RISK ASSESSMENT & DISASTER MANAGEMENT PLAN

'PROPOSED INTEGRATED OFFICE COMPLEX' for
Central Board of Secondary Education
at Sector 23 Dwarka, New Delhi -110075

CENTRAL BOARD OF SECONDARY EDUCATION

Shiksha Kendra, 2, Community Centre,

Preet Vihar, Delhi - 110092

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INTRODUCTION

Disaster has struck mankind from time immemorial. Disasters continue to strike unabated and without notice and are perceived to be on the increase in their magnitude complexity, frequency and economic impact. These hazards pose a threat to the people, structures or economic assets and assume disastrous proportions when they occur in areas of dense human habitations. This has compelled the need for a comprehensive approach to prevent and mitigate disasters

Natural Disasters are known to mankind before it evolved and will happen afterwards also. It reminds us of a meteorite that had hit the earth which eventually wiped off the entire dinosaurs, million years ago. Today, also we witness them in the form of Earthquake, Floods, Landslides, Cyclones, Wildfires, Avalanches, Cloudburst, Heat and cold waves and the tsunamis (giant tidal waves). Many countries have suffered loss of human lives and damage to property; their economic losses have been in million dollars. Thus, disasters not only kill people, but also have tremendous effect on economy. It enhances the poverty of an already poor country and makes it impoverish. In disasters, it is the poor and under privileged, who are the worst affected, they tend to lose their shelter, livelihood and become more impoverished.

Need for Disaster management

Data on disaster occurrence, its effect upon people and its cost to countries, are primary inputs to analyze the temporal and geographical trends in disaster impact. Disaster losses, provide the basis for identifying where, and to what extent, the potentially negative outcomes embedded in the concept of risk is realized.

They help to understand where, and to whom, disaster risk becomes impact. They also provide the basis of risk assessment processes, a departing point for the application of disaster reduction measures. – UN ISDR

Development cannot be sustainable unless disaster mitigation is built into development process. Investments in mitigation are more cost effective than expenditure on relief and rehabilitation. Prevention and mitigation contribute to lasting improvement in safety and are essential to integrated disaster management. Disaster response alone is not sufficient as it yields only temporary results at very high cost. So emphasis must be on Disaster prevention, mitigation and preparedness, which help in achieving objectivity of vulnerability reduction.

What is a Disaster?

“A Disaster is a sudden, calamitous event that causes serious disruption of the functioning of a community or a society involving widespread human material economic or environmental losses and impacts which exceeds the ability of the affected community or society to cope using its own resources.” ---- UN International Strategy for Disaster Reduction, (UNISDR)

A Disaster is a "Situation or event, which overwhelms local capacity, necessitating a request to national or international level for external assistance; an unforeseen and often sudden event that causes great damage, destruction and human suffering".---- Centre for Research of Epidemiology of Disaster (CRED), Belgium.

Identification and Assessment of Hazards

This stage is crucial to both on site and off site emergency planning and requires to systematically identifying what emergencies could arise. These should range from small events, which can be dealt with by plant personnel without outside help to the largest event for which it is practical to have a plan. Experience has shown that for every occasion that the full potential of an accident is realized, there are many occasions when some freak event occurs or when a developing incident is made safe before reaching full potential.

- ✓ The assessment of possible incidents should produce a report indicating
- ✓ The worst events considered
- ✓ The route to those worst events
- ✓ The time scale to lesser events along the way
- ✓ The size of lesser events if their development is halted.
- ✓ The relative likelihood of events
- ✓ The consequences of each event

Disaster Preventive Measures

Prevention and Mitigation are the things we do to prevent an emergency from happening and, if it does, to reduce or eliminate the impact. This includes structural (e.g. building reinforcement, infrastructure renewal) and non-structural measures (e.g. legislation, by-laws, and codes).

