

PROTECTING FROM THE NEXT EARTHQUAKE THROUGH STRUCTURE STRENGTHENING



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EARTHQUAKE PLANNING AND PROTECTION ORGANIZATION

Earthquake Planning and Protection Organization (E.P.P.O.) was founded in 1983. E.P.P.O. is a Legal Entity of Public Law and operates under the supervision of the Hellenic Ministry of Environment, Physical Planning and Public Works.

The aim of E.P.P.O. is to process and plan the national policy for earthquake protection and earthquake mitigation –in accordance to governmental directions – as well as to coordinate the public and private resources for the implementation of this policy.

E.P.P.O. , is managed by the President and the Administration Board that practices the administration and management and by the General Director that leads all the three Sectors of the Organization (Seismic Design, Social Seismic Defense, Economic-Administrative). The aim of E.P.P.O is supplemented by Permanent Scientific Committees Staffed by reputable scientists and experts. **Web site:** www.oasp.gr

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STRUCTURE OF E.P.P.O.

**ADMINISTRATIVE
COUNCIL**

PRESIDENT

GENERAL DIRECTOR

**CENTER FOR INFORMATION
MANAGEMENT**

**EARTHQUAKE
PLANNING DIVISION**

Programming Dpt.

Seismotectonics Dpt.

Earthquake
Engineering Dpt.

**EARTHQUAKE
CIVIL DEFENSE
DIVISION**

Emergency
Planning Dpt.

Emergency Response
and Aid Provision Dpt.

Training and information
Dpt.

**ADMINISTRATIVE &
ECONOMIC DIVISION**

Administrative Dpt

Secretariat Dpt.

Finance Dpt.

Finance Control Dpt.

PERMANENT SCIENTIFIC COMMITTEES

Scientific Committee for
Seismotectonics

Scientific Committee for
Earthquake Engineering

Scientific Committee for
Social protection

Permanent Scientific Committee for the Greek Seismic Code & Permanent Scientific Committee for the
Forecasting of the Earthquakes **e-mail: info@oasp.gr**



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EUR-OPA MAJOR HAZARDS AGREEMENT



Created in 1987, the European & Mediterranean Major Hazards Agreement

(EUR-OPA) is a platform for co-operation between European and Southern Mediterranean Countries in the field of major natural & technological disasters.

One of the main points of the Agreement is the creation of European and Mediterranean Centers.

The specialized Centers specific role is to develop projects , both at the National and Regional level , that aim to improve the awareness and resilience to major risks within the population.

In our Country this Agreement was ratified by the Greek Law , in 1992.

EUROPA : <http://www.coe.int/t/dg4/majorhazards>

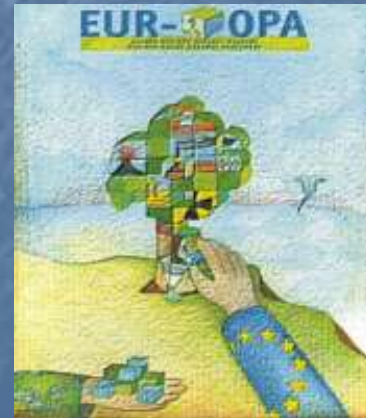


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European Center on Prevention and Forecasting of Earthquakes

