

# PREPARATION OF **GUIDELINES** FOR **ESTABLISHMENT** OF **EMERGENCY OPERATIONS** **CENTRE (EOC)**

REVIEW OF BEST PRACTICES OF EOC



Submitted By:

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# PREPARATION OF GUIDELINES FOR ESTABLISHMENT OF EMERGENCY OPERATIONS CENTRE (EOC)

## INTRODUCTION

Rapid urbanization and exponential urban growth in India in the past few decades have been accompanied with increased underlying vulnerabilities and exposure to various natural, human-induced and technological hazards. The climate change has further adversely altered the frequencies and severity of these hazards giving rise to complex and cascading urban risks. In the backdrop of this, urban local authorities and stakeholders have a critical role in understanding, mitigating and managing the urban risk and their associated impacts on different sections of society and different sectors of economy.

In this regard, it is pertinent to equip the urban local governance with adequate institutional and infrastructural systems for fulfilling these critical roles towards safeguarding their residents and infrastructure from disaster and climate risks. City level Emergency Operation Centre (EOC) is one such critical infrastructure and facility that augments the capacity of local authorities and other stakeholders in not only for a coordinated and timely response but also in undertaking myriads of mitigation and preparedness activities right from risk communication, hazard monitoring, early warning generation, dissemination, resource management, decision making, etc. The EOC establishes effective linkages among key stakeholders at different administrative level and aids in smooth and collaborative functioning of these stakeholders with the support of various physical, human and ICT infrastructure. An effective EOC system rests on the principle of accountability, unified command, unity of command, chain of command, etc. Overall, the EOC acts a central command and control unit at city level and supports effective discharge of various disaster risk management functions.

The current study for development of Guidelines for Establishment of Emergency Operation Centre (EOC) is being undertaken under the umbrella project 'Developing Resilient Cities through Risk Reduction in the context of Disaster and Climate Change' of USAID-Gol-UNDP. The project covers six cities, namely Cuttack (Odisha), Navi Mumbai (Maharashtra), Shillong (Meghalaya), Shimla (Himachal Pradesh), Visakhapatnam (Andhra Pradesh) and Vijayawada (Andhra Pradesh). The project has two main objectives of:

- i. Reducing disaster risk in urban areas by enhancing institutional capacities to integrate climate risk reduction measures in development programmes as well as undertaking mitigation activities based on scientific analysis;
- ii. Better preparing urban communities with increased capacities to manage climate risks

This report is part of Component 1 of the current study. The key tasks and considerations envisaged under Component 1: Review of existing national and international best practices of Emergency Operations Centres (EOCs) are:

- i. Preparation of concise document capturing three international best practices on Emergency Operations Centers being run by urban local bodies
- ii. The best practice compendium to cover details such as the evolution in understanding of risk at the urban level, preliminary efforts, investments made, roles and responsibilities, decision making bodies, stakeholders involved, technologies deployed, trainings conducted and reasons contributing the center's overall success
- iii. The selection of cities to be guided by their context and relevance for the Indian cities



# FRAMEWORK AND METHODOLOGY FOR COMPONENT 1 OF THE STUDY

To undertake the key tasks of Component 1, the project team was guided by the following framework for establishment and management of EOC (figur1). The framework categories the key components of the EOC functioning and management into core components and support components. The core components focus on physical, human (organizational and stakeholders), technological, data & informational and procedural aspects of functioning and management of EOC while the support components provide for effective and efficient functioning of the core components. Support components include aspects of training & capacity building of involved stakeholders, monitoring & evaluation of EOC management and functioning, grievance redressal and financial provisions and resources for overall management and functioning of EOC.

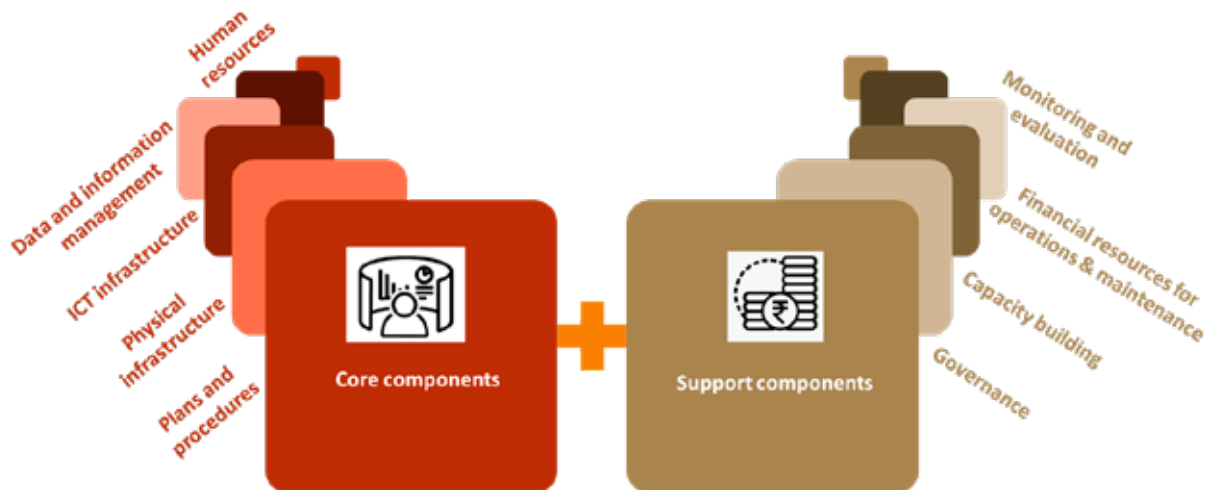


Figure 1: Framework for establishment and management of eoc

Guided by this framework, case study based methodology was deployed for fulfilling the tasks of Component 1. Under the methodology, existing EOCs of the international and national cities were reviewed and recommendations for Indian cities were laid down by undertaking the following steps (figure 2):

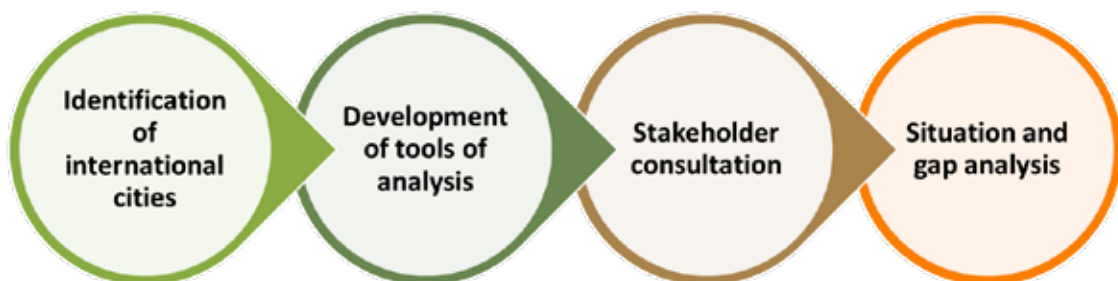


Figure 2: Methodology for component 1

## 2.1. Identification of international cities

Based on the following key criteria, six international cities, namely, Niceville (USA), Rio de Janeiro (Brazil), Shizuoka (Japan), Taipei (Taiwan), Tokyo (Japan) and Toronto (Canada) were selected for the review of their existing EOCs:

- i. Relevance to contexts of Indian cities
- ii. Diverse geographical locations
- iii. Use of technologies, including new and emerging ones, in the functioning of EOC for different aspects
- iv. Consideration for multi-hazard early warning system
- v. Streamlined organizational structure and incident response mechanism
- iv. Last mile dissemination and communication
- vii. Integration of all ESFs in one platform

## **2.2. Development of tools for analysis**

Guided by the framework, tools of data collection and analysis were developed for studying the existing practices on core and support components of establishment, functioning and management of EOC. The tools include template for development of case studies of international cities (Annexure 1) and qualitative questionnaire for consultations for EOCs of national (six project cities) (Annexure 2).

## **2.3. Stakeholder consultation**

Key stakeholders from the six project cities, namely, Cuttack, Navi Mumbai, Shillong, Shimla, Visakhapatnam and Vijayawada were consulted for better understanding of the functioning of the respective EOCs along with key limitations and local challenges faced in the functioning and management of the EOCs. The consultations were done through the developed questionnaire. Their responses are recorded in Annexure 4.

## **2.4. Situation and gap analysis in six national (project) cities**

The response and feedback sought during the consultation helped in understanding the existing situation and gaps in the functioning of the existing EOCs in the six cities in terms of infrastructure, technology, human and financial resources, etc. This was undertaken through SWOT (Strength, Weakness, Opportunity and Threat) analysis based on study of respective City Disaster Management Plans as well as the questionnaire-based consultation of city level stakeholders.

# REVIEW OF INTERNATIONAL CITIES

The detailed review based on case study approach of the six international cities is discussed below:

## **3.1. Niceville, USA**

Niceville is located in the Okaloosa County of Florida state of the United States of America. It has a land area of around 29.6 square kilometer (as of 2010) with a population of 15,972 as of July, 2019<sup>1</sup>.

### **3.1.1. Hazard profile of the city**

The city is primarily vulnerable to floods and hurricanes. Every year it is affected by at least one tropical cyclone. During the year 2004 and 2005, it was affected by eight cyclones. In the past, the state of Florida has braved various major hurricanes like Charley, Ivan, Jeanne, Dennis, Wilma and Irma. Recently, in September 2020, during the category 1 Hurricane Sally the necessitated the City to be on EOC on high alert. The city is also prone to coastal floods, storm surges, flash floods in all seasons of the year.

### **3.1.2. Administrative profile of the city**

#### **1. Administrative and governance structure in the city**

The city is governed by the City Council headed by Mayor and Vice Mayor. Various functions in the city are administered by various city level departments including the Administration Department, Building Inspection Department, Fire Department, Planning Department, Police Department, Public Works Department, Safety Department, etc.

#### **2. Institutional mechanism for disaster risk management at city level**

The Comprehensive Emergency Management Plan (CEMP) developed by the Emergency Management Chief of Okaloosa County Public Safety describes the key aspects of mitigation, preparedness, response and recovery from the impacts of a large-scale emergency or disaster. The Basic Plan section of the CEMP describes mechanism for management of large scale emergencies and disasters by the Okaloosa County in accordance with the National Incident Management System (NIMS). The Basic Plan includes sections that address areas such as the responsibilities of the county and city government, method of operations, financial policies during emergency or disaster, continuity of government, recovery issues, rapid and orderly implementation of rehabilitation and restoration programs, etc.

### **3.1.3. Establishment of Emergency Operation Centre (EOC)**

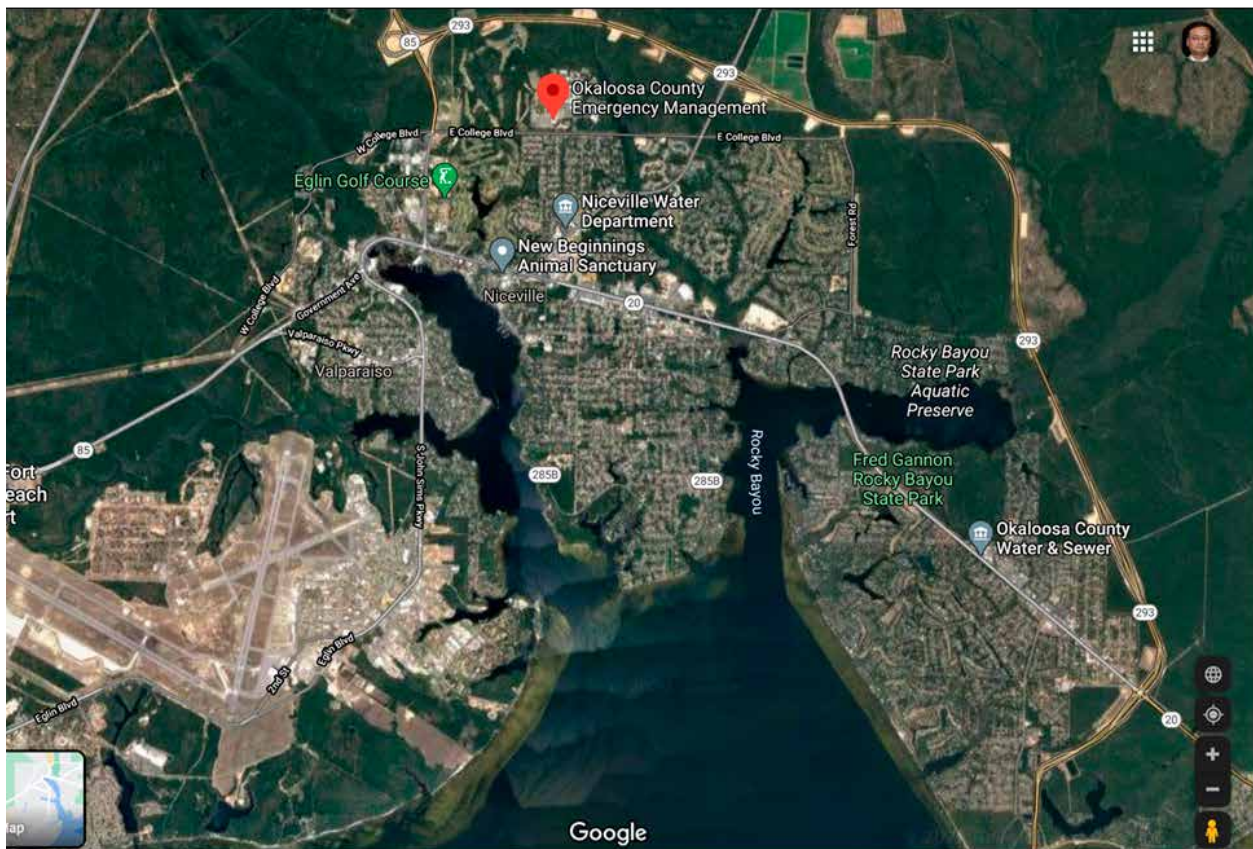
#### **1. Location of EOC**

The EOC is located at the Northwest side of Niceville city. It is located far away from the bay area

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<sup>1</sup> <https://www.census.gov/quickfacts/nicevillecityflorida>

which makes it a safe building for hosting an emergency facility like an EOC. The primary location of the EOC is 90 College Boulevard, Niceville. The secondary location is the Northwest Florida Regional Airport. The tertiary location is the visiting area of the Okaloosa County Jail, Crestview.



Map 1: Location of City EOC, Niceville

(Source: Google maps)

## 2. Governance of EOC

The Emergency Management Chief is responsible for maintenance of the EOC in a ready-to-activate state.

**Decision making process:** The primary responsibility for decision making (during level 1 of emergency) rests with the Unified Command (UC)/ Emergency Management Board, which is defined as a committee of appointed representatives usually stationed in the EOC. This committee may include state, federal, and volunteer agency representatives as the incident warrants. The members of the staff are divided into their ESFs under the NIMS structure. The on-site Incident Commanders (ICs) make decisions necessary to protect life and property and to stabilize the situation. Decisions designed to properly resolve the entire emergency shall be the responsibility of the Unified Command.

## 3. Physical infrastructure of EOC

The EOC is not simply one room but consists of the entire building or complex where it is in operation. When it is necessary to use rooms of other departments or agencies within the complex, the Director of Public Safety or the Emergency Management Chief makes a request in short memo format or verbally to the representative of the responsible agency. In the absence of

receipt of permission in the necessary time frame, the Director of Public safety or the Emergency Management Chief notify the County Administrator who seeks to obtain the needed space either directly or through the Board of County Commissioners.

The Northwest Florida State College Wellness Center is set aside as a sleeping area for EOC staff and family members. Wellness classrooms are used as sleeping areas for EOC staff that do not have families present. Overflow sleeping and support of family members is conducted in the Raider Room.

#### **4. ICT infrastructure at EOC**

With a few exceptions, each public safety agency maintains its own communications system and dispatch center. It also contains the Emergency Management Satellite Communications System (ESATCOM) and the "Code Red" Warning system used by Emergency Management to alert schools, nursing homes, and hospitals.

The Okaloosa County operates the Enhanced 9-1-1 Plus System with Automatic Number Identification and Automatic Location Identification which is administered and managed by the Department of Public Safety. The Primary Safety Answering Points (PSAPs) are located in the County Warning Point and the Crestview PD/FD dispatch centre. Crestview and Ft. Walton Beach are the designated emergency backups for the County Warning Point.

The Amateur Radio Emergency Service for supplemental emergency support has placed HAM radios with an operator in the Red Cross Shelters and the EOC. Besides, some municipalities have HAM radio capability for their EOC. Each school-based shelter also has a two-way VHF radio that can be operated by non-HAM personnel. Antenna systems for the HAM radios have been installed in the schools designated as public evacuation centres (Red Cross Shelters).

Okaloosa County Public safety (OCPS) has established an 800 MHz Command & Control Net for use during significant incidents. To date, the key organizations in the net include Okaloosa County Public safety, Okaloosa County Sheriff's Office, Okaloosa Water & Sewer, Ocean City/Wright Fire Control District, Niceville Fire Department, 6th Ranger Training Battalion, etc.

### **3.1.4. Functioning of EOC**

#### **1. Integration of early warning and communication system**

The County Warning Point conducts warning operations in accordance with established Standard Operating Procedures. A generator and UPS systems provide emergency power. The Emergency Management Warning System consists of the following components:

- Notification by the National Weather Service: Warnings by the National Weather Service (NWS) on impending danger from weather systems are issued to media outlets and emergency management bodies. OCPS also receives warning information from commercial vendors by facsimile and alphanumeric pager.
- **911 Call:** In the case of hazardous materials incidents, wildfires, aircraft crashes, etc., initial notification is made only after the danger has begun. This may be by a 9-1-1 call from a citizen, a business, or storage facility.



- **Relay of Warning by the Public Safety Department:** The Department of Public Safety relays warnings it receives by several methods which may be used singly or in conjunction with other methods. These methods include facsimile with broadcast capability for alerting the media, tourist resorts, and public safety agencies of potential hazards.

Besides, citizens have an option to receive severe weather alerts after registering with the EOC. The free service is provided by Everbridge. Besides, the EOC also has large outdoor mass notifications systems which is used to alert people living around the bay for cyclones and other incidents.

## 2. Detailed role during activation of emergency

The city responds to any emergency with the help of the 20 Emergency Support Functions (ESFs), namely, Transportation, Food and Water, Communications, Energy, Public Works, Military Support, Firefighting, Public Information, Planning, Volunteers, Mass Care, Law Enforcement, Resource Support, Animal Issues, Health and Medical, Municipalities, Search and Rescue, Business, Hazmat and Citizens Information.

During emergencies, different NIMS Sections are tasked with depending upon the size and complexity of the incident. The ICS/ UC is designed to expand and contract depending on the incident needs. The Span of Control for any Commander, Director, or Unit Leader should only be 3 – 5 people. If the number of direct reports is higher, Branch leaders shall be assigned to consolidate reporting for similar operational groups. The Incident Commander/ Unified Command is responsible for assigning personnel to each position as warranted and as per Standard Operating Guidelines.

**Command Staff** consists of Incident Commander, Public Information Officer, Safety Officer, Liaison Officer and Agency Representative.

- **Incident Commander:** The Incident Commander is responsible for the overall management of all incident activities, including the development and implementation of strategy, and for approving the ordering and release of resources. In multi-jurisdictional incidents, the duties of the Incident Commander may be carried out by a unified command established jointly by the agencies that have direct jurisdictional or functional responsibility for the incident. In single-jurisdiction incidents where assisting agencies have significant resources committed, the responsible agency may establish a unified command at the incident command level, or place assisting agency personnel in key positions within the organizational structure. The Incident Commander may have a deputy. The deputy's responsibilities is delegated by the Incident Commander.
- **Public Information Officer:** The Public Information Officer is responsible for the collection and release of information about the incident to the news media and other appropriate agencies and organizations. The Public Information Officer reports to the Incident Commander.
- **Safety Officer:** The Safety Officer is responsible for monitoring and assessing hazardous and unsafe situations and developing measures for assuring personnel safety. The Safety Officer corrects unsafe acts or conditions through the regular line of authority, although he or she may exercise emergency authority to stop or prevent unsafe acts when immediate action is required. The Safety Officer maintains an awareness of active and developing situations, approves the medical plan, and includes safety messages in each Incident Action Plan. The Safety Officer reports to the Incident Commander.

- **Liaison Officer:** The Liaison Officer is responsible for interacting (by providing a point of contact) with the assisting and cooperating agencies, including fire agencies, the American Red Cross, law enforcement, public works and engineering organizations, and others. When agencies assign agency representatives to the incident, the Liaison Officer will coordinate their activities. The Liaison Officer reports to the Incident Commander.
- **Agency Representative (Emergency Support Function Representative):** An Agency Representative is assigned to an incident from an assisting or cooperating agency with full authority to make decisions on all matters affecting that agency's participation at the incident. Agency Representatives report to the Liaison Officer, if that position has been filled. If there is no Liaison Officer, Agency Representatives report to the Incident Commander. There is only one Agency Representative from each agency assigned to the incident. In Okaloosa County, the agency representatives are organized under Emergency Support Functions under the National Incident Management System structure. In small incidents, the Agency Representatives answer to the Incident Commander. In larger incidents, agency representatives answer to their respective Section Chiefs, who in turn answer to the Incident Commander.

**Mechanism for resource management and demobilization:** The Resources Unit is primarily responsible for:

- Seeing that incident resources are properly checked in.
- The preparation and processing of resource status change information.
- The preparation and maintenance of displays, charts, and lists which reflect the current status and location of operational resources, transportation, and support vehicles.
- Maintaining a file or check-in list of resources assigned to the incident.

The Resources Unit Leader reports directly to the Planning Section Chief. The demobilization of the resources and personnel from a major incident is a team effort involving all elements of the incident command organization. The Demobilization Unit develops the demobilization plan and coordinates and supports the implementation of that plan throughout the incident command organization. Several units of the incident command organization, primarily in logistics, are responsible for assisting in the demobilization effort. These units should participate in the preparation of the plan.

The Demobilization Unit Leader is responsible for the preparation of the demobilization plan and assisting sections and/or units in ensuring that an orderly, safe, and cost-effective movement of personnel and equipment is accomplished from the incident. Individual agencies and/or contractors may have additional specific procedures to follow in the process of incident demobilization. The Demobilization Unit Leader will answer directly to the Planning Section Chief.

**Mechanism for data and information management:** The Planning Section Chief, a member of the Incident Commander's general staff, is responsible for the collection, evaluation, dissemination, and use of information regarding the development of the incident and status of resources. Information is needed to:

- Understand the current situation.
- Predict the probable course of incident events to include identification of future resource requirements.
- Prepare alternative strategies and control operations for the incident.

The Situation Unit is primarily responsible for the collection and organization of incident status and situation information, and the evaluation, analysis, and display of that information for use by ICS personnel. The Situational Unit Leader reports to the Planning Section Chief.

### 3. Capacity building measures undertaken at EOC

**Trainings:** The EOC staff and public safety managers are trained for their roles and capabilities of volunteer organizations annually. This training is coordinated with various organizations that provide volunteer services such as Red Cross, Salvation Army, VOAD, NOSR, etc.

