot be obstructed

  Portable fire extinguishers are provided at locations mentioned below,
  - One dry chemical powder ABC type fire extinguisher of 10 kgs. Capacity having ISI certification mark and two bucket filled with dry, clean sand shall be kept in electric meter room, lift machine room, as well as in the offices one each floor of all buildings
  - Twenty dry chemical powder ABC type fire extinguisher of 10 kgs. Capacity having ISI certification mark shall be kept in each basement level.
  - Forty dry chemical powder type fire extinguisher of 10 kgs capacity having ISI certification marked and ten buckets filled with dry, clean sand shall be kept in car parking areas, below first to third podium.

- **Emergency escape route plan**
  - Emergency exit route plan framed in glass shall be displayed in the common corridor, cross passages, staircase/lift lobbies of each floor level.

Fig. 6.8 Ground floor evacuation layout

- **Leakage of LPG without fire:**
  Cordon off the area around 30 meters radius so that no vehicle or source of ignition approaches the area. Attempt must be made to close the control/ manual valve.
  - Open all windows to increase ventilation and hence prevent buildup of vapor cloud. Avoid getting entrapped in the cloud vapor
  - Water sprays should be used to disperse the vapor cloud
  - Warn the surrounding areas to put off all naked flames
  - Automatic gas cutoff system shall be provided to prevent gas leakage.

➢ **Power Failures**

Failure of electrical power to building will have a serious impact on its operations, particularly if the failure occurs during normal operating hours when the building is fully occupied. A power failure may be a brownout (a partial reduction in service) or a total blackout.

Power failure can be caused either by man-made or natural events. Man- made causes may include drivers who collide with utility poles or power transformers, human error in operating equipment within the building or outside it (such as at the utility company supplying the power), or malicious tampering. Natural events include storms, floods, and earthquakes.

Power failures also can cause computer memory loss and equipment damage. If the power loss is anticipated, computers and computer systems can be shut down before it occurs. If no prior notice is received, the equipment should still be turned off as quickly as possible to avoid potential serious damage to the electrical system from the sudden surge of power when it is first restored. Computer systems, particularly mainframes, often are equipped with an uninterruptible power supply (UPS); and personal computers often are equipped with surge protectors to reduce the chance of damage when power fluctuates, surges, or is lost.

Buildings have emergency and standby power systems to provide safety and comfort to building occupants during interruptions in their normal power supply. These systems also provide power to operate building communication systems and to provide a minimum number of elevator functions. Both functions are critical to buildings during power failures.

- **Power failure backup**

Emergency power systems are a type of system, which may include lighting, generators, fuel cells and other apparatus, to provide backup power resources in a crisis or when regular systems fail. Emergency power systems can rely on generators, deep cycle batteries, and flywheel energy storage or hydrogen fuel cells.

A diesel generator is the combination of a diesel engine with an electrical generator (often called an alternator) to generate electric energy. Diesel generating sets are used in places without connection to the power grid or as emergency power-supply if the grid fails. The packaged combination of a diesel engine, a generator and various ancillary devices (such as base, canopy, sound attenuation, control systems, circuit breakers, jacket water heaters and starting system) is referred to as a generating set.

- **Emergency Power Backup:**
  2 nos. of diesel generator sets of capacity 650 kVA & 630 kVA and 2 DG sets of 500 kVA each each is been proposed at site. The diesel generator will backup common area lighting, lobbies, staircase & lifts etc. Emergency backup for the (Common loads, Environmental management facilities) essential load will be provided.

  The generating capacity to be installed will provide Essential power requirements of all systems/services. Auto Mains Failure (AMF) scheme is proposed for DG Sets.

- **Notes:**
  Ratings of D.G. sets will be reviewed after finalization of all designs and before inviting tenders.
  It is proposed to install emergency backup only for Essential loads using Diesel Generating Sets for supply of power when mains power is not available. Running of D.G sets in parallel with supply or parallel operation of D.G. sets / USS is not proposed.

- **Maintenance of the DG:**
  The vendor will provide the AMC for 3-5 Years as a part of contract. On expiration, the AMC will be renewed on annual basis.

