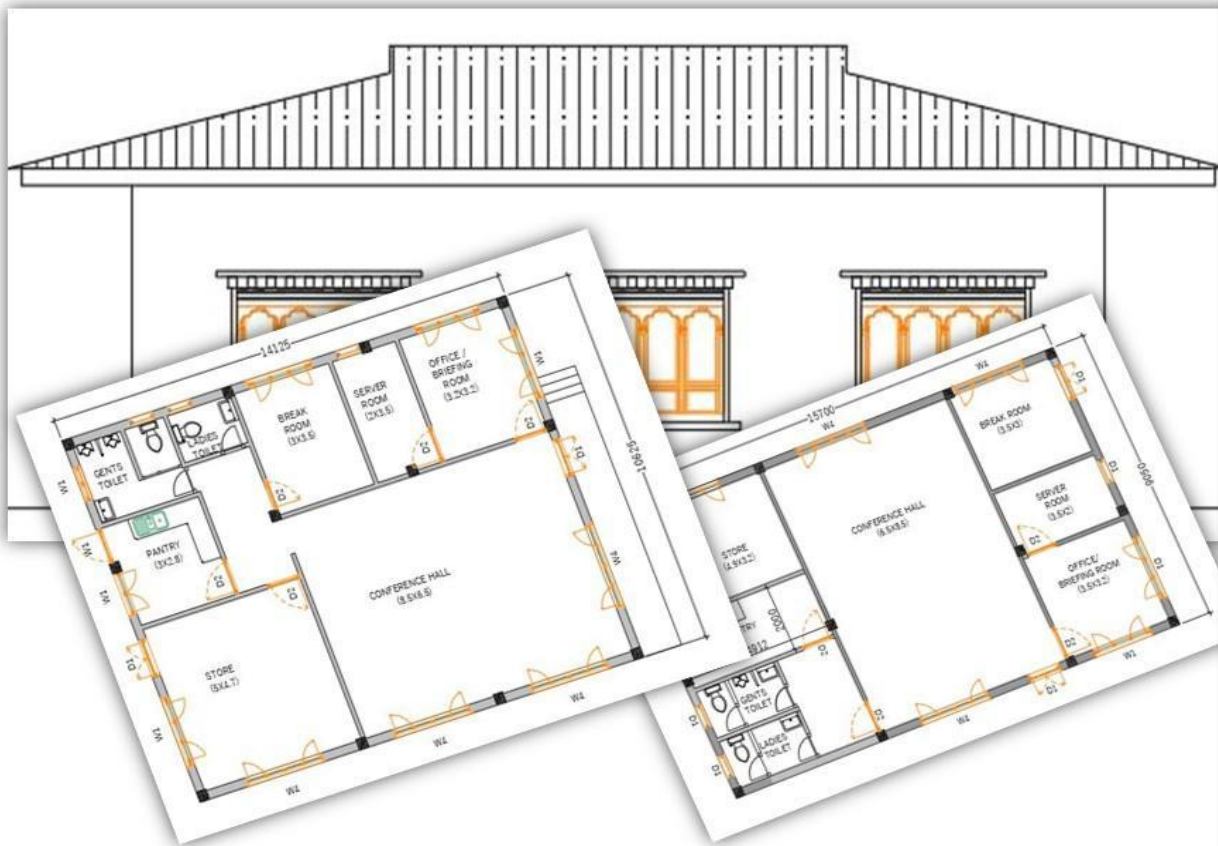




# Dzongkhag Emergency Operation Centre (DEOC)



## Drawings & Estimation

Department of Disaster Management  
Ministry of Home and Cultural Affairs



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Ministry of Home & Cultural Affairs  
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## PREFACE

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The National Disaster Management Authority (NDMA) emphasized the construction of emergency operation centre in all the Dzongkhags and Thromdes. The Department of Disaster Management was instructed to develop a standard drawing and design of an emergency operation centre which could be used by Dzongkhags and Thromde.

The Department of Disaster Management is pleased to share the design and drawings of the Emergency Operation Centres along with budget estimates. The DDM would like to inform you that it is not mandatory to adopt the designs proposed herein but rather can be used as a reference by your engineers. The Dzongkhags/ thromde may use locally available construction materials as per the prevailing government directives.

The drawings are designed to be earthquake resilient. Accessibility and safety from natural hazards may be taken into consideration while deciding on the location. The emergency operation centre should also have adequate space for storing Search and Rescue items, communication systems like HF and VHF radios. It is imperative to mention that the emergency operation should have adequate power socket, access to internet, access to both landline & mobile phones.