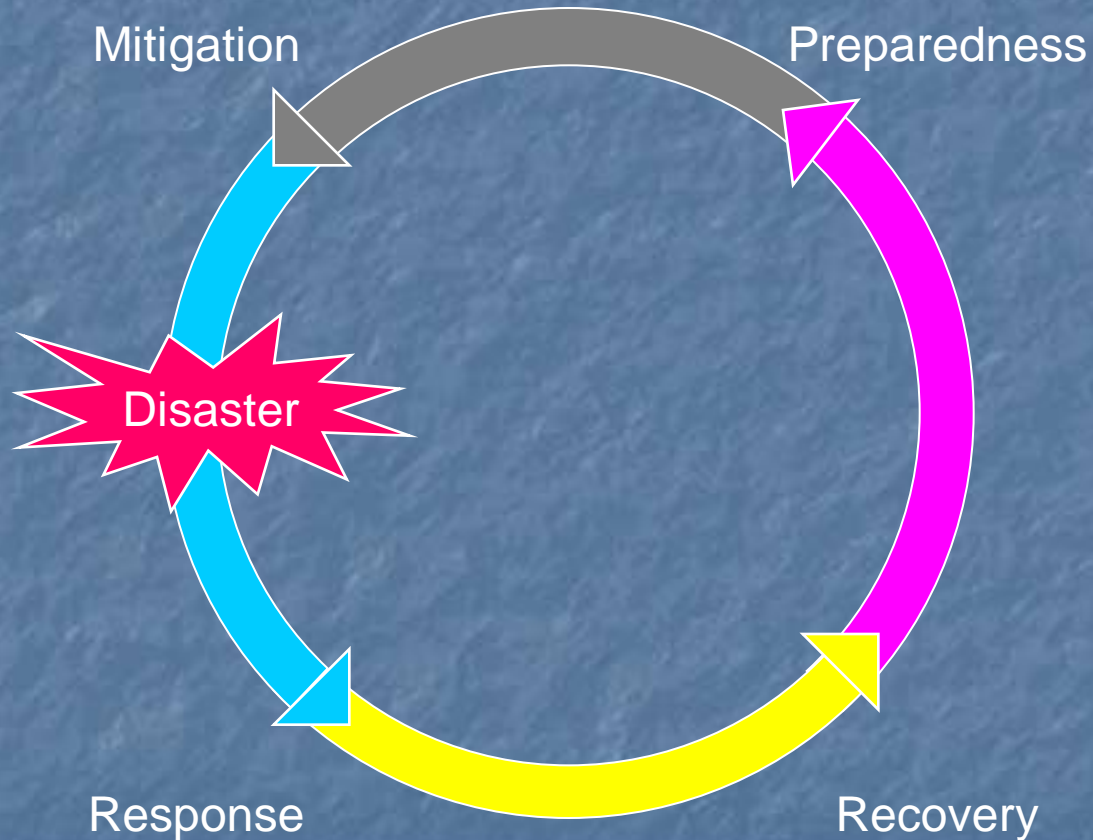
- European Center on Prevention and Forecasting of Earthquakes (E.C.P.F.E.) operates within the Framework of EUR-OPA . It belongs to the Network of 27 Specialized Centers of the Agreement and it is based in Athens , Greece . The Center has a close cooperation with Earthquake Planning and Protection Organization of Greece (E.P.P.O.).
- The objectives of E.C.P.F.E. are compatible with the thematic unions imposed by O.P.A. , concentrating on earthquake planning and protection. E.C.P.F.E. is also co-operating with other European Centers with relevant targets.



