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EARTHQUAKE PREPAREDNESS AND LOCAL GOVERNMENT

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Abstract

The earthquake preparedness plan is addressed to the central government, the local government and the public. The present paper outlines those chapters of the plan which are addressed to the local government (L.G.).

Introduction

Assuming that the role of local authorities will continue to expand, we should examine how they can increase their share of responsibility for earthquake protection in our country.

In today's favourable climate for initiative by local government, municipalities and communities can be undertaken to communicate the government's earthquake preparedness plans to the public, right down to the individual citizen.

Starting with timely preparations the local authority can and must control panic and in addition must undertake to co-operate with the central government for the solution of all the problems likely to be caused by a strong earthquake.

In Greece there is at least one earthquake with a magnitude higher than 6.5 Richter a year. Recent earthquakes do not appear to have been random events but, on the contrary, events that should be expected. Therefore, we must be prepared for them.

Having also in mind that the central government cannot organize the life of each and every municipality, village, community or neighbourhood after a destructive earthquake, it is obvious that local government must not only prepare the people to face an earthquake, but must also be ready to organize every day life during the mergency period following the disaster.

Apart from the psychological factor, to which the local authority can contribute substantially, there is a list of other problems to be solved: first aid, rescue, public information, re-direction of people to emergency receiving areas, keeping people away from heavily damaged buildings, shelter,

food, water, sewerage and electric power.

1. Preparation before an earthquake

The town planning approach

The technical services of the local authority must carefully examine the town planning system of its area, treating each town block as a separate structural system. Furthermore, the height of buildings in relation to street widths, the density of building, the materials and the quality of structures in relation to their vulnerability, the space available for traffic and evacuation routes to parks and open spaces, as well as access for first aid services to reach everyone that may need it, must all be considered.

The final proposition of the technical services must be submitted to the relevant ministries for their acceptance. These propositions, including the strengthening of any exceptionally vulnerable buildings, will reduce seismic risk.

A microzonation study of the area as well as earthquake hazard maps prepared by local government will help engineers and architects responsible for the design of new buildings, or strengthening existing buildings. Since the technical services of municipalities have obtained the power to issue building permits, a proper check for well designed aseismic buildings, as well as a proper distribution of activities, can be achieved.

The following UNDRO formula is well known:

Seismic Risk = Elements at Risk x Vulnerability x Seismic Hazard

This means that site specific seismic and related hazards can be determined by producing seismic microzonation studies and using these with earthquake hazard maps.

It follows from the above that the seismic risk of an area can be reduced by repair and strengthening, moving vulnerable elements (new housing, factories, etc.) to sites with the minimum of seismic hazard, and by reducing the density

or concentration of elements at risk. Indeed, the proper urban design of an area requires a determination of detailed seismic hazard and a corresponding distribution of structures.

Municipal and public buildings

Measures must be taken so that town halls remain operational at all times and can become the centre of co-ordination of disaster relief, rescue and rehabilitation within its territorial limits.

Buildings operating as first aid stations must also have been selected in advance. These buildings must be outside the centre of the city, away from town halls (or administrative centres), potential traffic jams and temporary camping areas. Their easy accessibility, as well as the guarantee that roads leading to them will not be blocked after the earthquake, are indispensable pre-requisites.

Buildings occupied by services whose operation is considered necessary after an earthquake must also be examined in advance. Local authorities must examine carefully the first aid station buildings, the fire stations, schools, hospitals, Public Power Corporation (PPC) stations, telephone and telegraph buildings and other municipal or public buildings in their area. Water tanks carefully examined and secured against earthquake must be installed in these buildings. If inspection proves that these buildings are dangerous or need strengthening, the municipal authorities must submit their proposals to the headquarters of the relevant organizations, explaining why the operation of their particular services must not stop in case of earthquakes, and asking them to remedy the problem.

Equipment

The local authorities must prepare and update lists of all municipal equipment as well as of citizens owning excavators, cranes, mobile generators, trucks, dump trucks, ladders, shovels, spades and all equipment and tools that should be mobilized and used immediately after an earthquake. The preparedness plan must include the names, addresses, phone numbers and professions of all those who should be mobilized.