The DDM would like to acknowledge the contributions of the engineers from Thimphu Thromde and Construction Development Board (CDB) in the designing, drawing and estimating the cost of constructing the emergency operation centre.

(Jigme Thinlye Namgyal)

Director General



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## About

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This document is prepared by the Department of Disaster Management, Ministry of Home and Cultural Affairs and is intended to serve as a reference for construction of Dzongkhag Emergency Operation Centre (DEOC) by Dzongkhags.

The document contains following:

1. Short description about DEOC and desired design features and components
2. Sets of simple, clear and detailed architectural, structural and electrical drawings
3. Detailed estimation and costing with based rate of Thimphu as of March 2020. Dzongkhags will have to apply appropriate cost indices depending on the time lapses and region while implementing.

For the construction components, which cannot be adopted uniformly all over, there are two broad alternatives for temperate and tropical respectively, which may be opted accordingly.

4. Methodology and brief description of prerequisites on how to begin is also included.
5. Optional plan is also drafted by incorporating minor changes in the layout for cases where the land shape may be elongated. Plinth area of the second option is 141 sq. m. compared to the first option of 148 sq. m. The cost of construction will be proportionately lesser.



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## What is DEOC?

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Emergency Operation Centre (EOC) is central command and control facility for carrying out the principles of emergency preparedness and emergency management, or disaster management functions at a strategic level during an emergency, and ensuring the continuity of operation.

Emergency Operation Centre is required at national and local level to administer the emergency depending upon the type of disaster. The national level National Disaster Management Authority (NDMA) will convene at National Emergency Operation Centre (NEOC) and the Dzongkhag level Dzongkhag Disaster Management Committee (DDMC) will convene at Dzongkhag Emergency Operation Centre (DEOC) for operation respectively.

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## Why DEOC?

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Section 105 of the Disaster Management Act of Bhutan 2013 mandates the establishment of NEOC and DEOCs;

Emergency Operation Centre is one of the Critical Disaster Management Facilities.

An Emergency Operation Centre is a nerve centre and command and control centre for coordination and management of disasters.

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## Purposes of DEOC?

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DEOC should serve the following purposes:

-during emergency

1. Receive disaster alerts and warnings from Responsible Agencies and other sources and relay the same to all relevant agencies;
2. Issue incident specific information and instructions to all concerned;
3. Forward reports to all relevant agencies;



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4. Facilitate and monitor response and relief operations;
  5. Facilitate coordination among agencies providing Critical Disaster Management Facilities;
  6. Requisition, procurement, planning and distribution of resources during disaster;
  7. Perform such other functions as may be directed by the NDMA.

-during normal times

1. Enhance preparedness at national level by providing awareness, information, training etc.;
2. Serve as Information Centre and maintain, update and analyze data and disseminate information;
3. Maintain up to date contact details of relevant persons;
4. Be well equipped and maintain equipment in operational condition;
5. Function as centre for other important functions like meeting, conference, etc. so as to ensure equipment are functional;
6. Perform other functions, as may be directed by DDM or DDMC;
7. Serve as a stock yard for basic relief materials, SAR equipment etc.

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## Features of DEOC

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It is desirable for DEOCs to have following important features that need to be considered during planning, designing and building, which may not be necessarily incorporated for feasibility reasons and budget constraints.

### 1. Location and Accessibility

It is desirable to have the DEOC located in or near populated area so that it can be reached quickly by all the relevant officials on time and act as necessary. Location should be complimented by accessibility. It should have access by road and footpath from more than one point. It should not get isolated or blocked by collapsed bridges, buildings or fallen trees.





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## 2. Geophysical Stability

The geological stability should also be considered for the DEOC so that natural hazards like earthquake, landslide or flood may not render the centre unusable or inaccessible.

## 3. Communication facilities

The DEOC should be equipped with the basic but fully functional communication equipment such as satellite phone, walkie-talkie, land lines or handsets (VHF) for communicating over long distance. Stock of stationery like white boards, chart papers, markers etc. are also recommended to be maintained for discussion, planning and communication amongst DDMC members during the emergency situations. Large maps of the whole country, respective Dzongkhag and all Gewogs should be kept.

## 4. Earthquake and fire resistance

While the DEOC should function as a nerve centre during disaster and manage the situation, it should withstand the impact itself and be intact and safe for all time. So earthquake resistant features like reinforced cement concrete (RCC) frame bracings should be incorporated. Opting fire resistant building materials like steel over fire susceptible material should also be considered.