Web site: www.ecpfe.gr , e-mail : ecpfe@oasp.gr

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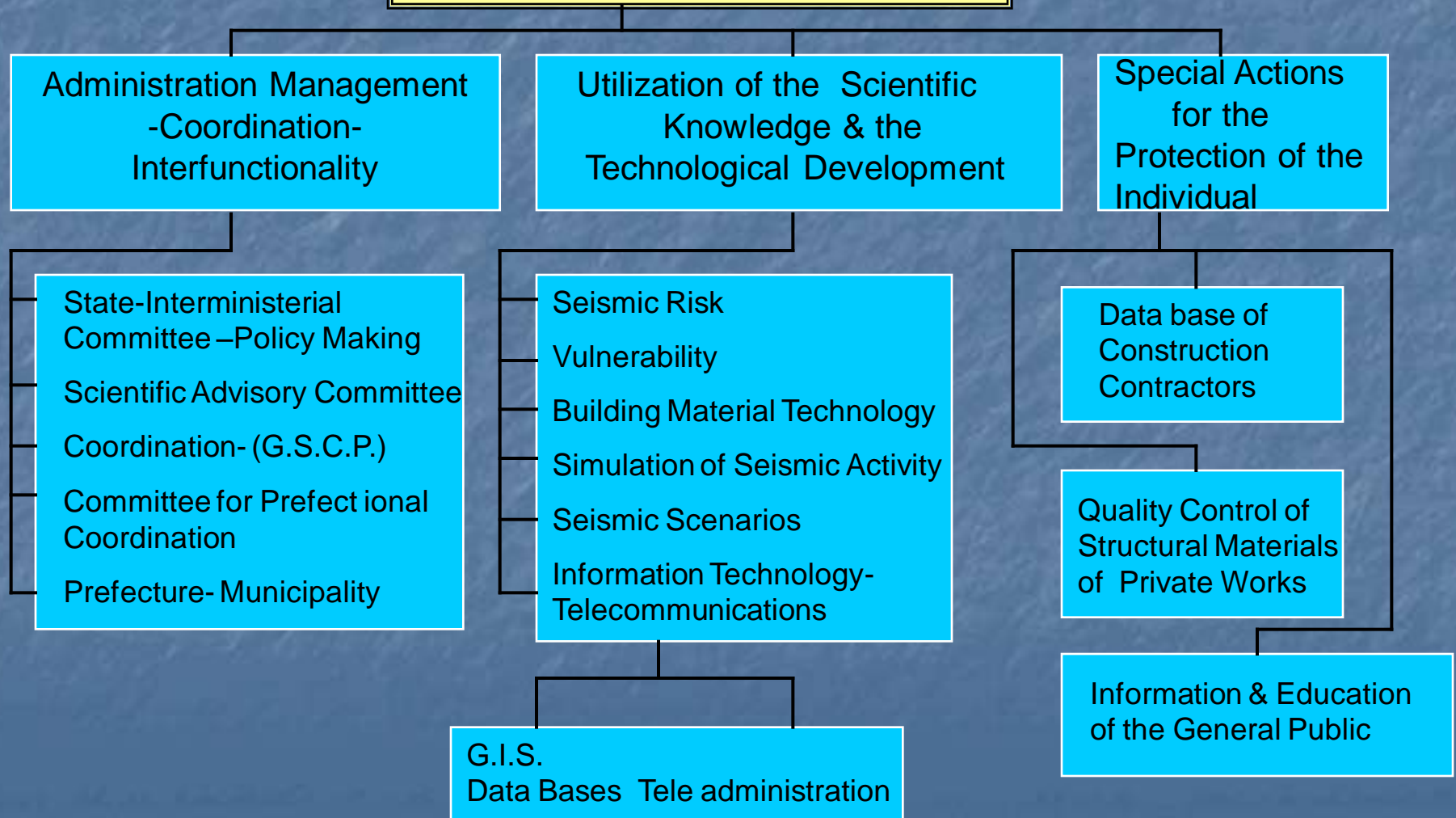
STATE LEVEL