It is not easy to control any disaster if contingency plans are not available. For effective control of disaster adequate manpower, technical know- how, alertness and internal help are the prime requirements. It is always better to take preventive measures to avoid any disaster. In the proposed project following prevention measures will be taken to prevent disaster:

- ✓ Design, manufacture and construction of the building will be as per national and international codes as applicable in specific cases and laid down by the appropriate statutory authorities.

- ✓ Routes for escape during disaster are provided.

National disaster management (NDMA) Act, 2005

The National emergency management authority was constituted in Aug 1999, which submitted a report in 2001, to have separate department for Disaster management in India Government enacted the National disaster management act on 23rd Dec 2005, which lead to the creation of National disaster management authority (NDMA).

Nodal ministries responsible for various categories of disasters

- ✓ Earthquakes and Tsunami : MHA/Ministry of Earth Sciences/IMD
- ✓ Floods : MHA/Ministry of Water Resources/CWC
- ✓ Cyclones : MHA/Ministry of Earth Sciences/IMD
- ✓ Drought : Ministry of Agriculture
- ✓ Biological Disasters : Ministry of Health and Family Welfare
- ✓ Chemical Disasters : Ministry of Environment & Forests
- ✓ Nuclear Disasters : Department of Atomic Energy
- ✓ Air Accidents : Ministry of Civil Aviation
- ✓ Railway Accidents : Ministry of Railways
- ✓ Terrorism, bomb blast, Riots : Ministry of Home Affairs

Pre disaster activities :

1. Policy development
2. National, State, district, local level disaster organization formation
3. Vulnerability and capacity assessment
4. Prevention and mitigation
5. Preparedness, planning and training

Emergency activities :

1. Warning (beginning before the actual event)
2. Evacuation, search and rescue
3. Emergency assistance (relief) – food, water, shelter, medical aid

Post disaster activities :

1. Repair and restoration of life lines (power, telecommunications, water transportation)
2. Reconstruction and rehabilitation

Mitigation methods

i. **Structural measures:** Any physical construction to reduce or avoid possible impact of hazards, which include engineering measures and warning system, hazard vulnerability risk analysis, communication mechanism etc**. --- NDMA (2005)**

Objectives of Disaster Management Plan:-

1. To prevent loss of human life and property damage
2. To study, analyze and evaluate the disasters
3. To identify the vulnerable locations and do the vulnerability and risk analysis.
4. To improve preparedness, prevention and mitigation at district level
5. To ascertain the status of existing resources and facilities available
6. To recommend appropriate strategies and responses to deal with future disasters