ESF teams are trained at the start of each severe weather season in basic NIMS/ ICS principles as well as their basic ESF functions and relationships with other ESFs and EOC, and WEB EOC operations. At a minimum, all emergency lead and support personnel are trained to ICS 100, ICS 200, ICS 300, and ICS 700 levels. The training include:

- Incident management organizations and personnel participating in realistic exercises, including multidisciplinary and multi-jurisdictional events and private-sector and nongovernmental organization interaction
- Standard courses on Incident Command and management and incident management structure
- Standard courses on operational coordination processes and systems
- Courses focused on discipline-specific subject matter expertise
- Courses focused on agency-specific subject matter expertise

Personnel who have emergency response responsibilities must meet established training requirements as specified in state or federal rules. OCPS, upon request, provides Level 1 Hazardous Materials Responder classes. Level 2 and higher classes must be coordinated with external agencies. OCPS provides training on the requirements of state and federal preparedness, response, recovery, and mitigation programs to local agencies. OCPS offers such training annually and coordinates additional training when time and resources allow.

**Simulation exercise:** Each municipality, department, and agency is responsible for conducting periodic exercises for emergency operations. The Department of Public Safety coordinates at least one full-scale and two functional exercises per year. To the extent possible, each agency with responsibilities under CEMP is involved in the exercise. The Department of Public safety provides assistance to hospitals, public safety agencies, municipalities, and others in setting up exercises when requested in writing to do so by the appropriate official. The Department participates in external exercises to the maximum extent practical. An after action review is conducted within two weeks of the cessation of an emergency operation or exercise to identify improvements needed in training, planning and operations, and resource management.

### 3.2. Rio de Janeiro, Brazil

The city of Rio de Janeiro, is part of the state of Rio de Janeiro of Brazil. It is situated at the far western side of the Atlantic coast, is one of the rapidly urbanizing regions of Brazil. It has a population of 6.5 million in its 1224 square km area, while the metropolitan region expands to 4539 square kilometres with a 12 million population<sup>2</sup>. The city has the second-largest economy after Sao Paulo, Brazil, and has its major income generated via the service sector such as entertainment and tourism (86% of the total)<sup>3</sup>.

<sup>2</sup> <https://use.metropolis.org/case-studies/rio-operations-center>

<sup>3</sup> International Case Studies of Smart Cities Rio de Janeiro, Brazil



### 3.2.1 Hazard profile of the city

The geographical settings of the city gives rise to high spatial and temporal variability of meteorological conditions, wherein the forest masses influence the climatic conditions. The city has recorded recurring events of natural hazards relating to intense rainfall and storms such as in 1960 and 2010 April. Improper development practices such as land reclamation, slope occupation, clearing of hills, and related sprawl into vulnerable regions have also resulted in a large set of the population under the disaster risk. Furthermore, it is reported that 22% of the total population stays in low-income vulnerable settlements. Improper policy management, overpopulation, and natural factors has posed new levels of challenges for the city.

### 3.2.2 Administrative profile of the city

#### 1. Administrative and governance structure in the city

The city is the part of the Metropolitan region and is divided into four regions, namely, the Center Zone (the economic region of the city having the Santos Dumont Airport and the Rio de Janeiro Port); the North Zone (consisting of middle class residential zones as well as commercial regions); the South Zone (richest pocket of the municipality with tourist friendly infrastructures); and the West Zone (the largest zone of the municipality accommodating a local population).

As the capital of the state and home to a large proportion of the state's population and wealth, the city government exercises almost as much power as the state government. The city is divided into 1 Municipality, 19 Sub-prefectures, and 34 Administrative regions. The Mayor is the head of the Municipality of Rio de Janeiro and is assisted by Secretaries. The Secretaries head various administrative departments of the Municipality. The legislative power is held by the members of the Municipal Chamber which is an elected body.<sup>4</sup>

#### 2. Institutional mechanism for disaster risk management at city level

The municipal administration has several institutions and agencies which perform varied functions related to disaster risk management. These include actions related to rainfall in the city. Along with the Municipal Civil Defense of the city, an Emergency Management Agency and various organizations such as the Geotechnical Foundation of the City of Rio de Janeiro, the Foundation of the Waters of the City of Rio de Janeiro work for risk management. Sub-Secretariat for Civil Protection and Defense of the City (SUBPDEC), created in 1973, is responsible for risk reduction in Rio de Janeiro and takes part in various projects of risk management, capacity building, training, etc. Rio-Águas is an agency responsible for storm water management and flood prevention in the city of Rio. Rio operations center (COR) helps to bring together multiple organizations for better management during emergencies.

### 3.2.3 Establishment of Emergency Operation Centre (EOC)

Rio Operations Center (COR) was established after the floods of 2010 and its functioning is based on:

- Data collection from sensors such as rain gauges, radar sensors, bus GPS systems, images, social networks, and other sources;
- Data analysis to make operational decisions; and
- Dissemination of information to the population, alerting citizens of disasters or other problems

4 <https://www.britannica.com/place/Rio-de-Janeiro-Brazil/Transportation#ref29052>

## 1. Location of EOC

Rio Operations Center (COR) is located in Cicade Nova at Rio de Janeiro, which is situated between the central and the north zone of the Municipality. The center is situated next to the city hall.

## 2. Inception of EOC

**Initial process and efforts towards establishment of EOC:** The city has been hit hard by repeated Atlantic storms imperiling the city, mostly affecting the low income households and the economy. Following a vicious storm in 2010, the then Mayor Eduardo Paes decided to create a center that operates 24 hours a day, staffed by officials from 30 city departments. His vision involved the creation of a single agency that coordinates multiple agencies, improves the safety and emergency response and also helps to manage public utility and transportation.

**Initial investment incurred and running cost:** Rio Operations Center was funded by the city government. The initial investment of the project was 14 million USD as per the Mayor. The assets are now owned by the Operations Center, under control of the City government's Executive Branch.

## 3. Governance of EOC

**Department/ authority heading or running the EOC:** The city government is the pioneer body responsible for COR. It brings together various organizations and other policy makers for effective risk management activities. The Chief Operating and Resilience Officer of COR reports to the Mayor upon decree and is responsible for running the operation to deal with situations that arise.

**Organizational structure of EOC:** The Chief operating and resilience officer is the head in charge of the COR operations, who reports to the Mayor. The organizational chart of COR enhances the integrated working model and discourages the idea of hierarchy and power. The branches are divided into Operations, Technology, Infrastructure, and Resilience. All the branches of COR work jointly and share equal responsibility.

**Human resource management:** The COR integrates over 30 local and state agencies for coordinating and managing the risk of the city. The human resource involves around 500 employees working 24 hours every day in shifts. The team includes experts such as meteorologists, engineers, geologists, etc.

## 4. Physical infrastructure at EOC

The building of COR covers an area of 1800 square metres which is spread across four floors. It has various rooms such as operations room, situation room, etc. which are designed for better management of disasters.

## 5. ICT infrastructure at EOC

The technological platform of COR was designed by a consortium which included Municipal Company of Information Technology, IBM, Pereira Passos Municipal Institute of Urbanism. Google Earth Technology is used for devising an integrated system of georeferenced data from all the municipal assets involved in the Rio's daily operations. Furthermore, COR has collaborated with Oi and TIM (telecom companies) which implemented the links for data transmission.

- The Control Room monitors the city in real-time, receiving images from over 900 cameras, through 30 km of fiber optic cable. The 65 m<sup>2</sup> video-walls in the control room are composed of 80 46-inch monitors, which rely on Bilfinger and Samsung technologies. Furthermore, in addition to the captured images, data from various sensors, such as rainfall stations and municipal systems are interconnected and made available for viewing and analysis on the screen.
- Meteorological activities are monitored by employing 'Rio Alerta Center' which is a rainfall and landslide alert system in hillsides. It collects data from rain gauges which monitors every 15-minute data from all the rain gauges. The analysis team involves a group of meteorologists, engineers, and experts. The data is shared at the control center which takes further actions such as issuing an alert to leaders. Alerta has its weather radar which helps in modeling the rainfall patterns.
- GeoPortal system ensures smart operability of various agencies and helps in the analysis of databases.

### 3.2.4 Functioning of EOC

#### 1. Key functions performed by EOC

**Key functions of EOC during normalcy:** The overall function of COR during normalcy is divided into 4 branches, namely, operations, technology, infrastructure and resilience.

- Operations: The operations support day to day routine of the organization, seeks solutions to the inevitable problems and works to prevent increasing disorders.
- Technology: The technology branch is responsible for data integration and innovation such as integration with platforms such as Twitter, weather databases as well as citizens for efficient management.
- Infrastructure: The infrastructure branch is responsible for the management and maintenance of buildings which helps in the smooth functioning of other departments.
- Resilience: The resilience branch supports development and execution of projects for building greater strength and enhancing city's adaptability to future shocks. It consolidates the vision of the city by learning from past experience and preparing itself.

**Key functions of EOC during and post emergency:** During the onset of emergency, the COR operational teams undertakes the laid down procedures. The situation is assessed wherein the incident is classified according to its criticality. Various factors such as location, time and affected population play major role in the decision making. The Chief Executive then notifies the situation management team which then takes necessary protocols.



**Figure 3:** Emergency management during emergency and post emergency

Source: (International Case Studies of Smart Cities Rio de Janeiro, Brazil, IDB<sup>5</sup>)

## 2. Detailed role during activation of emergency

COR uses colour coding to indicate the operational stage of the city and classify the intensity of emergencies. The colours are classified into green or normal stage, warning stage or yellow and crisis stage or red colour.

**Mechanism for inter-agency coordination:** The COR uses the model of multi-agency cooperation and integration. The model discourages internal barriers and enhances the value of unity of purpose and joint efforts among the branches. The main agencies are classified into:

- Municipal agencies: These include Civil Defense–Disasters, SMAC- Environment, and SMDS – Social Development, SMTR - Transports
- State, federal agencies and public utilities- These include CEG gas, CEDAI- water and sewage and so on.
- Partnership with the Public Security of Rio de Janeiro State Government- The partnership involves external relations with organizations such as CICC, the Secretary of the State of Public Security for integrating the actions of state and federal governments.

For the inter-agency operability, 'GeoPortal' platform is used for providing routine support to joint operations of the agencies, integrating and optimizing the strategic, tactical, and operational support efforts in meeting the demands of the city. The main aspects of GeoPortal includes

- Smart map: A platform wherein COR integrates all sources of data such as transportation, weather data, locations of social infrastructures and other integration with camera sensors for better management. Cesium tool<sup>6</sup> is used for data sharing and management.
- Integration and interoperability: The COR Integration Platform allows the interconnection of multiple data sources and provides services for consumption by other applications.

**Mechanism for data and information management:** During emergencies, the data flow is directed in the following stages:

- Data input stage: This stage includes data from sensors, cameras, legacy systems, and mobile applications. The data are processed, analyzed, and forwarded to the responsible agencies; which make decisions and notify their field staff for response activities.

5 <https://publications.iadb.org/publications/english/document/International-Case-Studies-of-Smart-Cities-Rio-de-Janeiro-Brazil.pdf>

6 An open platform allowing three dimensional visualization of geospatial data and allows advanced analytics.

- Response action stage: This stage concerns support and multi-agency coordination, management and analysis of situations, smart use of the video surveillance system, adoption of standard operating procedure and collaboration with field teams via Telegram and WhatsApp.
- Dissemination of information: The stage concerns the dissemination of information to citizens. It is supported by the press office team, which coordinates the communication strategies and the use of various communication channels. At this stage, the content of interest is also communicated to the press.
- The operational intelligence stage: The stage includes analysis and data correlation, process improvement, creation of new services, and transformation of the knowledge acquired in intelligence accessible to agencies. The experiences and the information are used for better management and prediction modeling in the future. Thereafter, it is possible to plan new actions and create solutions in search of preventing and reducing the impact of adverse conditions on the city



**Figure 1:** Information management during and post emergencies

Source: (International Case Studies of Smart Cities Rio de Janeiro, Brazil, IDB<sup>7</sup>)

**Mechanism for public relation and media management:** The press room of the Rio Operations Center is responsible for data dissemination to the public. The information communication involved is a two-way exchange of information that helps in proper management. Besides communicating the vulnerable groups about hazards, the media room also warns the Rio Operations Center about events which are notified by the public. The operations center runs a communication channel by the name '1746 Hotline', whereby citizens report problems about city services, get information about fines and permits, and even tourist information. This mechanism helps to foster community involvement in disaster risk mitigation and management. Besides, data and information dissemination from the COR to the public is done by using the press team of the COR which releases essential newsletters. Alerts are sent to general public and community leaders on their registered mobile numbers by SMS. Information is also disseminated widely by the press office of COR through social networks and news media.

7 <https://publications.iadb.org/publications/english/document/International-Case-Studies-of-Smart-Cities-Rio-de-Janeiro-Brazil.pdf>

### 3.2.5 Impact of EOC

The Rio Operations Center has enabled a new administration model that provides communication and coordination between public entities, facilitates information sharing, and enables prompt and efficient decision-making processes. Public transportation has showed significant improvements as a result of the introduction of Rio's Operation Center. Transportation management, which helps to improve sustainability, has been a major challenge. The representatives of bus, BRTs, train, ferry, and subway companies are present at the Rio Operations Center. Due to better management of transport systems, the emergency response time was reduced by 30%. Traffic teams are now able to manage incidents and reduce the overall damages. The city's map, with over 80 digital layers, shows data such as the present location of all municipal vehicles and equipment, has also helped in better management. In addition, street maintenance was also initiated as a result of the platform. The COR's platform has also helped in disease tracking and management. The geographical analysis of cases enabled the identification of the neighborhoods with the highest infection rates. All these have helped in the better management of risks in the city. However, some experts have highlighted the issues of improper management due to undeveloped website for communication and asymmetrical distribution of surveillances to the wealthier pockets of the city.

## 3.3. Shizuoka, Japan

Shizuoka city is the capital of Shizuoka Prefecture in Japan. It is located in the middle of Honshu Island on the southern coast of Japan facing the Pacific Ocean. The city is the second largest city in the Shizuoka Prefecture and the fifth largest in Japan. It has a population of around 3.6 million<sup>8</sup>. Mount Fuji, the tallest volcano and Japanese iconic mountain is located between Shizuoka Prefecture and Yamanashi. Shizuoka Prefecture is called 'advanced prefecture for disaster counter measures' as it is expected to be impacted by a huge earthquake and Shizuoka Prefecture Government has been preparing for the same for past 40 years.

### 3.3.1 Hazard profile of the city

Japan is located in the seismically and volcanically active circum-Pacific belt. The geographical, topographical and meteorological conditions make the country prone to various natural hazards such as typhoons, torrential rains and heavy snowfalls, earthquakes, tsunami, etc. The Shizuoka Prefecture is prone to frequent earthquakes, tsunami, typhoon, tidal waves. . The region from Suruga Bay to Huga-nada is called the Nankai trough, where the oceanic Philippine Sea plate is subducting beneath the continental plate on which Japan island lie. The area is known for large-scale earthquakes which repeatedly occur<sup>9</sup>. Since 1976, there is a possibility of a large scale of earthquake, called Tokai earthquakes in the Tokai area including Shizuoka Prefecture. The Shizuoka city is prone to both earthquakes and tsunami.

### 3.3.2 Administrative profile of the city

#### 1. Administrative and governance structure in the city

The city is governed by a Council headed by an elected Mayor. Administratively, the city is divided

8 <https://toukei.pref.shizuoka.jp/chosa/02-030/index.html>

9 Shizuoka Prefecture, Earthquake Preparedness in Shizuoka Prefecture, Japan, 2014, p.2.



into three wards, namely, Aoi Ward, Suruga Ward and Shimizu Ward with respective Ward Offices.

## **2. Linkage with wards, district and state**

Shizuoka Prefecture Government has the headquarters of Disaster Management for collecting information, providing assistance to municipalities, and ensuring swift and smooth emergency response during the disaster. It coordinates with both regional and national departments and agencies working for disaster reduction system. Regional level headquarters have been set up for each regional area such as Kamo, Eastern, Central, Western Area for better linkage and coordination with Shizuoka Prefecture. Each regional office supports DRR trainings and awareness raising activities organized by municipalities for improving the system. The regional headquarters play central role at local level during a disaster. The prefectural headquarter works in wide and close cooperation with national government offices and coordinate activities throughout the prefecture.

## **3. Institutional mechanism for disaster risk management at city level**

Shizuoka City Municipal Government has the Department of Crisis Management in the Municipal Government Office. It is responsible for matters related to the overall crisis management system. It coordinates and works with disaster prevention agencies and organization. It supports establishment of crisis management task force and operation meetings. It lays down plans and undertakes coordination of policies for disaster prevention. It has established earthquake disaster warning headquarters and disaster control headquarters, conducts disaster prevention meetings and develops regional disaster prevention plans. Department of Crisis Management functioning also concerns working with flood prevention council and on flood prevention plans. The city has Shizuoka City Disaster Prevention Council consisting of Mayor, Chief of Municipal Education Committee, Fire Department, Police, infrastructure companies, etc. The Council develops a regional disaster prevention plan for Shizuoka City, promotes its implementation and reviews it annually. The plan is envisaged to protect the life and property of the city and its residents from disasters. It defines roles & responsibilities of the key stakeholders of the city including disaster prevention agencies, citizens, and business establishments across. These roles & responsibilities pertain to disaster prevention, disaster response and recovery, and other related issues.

### **3.3.3 Establishment of Emergency Operation Centre (EOC)**

#### **1. Location of EOC**

Shizuoka Prefecture has established a permanent Crisis Management Center at the Disaster Management Headquarters in the prefectural government annex building to handle disasters such as large-scale earthquakes.

#### **2. Governance of EOC**

**Department/ authority heading or running the EOC:** The Crisis Management Centre and the Department of Disaster Management is managed by the Shizuoka Prefectural Government.

**Organizational structure of EOC:** Shizuoka City Mayor sets the headquarters of disaster management in case of an emergency or when one is likely to occur disaster to propose countermeasures.

**Decision making process:** The prefectural governor, deputy governors and leading members in Emergency Management Bureau has a system for assuming the responsibility in turns which helps in immediate decision making in case of emergency. In addition, disaster management specialists of the prefectural office and the four regional centers for emergency management collect and transmit information between prefecture and district at night and on holidays for supporting the decision making.

**Human resource management:** The Prefecture Crisis Management Centre employs the staff from the Prefectural government while Shizuoka City Municipal Government staffs working in the Department of Crisis Management.

### **3. Physical infrastructure at EOC**

Shizuoka Prefecture Crisis Management Center has the following these physical infrastructure facilities:

- Meeting rooms for decision making
- Staff room to plan measures and provide support
- PC rooms to collect and analyze information

### **4. ICT infrastructure at EOC**

Shizuoka Prefecture Crisis Management Center has following ICT facilities:

- AV operation desk
- Communication control room
- Helicopter TV transmission system established by prefectural government control bureau

## **3.3.4 Functioning of EOC**

### **1. Key functions performed by EOC**

**Key functions of EOC during normalcy:** Shizuoka Prefecture Crisis Management Center not only serves as the district headquarters during disasters but also implements disaster prevention measures that are tailored to the conditions of each region during normalcy. It supports disaster prevention measures and drills in cities and towns. In addition, it works towards building awareness among citizens by using earthquake simulation vehicles and disaster prevention games, etc.

**Key functions of EOC during and post emergency:** In case of large-scale disasters, Shizuoka Prefecture Crisis Management Center supports the head (Prefectural Governor) and members in decision making, planning operation, and working with support teams smoothly as per the laid down Guidelines for Emergency Activities for Prevention of Tokai Earthquake. The center has assesses the damage and the situation throughout the area immediately after a disaster.

### **2. Integration of early warning and communication system**

Tokai earthquake warning, warning declarations and Tokai earthquake prediction information issued by the Fire Department are received by the Fire and Disaster Prevention Radio (terrestrial and satellite lines) or by wired telephone. The Tokai earthquake warning information and Tokai earthquake prediction information notified by the Meteorological Agency/ Shizuoka Regional Meteorological Observatory are also received by wired telephone and fax (disaster prevention



radio). Information on prevention of disaster for cities, towns and organizations is communicated via the Prefectural Disaster Prevention Bureau. The route of transmission is in accordance with the Guidelines for Information and Public Relations on Large- Scale Earthquake.

Besides the earthquake, when the city receives a notification of special warnings, alerts, and advisories for weather-related issues, it is immediately notified to the residents via the broadcast radio or the Shizuoka City Disaster Prevention Mail.

### **3. Detailed role during activation of emergency**

At the Prefecture level, when a Tokai earthquake warning is issued, firstly the Governor will have the officials gather at the designated location in accordance with the Shizuoka Prefecture Earthquake Disaster Warning Headquarters Operation Guidelines. The staff members are engaged in preparations for the establishment of the Earthquake Disaster Preparedness Headquarters and the District Headquarters, as well as administrative work for the smooth implementation of earthquake disaster prevention and emergency response measures. When the investigation information (temporary) related to the Tokai earthquake is released, the necessary personnel are called to the headquarters, and the information collection, transmission, and communication system are ensured according to the information collection system specified in the operational guidelines.

**Mechanism for resource management and demobilization:** When an emergency situation arises during working hours, instructions are communicated simultaneously to all employees in the building using in-house announcements. In addition, the coordinating section of each department promptly give instructions to the offices at the destination by telephone. When an emergency situation on holidays or after working hours, staff check the instructions from the staff disaster information e-mail system. In case wired telephone service is disrupted and it becomes difficult to transmit mobilization orders to the staff, the staff obtain information from television, radio, etc., and gather them in accordance with the criteria for deployment of staff during disasters.

In principle, the citizens have to secure emergency supplies necessary at the time of the issuance of a warning declaration. In the event of a prolonged period of time and a shortage of emergency supplies, the city or town request the prefecture to procure emergency supplies.

**Mechanism for data and information management:** Shizuoka Prefecture has established the 'Fuji-no-kuni Disaster information Sharing System (FUJISAN)' to collect damage information and share the information with municipalities, related disaster prevention organizations and lifeline companies. This site is designed to be accessible from anywhere at any time using cloud services (internet) without a special software. This system also provides basic data about shelters, first-aid stations, heliports, hospitals at disaster management offices, first-aid hospitals and others critical facilities which can be visualized in the database. In case of disaster, information on availability of resources appears in the database. The Disaster Control Headquarters plans and implements comprehensive disaster countermeasures based on the damage information transmitted through FUJISAN.

**Mechanism for public relation and media management:** When the Tokai earthquake warning is announced or a warning declaration is issued, the prefecture provides the following information to the citizens to carry out appropriate and prompt public relations in close cooperation with disaster prevention organizations:

- Content and meaning of Tokai earthquake warning, warning declaration and Tokai earthquake

prediction information

- Major traffic conditions and road traffic information
- Disaster prevention measures to be implemented in households
- Request for disaster prevention activities to voluntary disaster prevention organization

From the time the Tokai earthquake warning information is announced until the lifting of the Tokai earthquake warning or the issuance of the warning declaration, and from the issuance of the warning declaration until the occurrence of the Tokai earthquake or the lifting of the warning declaration, the public information and the announcement of information by the Prefectural Warning Headquarters, etc. is carried out in an integrated manner with the cooperation of the media through mainly radio, television, newspaper and internet.

When warning information is announced, cities and towns agencies provide correct information promptly to calm the public, and publicize the necessary information to enable residents to take appropriate emergency measures. Matters to be publicized are as per the approval or guidelines of the prefectural government. Besides, the city use posters, radio, TV, internet, email, announcement car etc. to inform citizens of the necessity for disaster countermeasures.