THE EMERGENCY CYCLE

PROTECTING FROM THE NEXT EARTHQUAKE THROUGH STRUCTURE STRENGTHENING STATE LEVEL

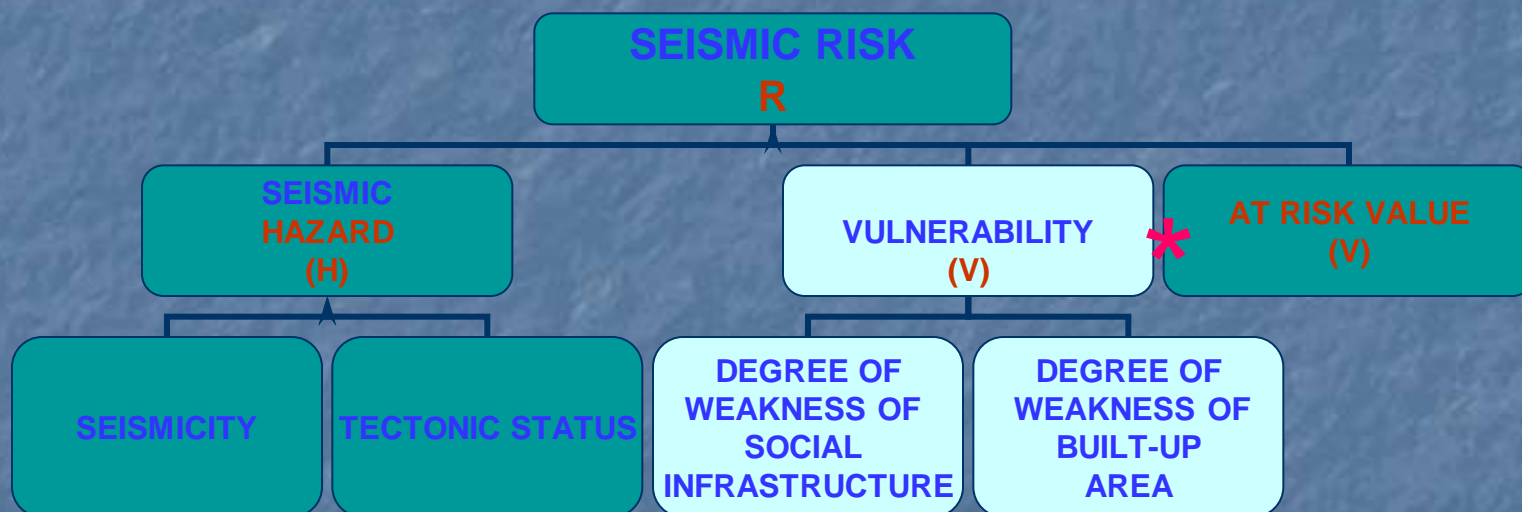
AXIS OF POLICIES OF REDUCTION OF THE SEISMIC RISK





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Confronting the problem



$$R=H*V*V$$

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$$R=H*V*V$$



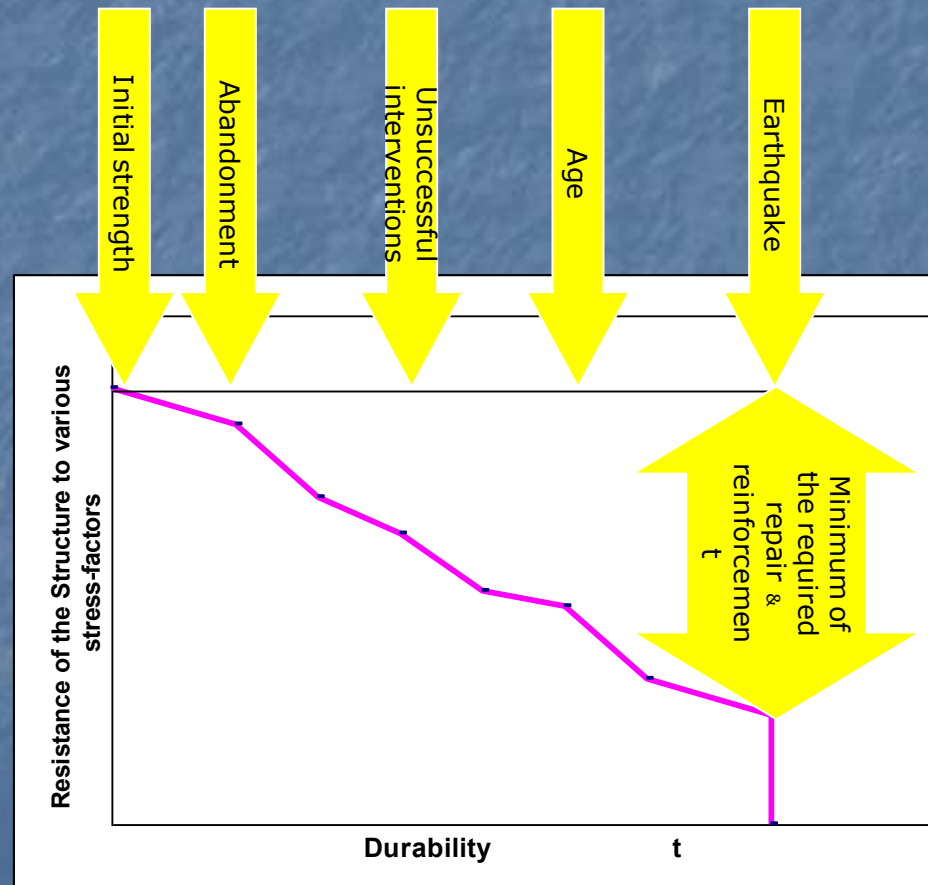
Vulnerability

expresses the Seismic Response of a Structure to Seismic Event with unknown Characteristics taking also into account the degree of uncertainty in the determination of the structural Characteristics

Reduction of the Vulnerability !!!