The local authorities must also consider purchasing their own equipment, because in addition to the construction programmes for which they are necessary, they would, in case of an earthquake, help face many problems in a minimum lapse of time. The immediate and appropriate removal of the debris of collapsed buildings, or the opening of a blocked road may save lifes.

Temporary shelter planning

One of the most essential things that the local authorities have to do is to study carefully their area and choose the nearest safe places to which the inhabitants may be directed in an emergency. In general, such places are schools, parks and unbuilt plots. These must naturally be sufficiently far from the sea or lakes to avoid tsunamis and seiches.

All the inhabitants must know in detail how to move and where they will camp after the earthquake.

In the areas of Athens, Salonica and others that have experienced recent earthquakes, the local authorities can count on the Earthquake Damaged Buildings Restoration Offices (E.D.B.R.O.) for assistance in damage assessment. E.D.B.R.O. has restored a number of buildings to their pre-earthquake condition but have not strengthened them to aseismic standards. Therefore we have an idea of the number of people who would be affected for a given earthquake.

Provision for vital needs

SHELTER: The best kind of shelter that the local or central authorities can offer is tents. (The local authorities can obtain them from the Prefecture). If they do not exist in sufficient numbers, it is possible to construct temporary shelters using plastic sheeting, wood or metal...

The local authorities could also find old buses and use them as shelter after the earthquake. These buses could also be used as schools or for any other social service.

Local authorities, having estimated the number of people who will sleep out of their homes after an earthquake, must prepare the camping areas, estimating 20-25 m2 for every family (where a family is approximated at 4 to 5 persons).

WATER: If there is no damage to the water supply system, the local authorities have to choose the best points from which the entire area(s) of the various camps can be supplied. Preparedness plans must include these points as well as how many meters of pipe would be needed for water supply to camping sites.

In case of damage to the water supply system, the local authorities must have an estimate of the quantity of water that can be stored per 24 hours. The water required per person for drinking, washing hands and cooking is about 16 litres per day.

The local authorities must also estimate the volume of water required, and determine whether the water stored in tanks and water-tank trucks is sufficient. Otherwise additional tanks must be provided. It is obvious that stored water must be renewed at regular intervals.

It must also be clear to everyone that until a potable water supply is restored, nobody must use water for washing dishes, clothes and bathing.

In cases where water is non-potable it can be purified as follows, depending on the source of the water and the reasons why it is not potable, as well as on its intended use:

a) Filtration through clean cloths, paper towels, etc.

b) Boiling, preferably for 15-20 minutes, and, if this is impossible, at least for 5 minutes, depending on the microbe content.

c) Use of Iodine (the best chemical purifier for drinking water).

d) Use of Chlorine (an acceptable purifier).

SEWERAGE: This is the problem that needs the greatest care. The local authorities must choose the point or points where temporary water closets will be installed at each camping site. In addition, the point of connection

of these water closets with sewer networks must also be included in the plan, as well as any additional piping required.

The water closets must be operable within 24 hours of the earthquake, or else the danger of communicative diseases increases considerably. Cleanliness (to the extent permitted by the availability of water) is not a luxury but a duty. Hand-washing is indispensable even in the lack of water. Everyone must understand that cleanliness saves lives.

However, before using the existing sewerage system, its entire length must be inspected for possible leakages. Such leakage might result in dangerous pollution and the spreading of epidemics. In case of damage to the sewerage network, septic tanks must be immediately dug as deep as possible and covered by concrete or wood. The tanks themselves, as well as the area around them, must be often sterilized with quicklime, chlorine or other purifying chemicals.

FOOD: The preparation of food immediately after an earthquake must be facilitated. The minimum amount of water must be used and a minimum amount of waste must be produced until the operation of a waste disposal system is effected. Thus, the most convenient food for this type of emergency is canned food. If, however, the continued use of canned food is unavoidable, its vitamin defficiency must be compensated for by the use of vitamin supplement pills.