### 3.3.5 Impact of EOC

Shizuoka Prefecture has been preparing for Tokai earthquake by implementing various disaster prevention measures and strengthening its observation system, both hardware and software. As a result, the prefecture has become the number one prefecture in Japan in terms of earthquake resistance of schools and kindergarten facilities. Also, the 'Shizuoka Model' has received high evaluation for its counter measures to mitigate the damage caused by the largest tsunami that can be expected to occur once in a thousand to several thousand years by raising the height of existing forests and roads.

In addition, in the wake of the April 2016 Kumamoto earthquake, Shizuoka Prefecture dispatched liaison officers to Kumamoto prefectural Office on the day after the previous earthquake hit. Officers established a support system for the prefecture even before the main earthquake hit. In this way, Shizuoka Prefecture actively provides support for earthquake disasters in other prefectures as well.

## 3.4. Taipei, Taiwan

Taipei, the capital city of Taiwan, is located in the north part of the Taiwan. It is the political, military, cultural, economic and financial centre of Taiwan. The city has a population of 2,645,041 (as of 2019 end) with a population density of 9732 people per square kilometer.<sup>10</sup> The population is unevenly distributed across the city. It spreads in an area of around 272 square km<sup>1</sup>. Geographically, the city is the northeastern tip of Taipei Basin. The basin is formed by fault displacement and river erosion activities. The strata of the city consists of sedimentary terranes and igneous rock and the city terranes are mainly divided into Taipei Basin, over-thrust fault ridges and Datun Volcanoes. The city has also has many rivers flowing across it. Primarily these are, Tamsui, Xindian and Keelung. It experiences a subtropical monsoon climate with hot summers and mild winters.

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<sup>10</sup> Taipei City Statistical Abstract (<https://www-ws.gov.taipei/001/Upload/367/refile/45669/8203213/e57dd823-8a0f-437d-ba72-47c93b55e480.pdf>)

### 3.4.1. Hazard profile of the city

The city is prone to earthquakes as three great faults (Xindian, Taipei and Kanjiao) span the city and is the City is located in the seismically active zone of Pacific Ring of Fire. The city experiences typhoons during summer and autumn months; also leading to flooding in low-lying areas. As a sub-tropical zone city, it is affected by monsoons. Besides, being located in a basin with multiple rivers running through it, the city is prone to floods during May to October during which the city receives 62% of its annual rainfall. The stretch of the city along downstream Tamsui River is susceptible to tidal highs and lows. Some parts of the city face issues of air pollution.

### 3.4.2. Administrative profile of the city

#### 1. Administrative and governance structure in the city

Taipei city is a special municipality. Administratively, the city is divided into 12 districts. The Taipei City Government (TCG) is headed by a Mayor and consist of Deputy Mayors, Secretary-General, Deputy Secretary-Generals. TCG operates various departments of the city and is supported by a few Committees.

#### 2. Institutional mechanism for disaster risk management at city level

The Disaster Prevention and Rescue Act, Taipei City Disaster Prevention and Rescue Guidelines and the Local Government Act guide the disaster prevention and rescue system in the Taipei City. The system includes mechanism for the City and for its districts. It consists of the Disaster Prevention and Protection Expert Consultation Committee, the Disaster Prevention and Protection Councils, the Office of Disaster Management, the Taipei City EOC and the District Emergency Response Centres.



Figure 5: Institutional mechanism for DRM of Taipei City

Source: Taipei City Disaster Prevention Info Website

The Disaster Prevention and Protection Experts Consultation Committee provides advice on disaster prevention and protection and is chaired by the Mayor. It consists of various units on typhoon, floods, earthquake, public safety, information and public health. It implements disaster prevention and protection policies, undertakes research and develops technology, and applies results of disaster prevention and protection. In addition to this, there is provision for conducting City's Disaster Prevention and Rescue Meeting, Residents Mobilization Meeting and Defense Coordination Meeting. The Joint Meetings bring together commissioners from the City Government's departments, district directors and representatives from civic bodies, the military and academics.

### 3.4.3. Establishment of Emergency Operation Centre (EOC)

The existing Emergency Operation Centre (EOC) of the Taipei city is an all-purpose, multi-function EOC. It replaced the earlier EOC of the City located on 3rd floor of the Taipei City Fire Department which faced the issues like space constraints and hence poor mobility; inadequate hardware and software.

#### 1. Location of EOC

The existing EOC is located in Xinyi District of the city.

#### 2. Inception of EOC

**Initial process and efforts towards establishment of EOC:** The planning of the existing EOC initiated in 2005 and its construction was completed in December 2006. However, its information and communication facilities were ready only by 2007. The EOC was inaugurated in December 2007.

#### 3. Governance of EOC

**Organizational structure of EOC:** The EOC is headed by the Mayor who is designated as Commander of the EOC. The Vice-Commander of the EOC is Deputy Mayor and the leader of different functional groups of EOC are Governors of related agencies and divisions.

**Human resource management:** The EOC envisages to nurture a human friendly working environment and operations system.

#### 4. Physical infrastructure at EOC

The EOC site area is 6936 square meters with a floor area of 26,368.58 square meters. The building has an SRC steel frame. Precast concrete construction technique was used due to which one floor got completed in 10 days and the building in a year's time. The EOC building has two underground floors (Basement 1 and 2 for parking), seven floors catering to different offices/ agency/ centres and a rooftop with helicopter pad.

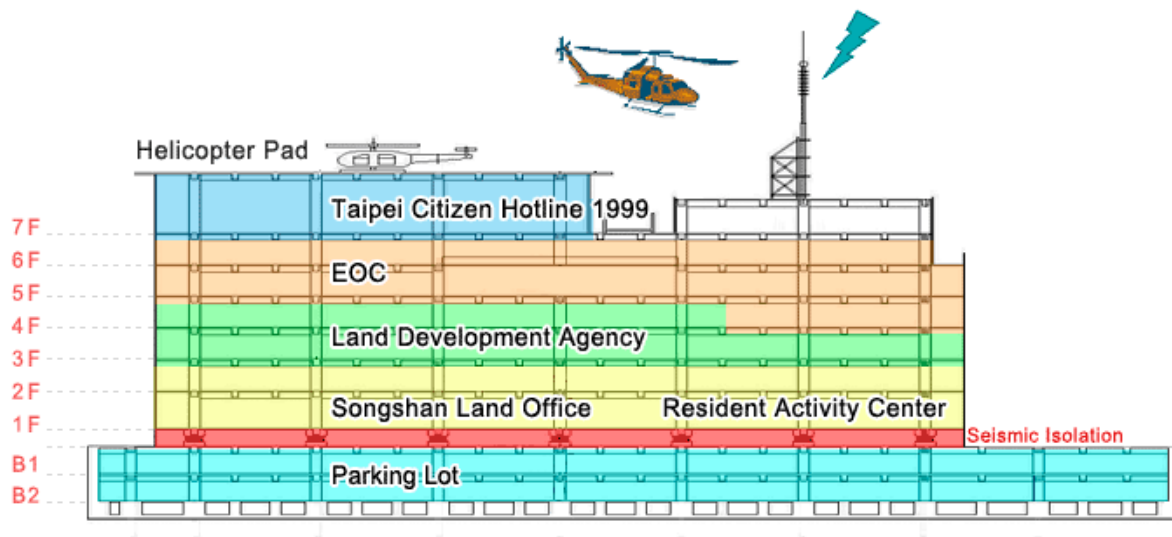


Figure 6: EOC building and floor plan

Source: Taipei City Disaster Prevention Info Website

**Layout of EOC:** Out of the entire building, the EOC is spread over 5th, 6th and 7th floor along with some part of 4th floor. Detailed floor wise layout, respective usage and floor maps could be referred in annexure 3.

**Disaster resilient construction and measures:** The EOC building has used 36 seismic isolation absorbers (of one meter diameter each) between the basement 1 and the first floor. This allows the building to withstand the earthquake of up to magnitude 7. In case of such an earthquake, such a system allows a horizontal displacement of 60 cm and horizontal acceleration of each floor is not more than 300 gal. Considering these factors, an 80 cm building interval has been ensured. Besides, the EOC has micro seismic activity monitoring devices and energy dissipated devices installed in it.

Additionally, the EOC has been developed such that it will not be inundated during severe floods. Various measures have been undertaken in the building to ensure uninterrupted power supply. It is connected to the Hulin and Sanzhangli Power Substations for the provision of power. Seismic isolation tube is used in the seismic isolation layer. Besides, there is a provision of double-barreled and double-pumped generators for ensuring uninterrupted and independent power supply for 72 hours. Adequate amount of fuel (60 litres) is also stored in two tankers along with provision of fuel pumps on 1st, 2nd and 4th floor.

For ensuring continued water supply in the building even during major emergencies with potential to disrupt the regular water supply, the building is equipped with tap water, wells and rain water recycling devices power. Four kinds of telecommunications system (PABX, satellite telecommunications, wireless telecommunications and microwave telecommunications) provides redundancy in communication during the disasters.

## 5. ICT infrastructure at EOC

The building is equipped with PABX, and satellite communication systems like Inmarsat and VSAT. In addition to this, there is a provision of microwave telecommunications system which connects the building with Taipei 101 and the Fire Department. A system of amateur wireless



telecommunications (VHF, UHF, EDACS) is also in place which connects the building to the Police, Fire, health and water services. It is also supported by the 2<sup>nd</sup> EOC.

The EOC space for the Operation Centre has personal computers, televisions, other audio visual devices and a huge screen for display of information for supporting assessment of situations and decision making by the staff. The EOC space used by Disaster Prevention Centre / Disaster Management Division of Taipei City Fire Department consist of telephones, fax machines, personal computers and other business machines. The Telecommunications / Computer Mainframe Room has telephone exchange, computer mainframe, wire and wireless telecommunication equipment installed. Information and communication devices, SNG operations cable and real-time AV devices are also installed in the Press Room of the EOC.

#### 3.4.4. Functioning of EOC

##### 1. Key functions performed by EOC

**Key functions of EOC during normalcy:** The day-to-day functions of the EOC include preparedness and examination; exercise and training; and watch and monitoring. The EOC functions 24\*7 and ensures it is duly prepared for all kinds of potential challenges.

**Key functions of EOC during and post emergency:** On occurrence of disaster, the key functions of EOC include reporting, communication, mobilization, dispatch, coordination and integration.

##### 2. Detailed role during activation of emergency

On activation of the EOC, all relevant departments set up respective Emergency Response Units and undertake the tasks entrusted to them by the EOC. At the site of major disasters, a Forward Command Post is established which is headed by the Commissioned of Taipei City Fire Department. The command is handed over to the EOC commander or the commander assigned by the EOC once he/ she reaches the disaster site.

**Mechanism for inter-agency coordination:** One of the key goal of EOC is to integrate Fire Department, Police Department, Emergency Dispatch Centre, Traffic Control Centre, MRT (Mass Rapid Transport) Operations Centre, Water Level Centre so that the EOC functions as a command centre during disasters. Besides, the centre integrates disaster information from different departments and bureaus.

**Mechanism for data and information management:** The EOC has an integrated information system which provides compatible work stations and includes decision making support system, rescue operations system and geographical information system. These are supported by various sub-systems such as mobilization sub-system, risk warning sub-system, decision making sub-system, damage monitor sub-system, information release sub-system, damage count and management sub-system. The decision making system monitors water level, weather, flood, warning report, quake rapid report, traffic on important locations, MRT construction sites, etc. In addition, it provides information of risk prevention to the general public.

The integrated system provides for information collection for the central government and other emergency departments of the City. It is also supported by the 2<sup>nd</sup> EOC and the Remote-controlled Monitoring System. Considering that it is difficult to get immediate situation report from a majorly damaged area, a Remote-controlled Monitoring System has been installed on 95<sup>th</sup> floor of the Taipei 101 Building to support capturing first hand pictures of almost any part of the City. It uses 86 power magnification lenses for capturing the target area. The gathered pictures are transmitted

from the system to EOC and other relevant agencies via microwave telecommunications to aid in prompt decision making and quick mobilization of response and rescue personnel and supply.

For gathering and reporting disaster information, the EOC has in place a Disaster Report System and Disaster Information Gathering and Report System. The Disaster Report System includes auto office fax, cell phone text report system, telephone service (including police emergency exchange), emergency audio report system and emergency operation communication system (VSAT Satellite Phone, Mini-in and GAN Satellite Phone). The Disaster Information Gathering and Report System consists of emergency communication system, auto office fax, emergency report e-mail, PDA Disaster Check And Report System, telephone service, wireless phone service, Emergency Audio Report System, Disaster Information Transmission System of National Fire Agency, Ministry of the Interior and the Remote-controlled Monitoring System.

**Mechanism for public relation and media management:** There is a dedicated media and press room for ensuring proper media management, press briefing, etc.

### 3.4.5. Impact of EOC

The existing EOC has addressed some of the key issues faced by the earlier EOC, namely, limited space and inadequate documents including the emergency operations plan.

## 3.5 Tokyo, Japan

Tokyo is the capital of Japan and a population of about 14 million<sup>11</sup>. It has a high population density of 6354 per square kilometer as of 2019. It is located at the head of Tokyo Bay and faces Pacific Ocean. It is the city of key importance due to location of both government and commercial offices and headquarters. The case study reviews Tachikawa City located in the middle of Tokyo and 30 km away from Tokyo Metropolitan City. Tachikawa city has 184 thousand population<sup>12</sup>.

### 3.5.1 Hazard profile of the city

East Japan including Tokyo has many of the active seismic faults. The Government has anticipated occurrence of large-scale earthquakes, called Tokyo Inland Earthquakes. Such an earthquake with magnitude 7.3 can result in around 23,000 deaths while around 72,000 people would need to be rescued along with complete collapse and damage of around 610,000 buildings. This would simultaneously raise the risk of tsunami to the coastal areas. Besides, the city is also prone to typhoon, floods, volcanic eruption. Typhoon affects the city every year from summer to autumn. 21 out of 111 active volcanoes in Japan are located in the Tokyo metropolitan area. All of these volcanoes are located in the insular area, and there are 8 inhabited volcanic islands (Izu Oshima, Toshima, Niijima, Kozushima, Miyakejima, Mikurashima, Hachijojima, and Aogashima).

### 3.5.2 Administrative profile of the city

#### 1. Administrative and governance structure in the city

Japan's local government system has a two-tiered system of municipalities and prefectures, in principle. Cities take on some of the duties performed by prefectures. However, Tokyo metropolitan

11 Tokyo Metropolitan Government <https://www.metro.tokyo.lg.jp/tosei/hodohappyo/press/2020/09/30/02.html>

12 <https://www.city.tachikawa.lg.jp/shimin/setai.html>

city has different structure from other prefectures, namely, special ward system, whereby each special ward generally takes on the duties performed by municipalities. Tokyo has 23 special wards, 26 cities and 5 towns and 8 villages. Each ward takes respective administrative decision and towns and villages adapt the same administrative structure as other cities. Then Tokyo Metropolitan City Assembly works to interact with its citizens.

## 2. Institutional mechanism for disaster risk management at city level

The Tokyo Metropolitan Government’s disaster prevention system is centered on the Disaster Countermeasures Headquarters and is based on information from the Disaster Prevention Center in cooperation with the national government, wards, municipalities, and other organizations to respond to disasters.

The Tokyo Metropolitan Disaster Prevention Council is an adjunct body of the Governor. The council is chaired by the Governor and consists of officials or representatives of designated local government agencies, designated public institutions, the metropolitan government, wards, cities, towns and villages. It is responsible for preparing the Tokyo Metropolitan Government’s Regional Disaster Prevention Plan and promoting its implementation.

In case the emergency, since immediate initial activities prevent an expansion of damage, Tokyo Metropolitan Government has established following initial activities. A nighttime disaster prevention office which is in Tokyo disaster prevention center, 9<sup>th</sup> floor of the Tokyo Metropolitan Municipal Office and residence for disaster countermeasure personnel have been set up so that initial activities can be taken event at night and on holidays. In addition, to ensure a system of information collection, the city has set an administrative radio system, a network of seismographs, cameras in high places, and a disaster prevention information system that integrates disaster prevention information. In an emergency situation, the Tokyo Metropolitan Government establishes a disaster response headquarters headed by the governor which deliberates and implements various items such as information gathering, firefighting, rescue and relief.



**Figure 7:** Organization chart of Tokyo Metropolitan City Disaster Management Council

Source: Disaster Prevention Information<sup>13</sup>

13 <https://www.bousai.metro.tokyo.lg.jp/taisaku/torikumi/1000067/1006099/index.html>



### 3.5.3 Establishment of Emergency Operation Centre (EOC)

Since Tokyo is the capital city, it has Emergency Operation Center for both regional and national disaster management facilities.

#### 1. Location of EOC

In preparation for the all kinds of disaster, the Government maintains and manages disaster management bases. The Disaster Management Back up Facility, called Tachikawa Wide-Area Disaster Management Base in Tachikawa City, Tokyo serves as the Government's Extreme Disaster Management Headquarters when the Prime Minister's official Residence are seriously damaged and become dysfunctional. However, it has also facilities for community based disaster prevention center in this base.

#### 2. Inception of EOC

**Initial process and efforts towards establishment of EOC:** Tachikawa Wide-Area Disaster Management Base is a former army base that was confiscated by the U.S military. Returning of the military airfield in 1977, under the consultation of the Central Council of property, it has been developed responding to the request of relevant agencies. This site was reconstructed as an excellent large-scale parks and wide area disaster prevention bases<sup>14</sup>.

**Criteria for site selection:** Tachikawa Disaster Management Base is located about 30 km from the Tokyo Metropolitan City center. It was built on a relatively well-grounded plateau and developed systematically adjacent to a large park, Syowa Memorial Park. As a result, effective transportation to the city center is expected avoiding damage from the earthquake. It has also the advantage of adequate space for shelters and temporary material accumulation with huge land of Tachikawa Management Base.

#### 3. Governance of EOC

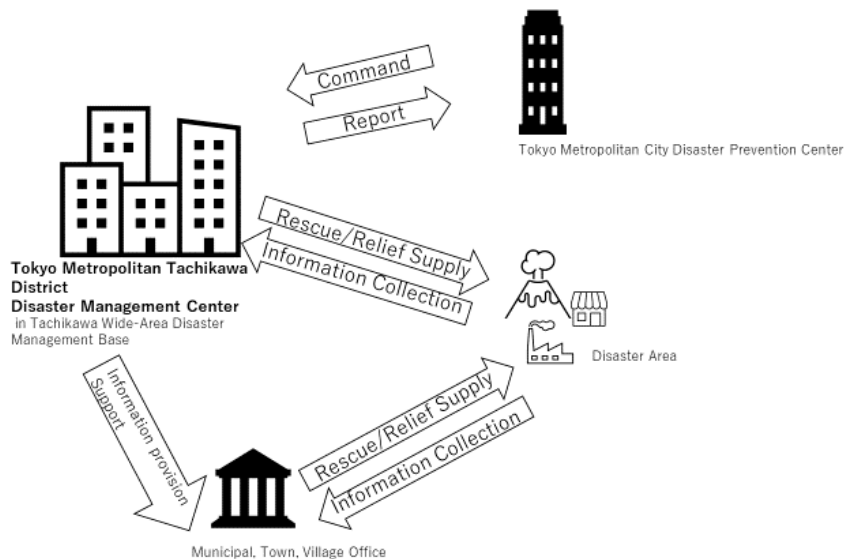
**Department/ authority heading or running the EOC:** The Cabinet Office owns the Tachikawa Disaster Management Base functions.

**Organizational structure of EOC:** As a base for disaster prevention activities in the middle of Tokyo area, the Disaster Prevention Center in Tachikawa Disaster Management Base, under the direction of the Tokyo Disaster Prevention Center, communicates and coordinates with local disaster prevention organizations, including the national government and municipalities.

Tachikawa Disaster Management Base functions as a back-up facilities for the disaster management headquarters of government disaster management. Headquarters for Emergency Disaster Control is organized when an emergency situation occurs, firstly in the Prime minister's Official Residence, secondly Cabinet Office and thirdly Ministry of Defense. In case the center of the city is destroyed or network is cut off in emergency situation and the above facilities become malfunction, the prevention base acts as an alternative headquarters.

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14 <http://www.bousai.go.jp/kyoiku/pdf/tachikawa.pdf>



**Figure 8:** function of Tokyo Metropolitan Tachikawa District Disaster Management Center

Source: Disaster Prevention Information

**Human resource management:** A guard watches the centre for 24 hours. When emergency occur, the guard immediately check facilities. Soon after that, three more guards hasten to the site and prepare for emergency management headquarter.

#### 4. Physical infrastructure at EOC

Tachikawa Disaster Management Base has following facilities:

- Tokyo Fire Department related facility
- Coast Guard Experimental Research Center
- Metropolitan Police Department related facility
- Housing for disaster management staff
- Tokyo Metropolitan Tachikawa District Disaster Management Center
- Tokyo Tama emergency supplies storehouse
- National Disaster Medical Center
- Japanese Red Cross Society related facility
- Japan Ground Self- Defense Force Tachikawa Camp

Tokyo Metropolitan Tachikawa District Disaster Management Center consists of a disaster prevention building and a residential building. Meeting rooms and gym are available for citizens who practice and take lectures of disaster risk management.

**Disaster resilient construction and measures:** The structure includes earthquake and seismic isolation and safety measures. In addition, the building is equipped with a private power generation system that can operate continuously for 72 hours and a water storage tank to ensure reliability of the facility.

## 5. ICT infrastructure at EOC

Tokyo Metropolitan Tachikawa District Disaster Management Center has disaster control room. The large screen in the room provides images of disaster area and various information on the data terminal. It also allows for video conferencing on emergency response activities. In the telecommunication room, staff can communicate with disaster area, municipalities, and disaster prevention centers via wireless phones and faxes.

### 3.5.4 Functioning of EOC

#### 1. Key functions performed by EOC

**Key functions of EOC during normalcy:** Tokyo Metropolitan Tachikawa District Disaster Management Center aims to provide relief to the Tama region and logistical support to the district. Therefore, it stockpiles emergency food, blankets, and other daily necessities, as well as medical supplies and equipment for citizens.

**Key functions of EOC during and post emergency:** In event of a widespread disaster in the South Kanto region, Tachikawa Wide-area Disaster Management base plays a central role in emergency disaster response activities as a relay and collection point for the emergency transportation of personnel and goods.

#### 2. Integration of early warning and communication system

Citizens can get information about earthquake, flood, typhoon, ballistic missile and terrorism through media such as TV and also they can get the alert from J-Alert (nationwide instantaneous alert system).

### 3.5.5 Impact of EOC

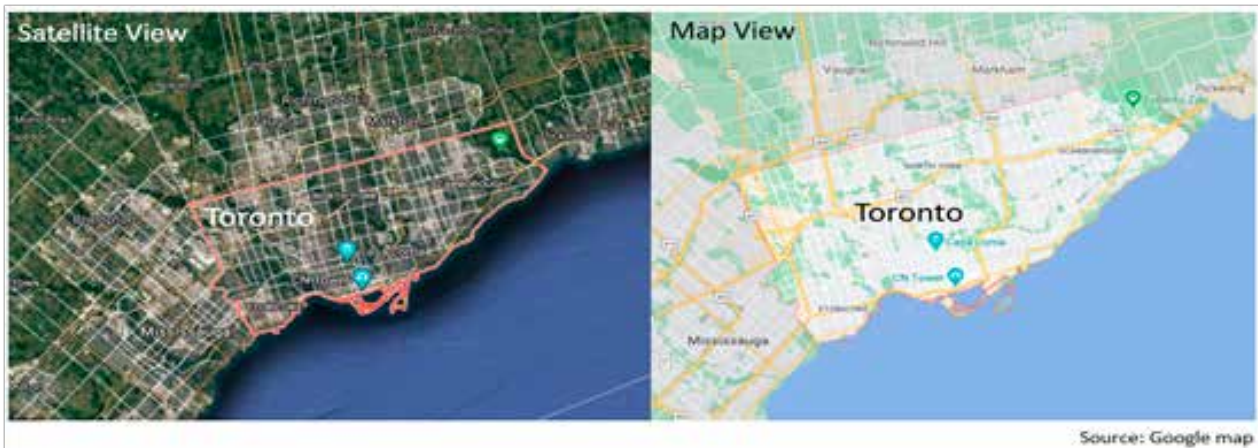
Tachikawa Disaster Management Base has been developed in a good location on a stable land. Therefore, it is suitable as a backup in case government facilities are affected or fail to work during emergency. The base plays critical role in both administrative and emergency management functions. The base is a good example of integrated facilities for both national and local emergency management center.