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Some of the causes leading to the weakness of a Structure



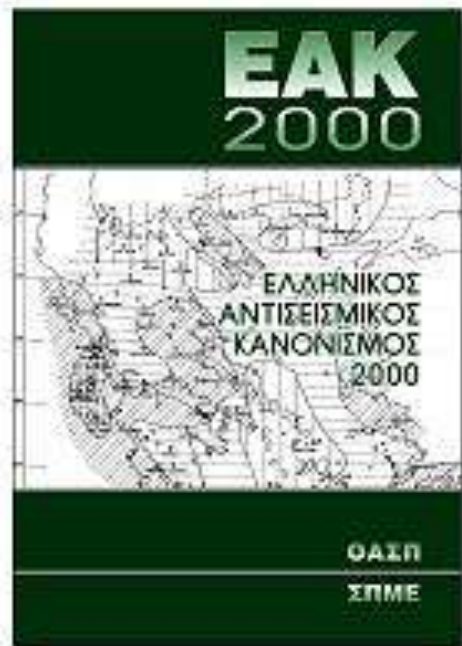
Weakness chart during time of a Structure

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- 1. New Greek Seismic Code**
- 2. New Greek Code of Reinforced Concrete**
- 3. Guidelines concerning Pre seismic & Post seismic Interventions in Buildings**
- 4. Intervention Code of Reinforced Concrete Buildings**
- 5. Pre seismic Control of Public Buildings and of Public Welfare Institutions**
- 6. Pre seismic Control of Bridges**
- 7. Elaboration of Euro codes**
- 8. Composition of specific proclamations**
- 9. Composition of regulations for the safety of Monuments against Earthquakes**
- 10. Educational Seminars for Engineers**
- 11. Science Congresses , 1-day Meeting**

PROTECTING FROM THE NEXT EARTHQUAKE THROUGH STRUCTURE STRENGTHENING

1. New Greek Seismic Code



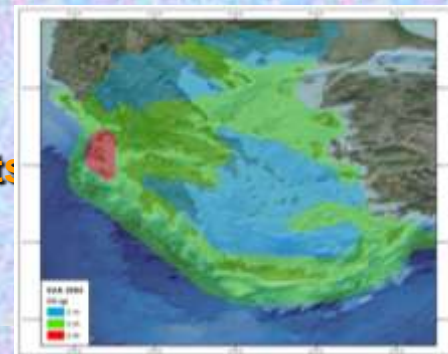
The Seismic Code has been revised twice by the relevant Permanent Scientific Committee .

a. The 1995 New Seismic Code has been revised and was put into force in 1-7-2001.

The relevant leaflets were issued by E.P.P.O. in collaboration with the Association of Civil Engineers of Greece and were Distributed free of charge. A number of Seminars were organized to ensure an optimum implementation of the Code.

b. The 2000 Seismic Code has been ameliorated with significant modifications. The New Code was put into force in 1-1-2004.

The most important of them, is the reduction of the 4 Seismic Zones initially considered in a Technical Study to 3.




SEISMIC ZONES IN GREECE

9. Composition of regulations for the safety of Monuments

10. Educational Seminars for Engineers

11. Science Congresses , 1-day Meeting NEW

PROTECTING FROM THE NEXT EARTHQUAKE THROUGH STRUCTURE STRENGTHENING

1. New Greek Seismic Code
2. New Greek Code of Reinforced Concrete
3.  Pre seismic 8
4. In reinforced Concrete
5. For Public Buildings
6. For Bridges
7. For Bridges
8. Code proclamation
9. Composition of regulations for the seismic
10. Educational Seminars for Engineers
11. Science Congresses , 1-day Meeting

a. Scientific Committees were convened by the Ministry of Environment Physical Planning and Public Works, the Technical Chamber of Greece and Earthquake Planning and Protection Organization in order to revise both the “ Greek Code of Reinforced Concrete- Edition 2000”(G.C.R.C.-2000) as well as the “New Seismic Code” .