Public information

Through public discussions, lectures, slide shows, films and frequent contact between the public and specialists, the public can be informed and familiarize themselves with the earthquake phenomenon. The phenomenon must be scientifically explained and the word "earthquake" must be distinguished from anything mythical or supernatural. On the other hand, people must always be prepared to meet an unforseen earthquake emergency. To this end, local government must issue pamphlets with detailed instructions to everyone about safety and action to take in case of earthquakes. Such pamphlets must mention the meeting place and the camping ground for people whose houses have been damaged, as well as the basic instructions for facing the earthquake at the community level.

Earthquake preparedness unit

In every municipality or community, an earthquake preparedness unit should be organized by decision of the Mayor and remain under his immediate supervision. This unit, which may have 3 to 5 members, is responsible for all preparedness measures, proposed alterations or improvements to the preparedness plan, preparedness exercises, training of emergency staff. It should also mobilize the assistance of the media to keep the public correctly informed with a view to reducing panic and social disruption (see Diagram 1).

2. Facing the earthquake

Ideally, the municipality or local government should solve the most pressing problems created by the disaster in the short-term. However, this may not always be possible, in which case help must come from the higher echelons of the public administration.

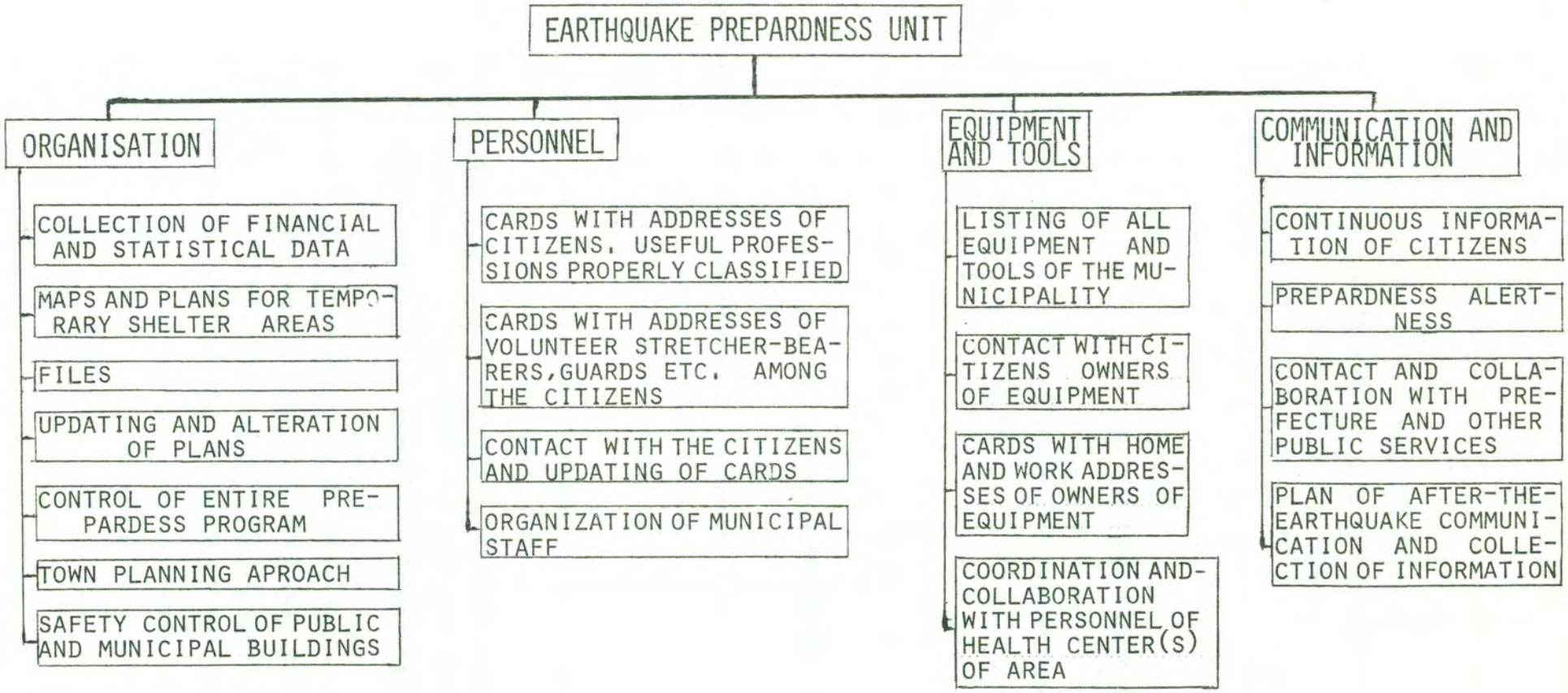
Municipal preparedness committee

Right after the earthquake, the Earthquake Preparedness Unit (E.P.U.) inspects the area to obtain a clear picture of the disaster. Depending on the extent of the damage, it implements the appropriate preparedness plan.

Wherever there are camps of people having been forced to abandon their houses, meetings should be held under the guidance of the local government, and committees responsible for co-operation with the local or central government should be elected. The experience of the most recent earthquakes in Greece is that wherever such committees were set up, they did a remarkable job.