## 3.6 Toronto, Canada

Toronto is the capital city of Ontario province of Canada. It is the largest and the most populous city in Canada and had a population of 2,731,571 in 2016<sup>15</sup>. Located on the north-western shore of Lake Ontario, it is an important international trading centre and is the country's international centre of business, finance, arts and culture. It is also recognized as one of the most cosmopolitan cities in the world. The city covers an area of 630 square kilometres, with a 46 kilometres long waterfront shoreline of Lake Ontario. The city is mostly flat with gentle hills and slopes upward away from the lake. The elevation difference in its hilly terrains ranges from 251 ft. to 686 ft. The land is interrupted by the Toronto ravine system, most notably the Humber River in the west, and the Don River and Rouge River in the east. The other major geographical feature of Toronto is its escarpments. Its location at the mouth of the Humber river facilitates a trade route north to Lake Simcoe and a shortcut to Georgian Bay on Lake Huron.

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15 Census Profile, 2016 Census; www12.statcan.gc.ca. Statistics Canada



**Map 2:** Map showing location of Toronto city

Source: Google maps

### 3.6.1 Hazard profile of the city

The city of Toronto is prone to various natural and human-induced hazards including floods, earthquake storms and wind hazards, heat, fires, epidemic, explosions, building collapse, nuclear emergencies, radiological emergencies, cyber threats, transportation-related accidents, disruption in natural gas supply, etc.

### 3.6.2 Administrative profile of the city

#### 1. Administrative and governance structure in the city

The city is administered by the City Council which is a legislative body. The council is headed by a Mayor and consists of 25 city councilors (each representing a ward of around 96,800 people).

#### 2. Institutional mechanism for disaster risk management at city level

For the purpose of emergency management, the City and its agencies are governed by the City of Toronto Municipal Code (Chapter 59 Emergency Management) and Provincial Emergency Management and Civil Protection Act (EMCPA). The key agencies and bodies are responsible for disaster risk management at city level:

**Toronto Emergency Management Program Committee-** The Toronto Emergency Management Program Committee consists of representatives holding positions in the City, its Divisions, Agencies and Corporations, or those designated to act on their behalf.

**Toronto Emergency Management Program Committee Control Group-** From the list of 'Toronto Emergency Management Program Committee', first 16 members forms the 'Toronto Emergency Management Program Committee Control Group' to oversee the City's emergency's response.

**Chair, Control Group-** The Mayor, the City Manager or their designate, acts as Chair of the Control Group and initiate, co-ordinate, direct the implementation of the Emergency Plans.

**City Manager of Emergency-** Depending on the nature of the emergency, the Director, Office of Emergency Management, or any other member of the Toronto Emergency Management Program Committee may notify the City Manager of an impending or actual emergency and request activation of the Emergency Operations Center.

**Emergency Management Working Group-** It consists of senior representatives (Director or Manager) from the Divisions, Agencies and Corporations like Toronto Police Service, Toronto Fire

Services, Toronto Paramedic Services, Toronto Public Health, Strategic Communications, Toronto Water, Transportation Services, Shelter, Support and Housing Administration, Toronto Building, Toronto Transit Commission etc.

**Cluster 'B' Operational Response Team-** The Cluster 'B' Operational Response Team, chaired by the Deputy City Manager, provides strategic management and supporting facility for the coordination of emergency response activities of Cluster 'B' divisional operations at the early onset of an emergency.

**Emergency Operations Centre (EOC)-** The EOC is a facility that supports the work of an Emergency Control Group (ECG), which may be established by any community, ministry or by other provincial bodies. It strives to protect the health, safety, and welfare of the inhabitants of the City of Toronto; to provide effective approach to respond and reduce impact of an emergency; and to serve as an established and recognized point of authority for the coordinated management of resources, personnel and incident information.

### 3.6.3 Establishment of Emergency Operation Centre (EOC)

#### 1. Governance of EOC

**Organizational structure of EOC:** The Director, EOC has the overall authority and responsibility for activities of the EOC and for ensuring organizational effectiveness. The EOC staff provides operational guidance and support to the Incident Commander who maintains the lead role at an emergency site.

**Roles & responsibilities of different positions:** When EOC is activated, the Incident Commander of the Major Incident Command Centre gets a full control of all resources under the command of the Toronto Police Services and other resources that functions for ensuring public safety and security. The Major Incident Command Centre is responsible for the continuity of controlling services throughout the City of Toronto and for liaising with the City's EOC which provides links to all City Divisions, Agencies and Corporations.

**Decision making process:** The Toronto Police Service Major Incident Command Centre is a central point of command, control, communication and information, whereas the other departments support the decision making. The provisions of Municipal Code, Chapter 59 provide the governance structure, including delegated authorities and members of the Committee who are the decision makers.

**Financial management:** Control Group oversees the City's emergency response and expend funds for the purpose of responding and recovering from the emergency. The City may also call upon the Provincial government to provide supplemental financial or physical resources necessary to deal with the overall impacts of the emergency.

On activation of EOC, each Division, Agency and Corporation tracks document and seek reimbursement, as appropriate, for costs incurred during the emergency response and recovery operations.

#### 2. ICT infrastructure at EOC

EOC is equipped with high-tech computerized equipment which establishes linkage to all the City divisions, agencies and corporations, and other command/ operation centers. EOC's Information and Communications Technology infrastructure consists of software, hardware, networks and the websites.

### 3.6.4 Functioning of EOC

#### 1. Key functions performed by EOC

**Key functions of EOC during normalcy:** During normalcy, EOC works towards identification of potential hazards, risk assessment and review of existing plans.

**Key functions of EOC during and post emergency:** During emergency, depending on the nature of the emergency, the EOC helps the decision support system to dispatch Toronto Transit Commission (TTC) Vehicles to shelter people on the site, in dispatching the Canadian Red Cross to attend to the affected residents, in providing temporary accommodation, transportation, and arrangements for food, clothing and other personal supports. In case of large-scale events, it supports and opens an Evacuation/Reception Centre and assists with rehousing (if necessary) and coordinates updates to the affected evacuees and provides assistance to pets and service animals. EOC also supports the emergency rescue operations through strategic planning.

Post emergency, the EOC undertakes analysis and assessment activities, reviews plans and conducts trainings.

#### 2. Detailed role during activation of emergency

Any member of the Toronto Emergency Management Program Committee, Control Group or Working Group has the authority and responsibility to request the activation of the EOC. Such requests are directed to either the Director of the Office of Emergency Management or to the Office of Emergency Management (OEM) with 24 hours a day & 7 days a week 'Standby' Coordinator. The City of Toronto uses a four-tier emergency level system to determine appropriate notifications- Level 0 - Normal, Level 1 - Incident, Level 2 - Emergency, Level 3 - Major Emergency.

As an incident is classified as a Level 2 Emergency or Level 3 Major Emergency, the Office of Emergency Management 'Standby' Coordinator is contacted by Toronto Fire Services, Toronto Police Services or Toronto Paramedic Services. The Office of Emergency Management staff is connected to the Deputy City Manager, Cluster 'B', to initiate the implementation of the Emergency Plan. Upon receiving an emergency notification, the OEM 24/7 'Standby' Coordinator liaise with the notifying Service, Division or Agency and utilize the Emergency Level Notifications table as a tool to assist in establishing the immediate notifications that may be necessary or appropriate. The City's EOC staff ensures that the EOC is always operationally ready for activation.

On activation, the EOC is staffed to manage the strategic response to the emergency and to support emergency operations at the site. The members of the Toronto Emergency Management Program Committee are then required to mobilize on short notice, to provide timely and effective direction or assistance. If activated, members of the Emergency Management Working Group or a designate from their Division, Agency or Corporation is required to respond on short notice to attend the EOC.

The EOC supports five major functions at the Incident Site: Command, Operations, Planning, Logistics and Finance & Administration. The key roles played by EOC on activation includes:

- Supporting coordination among the Councillors. Emergency Support Function (ESF) establishes a regular communication with the Councillors during a Level 2 Emergency or a Level 3 Major Emergency.
- Mobilizing resource, vehicles, dispatching the Canadian Red Cross
- Supporting evacuation



- Mobilizing animal care and relief services for providing response to service and companion animals that are displaced or otherwise affected by an emergency
- Activation of the Debris Management ESF for the removal and disposition of debris following an incident for limiting threats to lives, health, safety and welfare of the affected citizens, and for expediting search and rescue and recovery efforts in affected areas.
- Emergency Donations Management of financial contributions and donated goods

**Mechanism for inter-agency coordination:** The EOC maintains a dedicated facility from which the Control Group of the City of Toronto, its Divisions, Agencies, Corporations and Emergency Management partners co-ordinate their strategic response to an emergency.

**Mechanism for resource management and demobilization:** This ESF deals with the planning and preparing for a decision to evacuate an area in the event of an emergency or pending emergency. It also deals with recovery planning, coordinates resources and ensures if the information is accurate.

**Mechanism for data and information management:** Strategic Communications is responsible for communicating critical information before an impending incident, during and after a major disaster or public emergency on behalf of the EOC and City officials (City staff, Members of Council, community leaders, residents, businesses and the media). If the emergency involves multiple jurisdictions, communications may be done mutually, where necessary or appropriate. In the event of a major public emergency that requires a provincial or federal response, Strategic Communications will co-ordinate the City of Toronto communications with provincial and federal officials as appropriate.

**Mechanism for public relation and media management:** Strategic Communications Division performs the communication through 'Emergency Information and Media Relations Emergency Support Function' during an emergency and supports the City of Toronto's efforts to assist Toronto residents in coping and recovering from a Level 2 Emergency or Level 3 Major Emergency. Office of the Emergency Management notifies about emergency through newspaper, mail and hand-delivered information; telephone, email, internet and social media such as Twitter and Facebook; and local television, radio and on-line news broadcasts.

### **3. Capacity building measures undertaken at EOC**

**Trainings:** As per the Provincial Emergency Management and Civil Protection Act Section 2.1, training programs/ exercises for employees of municipalities and other persons are in practice for emergency response and recovery. Besides, public education and training on aspects of preparedness is also undertaken adequately.



# INTERNATIONAL BEST PRACTICES

Based on the review of international cities, following best practices have been identified.

## **4.1 Information dissemination and public query management during emergencies, Niceville, Okaloosa County, USA**

The designated Emergency Alert System (EAS) stations in Okaloosa County are AM 1260, AM 1210, FM 99.5, FM 104.7 and FM 105.5. During declared emergencies, the EAS radio stations establish a broadcast capability in the ARES work area at the EOC. Press briefings take place in an available courtroom or the jury assembly room.

The designated Citizen Information Line for emergencies is 6517583 or 311. During EOC activation, volunteers staff additional citizen information lines to answer questions from the public. This procedure has been used during past hurricanes such as Alberto, Erin, Opal, Ivan, Dennis and the communicable disease emergency. Phone numbers for this purpose are published at the time. OCPS, Elder Services, and Home Health Care Agencies cooperate to distribute preparedness information to elderly and shut-in population. OCES and some tourist resorts cooperate to provide preparedness information in locations from where it is readily accessible to tourists. OCPS also provides handouts to the Visitor's Center.

## **4.2 Level wise activation and functioning of EOC, Niceville USA**

Activation of the EOC means that it is staffed to the appropriate level by the Office of Emergency Management and by command representatives of the ESF lead and support agencies and other public, private, and volunteer sectors, etc. required to staff the County NIMS/ ICS structure. Office of Emergency Management makes notifications to the appropriate ESF/ NIMS components that the EOC is being activated and that their presence is required in the EOC. The Emergency Management Chief is responsible for maintaining the EOC in a ready-to-activate status. Level 1 activation of the EOC requires approval of the County Administrator. Stages of activation are discussed below.

Level 3 activation or monitoring includes routine operation. Fire/ EMS Dispatch acts as the county's 24-hour Warning Point. During a routine incident, the responsible department may set up an on-site Incident Command Post (ICP) if it so desires. Only city EOC gets activated to monitor the situation from the concerned departments. The responsible department handles press relations with their Public Information Officer (PIO). The required logistical support, additional personnel, or other resources is the additional responsibility of the responsible department.

Level 2 activation indicates urgent conditions. The Director of Public Safety can activate the EOC to level 2. During this, the EOC is active 12 hours (7 am-7 pm), 7 days per week with representatives of all required ESFs on 12-hour shifts. Public Safety management personnel staff the EOC 12 hours per day (or longer) shifts. The responsible department set up an on-site Incident Command Post (ICP) and all responding departments are notified of its location. NIMS is instituted and the designated Incident Commander (IC) assign designated personnel to the Administrative/ Finance,

Logistics, Planning, and Operations Sections of the NIMS structure as required by the incident. Unified Command (UC) is set up as necessary to coordinate operations among multiple agencies in an efficient manner.

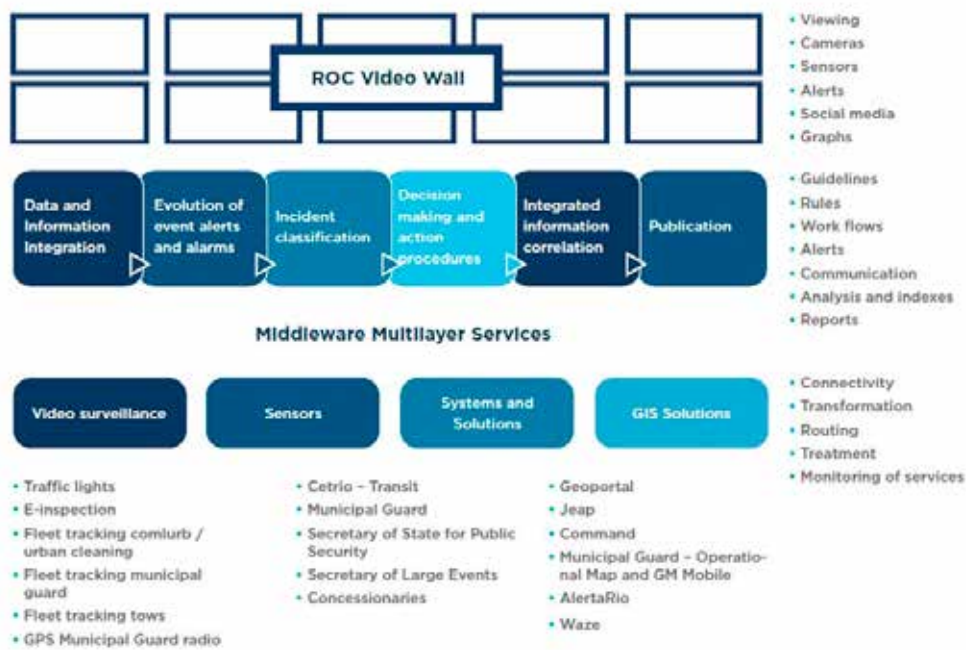
The responsible department may also set up an administrative command post at its main facility or at the EOC according to the level of administrative support required. The County Administrator, Director of Public Safety, and the Emergency Management Chief are notified of the command post location and of any need for EOC activation. As deemed necessary, the Incident commander designate a Public Information Officer for the incident, who determine the need to activate a Joint Information Center and/ or Joint Information System as required by incident demands. The required logistical support, additional support, or other resources is the responsibility of the Operations Section and the Logistics Section. Emergency purchases are referred to the County Administrator through the Administrative/ Finance Section, who may expedite those requests with the assistance of the County Purchasing Director under the Logistics Section as established.

Level 1 activation is considered a full activation and requires approval of County Administrator or BCC Chairman. Entire EOC staff is on duty for 24 hours per day, 7 days per week, on 12-hour shifts. Staff consists of one representative from each ESF, four Citizen Information operators, and Sprint, Gulf Power, and Okaloosa Gas. OCPS staff specified in the OCPS SOP is also present. Each agency is responsible for developing rosters and schedules to ensure the EOC is staffed as needed.

This level of emergency usually results in a “Declaration of Emergency” by the Okaloosa County Board of County Commissioners who invokes the emergency powers of the office. The senior representative of the department in charge of on-scene operations establish an on-site Incident Command Post and notify all departments of the location. NIMS is instituted and the designated Incident Commander assign designated personnel to the Administrative/ Finance, Logistics, Planning, and Operations Sections of the NIMS structure as required by the incident. Unified Command is set up as necessary to coordinate operations among multiple agencies in an efficient manner. As deemed necessary, the Incident commander designate a Public Information Officer for the incident, who determine the need to activate a Joint Information Center and/or Joint Information System as required by incident demands. The required logistical support, additional support, or other resources is the responsibility of the Operations Section and the Logistics Section. Emergency purchases should be referred to the County Administrator through the Administrative/ Finance Section, who may expedite those requests with the assistance of the County Purchasing Director under the Logistics Section as established.

### **4.3 ICT and field-based integrated system for decision making, Rio de Janeiro, Brazil**

Rio Operations Center (COR) showcases an integrated model wherein efficient use of ICT and field-based systems has helped in the overall management of disasters and risks in the city. The system acts as a tool for smart cities, wherein it can influence the overall strategic management. GeoPortal, the ICT based system of decision making showcases the possibility of better management of disasters and accidents and could be used for Indian cities, which would improve the overall management of the systems and ensure sustainability. Besides, GeoPortal system ensures smart operability of various agencies and helps in the analysis of their databases.



**Figure 8:** Features of the GeoPortal platform of COR

Source: (International Case Studies of Smart Cities Rio de Janeiro, Brazil, IDB<sup>16</sup>)

For the inter-agency operability, it provides routine support to joint operations of the agencies, integrating and optimizing the strategic, tactical, and operational support efforts in meeting the demands of the city. The main aspects of GeoPortal includes:

- Smart map: A platform wherein COR integrates all sources of data such as transportation, weather data, locations of social infrastructures and other integration with camera sensors for better management. Cesium tool<sup>17</sup> is used for data sharing and management.
- Integration and interoperability: The COR Integration Platform allows the interconnection of multiple data sources and provides services for consumption by other applications.

#### 4.4 Disaster resilient construction and service redundancy measures at EOC, Taipei, Taiwan

The Taipei EOC building uses 36 seismic isolation absorbers between the basement 1 and the first floor. This allows the building to withstand the earthquake of up to magnitude 7. In case of such an earthquake, such a system allows a horizontal displacement of 60 cm and horizontal acceleration of each floor is not more than 300 gal. Considering these factors, an 80 cm building interval has been ensured. Besides, the EOC has micro seismic activity monitoring devices and energy dissipated devices installed in it.

Additionally, the EOC has been developed such that it will not be inundated during severe floods. Various measures have been undertaken in the building to ensure uninterrupted power supply. It is connected to the Hulin and Sanzhangli Power Substations for the provision of power. Seismic isolation tube is used in the seismic isolation layer. Besides, there is a provision of double-barreled and double-pumped generators for ensuring uninterrupted and independent power supply for 72 hours. Adequate amount of fuel (60 litres) is also stored in two tankers along with provision of fuel pumps on 1<sup>st</sup>, 2<sup>nd</sup> and 4<sup>th</sup> floor.

16 <https://publications.iadb.org/publications/english/document/International-Case-Studies-of-Smart-Cities-Rio-de-Janeiro-Brazil.pdf>

17 An open platform allowing three dimensional visualization of geospatial data and allows advanced analytics.

For ensuring continued water supply in the building even during major emergencies with potential to disrupt the regular water supply, the building is equipped with tap water, wells and rain water recycling devices power. Four kinds of telecommunications system (PABX, satellite telecommunications, wireless telecommunications and microwave telecommunications) provides redundancy in communication during the disasters.

#### **4.5 Web-based incident management system, Toronto, Canada**

The key tool of Canadian emergency operation is an internet protocol-based system, which connects all the key stakeholders government department and offices such as Administration, Police, Fire, Water supply, meteorology, etc. This helps all the departments to better understand the situation and undertake necessary steps accordingly.

Toronto's DisasterLAN (DLAN) is a web-based incident management system for management of both planned events and disasters. It provides information, workflow, and communication tools and is accessible from all mobile devices. It has the ability to streamline the flow of information throughout the EOC and to electronically link the EOC with divisional operations centres (DOCs), emergency site commanders, other key officials and off-site staff. It saves valuable time and resources during an emergency and reduces duplicate efforts; thereby enhancing the efficiency.

# REVIEW OF NATIONAL CITIES

Review of the existing EOCs six project cities has been undertaken using the tool of SWOT analysis. SWOT analysis is based on study of respective City Disaster Management Plans along with questionnaire-based consultation of key city level stakeholders. The detailed analysis is discussed below.

## 5.1. Cuttack

### Strengths

- The city has two EOCs: one at Bikash Bhawan, Cuttack Municipal Corporation (CMC) and one small MIS centre for report processing.
- The EOC has sitting arrangements for staff with dedicated Toll Free and Landline numbers.
- The EOC undertakes the daily tasks of report collection, order issue and staff deployment, monitoring and arrangement of logistics, maintenance of registers with inward and outward messages and coordination with line departments.
- Emergency operations at EOC includes staff deployment, dewatering plans and pump deployment, shelter arrangement, evacuation, early warning, relief distribution, assessment planning.
- EOC's existing assets include maps, telephone directory, resources such as vehicles, siren, announcement systems, computer, printer, registers and phones.
- Bikash Bhawan EOC operates 24 hours and is responsible for dissemination of early warning. Information is generally received from IMD, DEOC and disseminated according to the Micro Planning of the CMC

### Weaknesses

- The awareness exercises are undertaken for wards but not as per a regular plan.
- There is no separate media plan at EOC, the Commissioner and Nodal Officer Disaster Management is only authorized for public relations and media management.
- The EOC has limited assets including a landline phone and other modes and equipment of communication can be explored e.g. VHF sets, satellite phones to plan for failure of traditional mode of communication through landlines and mobiles.
- There is no alarm system installed at community level.
- The EOC does not display ready reference maps with demographic details of the city, district and state, vulnerability maps, location of possible incident command post, temporary shelters, etc.

### Opportunities

- The EOC undertakes maintenance of grievance records and redressal records which are checked by senior officials. This can be extended to spheres of Disaster Risk Management by recording grievances regarding various mitigation measures pertaining to potential hazards. This can include aspects of open potholes, uncovered drains, clogged drains during pre-monsoon and pre-cyclone seasons, etc.

## Threats

- It is in the eastern part of the city and just 600 meters away from the river Kathajodi and the Ring Road embankment.
- No information/ study available on resilient construction practices in the EOC.
- No dedicated budget for EOC management.