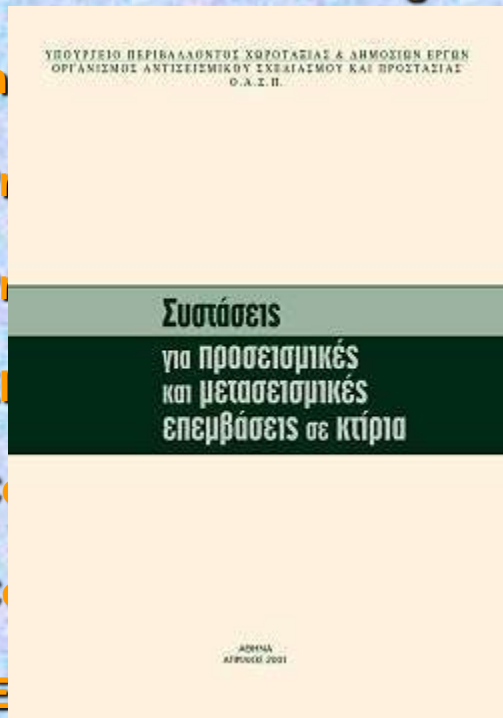
The relevant leaflets of both Codes were issued by E.P.P.O. in collaboration with the Association of Civil Engineers of Greece and were distributed free of charge. A number of Seminars were organized.

b. The G.C.R.C.-2000 was ameliorated with significant Modifications. The revised Code was put into force in 1-1-2004.

In order to support the above Codes, E.P.P.O. has convened the Permanent Scientific Committee with main task the solution of problems occurred during the implementation and the compatibility of both the Codes and the guidelines during an Aseismic Structural Design.

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2. New Greek Code of Reinforced Concrete
3. Guidelines concerning Pre seismic & Post seismic Interventions in Buildings
4. In
5. P
6. P
7. E
8. C
9. C
10. E
11. Science Congresses , 1-day Meeting



Reinforced Concrete Buildings

Public Buildings and other

Buildings

Proclamations

Measures for the safety of Monuments against Earthquakes

Engineers

In April 2001 "Guidelines concerning Pre seismic and Post seismic Interventions in Buildings " were drawn up by E.P.P.O. replacing previous recommendations of 1978. The relevant leaflet was distributed free of charge .

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1. The Intervention Code of Reinforced Concrete Buildings was completed and it is going to become Law by the end of 2009.
2. The Code has been forwarded to Technical Chamber of Greece and to the Scientific Community and it is also been open to public consultation .
3. The above Code will replace previous Guidelines concerning Pre seismic & Post seismic Interventions in Buildings published in 2001. The Intervention Code in its integrated form is unique globally.

4. Intervention Code of Reinforced Concrete Buildings



Background

EPPO assigned this Code to be elaborated to a Task Group which worked on it for nine years. During this period the first Draft was revised and ameliorated by a relevant Committee of Special Consultants. Then this Draft was submitted to selected Technical Offices in order to conduct Implementation Studies and thus to check the functionality , the adequacy as well us the feasibility of the Code. The Task Group after elaboration of the conclusions and recommendations suggested by the Technical Offices ,completed the Code. Also the Administrative Council of EPPO , after the relevant announcement , selected Applied Research Studies correlated to the Code. Simultaneously a great number of Training Seminars directed to Engineers will be held all over Greece.

10. Educational Seminars for Engineers

11. Science Congresses , 1-day Meeting

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4. Intervention Code of Reinforced Concrete Buildings
5. Pre seismic Control of Public Buildings and of Public Welfare Institutions
6. Pre seismic Control of Bridges
7. Elaboration of Proclamations
8. Completion of Proclamations
9. Completion of Proclamations for the safe
10. Educational Seminars for Engineers
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a. In May 2001, the Pannelinic Programme of the **Primary Stage of Pre seismic Control of Public Buildings and of Public Welfare Institutions** has been started based on specific recommendations that were drawn up by the relevant Scientific Committee.