## 5. Hall and furniture

The DEOC basically a hall should have adequate office furniture like tables and chairs and other amenities like computers, printers, internet connection, and uninterrupted power supply. Light tables will enable easy and fast rearrangement of tables into incident management desks. Wall free of any hanging will provide space for displaying LED screens, posting chart papers and any other information.

Since the EOC has the desk functions of command, operation, planning, logistics and finance/administration. Tables and chairs color coded matching the respective incident management teams will ease grouping and identification. Further color coded vests and caps will enhance grouping and identification.



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## 6. Power backup and power socket placement

Since uninterrupted power supply, irrespective of disaster scale and type is very important, hence more reliable alternatives (beside the central grid i.e. BPC) should be maintained. Therefore, a generator of adequate capacity may be installed and adequate stock of fuel be maintained for all times.

On the other hand, layout of power sockets and lightings may have to be provided strategically along the floor as well as wall with provision for LAN connection.

## 7. Store, Pantry and Break Room

An adequate space for storing essentials materials and equipment is necessary. Essentials materials like first aid kits, emergency medical supplies, Search and Rescue (SAR) equipment, basic relief materials like blankets, tents, etc may be stored.

There is a need for a pantry for catering, preparation and storing basic foods and beverages and a break room for resting and halting over-night.

## 8. Toilet

The toilet should have adequate water supply and have appropriate facilities separately ladies' and gent's toilet, urinary and hand wash etc.

## 9. Water Reserve

A continuous water supply should be ensured with a reservoir of adequate capacity as a normal network can fail and may undermine the use of the centre.

## 10. Energy Efficiency

Energy efficiency aspects may also be looked into at the time of construction especially while doing the layout. Alignment of DEOC may be done in such a way to harness or avoid the maximum sunlight for lighting, heating or cooling depending on the temperate or tropical location.