## 5.2 Navi Mumbai

### Strengths

- The city of Navi Mumbai is equipped with EOC, two control rooms, designated ward level officers and micro-level plans at ward levels.
- Disaster Management Cell of NMMC is well equipped with earthquake-resilient technology and 10 Hotlines and VHF's for communication
- There are clearly stated roles and responsibilities of Navi Mumbai Disaster Management Committee including functions during emergency and non-emergency period.
- The NMMC EOC is the nodal EOC and responsible for coordinating the support from all other Ward Control rooms for the activities of all line departments and agencies which are involved at the disaster site.
- EOC functions 24 x 7 round the year. During non-emergency time it functions as "Watch and Ward" regime and during emergencies, it's get activated to a full scale within a short time frame.
- It has advanced communication systems like HAM Radio. Doppler radar is also going to be installed in the next year for early meteorological warnings. Satellite phones are to be procured in 2021.
- The EOC is situated in an earthquake resilient building.
- Navi Mumbai Municipal Corporation EOC and district and state level EOC are in constant contact via emails and hotlines in order to share information either about prospective emergencies or sharing regular updates. Navi Mumbai Municipal Corporation has similar communication mechanism with other external stakeholders like NDRF, CISF, Railways and so on.
- EOC staff undergoes internal trainings and orientations on EOC and disaster management.
- SOPs and ESFs are detailed out. Ward level response plans are laid out. The plan also identifies the responsibilities and functions of ward level functionaries.

### Weakness

- There is no separate fund allocated for EOC operations and maintenance. The expenses incurred by EOC (human resources and staff salaries) are derived from the yearly budgeted allocations for the Regional Disaster Management Center.
- No formal reporting format exists. The communication takes place through official letters between NMMC officials.

### Opportunities

- The EOC closely connects with other agencies who provide early warning, thus helping in preparedness planning.

## **Threat**

- There were no predetermined criteria for the selection of onsite EOC in Navi Mumbai Municipal Corporation.
- There are no studies undertaken before establishing the EOC.
- Navi Mumbai has a well-established industrial sector. The industrial belt of Taloja-Thane-Belapur has important industrial units including chemical, pharmaceuticals, textile, oil processing, paper, plastic, steel and food. This increases the threat of accidents like fire, leakages, electrical short-circuit, mishandling of flammable materials etc. There have been 8 major and 240 minor fire calls in the city. HPCL and BPCL are major hazardous industries along-with J.N. Port Trust which handles 32 different hazardous chemicals.

## **5.3 Shillong**

### **Strengths**

The city operations are executed from the district EOC. Hence, the below analysis pertains to District EOC.

- The Deputy Commissioner is the Chairman of the Disaster Management Cell and the City Disaster Management Committee and the district response is coordinated under his/her guidance.
- The EOC is connected to all stakeholders and line Departments in the city.
- The building was designed as load bearing wall using seismic zone V important building requirements so as to ensure the safety of the building under probable earthquake occurrence. EOC has different antenna requirements therefore the building has flat reinforced concrete beams & slabs.
- DEOC Assets include a computer with printer with internet facility, VHF set with battery, VHF handheld, Hf Trans receiver, Transistor Radio, Fax Machine, Xerox Machine, Emergency Light, Landline Telephone, Genset, Portable PA system, Television, GPS, Notice Board, Thermometer, Mobile Phone, Four Wheel Vehicle, and a Two-Wheeler
- Meteorological early warnings generated by IMD are shared with District EOC, which transmits the information via email/WhatsApp and for the public via electronic media (AIR/ Newspapers/Meghalaya Integrated Information System).
- The District EOC will be backed up by the second EOC setup (during emergency) in the State Central Library.
- The EOC has been activated as a 24/7 emergency centre during the COVID-19 pandemic as a source to disseminate information of testing facilities and locations, contact tracing, facilitating and setting up of quarantine centers, centers for stranded migrants as well as for the homeless, check gates, provide transportation and relief materials and so on.
- The expenses incurred by EOC are derived from the yearly budgeted allocations from the Revenue and Disaster Management Department.
- EOC operators are selected from MPRO/Home Guard Depart of Shillong and are trained to operate EOC hotlines, communication & dissemination of information with different stakeholders and to oversee data collection related to various incidents and meteorological data



## **Weakness**

- The DEOC is located in Shillong, East Khasi Hills District of the State of Meghalaya. The city operations are executed from the district EOC.
- The CDMP available for Shillong is of the year 2018

## **5.4 Shimla**

### **Strengths**

There is no city EOC but only a control room for City level operations. The below strengths are based on provisions of proposed city EOC as stated in CDMP Shimla (2016)

- City level EOC would be established at the MC level.
- During the normal time the EOC would work for awareness and preparedness for emergency response.
- Training needs of EOC members are identified in the CDMP. National College of Civil Defense, Nagpur is identified as the centre for training of EOC.
- City EOC shall obtain information related to the earthquake, its magnitude, epicentre etc.
- City EOC/Municipal Corporation will identify areas and assess the requirement of police, armed forces, volunteer etc for search and rescue operations.
- City EOC shall set up Emergency Information Centre (EIC) at the City EOC level or other suitable location for release of consolidated information to all stakeholders including Media at the City Level.
- Helpline would be established at City EOC or other suitable location for providing information about victims to the next of kin, friends and others.
- EIC shall maintain all records and document of all major actions taken in managing the incident.
- City EOC can provide fire alerts
- The local people, media and environmental agencies can also report about any fire incident to the fire stations or to the City EOC which can further alert the key responders and vulnerable population.
- City EOC shall gather information about the deaths, injuries and damages to the infrastructure and property.
- Each 24 wards will have 01 incident command centre and these centers will connect with the City Emergency Center based at Municipal Corporation Shimla. The City EOC will coordinate with different departments who are having the Emergency Support Functions.
- City EOC shall coordinate planning procedures between district, the state and the centre and provide ready formats for all reporting procedures as a standby.

### **Weakness**

- There is no dedicated 24x7 EOC under the dominion of the Municipal Commissioner within City. However, there is a District Emergency Operation Centre which is under the control of Deputy Commissioner, District Shimla within the city. It is located within the complex of Deputy Commissioners office in the core area of the city, the Mall Road.

## **Opportunities**

- Since the City EOC is yet to be established, it can follow the guidelines and best practices so as to be an ideal EOC.

## **Threats**

- With rising population, un-checked construction and depleting forests, water crisis has mounted in the city.

## **5.5 Vijayawada**

### **Strengths**

- A dedicated EOC, called Command Control Center is established and functioning at main office building of Municipal office and it functions 24x7 with dedicated staff in place. The additional commissioner is in-charge of EOC /Command Control Center
- A team of Heads of Departments under leadership of Executive Authority in Municipal Corporation is functioning round the clock for day to day business and emergency operations by coordinating through walkie talkie, telegram, WhatsApp and a toll-free number. All the staff is monitoring by Nodal officer/Disaster Management Officer at VMC, who is permanent staff and monitors the contractual staff.
- City EOC is linked with District and State in its operations during natural disasters.
- Two EWS assessment studies have been undertaken.
- A dedicated emergency fund is available. With support of UNDP fund EOC is strengthened with system for flood management and wall mounted screens for tracking of emergency including establishment of an Automated Weather Station which is being monitoring 24x7 weather alerting line departments on extreme weather and lightening situations in the city.
- LCD screens and digital monitoring system is established for monitoring and tracking of waste management in the city by geo tagging system. It tacks the drainage blocks due to raining, city flood management and rock slide management.
- Weather is tracked with dedicated AWS, IMD services and information is disseminated to line of officials. Free flow of communication is encouraged through dedicated network of line departments for swift action by the functionaries on the ground.
- Assets: A weather station, server for system, dedicated internet system, operating systems, 900 CC cameras, LCD screens, satellite phone and video conference etc.
- The EOC team reviews the lapses, prepare action plans and update the system.
- A dedicated mobile/web-based application consisting of landslide alert and warning, flood management and low-lying areas is proposed to be built.
- The size of the EOC is of 75x24 ft layout with two cabins. One room is used for closed operations where there are systems and screens and operators sits. The outer large room is used for monitoring, video-conferencing/emergency meetings with a seating capacity of 20 members.

### **Weakness**

- The EOC is also used for addressing the public grievances, all the issues are segregated into categories and brought to concerned Heads of Department for sorting out on the field.

- Disaster alert is triggered via DEOC after confirmation from SEOC; there is no direct connect between SEOC and City EOC.
- Public Relations plan for weekly grievances exists, but not for EOC operations separately.
- Many of the staff on board are temporary including many data entry operators, there is a need to depute permanent staff who have technical knowhow during normal and emergency time

### **Opportunities**

- Local development issues are also being addressed in the EOC including drainage blocks, potholes issues which help to bridge the development and disasters gap.

### **Threats**

- There are several instances of EOC not able to function due to poor network system and damages to cable wires when heavy rains or cyclone occurs. This has been managed through social networks such as WhatsApp groups, Telegram and Walkie talkies. However, need to put resilient communication system in place.

## **5.6 Vishakhapatnam**

### **Strengths**

- City Operations Center (COC) is established under the smart city mission and acts as a coordination and communication center at the times of emergencies. It is strategically located inside the city administration building premises and is served by a separate power and communication facilities. There is 24/7 hrs power backup for one week.
- The system integration facility has been established in City Operations Center (COC) and is being used as EOC during emergencies.
- Standard Operating Procedures (SOPs) were prepared for the possible disaster events. These SOPs are to be reviewed quarterly and followed for each type of emergency / disaster situation. After any emergency/disaster event, these SOPs will be updated to fill the gaps in the operations. Data collection and documentation is also part of the City Operations Center (COC) responsibilities.
- The staff of the 'Incident Response Team (IRT)' are recruited and trained as per the disaster response requirements of the city. These staff are part of regular activities during normal times. Operations Manager is responsible to assign tasks to the Incident Response Team (IRT).
- The CC Cameras are integrated and the city can be monitored from this center during emergency situations. Around 500 CC cameras were installed all through the city and were integrated to the EOC where the operators monitor 24/7.
- The EOC building is wind resistant with power backup, flood resistant, and with fire safety practices. Fire safety protocols are in place.
- ECB (Emergency Call Box) were installed in 50 locations which facilitate citizens to report any emergency incident to the EOC.
- Public Address Systems (PAS) were installed at more than 50 locations to disseminate information to the citizens during emergency. Bulk SMS notification system was developed to send early warnings to the communities.

- Data analytics are used extensively in the dash boards.
- Apps are being widely used to collect and disseminate information. Push notification through Smart Vizag citizen mobile app is also used. Social Media is also used for crowd sourcing and information dissemination.
- The monitoring of air quality is also undertaken and important websites for updates are monitored.
- The EOC coordinates and disseminates the information to onsite LEOCS
- Inter-agency coordination is the responsibility of the Zonal Commissioners, Urban Community Development (UCD) section and Public Relations Section of the city administration.
- The EOC has a facility to be used as an alternate command centre if district emergency facility is affected. During COVID19, a control room was established on those lines.
- EOC has played a prominent role in creating awareness among the communities through the Public Address System, Variable Message Displays and Social media platforms. Till now it has done announcements for seasonal diseases, COVID-19, cyclones, heat wave, urban flooding, storm surge, industrial accidents, Swachh Survekshan, tax collections, etc.
- City Operations Center (COC) team monitors changes in the weather conditions, commencement of heavy rains, changes in the sea levels and commencement of tsunami waves etc.

### **Weaknesses**

- The day to day urban services and data management are also made part of the EOC operations. The EOC also works as a grievance redressal office. However, during emergency operations, there can be a disruption in provision of this service in the absence of separate and dedicate staff for the different purposes.
- As of now all expenses are borne by Smart City Mission, no separate permanent budgetary provision exists.

### **Opportunities**

- City Operations Centre has its own dashboards which narrate the effectiveness of departments in resolving the civic issues.

### **Threats**

- The COC is 5 kms away from the coastal line and located at safe elevation of 80 meters.
- Technology failures during emergencies may deprive EOC from having access to smart infrastructure and restrict it from performing duties during emergencies.

# KEY RECOMMENDATIONS

Based on the review of international cities, best practices on establishment and management of EOC were identified and recorded. With an understanding of the international case studies along with the situation & gap analysis of the six national cities, contextualized and actionable recommendations were laid down for Indian cities. Some of the key recommendations for establishment and management of Indian cities are as below:

- Many cities lack dedicated and adequately staffed and equipped EOC and either only have a control room or share the EOC with the District. There is a need to have dedicated EOC at city level which is adequately staffed and equipped to monitor and manage local and city level emergencies and supporting the district and state EOC in managing large scale emergencies.
- There should be a provision of dedicated regular staff at EOC who is specially trained in various aspects of day-to-day functioning of EOC along with its functioning during emergencies
- The EOC should also be strengthened to act as a backup to district and state EOC as in the case of the Tachikawa Wide-Area Disaster Management Base, Tokyo.
- There should be a provision of dedicated budget for functioning and maintenance of the EOC
- The EOC should be located in a safe and easily accessible site and its location should be mindful of direct and indirect impacts of all potential hazards, so as to ensure that the access to the EOC and its functioning is itself not affected during emergencies or their cascading impacts.
- The physical infrastructure of the EOC should include disaster resilient construction practices and measures as seen in the case of Taipei EOC.
- The case of Niceville suggests that clearly delineated roles and responsibilities under the Incident Response System helps in effective functioning of EOC on its activation.
- Many EOC also lack updated hazard wise SOPs and ESFs which are very crucial for performing prompt roles and managing the involved stakeholders.
- The level-based activation of EOC depending on the level of scale of emergencies helps in effective utilization of resources.
- Considering the various challenges like physical damage to EOC during emergencies, a web-based incident management or decision support system which can be accessed remotely seems very useful. Such a system, like in the case of Rio de Janeiro and Toronto, should support integration of various critical databases, resource mapping, hazard mapping, ESFs, etc. to aid the staff and decision makers in better management of emergencies.
- There is a need to have in place dedicated and duly budgeted mechanism of building capacity of the EOC both in terms of procurement of required equipment and resources and also for training the involved stakeholders and staff in their respective roles. Such a mechanism should also be mindful of the change in staff of the EOC due to administrative transfers and support regular capacity building measures accordingly.
- Considering the challenges the current pandemic has posed to the urban local bodies and

has impacted various sectors, it is important that the EOC provides a platform to bring together diverse stakeholders from different departments and sectors for collaborative planning and decision making. This should also be supported by providing to EOC access of key databases including baseline socio, economic and demographic which aids in prompt decision making by emergency managers.

- EOC should provide for multi-hazard early warning system duly integrated with other surveillance systems such as that of diseases with epidemic/ pandemic potential so as to promptly raise alarm and better monitor the ground situation.
- EOC should integrate existing, new and emerging ICT with field based system for better coverage and management of risks on ground.

# ANNEXURES

## Annexure 1: Template for case studies of international cities

### A. City (*city name, country*)

Introduce city, its geographical location, etc.

#### A.1. Hazard profile of the city

Key hazards and risks in the city

#### A.2. Administrative profile of the city

##### A.2.1. Administrative and governance structure in the city

##### A.2.2. Linkage with wards, district and state (or equivalent administrative divisions for foreign countries)

#### A.3. Institutional mechanism for disaster risk management at city level

Discuss in brief existing mechanism for DRM, decision making, planning and implementing authorities, etc.

### B. Establishment of Emergency Operation Centre

In case different words are used for it in different country, mention the name used like Operation Room, etc.

#### B.1. Location of EOC

Physically located in which part of city both geographically and administratively.

#### B.2. Inception of EOC

Discuss the following aspects:

##### B.2.1. Initial process and efforts towards establishment of EOC;

##### B.2.2. Criteria for site selection

##### B.2.3. Initial studies undertaken

##### B.2.4. Initial investment incurred and running cost

#### B.3. Governance of EOC

##### B.3.1. Department/ authority heading or running the EOC

##### B.3.2. Organizational structure of EOC

##### B.3.3. Roles & responsibilities of different positions

##### B.3.4. Decision making process

##### B.3.5. Financial management

(How are funds provisioned for functioning of EOC, running cost, who takes financial decisions, mechanism of fund disbursement, mechanism for monitoring and audit of funds?)

##### B.3.6. Human resource management

##### B.3.7. Other aspects (*Discuss any other important aspect not covered above*)



#### **B.4. Physical infrastructure at EOC**

(Discuss physical design, layout, disaster resilient construction practices and structural & non-structural measures undertaken)

#### **B.5. ICT infrastructure at EOC**

(Discuss technological resources available at EOC including those for hazard monitoring, surveillance, communication, early warning & alert, incident reporting, information & data management, inventory management, resource management, decision support system, etc.

Discuss application of new and emerging technologies used in EOC)

### **C. Functioning of EOC**

#### **C.1. Key functions performed by EOC**

(Discuss the key normalcy and emergency roles performed at EOC; identify key stakeholders; identify the responsibility matrix- who does what and when; discuss the SOPs laid down in this regard)

##### **C.1.1. Key functions of EOC during normalcy**

##### **C.1.2. Key functions of EOC during and post emergency**

#### **C.2. Integration of early warning and communication system**

(Discuss the mechanism of receiving and dissemination of warning and alert at EOC; warnings for which hazards originate at EOC; how is the warning dissemination integrated with communication systems; mechanism for dissemination to response agencies and to masses in general)

#### **C.3. Detailed role during activation of emergency**

(Discuss how the emergency is triggered; how the EOC is activated and expands to emergency roles; how are ESFs activated; discuss IRS system followed, formats used for emergency management, etc.

Also discuss if there are mechanism for establishing temporary remote EOC during emergencies; how they are established; how do they function; etc.)

##### **C.3.1 Mechanism for inter-agency coordination**

(Discuss the mechanism for inter-agency coordination and communication; how are agencies from outside the city, state or country coordinated with; how does transfer of command take place when agencies from higher authorities take over the operations from local agencies; etc.

Communication linkages with on-site and local EOC, district EOC, state EOC, etc.)

##### **C.3.2. Mechanism for resource management and demobilization**

(Discuss the mechanism of mobilization, acquisition, demobilization; etc.)

##### **C.3.3. Mechanism for data and information management**

(Discuss the mechanism data management, data and information reporting and sharing)

### **C.3.4. Mechanism for public relation and media management**

(Discuss mechanism for public relation, grievance redressal, media management, etc.)

### **C.4. City EOC as backup for District/ State EOC**

(Discuss if City EOC has been used as a backup for District or State EOC during emergency or if there is any existing mechanism to do so.)

### **C.5. Capacity building measures undertaken at EOC**

(Discuss various provision undertaken for capacity building at EOC including training of staff, procurement, simulation exercise, etc.)

#### **C.5.1. Trainings (*On what all aspects and for whom?*)**

#### **C.5.2. Procurement of equipment (*Mechanism and process*)**

#### **C.5.3. EOC used as awareness generation centre for community**

#### **C.5.4. Simulation exercise**

#### **C.5.5. Others**

### **D. Impact of EOC**

(Discuss mechanism for monitoring and evaluation of functioning of EOC; impact of EOC on disaster risk management functions of city)

### **E. Good practices**

(Highlight the 1 or 2 good practices undertaken in establishment and management of EOC that can be replicated for India.)

### **F. Annexures**

(If necessary, annex some supporting material, tables, data, etc.)

## **Annexure 2: Questionnaire for consultations with national cities**

### **A. Name of the city:**

<b>B. Disaster risk management at the City</b>	
Key hazards and risks in the city	
Institutional mechanism at city level for disaster risk management (DRM)	(Discuss in brief existing mechanism for DRM, decision making, planning and implementing authorities, etc.)
Linkage of City DM department/ agencies with District and State departments and agencies	
<b>C. Establishment of the City EOC</b>	
Where is the EOC located in the city?	<ul style="list-style-type: none"><li>• (Physically located in which part of city geographically (also discuss proximity of the EOC to hazards and other perceived risks to the EOC)</li><li>• Physically located at/ with which department building/ premise or has a separate dedicated building/ premise)</li></ul>

What were the key criteria for selection of site for EOC?	
Which key studies were undertaken before establishing the EOC?	<ul style="list-style-type: none"> <li>• (What all aspects did these studies focused on?)</li> <li>• Also share links or reports on the same.)</li> </ul>
What was the approximate initial investment incurred for establishment of EOC? What was the source of this fund?	
<b>D. Governance at the City EOC</b>	
Which Department/ authority in the City heads or runs the EOC?	
What is the organizational structure of City EOC?	(Discuss organogram, key designations/ positions and their organizational hierarchy)
What are key roles and responsibilities of the positions mentioned above?	(Discuss key roles and responsibilities for each position above)
What is the mechanism for decision making at the City EOC?	(Discuss who is responsible for strategic and operational decision making both during normalcy and during emergency. How are these decisions disseminated to others involved?)
What is the mechanism for financial management at the City EOC?	(How are funds provisioned for functioning of EOC; sources of fund, running cost of EOC; key aspects requiring running cost including salary of staff, procurement, capacity development measures, maintenance, etc.; who takes financial decisions; mechanism of fund disbursement; mechanism for monitoring and audit of funds?)
What is the mechanism for human resource management at the City EOC?	(How is the staff at City EOC recruited or deputed, are they contractual/ permanent, etc.; key qualifications of major positions; how are they oriented and trained for performing their functions; discuss/share TOR of key staff at EOC; mechanism of monitoring & evaluating the performance?)
Any other aspects concerning governance of EOC	
<b>E. Physical infrastructure at the City EOC</b>	
Year of establishment of the City EOC? Any major changes/ modifications undertaken after initial establishment?	

What are the key considerations while planning and designing the physical infrastructure at the City EOC?	(Discuss physical design, layout, associated factors considered, etc.)
What are the key disaster resilient construction practices undertaken in the EOC?	
What are the key structural & non-structural measures undertaken in the EOC?	
<b>F. ICT infrastructure at the City EOC</b>	
What are the key ICT related/ based resources currently available in the EOC?	(Discuss technological resources available at EOC including those for hazard monitoring, surveillance, communication, early warning & alert, incident reporting, information & data management, inventory management, resource management, decision support system, etc.)
What is the existing mechanism at the EOC for integration of early warning and communication system?	(Discuss the mechanism of receiving and dissemination of warning and alert at EOC; warnings for which hazards originate at EOC; how is the warning dissemination integrated with communication systems; mechanism for dissemination to response agencies and to masses in general)
Are any new and emerging technologies currently used in the EOC?	(Discuss how and for what purpose are they used?)
<b>G. Functioning of the City EOC</b>	
What are the key functions of the EOC during normalcy?	(Discuss day-to-day operations undertaken at EOC along with others functions catering to pre-disaster phases)
What are the key functions of the EOC during and post emergency	(Discuss the key emergency functions performed at EOC; identify key stakeholders; identify the responsibility matrix- who does what and when; discuss the SOPs laid down in this regard)
What is the mechanism to activate or expand emergency operations/ functions at the EOC?	<ul style="list-style-type: none"> <li>• (Discuss how the emergency is triggered; how the EOC is activated and expands to emergency roles; how are ESFs activated; discuss IRS system followed, formats used for emergency management, etc.</li> <li>• Also discuss if there are mechanism for establishing temporary remote EOC during emergencies; how they are established; how do they function; etc.)</li> </ul>

What is the mechanism for inter-agency coordination at the EOC?	<ul style="list-style-type: none"> <li>• (Discuss the mechanism for inter-agency coordination and communication; how are agencies from outside the city, state or country coordinated with; how does transfer of command take place when agencies from higher authorities take over the operations from local agencies; etc.</li> <li>• Communication linkages with on-site and local EOC, district EOC, state EOC, etc.)</li> </ul>
What is the mechanism for resource management and demobilization at the EOC?	(Discuss the mechanism of mobilization, acquisition, demobilization; etc.)
What is the mechanism for data and information management at the EOC?	(Discuss the mechanism data management, data and information reporting and sharing)
What is the mechanism for public relation and media management at the EOC?	(Discuss mechanism for public relation, grievance redressal, media management, etc.)
Is there a mechanism whereby the City EOC acts as backup for the District or State EOC in case they are affected during emergencies or otherwise?	(Discuss if City EOC has been used as a backup for District or State EOC during emergency or if there is any existing mechanism to do so.)
<b>H. Capacity development measures undertaken at the City EOC</b>	
What are the key aspects on which trainings of staff of EOC or other stakeholders undertaken?	(Discuss on what all aspects are training conducted, for whom, by whom?)
What is the mechanism for undertaking procurement at EOC?	(Discuss the mechanism, process, decision making authority, how is the need assessed, etc.)
Is the EOC currently being used as an awareness generation centre for the community?	(Discuss how and what all aspects, periodicity of such initiatives, etc.)
Are regular simulation exercises organized at the EOC to test its functioning and existing mechanisms, SOPs, etc.?	(Discuss how are they organized; who all are involved; periodicity of such initiatives; etc.)
Other measures/ initiatives undertaken towards capacity development of EOC?	