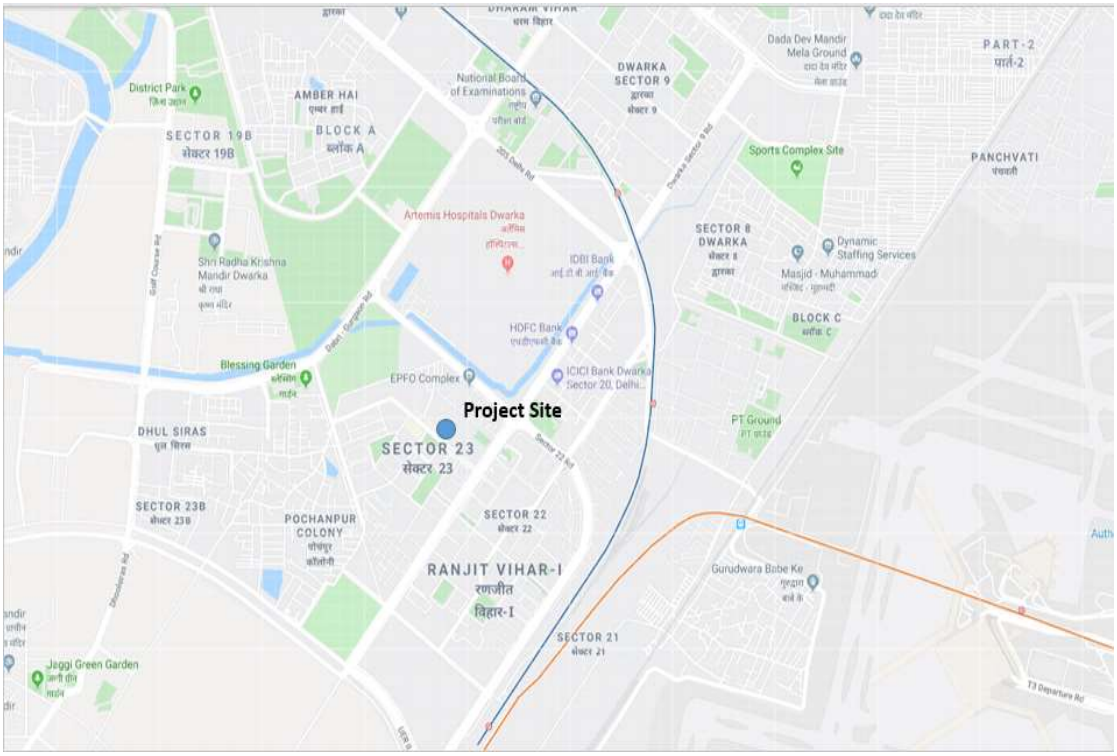
DISTRICT PROFILE

Location and Extent

The Dwarka Sub-city is situated in the south-west of Delhi and forms part Zone K having an area of 12056 ha. It is bounded by Najafgarh Road on the north-west, Pankha Road on the north-east, the Rewari Railway line on the south-west and the Najafgarh drain on the west. It is located in the vicinity of International and Domestic airports. It is bounded by NH-8, Outer Ring Road, Najafgarh Road, Pankha Road, and the Rewari railway line.

Proposed site is situated at Sector 23, Dwarka. The proposed project is located at Latitude 28° 33' 52.7724" North and Longitude: 77° 3' 23.4972" East. There is Basava Internaional School at the adjacent west side of the plot while Paramount International and Dwarka International school situated at Eastern side of the plot. EPFO complex is at North while 20 mtr road divides the plot and Navratan Housing society from South side. The proposed site is well connected to Delhi, Noida, and other NCR regions.

Fig 1 : PROJECT LOCATION



RESPONSE PLAN

The onset of an emergency creates the need for time sensitive actions to save life and property, reduce hardships and suffering, and restore essential life support and community systems, to mitigate further damage or loss and provide the foundation for subsequent recovery. Effective response planning requires realistic identification of likely response functions, assignment of specific tasks to individual response agencies, identification of equipment, supplies and personnel required by the response agencies for performing the assigned tasks. A response plan essentially outlines the strategy and resources needed for search and rescue, evacuation, etc.

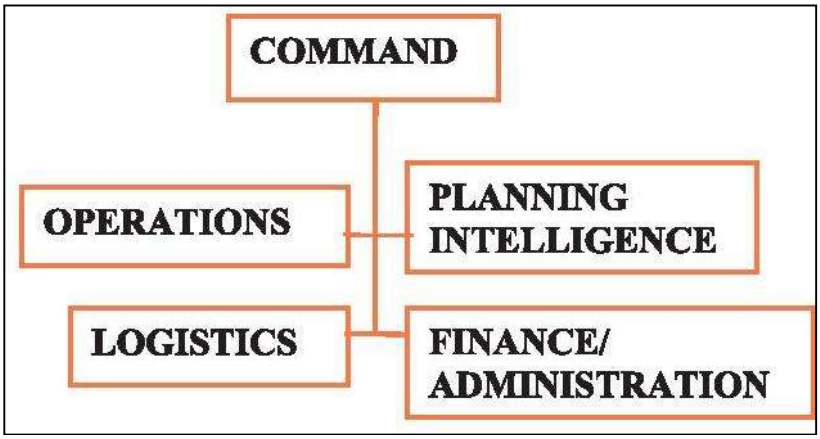
Considering all this points, this response plan has been developed. For the first time Incident Command System (ICS) has also been introduced in response plan along with the resource inventory that is directly linked to the website. In fact, during disaster the ICS management tool will be more effective to handle the situation in proper way within limited time.

