

Eurocode 8 – Design for Earthquake Resistance of Foundations

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ABSTRACT:

This lecture presents the topics covered by Part 1–Sections 1 & 2 and Part 5 of Eurocode 8 namely: seismic action, ground conditions and soil investigations, importance categories, importance factors and geotechnical categories. Also topics related with foundations behaviour under seismic loads, potentially liquefiable soils, foundation system and topographic aspects are discussed.

KEY WORDS: seismic loads, liquefiable soils, foundations, topographic aspects.

INTRODUCTION

The Commission of the European Communities (CEC) initiated a work in 1975 of establishing a set of harmonised technical rules for the structural and geotechnical design of buildings and civil engineers works based on article 95 of the Treaty. In a first stage would serve as alternative to the national rules applied in the various Member States and in a final stage will replace them.

From 1975 to 1989 the Commission with the help of a Steering Committee with the Representatives of Member States developed the Eurocodes programme.

The Commission, the Member states of the EU (European Union) and EFTA (European Free Trade Association) decided in 1989 based on an agreement between the Commission and CEN (European Committee for Standardization) to transfer the preparation and the publication of the Eurocodes to CEN.

The Structural Eurocode programme comprises the following standards:

- EN 1990 Eurocode – Basis of design
- EN 1991 Eurocode 1 – Actions on structures
- EN 1992 Eurocode 2 – Design of concrete structures
- EN 1993 Eurocode 3 – Design of steel structures
- EN 1994 Eurocode 4 – Design of composite steel and concrete structures
- EN 1995 Eurocode 5 – Design of timber structures
- EN 1996 Eurocode 6 – Design of masonry structures
- EN 1997 Eurocode 7 – Geotechnical design
- EN 1998 Eurocode 8 – Design of structures for earthquake resistance
- EN 1999 Eurocode 9 – Design of aluminium alloy structures

The work performed by the Commission of the European Communities (CEC) in preparing the “Structural Eurocodes” in order to establish a set of harmonised technical rules is impressive. Nevertheless, due the preparation of these documents by several experts, some provisions of EC8 with the special requirements for seismic geotechnical design that deserve more consideration will be

presented in order to clarify several questions that still remain without answer.

The actual tendency is to prepare unified codes for different regions but keeping the freedom for each country to choose the safety level defined in each National Document of Application. The global safety of factor was substituted by the partial safety factors applied to actions and to the strength of materials.

This lecture summarises the main geotechnical aspects covered by Eurocode 8 and also identifies some topics that need further implementation.

In dealing with these topics we should never forget the memorable lines of Lao- Tsze, Maxin 64 (550 B.C.):

“The journey of a thousand miles begins with one step”.

EUROCODE 8 –DESIGN of STRUCTURES for EARTHQUAKE RESISTANT

Introduction

The Eurocode 8 (EC8) “Design of Structures for Earthquake Resistant” deals with the design and construction of buildings and civil engineering works in seismic regions and is divided in six Parts.

The Part 1 is divided in 10 sections:

Section 1 - contains general information;

Section 2 - contains the basis requirements and compliance criteria applicable to buildings and civil engineering works in seismic regions;

Section 3 - gives the rules for the representation of seismic actions and their combination with other actions;

Section 4 - contains general design rules relevant specifically to buildings;

Section 5 - presents specific rules for concrete buildings;

Section 6 - gives specific rules for steel buildings;

Section 7 - contains specific rules for steel-concrete composite buildings;

Section 8 - presents specific rules for timber buildings;

Section 9 - gives specific rules for masonry buildings;

Section 10 - contains fundamental requirements and other relevant aspects for the design and safety related to base isolation.

Further Parts include the following:

Part 2 contains relevant provisions to bridges.

Part 3 presents provisions for the seismic strengthening and repair of existing buildings.

Part 4 gives specific provisions relevant to tanks, silos and pipelines.