This Control is convened by the Prefectures and the Municipalities and its aim is to locate and record their initial seismic capacity.

EPPO coordinates this Control . 8000 records were inscribed in the relevant Data Base. These records were calibrated according to their capacity and were sent back to the Prefectures for the Secondary Stage of Pre seismic Control.

b. The Proclamations concerning the **Secondary Stage of Pre seismic Control** are in the elaboration Stage .

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6. Pre seismic Control of Bridges
7. Elaboration of specific codes
8. Composition of specific proclamations
9. Composition of regulations for the safety of structures against earthquakes
10. Educational seminars for Engineers
11. Science Congresses , 1-day Meeting



In order to examine the Seismic Capacity of Bridges a relevant Study has been elaborated by a Scientific Committee .
This pilot Study will be the basis for future methods concerning the Pre seismic Reinforcing of Bridges.

PROTECTING FROM THE NEXT EARTHQUAKE THROUGH STRUCTURE STRENGTHENING

1. **New Greek Seismic Code**
2. **New Greek Code of Reinforced Concrete**
3. **Guidelines concerning Pre seismic & Post**
4. **Intervention Code of Reinforced Concrete**
5. **Code of Public Buildings and**
6. **Code of Bridges**
7. **Elaboration of Euro codes**
8. **Composition of specific proclamations**
9. **Composition of regulations for the safety**
10. **Educational Seminars for Engineers**
11. **Science Congresses , 1-day Meeting**



The Ministry of Environment Physical Planning and Public Works, has formed the Eurocode Committee, which operates as a National Platform for the realization of the implementation of Euro codes in Greece.

The Committee completed the following Tasks :

- ✦ The formation of the National Annexes , special Regulations adapted to local conditions in Greece.
- ✦ The translation into Greek of the Euro codes , as approved by the European Community.
- ✦ Background Reports

In December 2008, in accordance with Ministerial Resolution (Governmental Paper No 2692/31-12-2008) the following were set out:

- ✦ Provisional Recommendations concerning Bridge Design in combination with the relevant Euro codes.
- ✦ Provisional Recommendations concerning Civil Engineer Works (except Bridges and Reinforce Concrete Buildings) in combination with the relevant Euro codes .

On going by April 2010, Euro codes will replace all existing National Codes and become Law.



EUROCODES
Building the Future

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6. Bridges
7. des
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Specific Proclamations concerning the Seismic Design of Structures has been drawn up by Task Groups of EPPO and especially :

✦ Proclamations for the amelioration of antiseismic characteristics of the steel reinforcement of Concrete .This text was submitted by the Ministry of Physical Planning and Public Works to Hellenic Organization for Standardization S.A. in order to become Law.

✦ Proclamations for the elaboration and presentation of Bearing Structure of Buildings Studies.

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1. New Greek Seismic Code



A Primary Regulatory Document concerning the General Principles of Structural Interventions in Monuments has been completed. This Guide includes the contents of the necessary Documentation Study , the selection of the level of an optimum Seismic Action to be used in the Design Structural Interventions of such buildings , the selection of an optimal technical solution serving both Monumental & Social Values adequately, detailed calculation of the resistances .

This Document comprises an indicative Outline of the necessary measures that a Committee of Experts designated to compose such a Regulatory Document has to take into account.

Within the framework of the above , the next step is the formation of a Biministerial Scientific Committee , by EPPO& the Ministry of Culture with main task the compilation and the legalization of an Official Regulatory Document concerning the Structural Interventions as well as the Protection of our Cultural Heritage .