<b>I. Impact of the City EOC</b>	
Is there any existing mechanism to monitor & evaluate the functioning of the EOC?	
How has the EOC helped in the overall disaster risk management at the City Level?	
What are some of good practices at the EOC which have enhanced the effectiveness and efficiency of the EOC?	
Have there been past instances where the EOC was not able to perform the envisaged functions?	(Discuss such experiences; what were the key reasons for this? How was this managed or overcome?)
What are the key challenges and bottlenecks faced during the functioning of EOC in normalcy and during emergency times?	
How can some of these challenges and bottlenecks be overcome?	

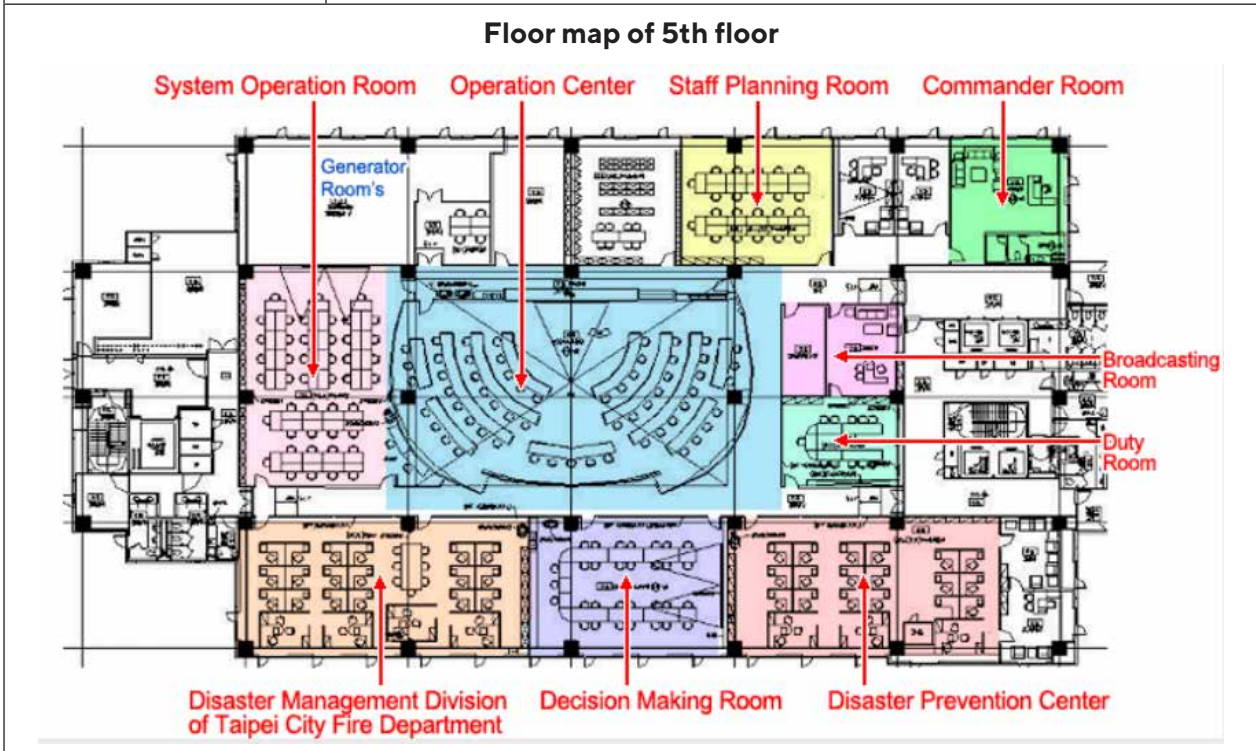
**Name and designation of the responder:**

### Annexure 3: Layout and floor plans, Taipei

4 <sup>th</sup> Floor	
Logistics Supply Room/ Storage	Supplies (water, foods) to sustain needed for the EOC operations without outside help for a total of 72 hours.
Dining Room	Offers foods or cooking utensils for EOC staff
Standby Room	Room with bedding and washroom for personnel with round the clock duty
<p><b>Floor map of 4th floor</b></p>	
5 <sup>th</sup> Floor	
Operation Centre	EOC nerve center where staff can have a meeting, make decisions, assess damages, communicate and handle the disaster. It is supported by required ICT infrastructure.
Decision-Making Room	A small meeting room where the Commander (Mayor), Deputy Commander and other officers can meet without being disturbed.
System Operation Room	When the Centre is activated, the staff members work here to collect information, assess the extent of the disaster, check the response and prepare documents.
Staff Planning Room	When the Centre is activated, staff from different departments gather in the Staff Room.
Commander/ Deputy Commander Room	Space for the commander and deputy commanders to work and rest.
Duty Room (EOC, Health Department)	A nighttime contingency room where duty officers work round the clock in case a disaster occurs in the evening or on holidays.
Broadcasting Room	Taipei Broadcasting Station (City's emergency broadcaster) studio.



Disaster Prevention Centre / Disaster Management Division of Taipei City Fire Department	Disaster Prevention Centre and Disaster Management Division of Taipei City Fire Department. It is supported by required communication and business machines.
Telecommunications / Computer Mainframe Room	For telephone exchange, computer mainframe, wire and wireless telecommunication equipment



6 <sup>th</sup> Floor	
Chief Officers Standby Room	Bedding for department commissioners
Staff Standby Room	Bedding for staff members from different departments
Press Room/ Media Rest Room	For releasing news and space for journalists to work and rest

**Floor map of 6th floor**

## Annexure 4: Response of stakeholders for national cities

### Annexure 4.1 Cuttack

**Respondent's name and designation of the responder:** Mr. Pradipta Kumar Mohanty, CPC, Cuttack City

A. Disaster risk management at the City	
Key hazards and risks in the city	Cyclone, Waterlogging, Flooding, Heat Wave, Fire Accident & Earthquakes
Institutional mechanism at city level for disaster risk management (DRM)	City has two EoCs i.e One is at Bikash Bhawan, CMC and one small MIS centre for report processing, EWS dissemination at Biju Bhawan. Bikash Bhawan Control operates 24hrs basis round the clock with staff arranged in different slots .The EOC has sitting arrangements for staff with dedicated Toll Free and Landline numbers. It has grievance records and redressal records which are checked by senior officials.

Linkage of City DM department/ agencies with District and State departments and agencies	EOC has linkage with PHED, Engineering, Drainage, Fire, ODRAF, R& B, Irrigation, Drainage and District EOC.
<b>B. Establishment of the City EOC</b>	
Where is the EOC located in the city?	<ul style="list-style-type: none"> <li>• It is in the East Part of the City i.e 600 mtrs away from River Kathajodi and Ring Road Emabankment.</li> <li>• Bikash Bhawan, Cuttack Municipal Corporation</li> </ul>
What were the key criteria for selection of site for EOC?	
Which key studies were undertaken before establishing the EOC?	<ul style="list-style-type: none"> <li>• Major Departments with Field Staffs are in the Bikash Bhawan Building like Engineering, Water Supply, Electricity, Slum Improvement, Sanitation and Health. The field staff can be well co-ordinated and deployed.</li> <li>• Monsoon Action Plan enclosed</li> </ul>
What was the approximate initial investment incurred for establishment of EOC? What was the source of this fund?	
<b>C. Governance at the City EOC</b>	
Which Department/ authority in the City heads or runs the EOC?	H&UD Housing and Urban Development Department
What is the organizational structure of City EOC?	Commissioner-EOC Incharge Officer-a.Staff Deployed with control room incharge, b. Field Staff Supervising Officers, c. Other stakeholders
What are key roles and responsibilities of the positions mentioned above?	<ol style="list-style-type: none"> <li>1.Report Collection</li> <li>2.Order Issue and staff deployment</li> <li>3.Monitoring and arrangements of logistics</li> <li>4.Manintainage of registers of inward and outward massages</li> <li>5.Co-ordination with departments</li> <li>6.EWS warning dissemination and dewarning</li> </ol>
What is the mechanism for decision making at the City EOC?	Basically the Nodal Officer in charge of City EOC took the decision in consultation with Commissioner.
What is the mechanism for financial management at the City EOC?	<p>During Emergency Response Finance Officer ordered to coordinate with EOC Nodal Officer in case of procurement of logistics and pre arrangements and relief provisions</p> <p>All are as per the Govt. guidelines in consultation with State and District EOC</p>

What is the mechanism for human resource management at the City EOC?	Please refer the Monsoon Micro Plan
Any other aspects concerning governance of EOC	
<b>D. Physical infrastructure at the City EOC</b>	
Year of establishment of the City EOC? Any major changes/modifications undertaken after initial establishment?	
What are the key considerations while planning and designing the physical infrastructure at the City EOC?	
What are the key disaster resilient construction practices undertaken in the EOC?	
What are the key structural & non-structural measures undertaken in the EOC?	
<b>E. ICT infrastructure at the City EOC</b>	
What are the key ICT related/ based resources currently available in the EOC?	Maps, Telephone directory, resources i.e. vehicles, siren, announcing systems, Computer, Printer, Registers, Phones are available in EOC
What is the existing mechanism at the EOC for integration of early warning and communication system?	Information generally received from IMD, District EOC and disseminated according to the Micro Planning
Are any new and emerging technologies currently used in the EOC?	Biju Bhawan MIS Centre is used for reporting and Bikash Bhawan EOC used for response and management.
<b>F. Functioning of the City EOC</b>	
What are the key functions of the EOC during normalcy?	Daily Grievance checked and summed up from the field
What are the key functions of the EOC during and post emergency	<ul style="list-style-type: none"> <li>• Staff Deployment</li> <li>• Dewatering Plans and Pump deployment</li> <li>• Arrangement in shelters</li> <li>• Evacuation</li> <li>• EWS</li> <li>• Relief and dry Foods</li> <li>• Assessment</li> </ul>

What is the mechanism to activate or expand emergency operations/ functions at the EOC?	EOC activated upto sector and ward officers with Micro teams from different sections.
What is the mechanism for inter-agency coordination at the EOC?	<ul style="list-style-type: none"> <li>Interagency co-ordination managed by incharge officers. For any critical response the concerned agency staff are pulled up to city EOC for better co-ordination and management.</li> </ul>
What is the mechanism for resource management and demobilization at the EOC?	Nodal Officer Control Room managed the acquisition, allocation and disbursement.
What is the mechanism for data and information management at the EOC?	Data is managed by Control Room incharge clerk and MIS.
What is the mechanism for public relation and media management at the EOC?	Commissioner and Nodal Officer Disaster Management is only authorized for public relations and media management.
Is there a mechanism whereby the City EOC acts as backup for the District of State EOC in case they are affected during emergencies or otherwise?	
<b>G. Capacity development measures undertaken at the City EOC</b>	
What are the key aspects on which trainings of staff of EOC or other stakeholders undertaken?	<p>Training of Field staffs has been taken up</p> <p>Training of EOC staff has been taken up</p>
What is the mechanism for undertaking procurement at EOC?	Commissioner and Nodal Officer after discussions with Sector Officers
Is the EOC currently being used as an awareness generation centre for the community?	Sometimes Ward Officers are directed by EOC to carry awareness in Wards.
Are regular simulation exercises organized at the EOC to test its functioning and existing mechanisms, SOPs, etc.?	In Some cases drill are taken up in most vulnerable wards.
Other measures/ initiatives undertaken towards capacity development of EOC?	

<b>H. Impact of the City EOC</b>	
Is there any existing mechanism to monitor & evaluate the functioning of the EOC?	Commissioner/Joint Commissioner/Nodal Officer inspect the functioning of EOC
How has the EOC helped in the overall disaster risk management at the City Level?	It is playing crucial role in the disaster management.
What are some of good practices at the EOC which have enhanced the effectiveness and efficiency of the EOC?	
Have there been past instances where the EOC was not able to perform the envisaged functions?	
What are the key challenges and bottlenecks faced during the functioning of EOC in normalcy and during emergency times?	
How can some of these challenges and bottlenecks be overcome?	



## Annexure 4.2 Navi Mumbai

**Respondent's name and designation of the responder:** Mr, Kevala Rathod – Superintendent, Regional Disaster Management Center, Navi Mumbai Municipal Corporation. Additional inputs – Yash Kadam, City Project Coordinator, UNDP

<b>A. Disaster risk management at the City</b>	
Key hazards and risks in the city	Urban floods, cyclones, fire accidents, water logging and chemical disasters.
Institutional mechanism at city level for disaster risk management (DRM)	<p>The Municipal Commissioner vide order No RVN&amp; Forest DMU 2006/CR-11/DM-1/dated 25th July 2006 is appointed as the District Disaster Officer for Navi Mumbai in majority of the disasters within the managerial capacity of NMMC, the NMMC manages the disaster situation without intervention from the State authorities. With the EOC and 2 Control Rooms, Micro-level plans at ward level have been prepared for all the 8 wards incorporating specific responsibilities of ward officer who will act as Ward Disaster Manager.</p> <p>However, in case of disaster of exceptionally large magnitude which require co-ordination with wide range of lateral agencies including central government agencies, the additional Chief Secretary (Home) will assume the responsibility of Disaster Manager of Navi Mumbai.</p>
Linkage of City DM department/ agencies with District and State departments and agencies	<p>The Regional Disaster Management Center is connected to all the major stakeholders ranging from Home Department Control Room- Maharashtra, Thane DM Control Room, NDRF, CISF, Railways, CIDCO, MSEB, Reliance Energy and Mumbai Municipal Corporation EOC.</p> <p>There is direct communication between Navi Mumbai Municipal Corporation EOC with Thane District EOC for matters pertaining to sharing early warnings about climate related risks, sharing information on disaster management (meetings, trainings, policy updates and other forms of documentation).</p>
<b>B. Establishment of the City EOC</b>	
Where is the EOC located in the city?	<p>The EOC is located in the headquarters of Navi Mumbai Municipal Corporation building. Physically, the Disaster Management Cell of NMMC is housed in the basement of NMMC headquarter at Belapur. The building is well-constructed with earthquake resilient technology. Due to its location, it has a quick access to all the important emergency managers.</p> <p>EOC Team is also available at each of the 8 Wards of Navi Mumbai Municipal Corporation Ward Offices and is active 24x7 for 5 months during monsoon season and during the rest 7 months (non-monsoon season) can be activated when required.</p>



What were the key criteria for selection of site for EOC?	There were no predetermined criteria for the selection of onsite EOC in Navi Mumbai Municipal Corporation.
Which key studies were undertaken before establishing the EOC?	There no studies undertaken before establishing the EOC.
What was the approximate initial investment incurred for establishment of EOC? What was the source of this fund?	The amount could not be confirmed by EOC Superintendent.

### C. Governance at the City EOC

Which Department/ authority in the City heads or runs the EOC?	The Regional Disaster Management Center, Navi Mumbai Municipal Corporation oversees the functioning of the EOC. The Regional Disaster Management Center is under the direct supervision of the Additional Commissioner (City) of Navi Mumbai Municipal Corporation.
What is the organizational structure of City EOC?	<p>The organizational structure of the City EOC is as follows:</p> <ul style="list-style-type: none"> <li><b>Navi Mumbai Disaster Management Committee</b> (top level) is supported by: <ul style="list-style-type: none"> <li>IMD, NDRF, Armed Forces, BARC, IIT, CISF, Railways, CIDCO, Railways, Jawaharlal Nehru Port Trust, Pawan Hans, MSEB, and Reliance Energy</li> <li>Home Department, Govt. of Maharashtra</li> </ul> </li> <li><b>NMMC Control Room</b> (middle level) is connected to: <ul style="list-style-type: none"> <li><b>Hot Lines</b> (left side): <ol style="list-style-type: none"> <li>1. Fire department, Vashi</li> <li>2. Traffic Control Room</li> <li>3. Police Control Room</li> <li>4. Thane District DM Cell</li> <li>5. Vashi Railway</li> <li>6. BMC Control Room,</li> <li>7. Mantralaya Control Room</li> <li>8. Vashi -FRU Hospital</li> <li>9. BEST Wadala and</li> <li>10. CIDM Parel</li> </ol> </li> <li><b>Ward Control Room</b> (right side)</li> </ul> </li> <li><b>Ward Control Room</b> (bottom level) is connected to: <ul style="list-style-type: none"> <li>Ward level departments/ agencies</li> <li>Civil Defence</li> <li>Community</li> <li>Local CSOs/ NGOs</li> </ul> </li> </ul>

<p>What are key roles and responsibilities of the positions mentioned above?</p>	<p>1. Disaster Management Department of NMMC</p> <p>The NMMC EOC in its capacity as to nodal EOC is responsible for coordinating the support from all other Ward Control rooms for the activities of all line departments and agencies which are involved at the disaster site. The NMMC EOC may seek assistance from the District Collector Thane for requisitioning of resource such as private transport, temporary shelter and other resources.</p> <p>Disaster Management EOC coordinates with various line departments of NMMC, agencies of State and Central Government based in Navi Mumbai for effective coordination, communication, preparedness and responses during emergencies.</p> <p>2. Fire Brigade Control Room:</p> <ul style="list-style-type: none"> <li>• Rescue and evacuation</li> <li>• Salvage Operations</li> <li>• Communicate to NMMC Control Room details of all the above activities</li> <li>• Communicate to NMMC Control Room any additional resource required for performing the above tasks.</li> </ul> <p>3. Police Control Room</p> <ul style="list-style-type: none"> <li>• Co-ordinate with NMMC Control Room</li> <li>• Cordoning of area to restrict movement of vehicular and pedestrian traffic</li> <li>• Providing easy access to rescue and relief personnel/ vehicles</li> <li>• Corpse disposal</li> </ul> <p>4. Railways Control Room (Harbour)</p> <ul style="list-style-type: none"> <li>• Rescue and Salvage Operations for rail accidents</li> <li>• Monitor flood situation on railway tracks and co-ordinate with NMMC Control Room for mass transport requirement.</li> <li>• Co-ordinate with NMMC Control Room for draining of flood water from the railway tracks.</li> <li>• Co-ordinate medical and first aid with Railway Hospitals and BMC control room.</li> <li>• Set up an information centre to organize sharing of information with mass media and community.</li> <li>• Communicate to NMMC Control Room details of all the above activities.</li> <li>• Communicate to NMMC Control Room any additional resource required for performing the above tasks.</li> </ul>
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What is the mechanism for decision making at the City EOC?	<p>The Regional Disaster Management Center is headed by Additional Municipal Commissioner (City). EOC is primarily established at NMMC Head Office at CBD Belapur. EOC functions 24 x 7 round the year. During non-emergency time it functions as "Watch and Ward" regime and during emergencies, it's get activated to a full scale within a short time frame. It also closely connects with other agencies who provide early warning.</p> <p>In order to ensure speedy and effective response, the execution of disaster related activities are undertaken under the direction of the NMMC Disaster Management Committee. The Navi Mumbai Disaster Management Committee is headed by the Municipal Commissioner (MC). Depending upon the type of disaster the MC appoints one of the committee members to deal with the disaster. The Committee is responsible for continuous monitoring of all disaster related activities.</p>
What is the mechanism for financial management at the City EOC?	The expenses incurred by EOC are derived from the yearly budgeted allocations for the Regional Disaster Management Center. There is no separate fund allocated for EOC operations and maintenance. The budget for 2019-20 for Regional Disaster Management Center stands at Rs. 4 crore.
What is the mechanism for human resource management at the City EOC?	The expenses incurred by EOC (human resources and staff salaries) are derived from the yearly budgeted allocations for the Regional Disaster Management Center.
Any other aspects concerning governance of EOC	
<b>D. Physical infrastructure at the City EOC</b>	
Year of establishment of the City EOC? Any major changes/modifications undertaken after initial establishment?	<p>The EOC, was established in 2007 in the aftermath of Mumbai 2005 floods.</p> <p>There are no major changes to the EOC undertaken. Over time, advanced communication systems were installed like HAM Radio. Doppler radar is also going to be installed in the next year for early meteorological warnings.</p>
What are the key considerations while planning and designing the physical infrastructure at the City EOC?	The physical infrastructure available with EOC is on the lines of requirements
What are the key disaster resilient construction practices undertaken in the EOC?	The EOC is situated in an earthquake resilient building.