INCIDENT COMMAND SYSTEM (ICS)

The Incident Command System (ICS) is a management system and an on-scene, all risk, flexible modular system adaptable for natural as well as man-made disasters. The ICS has a number of attributes or system features. Because of these features, ICS has the flexibility and adaptability to be applied to a wide variety of incidents and events both large and small. The primary ICS management functions include:

- Command
- Operations
- Logistics
- Planning
- Finance / Administration

Fig 2 : ICS MANAGEMENT FUNCTIONS



The five command functions in the Incident Command System are as follows :

1. Incident Commander

The EHS(Environment Health and Safety) Manager will be Incident Commander responsible for all incident activity. Although other functions may be left unfilled, there will always be an Incident Commander.

2. Operations Section

Develops tactical organization and directs all the resources to carry out the Incident Action Plan.

3. Planning Section

It is responsible for the collection, evaluation, and display of incident information, maintaining status of resources, and preparing the Incident Action Plan and incident related documentation.

4. Logistics Section

Provides resources and all other services needed to support the organization.

5. Finance / Administration Section

Monitors costs related to the incident, provides accounting, procurement, time recording, cost analysis, and overall fiscal guidance.

HAZARD ANALYSIS

This plan largely deals with the disasters that the proposed project may experience. Based on this, the vulnerability assessment of people and infrastructure has been done so that such elements can be safely taken care of before any unexpected disaster or during the disasters.

This is the most important part of the plan. Vulnerability assessment deals with the socio-economic vulnerability, housing vulnerability and environmental vulnerability.

RISK ASSESSMENT AND DISASTER MANAGEMENT PLAN

This project encompasses the lives of a large number of people. It also involves installation of various structures and machineries that meet the comfort and needs of its population but may also pose serious threat to the occupants in case of an accident. It is thus considered necessary to carry out a risk assessment and disaster management plan for the project.

RISK HAZARD & ITS CONTROL MEASURES

It is attempted to plan and construct the buildings following all safety norms. However, it is not always possible to totally eliminate such eventualities and random failures of equipment or human errors. An essential part of major hazard control has therefore, to be concerned with mitigating the effects of such emergency and restoration of normalcy at the earliest.

During the Construction Phase : there is risk to the workers. Potential hazards for workers in construction include:

- Falls (from heights)
- Trench collapse
- Scaffold collapse
- Electric shock and arc flash/arc blast
- Failure to use proper personal protective equipment
- Repetitive motion injuries

Safety measures will be as follow:

a. **Scaffolding**:

Hazard: When scaffolds are not erected or used properly, fall hazards can occur.

Solutions:

- Scaffold must be sound, rigid and sufficient to carry its own weight plus four times the maximum intended load without settling or displacement. It must be erected on solid footing.
- Unstable objects, such as barrels, boxes, loose bricks or concrete blocks must not be used to support scaffolds or planks.
- Scaffold must not be erected, moved, dismantled or altered except under the supervision of a competent person.
- Scaffold accessories such as braces, brackets, trusses, screw legs or ladders that are damaged or weakened from any cause must be immediately repaired or replaced.
- Scaffold platforms must be tightly planked with scaffold plank grade material or equivalent.

b. Ladders

Hazard: Ladders and stairways are another source of injuries and fatalities among construction workers.

Solutions:

- Use the correct ladder for the task.
- Have a competent person visually inspect a ladder before use for any defects such as:
- Structural damage, split/bent side rails, broken or missing rungs/steps/cleats and missing or damaged safety devices;
- Grease, dirt or other contaminants that could cause slips or falls;
- Paint or stickers (except warning labels) that could hide possible defects

- Mark or tag ("Do Not Use") damaged or defective ladders for repair or replacement, or destroy them immediately.

c. Trenching

Hazard: Trench collapses cause dozens of fatalities and hundreds of injuries each year.