Together, the heads of the above committees (including the Mayor, the technical services of the municipality, and whoever else is thought necessary, together with the E.P.U. from the Municipal Preparedness Committee) must contact all the higher authorities, in order to solve temporary as well as future problems.

DIAGRAM 1


EARTHQUAKE PREPARDNESS UNIT
ORGANISATION
COLLECTION OF FINANCIAL AND STATISTICAL DATA
MAPS AND PLANS FOR TEMPORARY SHELTER AREAS
FILES
UPDATING AND ALTERATION OF PLANS
CONTROL OF ENTIRE PREPARDESS PROGRAM
TOWN PLANNING APROACH
SAFETY CONTROL OF PUBLIC AND MUNICIPAL BUILDINGS
PERSONNEL
CARDS WITH ADDRESSES OF CITIZENS. USEFUL PROFESSIONS PROPERLY CLASSIFIED
CARDS WITH ADDRESSES OF VOLUNTEER STRETCHER-BEARERS, GUARDS ETC. AMONG THE CITIZENS
CONTACT WITH THE CITIZENS AND UPDATING OF CARDS
ORGANIZATION OF MUNICIPAL STAFF
EQUIPMENT AND TOOLS
LISTING OF ALL EQUIPMENT AND TOOLS OF THE MUNICIPALITY
CONTACT WITH CITIZENS OWNERS OF EQUIPMENT
CARDS WITH HOME AND WORK ADDRESSES OF OWNERS OF EQUIPMENT
COORDINATION AND-COLLABORATION WITH PERSONNEL OF HEALTH CENTER(S) OF AREA
COMMUNICATION AND INFORMATION
CONTINUOUS INFORMATION OF CITIZENS
PREPARDNESS ALERTNESS
CONTACT AND COLLABORATION WITH PREFECTURE AND OTHER PUBLIC SERVICES
PLAN OF AFTER-THE-EARTHQUAKE COMMUNICATION AND COLLECTION OF INFORMATION

The Municipal Preparedness Committee (M.P.C.) is responsible for the collection, sorting, verification and transmission of information related to damage, injury or loss of life, and general social conditions in the area. It is also responsible for shelter and social guidance. Finally, it co-ordinates all the services of the municipality and has the political responsibility for all inititatives as well as for establishing priorities (see Diagram 2).

Public information

Immediately after the earthquake the local authorities must, have cars out on the streets with loudspeakers informaing the people where they must go, and repeating the basic instructions written in the emergency plan. This also shows the immediate response of the local authority to the situation and helps maintain public morale. In addition, the movement of the public to pre-arranged meeting and camping sites must be checked and helped along. Pamphlets on "facing the earthquake" must be distributed again.

