7. RISK ASSESSMENT & DMP

7.1 INTRODUCTION

The construction project involves lot of activities like installation of various types of structures and machineries. These activities include lifting and transportation of building materials at different levels, digging pits, operation of concrete mixer, working near electrical circuit, which is required during construction of such housing project. Hence such work puts workers at risk of burial, engulfment or falling from a height, risk of electrocution where the risk is particularly aggravated by the nature of the work or processes used or by the environment at the place of work or site.

On completion of project, the infrastructure created includes provision of lifts, DG set as power backup, laying of internal as well as external electrical cables, provision of pipeline for LPG uses (specially in kitchens), construction of internal roads etc, which may also pose risk of accident to the occupants .

However, it is not always possible to totally eliminate such eventualities and random failures of equipment due to human errors or natural calamities like earthquake.
It is thus necessary to carry out hazard identification and risk assessment for risk monitoring and to formulate its Control Measures like Risk response planning i.e. Disaster Management Plan/Onsite Emergency Plan for the project.

An essential part of major hazard control is therefore, to be concerned with mitigating the effects of such emergency situation and restoration of normalcy at the earliest by following Disaster Management Plan (DMP) for different type of Emergencies like Earthquake, LPG leakage, Fire in the building.

7.2 SAFETY CODE FOR BUILDING & FIRE FIGHTING SYSTEM

The Fire fighting network followed by Emergency Response mock drills are essential part of Risk Control Measures.

The project site falls under residential occupancies according to National Building Code 2005. Following provisions are required to be made according to National Building Code 2005. The fire fighting system has been designed considering the following codes, manual and guidelines;

- National Building Code of India (NBC);

- Latest relevant NFPA codes, USA, in particular NFPA – 13, 14, 20 & 22;
- IRI guidelines;
- As per requirement of fire officer/local fire approving authorities; and
- As per Indian Standard Code for Fire Protection (IS Codes)

Following items are envisaged for firefighting:

- Fire-Water Connections;
- Firewater inlet and outlet connections shall be provided to the water storage tanks;
- External main fire ring, having 150 mm diameter and hydrants @ 45 m^3/s spacing shall be provided. This external fire ring shall be separated from the Sprinkler Main Systems;
- All flow switches, test valves, drain pipes etc. shall be provided as per NFPA guidelines on the sprinkler system;
- All pump installation and arrangements shall be in accordance with IRI guidelines and NFPA-20;
- All pumps and accessories and electrical controllers shall be as per UL/FM lists, tested, approved and certified; and
- By-pass arrangements shall be provided (150 mm diameter nominal bore) with NRV and gate valve and bulk flow meter on the discharge header of each pump to check the duties of pumps.
- Storage tanks are provided in the basement for the supply of water for the firefighting facility.
- The fire extinguishers provided should be in conformance with Ozone Depleting Substances (Regulation and Control) Rules 2000.

7.3 DISASTER MANAGEMENT PLAN

The overall objective of DMP is to make use of the combined resources at the site and outside services to achieve the following:

- To localize the emergency and if possible eliminate it;
- To minimize the effects of the accident on people and property;
- Effect the rescue and medical treatment of casualties;
- Safeguard other people;
- Evacuate people to safe areas;
- Informing and collaborating with statutory 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;

- Investigating and taking steps to prevent reoccurrence

The DMP is, therefore, related to identification of sources from which hazards can arise (based on Hazard Identification) and to minimize credible loss scenario that can take place in the concerned area. The DMP takes into account the maximum credible loss scenario and actions that can successfully mitigate the effects of losses.

Hence emergency plan need to be well framed, so that with less effort and resources, emergencies may be controlled and terminated, in minimum time, to reduce damages to life and properties. The Disaster Management Plan is designed to

- Anticipate the types of disasters that are most likely to occur.
- Identify the possible effects of any disaster that may occur.
- Identify the preventative and mitigating strategies to deal with any possible disaster.
- Involve all role players in a coordinated manner to respond to the challenges posed in disaster situations.
- Procure essential goods and services for disaster management.
- Identify the weaknesses in respect of capacity and skills to deal effectively with disastrous situations.
- Provide essential training and skills to handle such disaster and to promote awareness and preparedness in respect of the occurrence of disasters.
- Plan in advance the relief and rescue operations that may be required or to be exercised in disaster situations.

The hazard identified for the project include hazards pertaining to fires in buildings and fire in diesel storage areas, earthquake and LPG leakage and DMP pertaining to these as described in the following section.

7.4 RESPONSE IN CASE OF EARTHQUAKE

7.4.1 RESPONSE PROCEDURES FOR OCCUPANTS

7.4.1.1 IF INDOORS

- Take cover under a piece of heavy furniture or against an inside wall and hold on.
- **Stay inside:** The most dangerous thing to do during the shaking of an earthquake is to try to leave the building because objects can fall on you.

7.4.1.2 IF OUTDOORS

- Move into the open, away from buildings, streetlights, and utility wires. Once in the open, stay there until the shaking stops.