Solutions:

- Never enter an unprotected trench.
- Always use a protective system for trenches feet deep or greater.
- Employ a registered professional engineer to design a protective system for trenches 20 feet deep or greater.
- Keep spoils at least two feet back from the edge of a trench.
- Make sure that trenches are inspected by a competent person prior to entry and after any hazard-increasing event such as a rainstorm, vibrations or excessive surcharge loads.

d. Head Protection

Hazard: Serious head injuries can result from blows to the head.

Solution:

- Be sure that workers wear hard hats where there is a potential for objects falling from above, bumps to their heads from fixed objects, or accidental head contact with electrical hazards.
- Workers shall wear hard hats where there is a potential for objects falling from above, bumps to their heads from fixed objects, or of accidental head contact with electrical hazards.
- Hard hats are routinely inspected for dents, cracks or deterioration.
- Hard hats are replaced after a heavy blow or electrical shock.
- Hard hats are maintained in good condition.

e. Electrical Safety

Hazard: Electrical contact with energized equipment or a conductor, and from which the person may sustain an injury from shock; and/or, there is potential for the worker to receive an arc flash burn, thermal burn, or blast injury.

Solution:

- Work on new and existing energized (hot) electrical circuits is prohibited until all power is shut off and grounds are attached.
- An effective Lockout/Tagout system is in place.
- Frayed, damaged or worn electrical cords or cables are promptly replaced.
- All extension cords have grounding prongs.
- Protect flexible cords and cables from damage. Sharp corners and projections should be avoided.
- Use extension cord sets used with portable electric tools and appliances that are the three-wire type and designed for hard or extra-hard service.
- All electrical tools and equipment are maintained in safe condition and checked regularly for defects and taken out of service if a defect is found.
- Do not bypass any protective system or device designed to protect employees from contact with electrical energy.
- Overhead electrical power lines are located and identified.
- Ensure that ladders, scaffolds, equipment or materials never come within 10 feet of electrical power lines.
- All electrical tools must be properly grounded unless they are of the double insulated type.
- Multiple plug adapters are prohibited.

DISASTER WISE MITIGATION MEASURES

FLOOD

VULENERABILITY ASSESSMENT

The city has been experiencing floods of various magnitudes in the past due to floods in the Yamuna and the Najafgarh Drain system. The Yamuna crossed its danger level (fixed at 204.83m) twenty five times during the last 33 years (table 3.1). Since 1900, Delhi has experienced six major floods in the years 1924, 1947, 1976, 1978, 1988 and 1995 when peak level of Yamuna river was one meter or more above danger level of 204.49m at old rail bridge (2.66m above the danger level) occurred on sixth September 1978. The second record peak of 206.92 m was on twenty seventh September 1988.

However site is at a distance of more than 15 Km from the Yamuna river at east Delhi and at a distance of 8 km from najafgarh drain. Hence, therefore possibility of flood near the site is rare.

FIRES

VULENERABILITY ASSESSMENT

In Delhi, there has been a substantial increase in population and industrialization, since Independence. Well over 1,50,000 small scale industrial units in identified industrial units in identified industrial pockets (in addition to industries running illegally), over 1200 J.J. Clusters providing shelter to nearly one third of the population and over 3.5 million automotive vehicles have choked infrastructural services. The fast increased has not been planned for Master Plan for Delhi, had been created as an instrument to control the use of land in urban area and protect the welfare of people. The concept of zoning has not yielded desirable results over and above allowing for mixed use and occupancy, authorized as well as unauthorized. Banquet halls in residential areas, cottage industries in congested areas, trade of hazardous chemicals from the highly congested residential/commercial areas, which have further deteriorated environmental services. This has certainly added to the fire risk already inherited by a particular occupancy. As a result losses due to fire are

increasing to both the life and property. This is developing a dangerous trend. Man-made disasters are likely in these areas.