Contact with other authorities for immediate help

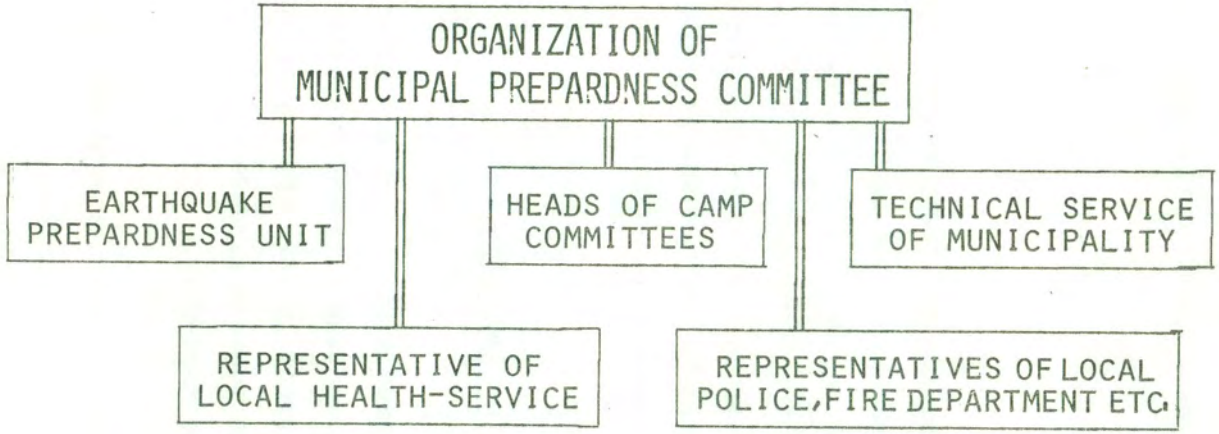
The local authority must immediately inform all other authorities and services liable to assist in protecting life and property: the military authorities (with their men and equipment in case of people trapped under collapsed buildings, or in case of blocked roads); firemen; the police force; and those health services considered to be necessary.

An adequate number of operators of heavy equipment must be on monthly stand-by. They must listen to radio announcements, and report to their respective centres when called. The same is also valid for water truck owners, volunteer paramedicals, the staff of the municipality and any others considered necessary (e.g. engineers, doctors, social workers, etc.)

Emergency work force

The employees of the local authority, assisted by selected volunteers

DIAGRAM 2


ORGANIZATION OF
MUNICIPAL PREPARDNESS COMMITTEE
EARTHQUAKE
PREPARDNESS UNIT
HEADS OF CAMP
COMMITTEES
TECHNICAL SERVICE
OF MUNICIPALITY
REPRESENTATIVE OF
LOCAL HEALTH-SERVICE
REPRESENTATIVES OF LOCAL
POLICE, FIRE DEPARTMENT ETC.

will immediately start to work at the assembly sites (water connections, sewerage, shelters, etc.) It is obvious that the size of the work will be proportional to the number of people forced to abandon their houses. Offers of voluntary work must be taken advantage of, but not at the cost of further confusion. It is the local authority to see to it that voluntary workers are properly organized and supervised.

Damage assessment

The technical services of the local authority must be fully available until a preliminary damage survey has established which buildings can and cannot be immediately re-occupied.

A questionnaire prepared in advance, to be filled in by engineers and technicians (who are not necessarily specialists in earthquake engineering), will help the initial damage assessment of each building and its classification as usable or not. These questionnaires will be collected and analysed by a qualified service person who will list and classify damage. Thus both the local and the central government will soon be able to know the extent and the total cost of the damage in each area.

Immediately after the initial damage survey, one or more special technical committees will then inspect the most dangerous buildings, and will give guidelines on the spot for either the demolition or the shoring and/or strutting to teams of technicians and workers in order to avoid risks of collapse, especially with respect to aftershocks.

Conclusions

In conditions similar to those of Greece, local government can play a primary role in disaster relief and mitigation of the seismic risk. Various drills must be carried out regularly, and the plans must be updated. This experience will be a substantial input to the increase of knowledge of preparedness at the local level.