What are the key structural & non-structural measures undertaken in the EOC?	No such measures have been undertaken.
<b>E. ICT infrastructure at the City EOC</b>	
What are the key ICT related/ based resources currently available in the EOC?	Hotlines and HAM Radio. Doplar Radar and satellite phones will be procured in 2021.
What is the existing mechanism at the EOC for integration of early warning and communication system?	Meteorological early warnings generated by IMD are shared with Navi Mumbai Municipal Corporation EOC by the state government EOC as well as District Collector's office.
Are any new and emerging technologies currently used in the EOC?	No
<b>F. Functioning of the City EOC</b>	
What are the key functions of the EOC during normalcy?	<ul style="list-style-type: none"> <li>• Keep the EOC functional in all respects so as to perform the duties effectively during emergency time.</li> <li>• Keep maps updated with latest development</li> <li>• Keep resource data and GIS map updated and update the resource inventory.</li> <li>• Keep communication links active</li> <li>• Receive daily feedback from the ward as well as other stakeholders regarding any incidences, maintain telephone, and radio logs.</li> <li>• Keep contact details of all stakeholders and response forces.</li> <li>• Update Mumbai Disaster Management Plan including mutual aid schemes.</li> <li>• Media management as and when required with only the authorized PR Officer interacting.</li> <li>• Internal funds accounting and management.</li> <li>• Keep EOC staff well trained.</li> </ul>

<p>What are the key functions of the EOC during and post emergency</p>	<ul style="list-style-type: none"> <li>• Ensure updating of information to the Mayor, Chairman of NMMC DM Committee, Additional Municipal Commissioner, and all the members of the NMMC DM Committee.</li> <li>• Maintain communication between the EOC and affected Wards and get periodic feedbacks.</li> <li>• Maintain log of activities carried out during emergency.</li> <li>• Make arrangements of meetings of stakeholders in the EOC.</li> <li>• Keep track of all info and intelligence for dissemination to all concerned.</li> <li>• Ensure dissemination of orders / information to all Wards &amp; Stakeholders</li> <li>• Media management</li> </ul>
<p>What is the mechanism to activate or expand emergency operations/ functions at the EOC?</p>	<p>The Municipal Commissioner or Additional Municipal Commissioner, Disaster Management, NMMC may activate the EOC if the following conditions exist:</p> <ul style="list-style-type: none"> <li>• If there exists an imminent threat to public safety or health on a large scale;</li> <li>• If an extensive State government, District government, or National government</li> <li>• Response and coordination will be required to resolve or recover from the emergency or disaster event;</li> <li>• If the disaster affects multiple Wards within NMMC that rely on the same resources to resolve major emergency incidents</li> </ul>
<p>What is the mechanism for inter-agency coordination at the EOC?</p>	<p>Corporation EOC and district and state level EOC are in constant contact via emails and hotlines in order to share information either about prospective emergencies or sharing regular updates.</p> <p>Navi Mumbai Municipal Corporation has similar communication mechanism with other external stakeholders like NDRF, CISF, Railways and so on.</p>
<p>What is the mechanism for resource management and demobilization at the EOC?</p>	<p>In case of an emergency, the resources are mobilized and acquired at Ward Office level. The Ward officer coordinates with the EOC at Navi Mumbai Municipal Corporation and keeps them informed about the situation in case external intervention is required.</p>
<p>What is the mechanism for data and information management at the EOC?</p>	<p>No formal reporting format exists. Communication takes place through official letters between NMMC officials.</p> <p>The EOC operator prepare</p>

What is the mechanism for public relation and media management at the EOC?	The EOC and Public Relations Department work in tandem to brief the media. Information is shared via press briefs, official social media posts and via newspaper outlets.
Is there a mechanism whereby the City EOC acts as backup for the District of State EOC in case they are affected during emergencies or otherwise?	This instance has not occurred so far.
<b>G. Capacity development measures undertaken at the City EOC</b>	
What are the key aspects on which trainings of staff of EOC or other stakeholders undertaken?	Training on Incident reporting system was provided to EOC staff in 2018. EOC staff also undergoes internal trainings and orientations on EOC and disaster management.
What is the mechanism for undertaking procurement at EOC?	EOC operators are selected from Fire Department of Navi Mumbai Municipal Corporation and are trained to operate EOC hotlines, HAM radio, communication & dissemination of information with different stakeholders and to oversee data collection related to various incidents and meteorological data.
Is the EOC currently being used as an awareness generation centre for the community?	No.
Are regular simulation exercises organized at the EOC to test its functioning and existing mechanisms, SOPs, etc.?	A simulation activity is conducted once a year. Last simulation exercise that was conducted was on Chemical Emergency Mock Drill in January 2019.
Other measures/ initiatives undertaken towards capacity development of EOC?	No additional initiatives.
<b>H. Impact of the City EOC</b>	
Is there any existing mechanism to monitor & evaluate the functioning of the EOC?	No such mechanism is in place.

How has the EOC helped in the overall disaster risk management at the City Level?	<p>The EOC has successfully coordinated all small and major emergencies with the relevant stakeholders. The EOC also publishes a list of relevant contacts of essential services and resources (Ward wise hospitals, fire stations, schools, shelter homes, NGOs, food supply utilities) throughout the Navi Mumbai city yearly which serves as a critical asset for effective resource mobilization.</p> <p>The EOC has been very active during the Covid-19 pandemic as a source to disseminate information regarding hospital bed availability, testing and contact tracing ambulance services and so on among the citizens.</p>
What are some of good practices at the EOC which have enhanced the effectiveness and efficiency of the EOC?	Maintaining and updating the booklet containing contact information of all the essential services in Navi Mumbai yearly is a good practice.
Have there been past instances where the EOC was not able to perform the envisaged functions?	
What are the key challenges and bottlenecks faced during the functioning of EOC in normalcy and during emergency times?	Though the coordination and response among different departments is satisfactory, there should be more inter departmental meetings for a proactive approach and advance planning.
How can some of these challenges and bottlenecks be overcome?	By developing efficient early warning systems for meteorological risks.

### Annexure 4.3 Shillong

<b>A. Disaster risk management at the City</b>	
Key hazards and risks in the city	Earthquake, Landslides, Storms, Flash Floods, Fire accidents, Road accidents



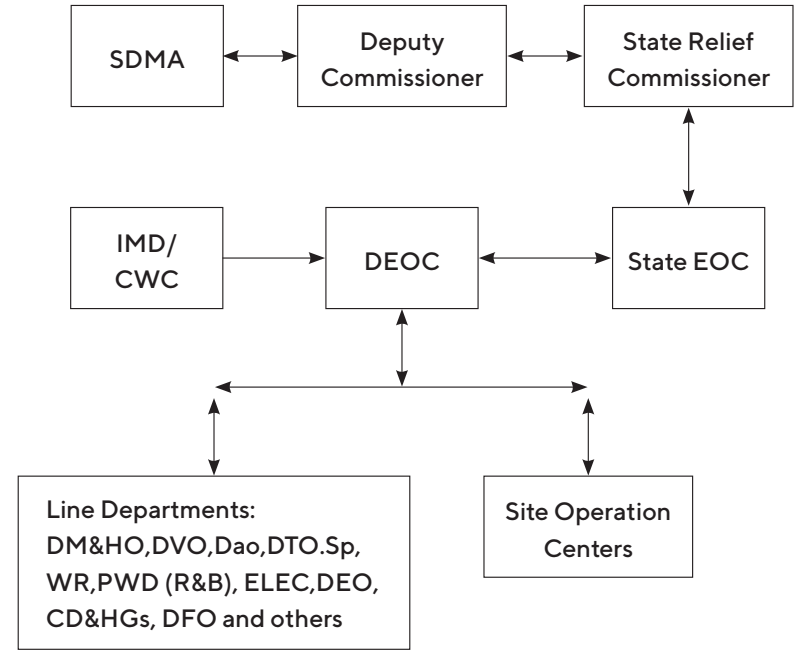
<p>Institutional mechanism at city level for disaster risk management (DRM)</p>	<p>The Deputy Commissioner is the Chairman of the Disaster Management Cell and the City Disaster Management Committee and the district response is coordinated under his/her guidance. The City Disaster Management Committee exist to assist the Additional Deputy Commissioner &amp; CEO, DM in</p> <ul style="list-style-type: none"> <li>• Reviewing the threats of a disaster</li> <li>• Strengthen the capacity of the DDMA</li> <li>• Analyzing the vulnerability of the district to such disasters</li> <li>• Evaluating the preparedness and response</li> <li>• Considering the improvements of the DDMP.</li> </ul> <p>The District Disaster Management Officer is the person who runs the Disaster Management work on a day to day basis.</p>
<p>Linkage of City DM department/ agencies with District and State departments and agencies</p>	<p>The EOC is connected to all stakeholders and line Departments in the city. Communication with the State EOC and the District EOC is done regularly and sharing of information, updates, documentations on Disaster Management and training is often done.</p>
<p><b>B. Establishment of the City EOC</b></p>	
<p>Where is the EOC located in the city?</p>	<p>The EOC is Located in Shillong, East Khasi Hills District of the State of Meghalaya</p> <p>The Emergency Operating Centre is located at the Deputy Commissioners Office, East Khasi Hills District. The Disaster Management Cell is located behind the Deputy Commissioners Office. It is a one storied building it has two entry points and has access to all emergency services.</p>
<p>What were the key criteria for selection of site for EOC?</p>	<p>No information available</p>
<p>Which key studies were undertaken before establishing the EOC?</p>	
<p>What was the approximate initial investment incurred for establishment of EOC? What was the source of this fund?</p>	<p>-</p>

**C. Governance at the City EOC**

Which Department/ authority in the City heads or runs the EOC?

The Deputy Commissioner is the Chairperson of the District Disaster Management Authority (DDMA), the Additional Deputy Commissioner is the CEO of (DDMA) and District Disaster Management Officer is in charge of handling the daily work at the EOC. In the absence of the Deputy Commissioner, the Additional Deputy Commissioner/EAc (Relief) the Emergency Officer or any other Officer on duty at that point in time shall remain in overall incharge of the control room.

What is the organizational structure of City EOC?



<p>What are key roles and responsibilities of the positions mentioned above?</p>	<p>The Deputy Commissioner circulates the SOP among the Departments and ask for compliance of the preparedness measures in the DDMA meetings.</p> <ol style="list-style-type: none"> <li>1. Agri Department:- Assist in assessment of damage to agriculture &amp; farming community and help them to restart their farming operations.</li> <li>2. Health &amp; Family Welfare:- To provide immediate medical, health and public hygiene services. To check outbreak of epidemics and provide on site operation theaters and trauma services. Awareness generation and public health.</li> <li>3. Animal Husbandry &amp; Vet Dept:- Disposal of dead animals to prevent outbreak of health and sanitation problems. Management of livestock in emergency. Assist police and Civil Defence &amp; Home guards in disposal of dead bodies.</li> <li>4. Public health &amp; Engineering Dept:- to provide immediate supply of clean drinking water in the disaster affected area and in relief camps, hospitals etc.</li> <li>5. Police (Home) Department:- Maintain Law &amp; Order. Undertake search &amp; rescue works as well as orderly evacuation to safer areas. Protection of supply &amp; convoy assistance in orderly distribution of relief materials.</li> <li>6. Public works Dept: - Arrange &amp; dispatch supplies to affected areas. Arrange distribution of commodities. Maintain price line. Regular reporting.</li> <li>7. Meghalaya energy . Corporation Ltd:- Restoration of power supply and provision of power/electricity to hospitals, lifeline buildings, feeding centers.</li> <li>8. Transport dept: - Arrange transportation for supplies to affected areas. Transport for evacuation and Medical team</li> <li>9. Water Resource Dept: - Address and phone numbers of all staff/officials to be prepared. Control room arrangements in the headquarters and appointment of Nodal Officer. Details of damage prone places. Location of water level gauge stations. Detail action in case of leakage in large water storage reservoirs.</li> <li>10. Urban Affairs:- Damage Assessment finalization of reports and mobilization of finance</li> <li>11. District Rural Development Agency:- supplement other agencies in creation of roads, footpaths, community halls etc.</li> <li>12. Housing:- Training to engineers, contractors etc on how to construct safe dwelling units. Provide materials.</li> <li>13. Meghalaya Police Radio Operations MPRO/IMD:- For collection/dissemination of information</li> </ol>
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What is the mechanism for decision making at the City EOC?	The Deputy Commissioner is the Overall incharge of the EOC, the day to day operation of the EOC is the responsibility of the District Disaster Management Officer and the officials in charge of the Disaster Management of the Revenue Department. The District Disaster management Officer is responsible for assisting the Deputy Commissioner for overall functioning coordination of the EOC. At the block level, Block Development Officer is in charge of the Control Room. During emergency, officers/staffs of other line departments are also deputed on rotation basis in the control room.
What is the mechanism for financial management at the City EOC?	The expenses incurred by EOC are derived from the yearly budgeted allocations from the Revenue and Disaster Management Department.
What is the mechanism for human resource management at the City EOC?	The expenses incurred by EOC are derived from the yearly budgeted allocations from the Revenue and Disaster management Department.
Any other aspects concerning governance of EOC	
<b>D. Physical infrastructure at the City EOC</b>	
Year of establishment of the City EOC? Any major changes/modifications undertaken after initial establishment?	The EOC was established in 2007. There are no modifications undertaken so far.
What are the key considerations while planning and designing the physical infrastructure at the City EOC?	The EOC has the following rooms <ul style="list-style-type: none"> <li>• Control Room Conference room for storing communications equipment with personal desks, power supplies etc.</li> <li>• District Magistrate cabin used to oversee all disaster management and emergency related operations, functions and coordination with the state and other concerned line departments.</li> <li>• Administration for persons on duty in the control room</li> <li>• Store Room</li> <li>• Rest Room</li> </ul>
What are the key disaster resilient construction practices undertaken in the EOC?	The building was designed as load bearing wall using seismic zone V important building requirements so as to ensure the safety of the building under probable earthquake occurrence. EOC has different antenna requirements therefore the building has flat reinforced concrete beams & stabs
What are the key structural & non-structural measures undertaken in the EOC?	Structural measures like the EOC building etc have been done Non Structural - None.

<b>E. ICT infrastructure at the City EOC</b>	
What are the key ICT related/ based resources currently available in the EOC?	<p>Computer with printer with internet facility, VHF set with battery, VHF Handheld, Hf Trans receiver, Transistor Radio, Fax Machine, Xerox Machine, Emergency Light, Landline Telephone, Genset, Portable PA system, Television, GPS, Notice Board, Thermometer, Mobile Phone, Four Wheel Vehicle, Two Wheeler</p> <p>Materials</p> <p>Meghalaya Relief Code/Manual, District Map, DDMP, Block Disaster Management Plan Control Room Duty Roaster, Register for in and out messages, Rainfall register, Guard File for all important circulars relating to disaster, Master list of all blocks, villages with population, list of shelters with locations, list of NGOs in the district, List of all Telephone numbers, Maps-Risk Vulnerability Resources, List of resource inventory, Safety Goggles, Dusk Mask, Fluorescent Jacket, First Aid Kit, All other printed/documented lists in the DDMP</p>
What is the existing mechanism at the EOC for integration of early warning and communication system?	Meteorological early warnings generated by IMD are shared with District EOC, East Khasi Hills, where the EOC then transmits the information via email/Whatsapp and for the public via electronic media (AIR/Newspapers/Meghalaya Integrated Information System)
Are any new and emerging technologies currently used in the EOC?	No
<b>F. Functioning of the City EOC</b>	
What are the key functions of the EOC during normalcy?	The EOC ensures the preparedness and mitigations measure for disasters are updated regularly, ensure communication lines are active, Keep Internal funds accounting and management. Keep the responsible officials updated and trained regularly.

<p>What are the key functions of the EOC during and post emergency</p>	<ul style="list-style-type: none"> <li>• Information and update of the situation is shared with the Deputy Commissioner and Chairperson District Disaster Management Authority DDMA, Additional Deputy Commissioner and CEO DDMA and all line Departments concerned.</li> <li>• Information and communication is maintained between the EOC and affected localities.</li> <li>• Maintain log of activities carried out during emergency.</li> <li>• Briefing of the incident and actions taken is conducted with the Deputy Commissioner.</li> <li>• Orders and actions to be taken are shared with concerned departments.</li> <li>• Reports on the incidents are recorded and provide relief to the effected is arranged.</li> </ul>
<p>What is the mechanism to activate or expand emergency operations/ functions at the EOC?</p>	<p>The Deputy Commissioner or The Additional Deputy Commissioner, District Disaster Management Authority , EKH may activate the EOC if the following conditions exist:</p> <ul style="list-style-type: none"> <li>• If there exists an imminent threat to public safety or health on a large scale;</li> <li>• If an extensive State government, District government, or National government</li> <li>• Response and coordination will be required to resolve or recover from the emergency or disaster event;</li> <li>• If the disaster affects multiple Areas/Blocks within the District that rely on the same resources to resolve major emergency incidents</li> <li>• If red alert received manpower deployed 24/7</li> </ul>
<p>What is the mechanism for inter-agency coordination at the EOC?</p>	<p>The DDMA or DEOC is in constant communication with SDMA for exchange of information or data via email and telephone. The SDRF, Home Guard, Fire Services, police, Line Departments etc. are also kept in the loop during a disaster or sharing of important information</p>
<p>What is the mechanism for resource management and demobilization at the EOC?</p>	<p>In case of an emergency, the resources are mobilized and acquired at Block level. The Block Development Officer operates from his control room and coordinates with the EOC at Shillong gives updates on the situation.</p>
<p>What is the mechanism for data and information management at the EOC?</p>	<ul style="list-style-type: none"> <li>• A log Book is prepared for recording events from time to time, where the time, events and action taken are recorded</li> <li>• Information is passed on through official letters</li> </ul>

What is the mechanism for public relation and media management at the EOC?	The EOC and Public Relations Department & MPRO work in tandem to brief the media. Information is shared via press briefs with an approved format.
Is there a mechanism whereby the City EOC acts as backup for the District of State EOC in case they are affected during emergencies or otherwise?	The District EOC will be backed up by the second EOC setup (during emergency) in the State Central Library.
<b>G. Capacity development measures undertaken at the City EOC</b>	
What are the key aspects on which trainings of staff of EOC or other stakeholders undertaken?	The DDMO has been trained on Incident Response system, Handle Communication equipment like HF/VHF
What is the mechanism for undertaking procurement at EOC?	EOC operators are selected from MPRO/Home Guard Depart of Shillong and are trained to operate EOC hotlines, communication & dissemination of information with different stakeholders and to oversee data collection related to various incidents and meteorological data
Is the EOC currently being used as an awareness generation centre for the community?	Various Advisories (on Disasters and Precautionary Measures ) are published and broadcasted via radio/ television
Are regular simulation exercises organized at the EOC to test its functioning and existing mechanisms, SOPs, etc.?	Mock Drills and Trainings regularly conducted.
Other measures/ initiatives undertaken towards capacity development of EOC?	
<b>H. Impact of the City EOC</b>	
Is there any existing mechanism to monitor & evaluate the functioning of the EOC?	The Deputy Commissioner and the District Disaster Management Authority Monitors the EOC



How has the EOC helped in the overall disaster risk management at the City Level?	<p>The EOC functions as an information/emergency centre for small and major emergencies, coordination with stakeholders and line departments for rescue, response as well as rehabilitation for the effected.</p> <p>The EOC has been activated as a 24/7 emergency centre during the Covid-19 pandemic as a source to disseminate information of testing facilities and locations, contact Tracing, facilitating and setting up of Quarantine Centers, Centers for Stranded migrants as well as for the homeless, Check gates, provide transportation and relief materials and so on.</p>
What are some of good practices at the EOC which have enhanced the effectiveness and efficiency of the EOC?	Updating of the Shillong City DM Plan and the district DM Plan regularly, conduct training/mockdrills on IRS, publish Advisories and maintaining/updating the contact information
Have there been past instances where the EOC was not able to perform the envisaged functions?	No
What are the key challenges and bottlenecks faced during the functioning of EOC in normalcy and during emergency times?	Trained manpower needs to be added, infrastructure (more space/dissemination of information
How can some of these challenges and bottlenecks be overcome?	Add more trained manpower, funds for implementing more warning system and infrastructure.

#### Annexure 4.4 Shimla

**Name and designation of the responder:** Dr. (Ms.) Harkanchan Singh City Project Coordinator, UNDP, MC Shimla

<b>A. Disaster risk management at the City</b>	
Key hazards and risks in the city	Earthquakes, Landslides, Forest and household fires, hailstorm, snowfall, cloud burst, road accidents, seasonal diseases like jaundice besides the present COVID -19, monkey menace.

Institutional mechanism at city level for disaster risk management (DRM)	The DRM programme at Shimla city is being implemented under the overall supervision of the Shimla Municipal Commissioner and based on the approval from the house of elected members under the Chairmanship of the Hon'ble Mayor for certain activities which involve the city/ wards. MC Shimla has a dedicated toll-free number for complaints/emergencies at its control room and recently under COVID -19 provided a what's app number for the public which is monitored by the heads of the various branches under the Municipal Commissioner.
Linkage of City DM department/ agencies with District and State departments and agencies	The DRM project at Shimla city is unrouted through the Himachal Pradesh State Disaster Management Authority which is monitored by the Special Secretary (Revenue-Disaster Management). It is also linked to the District Disaster Management Authority as per guidelines of the State and District disaster management plans.
<b>B. Establishment of the City EOC</b>	
Where is the EOC located in the city?	There is no dedicated 24x7 EOC under the dominion of the Municipal Commissioner within City. However, there is a District Emergency Operation Centre which is under the control of Deputy Commissioner, District Shimla within the city. It is located within the complex of Deputy Commissioners office in the core area of the city, The Mall Road. Looking into the proximity to Hazards its location is not ideal to handle major disasters within the city.
What were the key criteria for selection of site for EOC?	The key criteria for selection of District EOC may have been its proximity and ease of access to the authorities of the district administration.
Which key studies were undertaken before establishing the EOC?	As mentioned Shimla Municipal Corporation does not have an Emergency Operation Centre established under it, therefore no documents or reports that can be shared as of now.
What was the approximate initial investment incurred for establishment of EOC? What was the source of this fund?	Not Applicable
<b>C. Governance at the City EOC</b>	
Which Department/ authority in the City heads or runs the EOC?	N.A However, the District EOC is headed by the District Collector of Shimla District which is not part of MC Shimla

What is the organizational structure of City EOC?	N.A.
What are key roles and responsibilities of the positions mentioned above?	N.A.
What is the mechanism for decision making at the City EOC?	N.A.
What is the mechanism for financial management at the City EOC?	N.A.
What is the mechanism for human resource management at the City EOC?	N.A.
Any other aspects concerning governance of EOC	N.A.
<b>D. Physical infrastructure at the City EOC</b>	
Year of establishment of the City EOC? Any major changes/modifications undertaken after initial establishment?	N.A.
What are the key considerations while planning and designing the physical infrastructure at the City EOC?	N.A.
What are the key disaster resilient construction practices undertaken in the EOC?	N.A.
What are the key structural & non-structural measures undertaken in the EOC?	N.A.
<b>E. ICT infrastructure at the City EOC</b>	
What are the key ICT related/ based resources currently available in the EOC?	ICT based activities within MC Shimla are based on the IMD alerts related to hazards. IDRN is used for inventory management of City, and the emergency hooter installed within city is used as EWS to inform the public of any untoward incidents. Incident reporting and damage loss as per landslides is uploaded on the state online platform of damage & losses on daily bases during monsoon and snowfall seasons. Alerts to heads of the departments within MC Shimla and to elected members of the city are disseminated through What's App group.

What is the existing mechanism at the EOC for integration of early warning and communication system?	Under the DRM project studies have been undertaken on EWS for the city in 2014 and a review done again in 2018. However no system has been established by the City Administration till now. The city uses the communication system of the DDMA Shimla
Are any new and emerging technologies currently used in the EOC?	DDMA has installed satellite phones for emergency purposes in there EOC.
<b>F. Functioning of the City EOC</b>	
What are the key functions of the EOC during normalcy?	N.A.
What are the key functions of the EOC during and post emergency	N.A.
What is the mechanism to activate or expand emergency operations/ functions at the EOC?	N.A.
What is the mechanism for inter-agency coordination at the EOC?	N.A.
What is the mechanism for resource management and demobilization at the EOC?	N.A.
What is the mechanism for data and information management at the EOC?	N.A.
What is the mechanism for public relation and media management at the EOC?	N.A.
Is there a mechanism whereby the City EOC acts as backup for the District or State EOC in case they are affected during emergencies or otherwise?	Due to non-existence of city EOC there is no mechanism of backup for the district or state EOC
<b>G. Capacity development measures undertaken at the City EOC</b>	
What are the key aspects on which trainings of staff of EOC or other stakeholders undertaken?	N.A. However, even then trainings mock-drills are undertaken under the DRM project of the Shimla Municipal Corporation related to awareness of various hazards like earthquake, fire, first aid, etc.