High population density, crowded streets, un-matching mixed occupancies, inadequate water supply, poor electrical services, encroachment are few examples of ineffective planning which adversely affect the fire response time. Fire safety should therefore be an integral part of urban planning process rather than an afterthought.

PRE DISASTER PREPAREDNESS :-Following fire safety recommendations has been proposed:-

- Access to the building shall be provided by the width of the road not lesser than 4.5 mtr.
- There is three nos. of staircases of 1.5 mtr width from basements to all floors and another tow from ground to first floor. Escalators are proposed to be provided as per NBC Part-1V.
- Protection of exits by means of fire check door(s) and or pressurization:
- The building shall be suitably compartmentalized so that the tire smoke remains confined to the area where fire incidents has occurred and does not spread to the remaining part of the building.
- Smoke venting facilities shall be provided as per NBC Part IV. Fire and Life Safety.
- Fire management equipments like Fire Extinguisher, Fire Aid Hose Reel, Automatic Fire Detection and Alarming system, Manually operated electric fire alarm, Public address system, Automatic sprinkler system, Internal Hydrants and yard hydrants, adequate pumping arrangement, captive water storage for fire fighting etc. have been proposed.
- Exit Signage shall be provided in the building at appropriate locations. The sizes and color of the exit signs shall be as per IS 9457:1980.
- Pressurization system for Lifts / staircase shaft and lobbies shall be installed as per NBC Part-IV.
- A stand by electric generator shall be installed to supply power to Staircase and corridor lighting circuits, fire lifts, the standby fire pumps, pressurization fans, blowers, smoke extraction and damper systems etc in case of normal electric supply.
- Fire control room shall be established at entrance floor near entrance gate as marked on building plans. Trained personal shall be appointed round the clock to look after the.fire protection arrangements. in the building.
- The construction of electric sub-station and installation of Dry Transformer, LT & HT panels shall be as per the provisions specified by the Electrical Authority.
- All the fittings / equipments shall be ISI marked.

- Periodic fire safety and management mock drills will be conducted to check the level of preparedness and its outcome shall be evaluated to determine the adequacy of resources, co-ordination between various agencies and staffs, community participation etc. The plan will be updated when shortcomings are observed. Response mechanism following reports on drills or exercises Assignments of state agencies

DURING DISASTER

- Incident commander/EHS manager will take the duty of evasion by the means of alarming system.
- Security officers and staffs will ensure that all the young children, elderly and disabled person safely comes out of the building.
- Immediate call will be made to the nearest fire station and at 101.
- Call to the nearest hospital for providing the ambulance and at 102 will be made so immediate treatment can be given to prevent human life.

POST DISASTER

- All the compartment of buildings shall be thoroughly searched for any damage to life of human.
- Injury check and first aid treatment will be provided to the victim.
- Assessment for the possible cause and measure will be taken accordingly.
- Will guide the team members about the payments of relief accident to damage as per the rules and policies of the government before the start of duty.
- Will make arrangements for the transportation and distribution of relief compensation and materials.
- Primary estimates of the damage will be worked out.

EARTHQUAKES

VULENERABILITY ASSESSMENT

Delhi, the capital of India is bounded by the Indo-Gangetic alluvial plains in the North and East, by Thar desert in the West and by Aravalli hill ranges in the South. The terrain of Delhi is flat in general except for NNE-SSW trending ridge which is considered and extension of the Aravalli hills of Rajasthan. A computer image of the surface topography of Delhi is presented in the figure below.

Seismicity around Delhi appears to be associated with a major geological structure, which is known as the Delhi-Hardwar Ridge. It coincides with the extension of the Aravali Mountain belt beneath the alluvial plains of the Ganga basin to the northeast of Delhi towards the Himalayan mountain (Jain,1996).