6. Pre seismic Control of Bridges

7. Elaboration of Euro codes

8. Composition of specific proclamations

9. Composition of regulations for the safety of Monuments against Earthquakes

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PROTECTING FROM THE NEXT EARTHQUAKE THROUGH STRUCTURE STRENGTHENING

ASEISMIC PROTECTION OF OUR CULTURAL HERITAGE :APPROACHING THE PROBLEM

An Intervention Code concerning the Monumental Buildings faces a lot of difficulties:

- **Uncertainties concerning the estimation of the existing resistances**
- **Uncertainties in the selection of Seismic Actions to be used in the design of Structural Interventions**
- **Uncertainties concerning the procedures to be followed during the various phases of relevant Design (Methods of Analysis ,Dimensioning & Construction)**
- **Difficulties in decision taking because of the contradictory current-state values of Monuments (Social &Historical)**
 - **Human Life (in correlation with visit ability and habitability)**
 - **Historical Materials & Techniques**
 - **Structural Typologies**
 - **Aesthetic Value**
 - **Economy and Use**

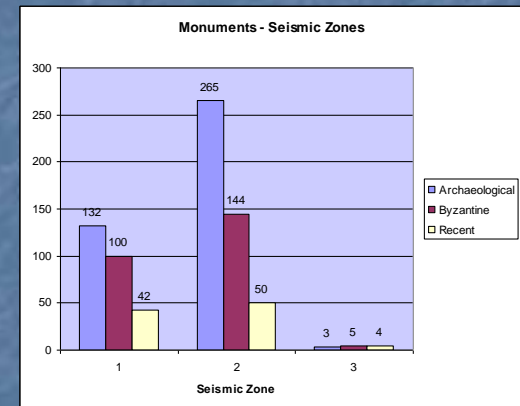
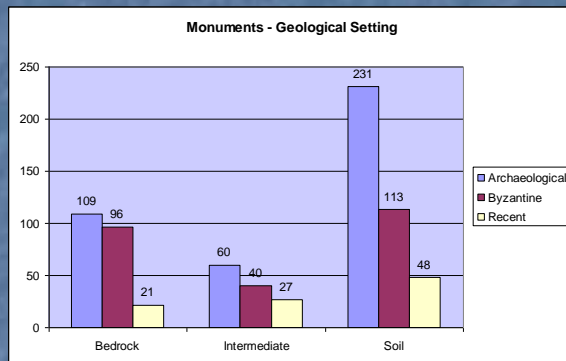


PROTECTING FROM THE NEXT EARTHQUAKE THROUGH STRUCTURE STRENGTHENING

ASEISMIC PROTECTION OF OUR CULTURAL HERITAGE :APPROACHING THE PROBLEM

IN ADDITION !

In Greece we have a variety of Monuments concerning the typology and especially: **Archaeological** , **Byzantine** and **Recent** spreading all around the Country founded in different soil conditions and in the 3 Seismic Zones .



Thus Monumental Buildings are unique and cannot be reduced to any Structural Scheme!

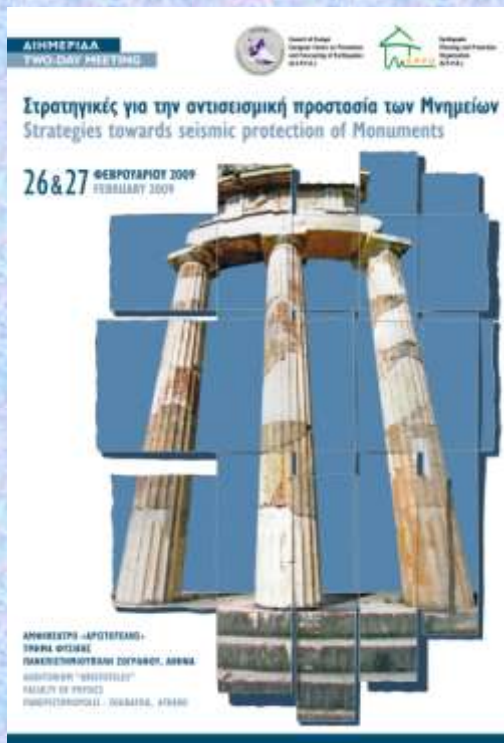
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EPPO has participated in cooperation with other Institutional Bodies in the Organization of several Educational Seminars for the training of Engineers.

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6. Bridges
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10. for Engineers
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EPPO has organized as well as financed in cooperation with other Institutional Bodies numerous Seminars 2-day meetings and Scientific Events.

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THANK YOU FOR YOUR ATTENTION