What is the mechanism for undertaking procurement at EOC?	N.A.
Is the EOC currently being used as an awareness generation centre for the community?	N.A. Under the DRM even without EOC various community awareness campaigns are undertaken within wards/ departments/ educational institutes/ NGO's/ police/ para military, etc.
Are regular simulation exercises organized at the EOC to test its functioning and existing mechanisms, SOPs, etc.?	N.A.
Other measures/ initiatives undertaken towards capacity development of EOC?	N.A.
<b>H. Impact of the City EOC</b>	
Is there any existing mechanism to monitor & evaluate the functioning of the EOC?	N.A.
How has the EOC helped in the overall disaster risk management at the City Level?	N.A.
What are some of good practices at the EOC which have enhanced the effectiveness and efficiency of the EOC?	N.A.
Have there been past instances where the EOC was not able to perform the envisaged functions?	N.A.
What are the key challenges and bottlenecks faced during the functioning of EOC in normalcy and during emergency times?	The biggest bottleneck is establishing a separate EOC at the city level besides the DEOC and the SEOC
How can some of these challenges and bottlenecks be overcome?	These challenges can only be overcome through proper established guidelines of State and District DM Authorities and incorporated in their respective plans.



Figure 9: Control room, Shimla City

#### Annexure 4.5 Vijayawada

**Name and designation of the responder:** Ms. U. Sarada Devi, Additional Commissioner, Vijayawada Municipal Corporation

A. Disaster risk management at the City	
Key hazards and risks in the city	Cyclone, landslides, floods, heat waves, fire hazards and epidemics
Institutional mechanism at city level for disaster risk management (DRM)	A team of Heads of Departments under leadership of Executive Authority in Municipal Corporation is functioning round the clock for not only day to day business and emergency operations by coordinating with Wachie take, Telegram, Whatsup and Toll free number. The authorities are not only track issues of public but attend emergency works arises due to heavy rains, floods, rock slides and fire accidents. Etc City Disaster Management Plan – a planning document is reference guide for the officials and designated nodal officer for any planning, operations and logistics etc.
Linkage of City DM department/ agencies with District and State departments and agencies	City is linked with District and State in its operations during in natural disasters

<b>B. Establishment of the City EOC</b>	
Where is the EOC located in the city?	<ul style="list-style-type: none"> <li>• A dedicated Command Control Center [EOC] is established and functioning at Main office building of Municipal building and functioning of a 24x7 with dedicated staff is in placed by the authority</li> <li>• All the staff is monitoring by Nodal officer/Disaster Management Officer at VMC</li> </ul>
What were the key criteria for selection of site for EOC?	It is located in main office of municipal corporation, where in access by all Heads of Departments at VMC and on every Monday a public call for grievance and other emergency situations are being reviewed by all Heads of Department in a leadership of Executive Authority, VMC
Which key studies were undertaken before establishing the EOC?	Early Warning Study assessment done by expert agency and recommended in 2012 by Taru and in 2019 again EWS system was reviewed by RIKA and given recommendations
What was the approximate initial investment incurred for establishment of EOC? What was the source of this fund?	1.5 crore of Municipal Corporation
<b>C. Governance at the City EOC</b>	
Which Department/ authority in the City heads or runs the EOC?	General administration who coordinate with all Heads of Departments – Engineer, Planning, Health, Education, Estate and Community Development
What is the organizational structure of City EOC?	Commissioner, additional commissioner and followed by Seven Heads of Departments and down the line key operational heads in three circles and 64 Division and 286 ward secretaries in the field. The additional commission is incharge of EOC /Command Control Center
What are key roles and responsibilities of the positions mentioned above?	Executive authority coordinate with all heads of departments for normal and emergency operations in the city also reviewed the stock of the situations from time to time. Other Heads of departments will monitor in the field with their functionaries by interactions local ward secretaries in the city
What is the mechanism for decision making at the City EOC?	District Collector and City Commissioner are key decision makers and directing Additional Commissioner for effective operation and management of system, all the staff in EOC is directly control by Additional Commissioner who is coordinate with Heads of Department sections and update to the city and district authority



What is the mechanism for financial management at the City EOC?	Since it is dedicated system under the control of Additional commissioner who reports to the commissioner, all the aspects related to staffing, infrastructure and other emergency requirement can be met from Emergency Fund or General fund a dedicated emergency fund is available. With support of UNDP fund EOC is strengthened with dedicated system for flood management and wall mounted screens for tracking of emergency including established an Automated Weather Station is being monitoring 24x7 weather alerting line departments on extreme weather and lightening situations in the city
What is the mechanism for human resource management at the City EOC?	EOC is incharge by permanent staff who is monitoring other contractual staff, each staff/member having their own duties in general and emergency time, basically operations of waste management, drainage blocks due to raining, city flood management and rock slide management. During emergency additional staff are being deputed for the task on 24x7 for three shifts of staff works and tracking the situations and update to authority for effective decision making
Any other aspects concerning governance of EOC	Nil
<b>D. Physical infrastructure at the City EOC</b>	
Year of establishment of the City EOC? Any major changes/modifications undertaken after initial establishment?	Established in the year 2017, later LCD screens and digital monitoring system established for monitoring and tracking of waste management in the city by geo tagging system
What are the key considerations while planning and designing the physical infrastructure at the City EOC?	It in the size of 75x24 ft layout with two cabins one is closed operations wherein systems and screens and operators sits, outer large room for monitoring, videoconferencing/emergency meetings with seating capacity of 20 members
What are the key disaster resilient construction practices undertaken in the EOC?	9 floor new building is under construction for office including a dedicated room for EOC/Conference Hall
What are the key structural & non-structural measures undertaken in the EOC?	Key structural measures including dedicated systems, LCD screen mounted walls and fitting video conference to all online and offline mode. Non-structural including EOC plan, Dedicated Staff in place and roles and responsibilities of the members
<b>E. ICT infrastructure at the City EOC</b>	
What are the key ICT related/ based resources currently available in the EOC?	A dedicated weather station, server for system, dedicated internet system, operating systems, 900 CC cameras, LCD screens, satellite phone and video conference etc.

What is the existing mechanism at the EOC for integration of early warning and communication system?	Weather is tracked with dedicated AWS, IMD services and disseminate through line of officials, communication system from district headquarter and state unit of EOC at Secretariat of Government etc. Free flow of communication through dedicated network of line departments, bureaucrats for swift action by the functionaries on the ground.
Are any new and emerging technologies currently used in the EOC?	NIL
<b>F. Functioning of the City EOC</b>	
What are the key functions of the EOC during normalcy?	Addressing public grievances, all the issues are segregate into categories and brought to concerned Heads of Department for sorting out on the field, preparing conferences, video conference, and teleconferences
What are the key functions of the EOC during and post emergency	Review the lapses, prepare action, update system and technology
What is the mechanism to activate or expand emergency operations/ functions at the EOC?	
What is the mechanism for inter-agency coordination at the EOC?	
What is the mechanism for resource management and demobilization at the EOC?	It is being done after receipt of the command from DDMA and Incident Commander will instruct the nodal officer EOC as no emergency for normal operations
What is the mechanism for data and information management at the EOC?	Data is collected, consolidated and managed by DEOs and Nodal officer EOC will check the data and send to the authority on each incident and hazard/s, it is cross check in the field
What is the mechanism for public relation and media management at the EOC?	Weekly once public and media is allowed for grievance redressal in the conference hall, nothing to do with EOC operations
Is there a mechanism whereby the City EOC acts as backup for the District of State EOC in case they are affected during emergencies or otherwise?	Basically City EOC is depend on District and State EOCs for any emergency operations that the subject is beyond the city limitation viz., cyclone, flood and heat waves are being disseminated by State, city specific hazards like inundation, rock slides and emergency services are being take up city admin with support of city EOC

<b>G. Capacity development measures undertaken at the City EOC</b>	
What are the key aspects on which trainings of staff of EOC or other stakeholders undertaken?	Orientation to all EOC staff periodically on various services and emergency services and category of services on regular basis both technical, non technical and effective functional of the system
What is the mechanism for undertaking procurement at EOC?	It is through as per the norms of the local body and government guidelines, through quotation, tendering process etc.
Is the EOC currently being used as an awareness generation centre for the community?	Yes sometimes, volunteers, school children and public can access EOC and every Monday authorities conduct public grievance in the EOC where in online call and off-line methods of issues /problems are heard from the public
Are regular simulation exercises organized at the EOC to test its functioning and existing mechanisms, SOPs, etc.?	On periodical basis the EOC being checked and testing of SOPs the core functioning of civic body such as services of drinking water, sanitation and waste management etc. On occasion of every of Devi pooja in the city for 10 days the system is effectively used for regular and emergency public services in the city
Other measures/ initiatives undertaken towards capacity development of EOC?	Yes there is plan to build a robust system of EOC by developing a dedicated DM APP consist of landslide alert and warning, flood management and low lying areas
<b>H. Impact of the City EOC</b>	
Is there any existing mechanism to monitor & evaluate the functioning of the EOC?	Yes the incharge of EOC is exposure to other major cities for learning the new practices
How has the EOC helped in the overall disaster risk management at the City Level?	It is dedicated center for working 24x7 emergency room, the incharge team is in contact with circle and ward officials for coordination and monitoring
What are some of good practices at the EOC which have enhanced the effectiveness and efficiency of the EOC?	Tracking of waste management system through GPS, tracking of public grievance addressal system and monitoring progress of various developmental works and regular video conference with line departmental officials etc.
Have there been past instances where the EOC was not able to perform the envisaged functions?	Yes there are several instances of not functioning of EOC due with poor network system and damages to cable wires when heavy rains or cyclone occurs. This has been managed through social networks such as Whats up groups, Telegram and Walky talkies when emergency arises in day in and day out.

What are the key challenges and bottlenecks faced during the functioning of EOC in normalcy and during emergency times?	Many of the staff on board are temporary including many Data Entry operators, need to be deputed permanent staff who have high technical knowhow during normal and emergency time
How can some of these challenges and bottlenecks be overcome?	Imparting training to EOC staff periodically on various issues and services of emergency – water, sanitation, health housing and energy etc.



Figure 10: Command Control Center, EOC, Vijayawada

#### Annexure 4.6 Visakhapatnam

**Name and designation of the responder:** Mr. G.V.V.S. Murthy, Officer-Special Duty, Former Additional Commissioner, GVMC; Mr. Krishna Kumar, Operations Manager, City Operations Centre (COC), GVMC; Ms. Manjula Boyina, Project Associate (Urban Planner), GVMC; Mr. Srinivasa Rajamani, City Project Coordinator, UNDP-Gol project, GVMC

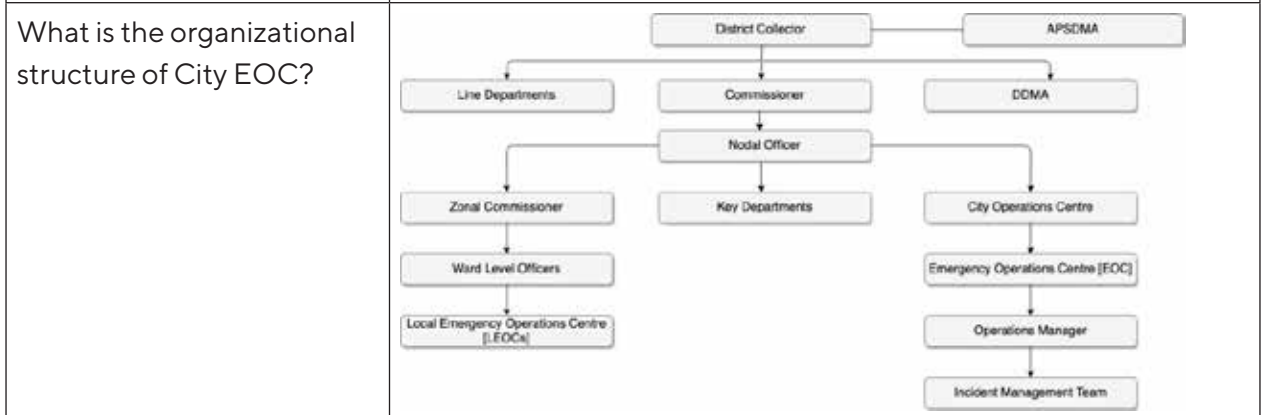
A. Disaster risk management at the City	
Key hazards and risks in the city	Cyclones, industrial accidents, tsunami and earthquake, urban flooding, road accidents, storm surge, land slide, heat wave, seasonal diseases etc.

<p>Institutional mechanism at city level for disaster risk management (DRM)</p>	<p>Preparedness: UNDP-Gol project is mainly focused on 'Disaster Risk Management (DRM) activities, which includes trainings and capacity development to the officers/staff of city administration, line departments and community towards preparedness.</p> <p>Response: City Operations Center (COC) established under smart city mission acts as coordination and communication center at the times of emergencies.</p> <p>Relief: Urban Community Development (UCD) wing, Zonal offices (administration) in coordination with other line departments involve in relief activities.</p> <p>Decision making: Under the guidelines of District Collector, Commissioner, Greater Visakhapatnam Municipal Corporation (GVMC) (city administration) and the nodal officers will be involved in making decisions, in consultation with field functionaries.</p>
<p>Linkage of City DM department/ agencies with District and State departments and agencies</p>	<p>All activities will be done in coordination with the District Disaster Management Authority (DDMA) and other line departments, under the supervision of District Collector and as per the guidelines of State Disaster Management Authority (APSDMA).</p>
<p><b>B. Establishment of the City EOC</b></p>	
<p>Where is the EOC located in the city?</p>	<p>City Operations Center (COC), works as Command and Communication Center at times of emergencies or disasters. It is strategically located in city administration building premises served by separate power and communication facilities.</p>
<p>What were the key criteria for selection of site for EOC?</p>	<p>As part of Smart City project, system integration facility has been established in City Operations Center (COC) and is being used as EOC during emergencies. The COC is 5 kms away from the coastal line and located at safe elevation of 80 meters msl.</p>
<p>Which key studies were undertaken before establishing the EOC?</p>	<p>Under UNDP-Gol project, Hazard Risk and Vulnerability Assessment (HRVA) study was under taken at the initial stages of the project. This report's suggestions were considered for the establishment of the City Operations Center (COC) and its EOC responsibilities.</p> <p>Initially City Operations Center (COC) was started as Command &amp; Control Centre (CCC) and later changed its name as City Operations Center (COC), as day to day urban services data management also was made part of it. The EOC operations were made part of the City Operations Center (COC) responsibilities.</p>

<p>What was the approximate initial investment incurred for establishment of EOC? What was the source of this fund?</p>	<p>Initial investment was routed through smart city project. Source of funding is both Government of Andhra Pradesh and Ministry of Housing and Urban Affairs (MoHUA).</p>
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**C. Governance at the City EOC**

<p>Which Department/ authority in the City head or run the EOC?</p>	<p>Greater Visakhapatnam Municipal Corporation (GVMC) and Greater Visakhapatnam Smart City Corporation Ltd., (GVSCCL), both headed by the Commissioner.</p>
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<p>What are key roles and responsibilities of the positions mentioned above?</p>	<p>District Collector as ‘Special Officer’ will be the overall in-charge of the administration.</p> <p>The Commissioner, GVMC will be appointing Nodal Officer to handle the EOC during emergencies.</p> <p>Nodal Officer is responsible to monitor the conditions from EOC and report to the Commissioner periodically.</p> <p>Incident Management Team (IMT) headed by Operations Manager, City Operations Center (COC) is responsible to coordinate and monitor the city using various facilities available with the COC. If any incidents/issues are identified, the Zonal Commissioner is responsible to establish Local Emergency Operations Centre (LEOC) and deploy team to handle the incident.</p> <p>Zonal Commissioners will monitor the ward level works and report to the nodal officer periodically.</p> <p>Standard Operating Procedures (SOPs) were prepared for the possible disaster events. These SOPs will be reviewed quarterly and followed for each type of emergency / disaster situation. After any emergency/disaster event, these SOPs will be updated to fill the gaps in the operations. Data collection and documentation is also part of the City Operations Center (COC) responsibilities.</p>
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What is the mechanism for decision making at the City EOC?	<p>Strategic decisions are made by the Commissioner after detailed discussions made with the Nodal Officer, respective HODs and field functionaries of the city administration.</p> <p>Timely decisions related to field operation will be taken by the Nodal Officer as per the guidelines given in the SOPs and in consultation with the relevant officers/staff. The same will be reported to the Commissioner.</p>
What is the mechanism for financial management at the City EOC?	The City Operations Center (COC) was established under the Smart City initiative. All expenses related to its operations and maintenance were under system integration project funded by the Smart City Mission, Ministry of Housing and Urban Affairs (MoHUA).
What is the mechanism for human resource management at the City EOC?	<p>Nodal Officer will be appointed by the Commissioner on adhoc basis, mostly any HOD or key official.</p> <p>The staff of the 'Incident Response Team (IRT)' are recruited and trained as per the disaster response requirements of the city. These staff will be part of regular activities during normal times. Operations Manager is responsible to assign tasks to the Incident Response Team (IRT).</p>
Any other aspects concerning governance of EOC	
<b>D. Physical infrastructure at the City EOC</b>	
Year of establishment of the City EOC? Any major changes/ modifications undertaken after initial establishment?	<p>2018.</p> <p>No major changes after establishment.</p>
What are the key considerations while planning and designing the physical infrastructure at the City EOC?	EOC is designed as Command & Communication Center (CCC) to support the city administration for 24/7, with power backup for one week. With the CC Cameras integrated, city can be monitored from this center during emergency situations.
What are the key disaster resilient construction practices undertaken in the EOC?	Wind resistant, power backup, flood resistant, and with fire safety practices.
What are the key structural & non-structural measures undertaken in the EOC?	Flood resistant, wind resistant are the main structural measures. Power backup and fire safety protocols are the main considerations. Capacity building activities related to DM are under taken for the team.



<b>E. ICT infrastructure at the City EOC</b>	
What are the key ICT related/ based resources currently available in the EOC?	Around 500 CC cameras were installed all through the city and were integrated to the EOC where the operators monitor 24/7. ECB (Emergency Call Box) were installed in 50 locations which facilitate citizens to report any emergency incident to the EOC. Public Address Systems (PAS) were installed at more than 50 locations to disseminate information to the citizens during emergency. Bulk SMS notification system was developed to send early warnings to the communities. Standard Operating Procedures (SOPs) are available for most of the emergency situations.
What is the existing mechanism at the EOC for integration of early warning and communication system?	Incident notifications and bulk SMS alert mechanisms are followed in EOC. Once the Incident Management Team receives a confirmation about the incident, alerts will be sent to the Commissioner, Nodal Officer and other HODs as per the SOP. Regarding information to the communities, Bulk SMS system is in operation.
Are any new and emerging technologies currently used in the EOC?	Data analytics are used extensively in the dash boards. Apps are being widely used to collect and disseminate information. Push notification through Smart Vizag citizen mobile app is also used. Social Media is also used for crowd sourcing and information dissemination.
<b>F. Functioning of the City EOC</b>	
What are the key functions of the EOC during normalcy?	Monitoring the air quality, CC Cameras, public announcements and important websites for updates. Grievance redressal
What are the key functions of the EOC during and post emergency	Disseminating information required to LEOC time to time. Collection of data from field operations and observations. Sharing information such as availability of power tools, man power etc in different zones as and when required.
What is the mechanism to activate or expand emergency operations/ functions at the EOC?	<ul style="list-style-type: none"> <li>• Triggering alert and following up with the Nodal Officer, Zonal Commissioners and LEOC in charges regarding the situation at grass root levels or where the incidents reported.</li> <li>• The EOC and the Incident Management Team works 24/7 and are alert and active. Once the Incident confirmed the SOP will be triggered and key stake holders and Officers will be alerted with push notification messages to their mobile phones.</li> <li>• No such need arose till now to establish a remote EOC. LEOCs at ward level can be operable for such purpose.</li> </ul>

What is the mechanism for inter-agency coordination at the EOC?	Inter departmental coordination at city and district level is established during emergency situations. Clear division of work among the line departments are mentioned in the District Disaster Management Plan. Inter agency coordination responsibility is with the Zonal Commissioners, Urban Community Development (UCD) section and Public Relations Section of the city administration.
What is the mechanism for resource management and demobilization at the EOC?	Resources will be provided by the administration section. Providing logistics is part of engineering, public health and administration sections.
What is the mechanism for data and information management at the EOC?	ISO standards are being followed. Data analytics are used extensively in the dash boards. Apps are being widely used to collect and disseminate information. Push notification through Smart Vizag citizen mobile app is also used. Social Media is also used for crowd sourcing and information dissemination.
What is the mechanism for public relation and media management at the EOC?	A separate media team is working under the supervision of Public Relations Officer (PRO) of GVMC to coordinate with the media.
Is there a mechanism whereby the City EOC acts as backup for the District of State EOC in case they are affected during emergencies or otherwise?	Yes. COC is in coordination with the police and state command & control centres. It has facility to use as alternate command centre if district emergency facility is affected. During COVID19, Control Room established in those lines.
<b>G. Capacity development measures undertaken at the City EOC</b>	
What are the key aspects on which trainings of staff of EOC or other stakeholders undertaken?	Many DM related training sessions on handling of different emergencies were conducted for the COC (IMT) team by the UNDP and the team was also trained by the APHRDI. City Operations Center (COC) team is trained to use different Early Warning Communication Systems.
What is the mechanism for undertaking procurement at EOC?	Any sort of procurement is done with the prior approval from the executive authority and concerned HOD depending on the type of procurement depending upon the utility.
Is the EOC currently being used as an awareness generation centre for the community?	EOC is playing prominent role in creating awareness among the communities through the Public Address System, Variable Message Displays and Social media platforms. Till now it has done announcements for seasonal diseases, Covid-19, cyclones, heat wave, urban flooding, storm surge, industrial accidents, Swachh Survekshan, tax collections, etc. And it performs whatever the task being assigned by the administration.

Are regular simulation exercises organized at the EOC to test its functioning and existing mechanisms, SOPs, etc.?	Yes. Several simulation exercises were conducted as part of the UNDP-Gol Project, by involving City Operations Center (COC).
Other measures/ initiatives undertaken towards capacity development of EOC?	Periodical training programs are being conducted to EOC staff for better executions of EOC operations and new task trainings are being conducted to the staff whenever there are new technical inclusions into EOC system.
<b>H. Impact of the City EOC</b>	
Is there any existing mechanism to monitor & evaluate the functioning of the EOC?	City Operations Center (COC) mechanisms are being monitored and evaluated by the respective HODs/key officials by standard procedures and cross verifications. Service level assessment (SLA) can be taken as the indicator in evaluating the performance of COC/EOC. City Operations Centre has its own dashboards which narrate the effectiveness of departments in resolving the civic issues.
How has the EOC helped in the overall disaster risk management at the City Level?	EOC works a bridge between the citizen and GVMC officials for quick resolution of the issues arise. EOC maintains the data related to the issues arise during the emergencies and get the issues resolved. Apart from this, surveillance cameras are used to observe the ground condition, PAS & VMD for dissemination of early warnings. Early Warnings regarding certain hazards which would affect the city with the specialized man power that EOC holds.
What are some of good practices at the EOC which have enhanced the effectiveness and efficiency of the EOC?	City Operations Center (COC) team foresee the changes in the weather conditions, commencement of heavy rains, changes in the sea levels and commencement of tsunami waves etc. It also takes the responsibility of making reports of calamities occurred.
Have there been past instances where the EOC was not able to perform the envisaged functions?	City Operations Center (COC) came into operation in 2018 and so for there have been no such instances.
What are the key challenges and bottlenecks faced during the functioning of EOC in normalcy and during emergency times?	So far haven't faced any difficulties in executing its duties during this time. Technology failures during emergencies may deprive EOC from having access to smart infrastructure and restrict it from performing duties during emergencies.
How can some of these challenges and bottlenecks be overcome?	