- **Uninterruptible power supply (UPS)**
  An uninterruptible power supply, also uninterruptible power source, UPS or battery/flywheel backup is an electrical apparatus that provides emergency power to a load when the input power source, typically the utility mains, fails. A UPS differs from an auxiliary or emergency power system or standby generator in that it will provide instantaneous or near-instantaneous protection from input. This will be used to backup important server and computer system.

c) Display evacuation plan in times of disaster

- **Evacuation**
  - Stay calm; do not rush or panic
  - Safely stop your work
  - If safe, gather your personal belongings; take prescribed medications with you
  - If safe, close doors and window but do not lock them
  - If in parking lot, immediately park your car so that the access to other vehicles as well as people are not hampered and proceed to the nearest exit by staircase or as guided.
  - Location of all exit corridors, exit stairs and exit serving the building would be marked and provided during commissioning stage.
  - An evacuation team consisting of building management, the building Facility Manager, security, Security In-charge, and floor response personnel should be organized and trained. This should be coordinated with all building tenants and designed in conjunction with developing the bomb incident plan. The team will be trained in how to evacuate the building during a bomb threat. The order in which to evacuate—for instance, by floor level should be established.

- Evacuate the floor levels above and below the danger area to remove occupants from danger as quickly as possible. Training in such an evacuation usually is made available by building management, with advice supplied by local law enforcement and the fire department.
- The evacuation team also may be trained in search techniques, or there may be a separate search team. Volunteers should be sought for this function; however, Security In-charge, search monitors, and the like could be assigned to the task. To be proficient in searching the building, search personnel must be thoroughly familiar with all hallways, restrooms, false ceiling areas, and other locations in the building where an explosive or incendiary device could be concealed. Thus it is extremely important for the evacuation or search team to be thoroughly trained and familiar with both the inside of the building and immediate outside areas. When a room or particular area has been searched, it should be marked or sealed with a piece of tape and reported as clear to the appropriate supervisor.
- The team will be trained only in evacuation and search techniques and not in the techniques of neutralizing, removing, or otherwise having contact with the device. If a device is located, it should not be disturbed. However, its location should be well marked and the route to it noted.

- **Fire Engine Access Movement**
  The site layout & Fire Engine Movement has been shown, for the site.
  An adequate space has been provided to escape and access for fire-fighting equipment and vehicle

Fig 6.10: Fire Engine Movement Plan

- **Demonstration/ Civil Disturbance Procedures**
  Most demonstrations are peaceful and if one is conducted near or in your building, carry on work as usual. Avoid provoking or obstructing demonstrators. Should a disturbance occur, call Police for assistance.

  If protestors enter your building, let them. Try to carry on work as usual. If the noise becomes too loud, or the crowd too large, feel free to close and lock your podium gate– this decision needs to be taken by society manager or managing committee of society in conjunction with local police authority only. Proceed to the EAA and wait for additional instructions.

5. On-Site of Disaster

a) Site disaster manager to take charge and give guidance over public address system

- Facility Manager will take charge and give guidance over public address system during operation phase from Fire control room.

b) Call for outside assistance of fire brigade, Hospitals, ambulances

Table 6.11: Emergency numbers of Fire Brigade, Hospitals & ambulances

Hospital		
Thane Civil Hospital	Approx 6.2 km	---
ESIS Hospital	Approx 1.4 km	+91 22 2564 5521
Hira Mongi Navneet Hospital	Approx 1.2 km	+91 22 2591 5577
Swatantryaveer V.D. SavarkarBrihanmumbai Municipal Corporation Hospital	Approx 3.4 km	+91 99 30 468580
Fire Station		
Mulund Fire Station	Approx 0.90 km	+91 22 2568 7637
Ambulance		
Siddhivinayak Ambulance	Approx 5.1 km	+91 22 2581 0751
Life Line Cardiac Ambulance	Approx 8.1 km	+91 98 69 50909
Chintamani Ambulance Services	Approx 5.6 km	+91 98 92 657440

c) Networks with state, district and ward level control rooms

- The response structure given in the ward plan essentially limits itself to micro-level intervention. When more than one ward are affected, BMC control room which is the co-ordinating authority, would expect the ward officers to co-ordinate the activities at the ward level with the line agencies such as Fire Brigade, Police etc. The responsibilities for all the ward level functionaries have been identified by M.C.G.M.