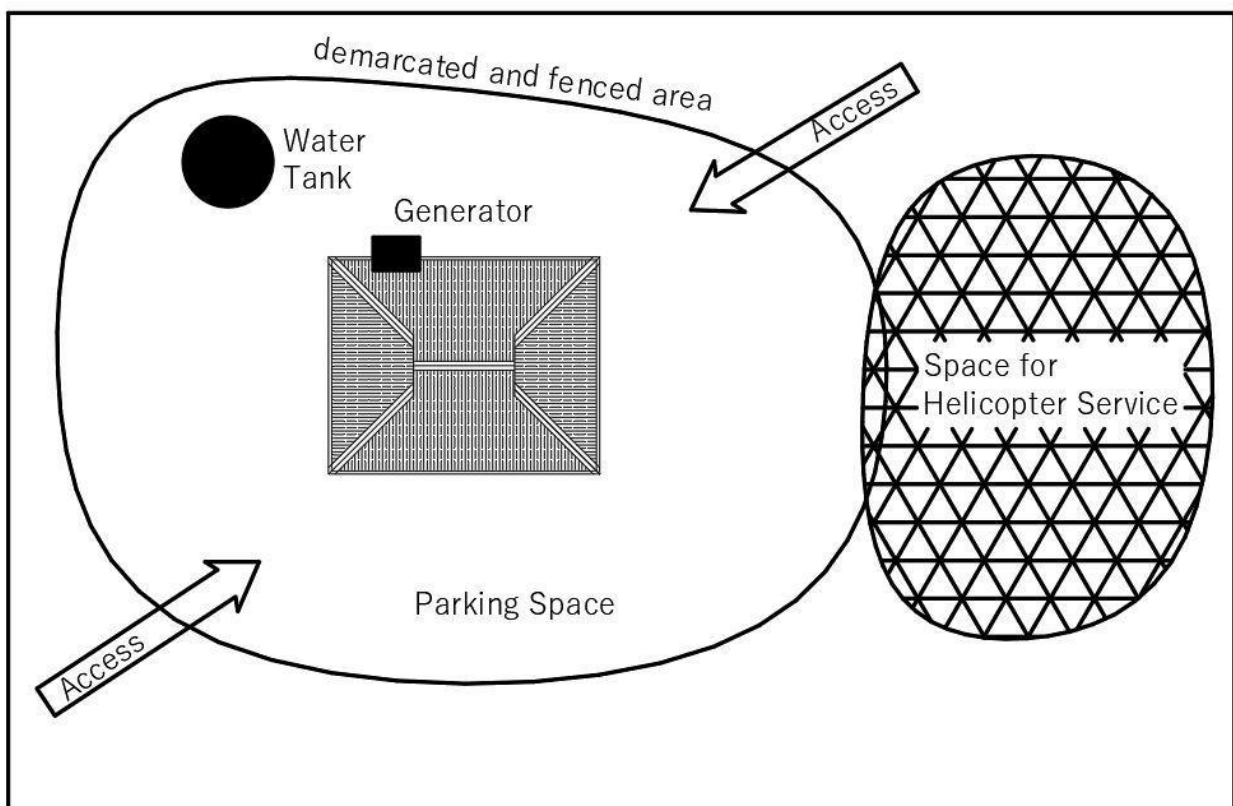




## 11. Ideal Layout of DEOC

In addition to the due diligence to vulnerability to geophysical instability, landslide, flooding etc. ideal layout of the DEOC merits equal consideration. An ideal layout is where every desired element can be provided in appropriate location and adequate capacities and placed accordingly.

Schematic diagram of an ideal layout is shown below.



## Prerequisites for construction

### 1. Land acquisition

Land acquisition is the first and foremost prerequisite for DEOC construction. Land may be acquired or identified in consultation with relevant section, division, or agency and NLCS. The land for DEOC must accommodate a minimum planar area of 15m by 11m with provision for setback as prescribed by prevailing norms of about 2m or 3m. There should be adequate open space nearby to facilitate helicopter services if possible.



## 2. Demarcation

After the land for DEOC is secured, demarcation of the land and fencing it is recommended to prevent encroachment by neighboring land owners, nuisances by animals, besides easy identification and avoid misuse.

Demarcation and layout of the DEOC must also be done prior to actual construction so that the centre is constructed on actual intended location and all the requirements of accessibility and setbacks are maintained as per design.

## 3. Tender (Outsource or departmental execution)

If the administration decides to outsource, notice inviting tender must follow. The attached BOQ may have to be re visited considering the appropriate choices from the alternatives and apply appropriate cost indices to come up with more realistic and up-to-date costing.

## Working group

### 1. Working group

The design, drawing and estimation for DEOC was carried out by a team of Engineers from Construction Development Board (CDB), DDM and Thimphu Thromde, and a Senior JICA volunteer who is also a civil engineer.

Tsutomu Sakakiyama (Civil Engineer)	Senior JICA volunteer
Yeshey Lotay (Chief Engineer)	CDB
Sonam Tshewang (Civil Engineer/GIS officer)	DDM
Sonam Tobgay (Civil Engineer)	DDM
Nidup Zangmo (Electrical Engineer)	Thimphu Thromde
Tshering Dorji (Civil Engineer)	Thimphu Thromde

## Methodology



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## 1. Conceptual Floor plan

The floor plan was first drafted based on the earlier work, based on thorough deliberation considering necessity and desirables, functions and aesthetics and uncertainty budget and land. Inputs of every member were thoroughly deliberated and incorporated to come up with most acceptable.

An optional plan was also drafted by tweaking the first one assuming the land elongated in shape. While doing so, the planar area decreased from 148 sq. to 141sq.m and the cost of construction is expected to be less proportionately.

## 2. Detail Design and Drawings

Agreeing on a single storied DEOC, the group also opted for the RCC frame for better safety. Structural analysis was done in StaadPro with all the earthquake parameters and loads. The Importance factor of 1.5, Respond factor of 5 for the worst case scenario of Seismic Zone V was considered in accordance as per IS code 1893-2002/2005. The structural design and drafting was done in compliance with the IS-456 2000 and IS 19320. Load cases and combinations were done in compliance to IS-875 (part 1,2 and 3) 2006.

After the finalisation of the plan, the detailed architectural drawing was drafted in accordance with Bhutan Architectural Guidelines 2014 and Bhutan Building Regulations 2018. Electrical drawing was done in compliance with the Specification of Electrical Works (SEW) 2017

## 3. Estimation and Costing

Estimation was carried out after the completion of detailed drawings. The base rate for Thimphu in accordance with the BSR-2020 (for civil and electrical works) was considered. Rate analysis was done for the items that are not in the BSR but incorporated in the design and drawing.

***APPROPRIATE COST INDEX MAY BE APPLIED BY RESPECTIVE DZONGKHAGS DEPENDING ON THE TIME LAPSE WITH RESPECT TO MARCH 2020 AND DEPENDING ON THE REGION DURING THE ACTUAL CONSTRUCTION.***