7.4.1.3 IF IN A MOVING VEHICLE

- Stop quickly and stay in the vehicle. Move to a clear area away from buildings, trees, overpasses, or utility wires. Once the shaking has stopped, proceed with caution. Avoid bridges or ramps that might have been damaged by the quake.

7.4.1.4 AFTER THE QUAKE

- After the quake be prepared for aftershocks
- Although smaller than the main shock, aftershocks cause additional damage and may bring weakened structures down. Aftershocks can occur in the first hours, days, weeks, or even months after the quake.

7.4.1.5 HELP INJURED OR TRAPPED PERSONS

- Give first aid where appropriate. Do not move seriously injured persons unless they are in immediate danger of further injury. Call for help.
- Remember to help those who may require special assistance--infants, the elderly, and people with disabilities.
- Stay out of damaged buildings.
- Use the telephone only for emergency calls.

7.4.2 RESPONSE PROCEDURE FOR EMERGENCY TEAM

- Formulate an Emergency Response Team for earthquake response
- Using the public address system, inform residents of response procedures discussed above.
- Inform the necessary authorities for aid.
- Ensure that no person is stuck beneath any debris, in case of a structural failure.
- Ensure that all occupants standing outside near the buildings are taken to open areas.
- Ensure that the first aid ambulance and fire tender vehicles are summoned if necessary.
- Inform the nearby hospitals if there are any injuries.
- Check the utilities and storage tanks for any damage.

7.5 RESPONSE FOR LPG LEAKAGE

- The affected area should be evacuated and cordoned off immediately
- Initiate an Emergency Response Team for LPG leakage
- Shut down the main valves in the gas bank

- Ensure that only concerned personnel are present in the affected area and all other personnel and visitors are moved to the nearest assembly points
- Rescue trapped personnel, also check if any personnel are unconscious in the area and immediately move them outside and provide first aid.
- Ambulance should be summoned to take injured personnel to the nearest hospital
- Personnel in the nearby buildings to close all doors and windows to prevent entry of the leaked gas
- Source of leakage to be traced and isolated from all the other areas. If required use pedestal fans to bring down the gas concentration
- In case of fire follow the instructions

7.6 RESPONSE IN CASE OF FIRE

- Required response during in the event of a fire shall be described in signs located in the lobby.
- On sighting a fire, it shall be immediately informed to the environment manager giving the exact location and type of fire in detail.
- Initiate the Emergency Response Team for fires
- If the fire is small, engage in extinguishing the fire using the nearest fire extinguisher.
- Guide the Emergency Response Team staff to the emergency assembly point.
- The Emergency Response Team shall immediately inform the nearest dispensary and security force. If required a fire tender shall be summoned.
- The response team shall immediately move to the point of fire and take all necessary steps to stop the fire. If the fire is not controllable and spreads then the manager in charge shall inform the district authorities and call for external help.
- The Emergency Response Team will provide immediate relief to the injured residents at the scene of incident. Any injured persons shall be evacuated on priority to the dispensary or one of the nearest hospitals based on their condition.

Instructions for occupants

- Get out of buildings as quickly and as safely as possible.
- Use the stairs to escape. When evacuating, stay low to the ground.
- If possible, cover mouth with a cloth to avoid inhaling smoke and gases.
- Close doors in each room after escaping to delay the spread of the fire.
- If in a room with a closed door.
- If smoke is pouring in around the bottom of the door or if it feels hot, keep the door closed.

- Open a window to escape or for fresh air while awaiting rescue.
- If there is no smoke at the bottom or top and the door is not hot, then open the door slowly.
- If there is too much smoke or fire in the hall, slam the door shut.
- Stay out of damaged buildings.
- Check that all wiring and utilities are safe.

7.7 FIRE FIGHTING SYSTEM

A state of the art fire fighting system is proposed for the project to prevent and control fire outbreaks. The fire fighting system will consist of portable fire extinguishers, hose reel, wet riser, yard hydrant, automatic sprinkler system, and manual fire alarm system. The proposed buildings will also be provided with automatic fire detection and alarm system.

- Pumps shall be protected with Sprinkler as per NFPA 20 (refer to NFPA 13 for design)
- DG sets need to be protected with mist as per the applicable regulation (refer to NFPA 750 for design)

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The fire and safety consideration will be as per the applicable National Building Code 2005. Important component are mentioned below.

- Provision of water sprinklers
- Provision of hose reels, external hydrants and wet risers
- Provision of fire fighting underground water storage tank,
- Provision of overhead water storage tank on each buildings
- There is a provision of fire fighting pumps.
- Adequate Fire Extinguishers shall be available for emergency situations
- HT and LT panels will be protected with manually operated CO_2 protection system.
- Automatic sprinklers will be installed in the entire building
- Portable fire extinguishers shall be provided at strategic locations

- Automatic fire detection system i.e. smoke/ heat detection system shall be provided in the buildings at appropriate places. The system will be connected to the fire alarm system

HSD and other petroleum products at site shall be stored at earmarked area having impervious floor and adequate fire fighting arrangements. Hazardous wastes as waste oil shall be collected and stored and periodically sold off to MoEF&CC/ SPCB authorized recyclers. Buy back arrangement shall be made with the authorized dealer of Lead acid storage batteries used in the DG Sets.