Delhi has had many damaging earthquakes in the past and is placed in a high seismic zone (zone IV). Delhi is prone not only to damaging earthquakes in or near Delhi, but due to its peculiar geological setting it could also sustain strong shaking due to a large earthquake in the Himalaya. Unfortunately, most buildings in Delhi may not meet Indian standards on a seismic constructions and may be considered deficient from seismic safety view point. Thus, there is a real potential for a great earthquake disaster in Delhi, the implications of which go well beyond casualties because of its political and commercial significance.

PRE DISASTER PREPAREDNESS

- It will be ensure that building is constructed as per the Building Bye-Laws with earthquake resistant stability and feature.
- Safe places in and around the building shall be identified and marked where the people will group during any such incident.
- Signs will be placed at various locations for Dos' and Dont's like 'Do not push others', 'Do not use lift', 'To stay calm', 'Let younger children, elderly and disabled leave first' etc.
- Periodic Mock drills will be conducted for tackling the situations in case of disaster.

DURING DISASTER

- Incident commander/EHS manager will take the duty of evasion by the means of alarming system.
- Security officer will ensure that all the young children, elderly and disabled person safely comes out of the building.
- All the people will be assembled at the pre marked areas at a safe distance from the building.

POST DISASTER

- All the compartment of buildings shall be thoroughly searched for any damage to life of human.
- Check for fire in all the possible areas where incident can possibly occur. In case of any mis-happening, call will be made to concerned departments like Fire, Hospitals etc.
- Injury check and first aid treatment will be provided after tremors subside.

TERRORISM

VULENERABILITY ASSESSMENT

Terrorism, the systematic use of violence to create a general climate of fear in a population and thereby to bring about a particular political objective. Terrorism has been practiced by political organizations with both rightist and leftist objectives, by nationalistic and religious groups, by revolutionaries, and even by state institutions such as armies, intelligence services, and police.

Delhi being National Capital is also under the threat of any form of conventional and contemporary warfare. History perceives that generally terrorist attacks takes place in important government building, airports, cantonment areas, historical monuments, populous places and important public gathering etc. Many events of bomb-blasts and terrorist attacks give an insight towards the importance of this issue. Terrorist attacks

such as High Court blast, Paharganj, Sarojini Nagar, Govindpuri blasts, serial blasts of 2008 depict the high vulnerability of Delhi. Being capital city NBC threats are one of the major potential hazard in the state

Terrorists incidents will be avoided by taking the adequate safety measures such as:-

- Security staffs at all entries, exits and escape routes. For awareness regarding safety, the general safety rules are displayed at the notice boards at Control Room and Guard Room.
- Metal Detector to the security staff.
- CCTV shall be located at all important locations with remote viewing facility and recording back up, with highest resolution and picture quality.
- Periodic mock drills related to training in case of disaster handling will be done
- Hand held scanners shall be used for checking of vehicles both at entry & basements.
- The proper arrangement of a safety gadget to the workers for safe working during emergency.

DURING DISASTER

- Follow the advice of local emergency officials.
- Listen to your radio or television for news and instructions.
- If the event occurs near you, check for injuries. Give first aid and get help for seriously injured people.
- If the event occurs near your home while you are there, check for damage using a flashlight. Do not light matches or candles or turn on electrical switches. Check for fires, fire hazards and other household hazards. Sniff for gas leaks, starting at the water heater. If you smell gas or suspect a leak, turn off the main gas valve, open windows, and get everyone outside quickly.
- Shut off any other damaged utilities.

- Call your family contact—do not use the telephone again unless it is a life-threatening emergency.
- Check on neighbours, especially those who are elderly or disabled.

POST DISASTER

- Inform the local police station and disaster management cell.
- Check for any fires in the building and if found take the measures to contain it.
- Secure the people and follow them to exit routes.
- Provide first aid to the injured and call the local ambulance and inform the near-by hospital to be prepared for emergency casualties.
- Inform the relatives of the people suffered.