➢ **Details of 'T' ward officer's responsibilities are given on MCGM website:**
http://www.karmayog.com/floods/mumbai_t_ward_plan.htm

d) Ensure adequate warning before switching off power

- All announcements will be done with good quality equipments.
- Switching off power will be done only after having current status of the all building facilities from concern In-charge.
- With the help of CCTV camera will confirm that if any trapped in basement & lift during the disaster
- Parking In-Charge and lift man will ensure that no occupants is trapped inside the building and Security In-charge will confirm with Parking In-Charge and lift man
- Emergency Electrical switch is at the meter room will be operated by only authorized person under instruction of Security In-charge

e) Assure occupants of continuous communication and take all, measures to keep up their morale

- Periodical mock drill will be arranged by the Facility Manager / Security In-charge
- Through training & info will be given to occupants about the available rescue sources, rescue plans
- Assurance will be given to occupants that evacuation will be done by trained volunteers, so occupants will be trained that how to co-operate with volunteer during disaster

f) Guide occupants on the steps being taken for evacuation in systematic manner

- This requirement will be handled by dedicated trained staff/volunteers

- In case lift power supply is shutdown all the lifts will stop at floor level and door will automatically open

Procedures for people during emergencies:

- By law building occupant may be required to evacuate when the fire alarm is raised
- For floors beyond 10, evacuation has to be done to the nearest refuge area through staircase exit only
- The floor diagram will be provided to every floor which can show the entry and exit during evacuation
- Proper sign showing the exit route, Primary evacuation routes leading to the designated assembly point (solid lines) would be provided
- Use the nearest stairs and proceed to the nearest exit. Do not use the elevator
- If in parking lot, immediately park your car so that the access to other vehicles as well as people are not hampered and proceed to the nearest exit by staircase or as guided
- Duck under the nearest sturdy object and hold onto it until tremors stops. If you are not near a sturdy object, make yourself as small as possible and cover your head and neck when earthquakes occurs
- In case of fire, move away from fire and smoke. Close doors and windows if time permits. Touch closed doors. Do not open them if they are hot

Procedures for people with disabilities during emergencies:

In all emergencies, after an evacuation has been ordered:

- Evacuate people with disabilities if possible
- Do not use elevators, unless authorized to do so by police or fire personnel. Elevators could fail during a fire or a major earthquake
- Check on people with special needs during an evacuation. A "buddy system", where people with disabilities arrange for volunteers (neighbors) to alert them and assist them in an emergency, is a good method
- Attempt a rescue evacuation ONLY if you have had rescue training or the person is in immediate danger and cannot wait for professional assistance
- Always ask someone with a disability how you can help BEFORE attempting any rescue technique or giving assistance. Ask how he or she can best be assisted or moved, and whether there are any special considerations or items that need to come with the person

g) Take steps to reduce/ eliminate panic

- Periodical training to internal volunteers & members.
- Periodical mock drills to all occupants, members, volunteers and staff.
- Evacuation assurance to occupants by trained personals or external force volunteers during emergency

h) Liaise with law and order machinery

- Facility Manager after occupancy of project will liaise with police Fire Brigade, Civil Defense & BEST etc.

6. Preventive Measure

- Arrangement of periodical training for each disaster & equipment
- Provided Fire detection & fighting systems
- Automation will be there for warning system
- 24x7 fully trained Security staff
- Do’s & Don’ts template at designated location of each buildings
- Preventive maintenance to all machineries & equipments
- Tagging of date for last preventive maintenance on every emergency equipments

- Provided 6 m wide internal access road in podium, also provided 6 m to 7.5 m wide internal access road at stilt floor level.
- Video & plan wise evacuation training to volunteers for emergency

a) Regular inspection of equipment and systems mandated by Chief Fire Officer in the NOC granted

- Regular inspection will be carried out by competent and dedicated engineer of O&M employed contractors at regular intervals for all kinds of equipments& system
- Preventive maintenance will also be carried out after checking equipments during an mock drills.

b) Scrupulous adherence to approved plan of building and protection of system put in place to handle disaster

- No violation or changes will be done
- In Operation stage at the time of entry, emergency preparedness plan's training shall be conducted and reoriented after every drill conducted

c) Regular maintenances of equipment and systems

- Periodical maintenance will be carried by certified, competent and skilled employed contractors at regular intervals.
- Maintenance of lift will be done at regular intervals by the lift company who will install the lift.

Summary:

Prepare occupants in your building ahead of time for emergency evacuations. Know your building occupants. Train staff, faculty, and students to be aware of the needs of people with disabilities and to know how to offer assistance. Hold evacuation drills in which occupants participate, and evaluate drills to identify areas that need improvement. Plans must cover regular working hours, after hours, and weekends. Everyone needs to take responsibility for preparing for emergencies. People with disabilities should consider what they would do and whether they need to take additional steps to prepare. "Emergency Guidelines for People with Disabilities" may be available from your Building Coordinator.

Conclusion

M/s. Chhaganlal Khimji & Co Ltd. will periodically review and update the Disaster Management Plan and will take the initiative to institutionalize the relationship between all Emergency Security and Rescue Forces (e.g. Police, Municipality, Fire Brigade, Medi-Care Centres etc.)