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Autor: Anastasescu, Decebal / Gadea, Angelu
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Antiseismic Protection and Rehabilitation of Buildings in Timisoara

Decebal ANASTASESCU

Prof. Dr. Eng.

ILIAN - Ltd

Timisoara , Romania

Angelu GADEA

Prof.

CASTEL - SD - Ltd

Timisoara, Romania

Decebal Anastasescu, born in 1926, received his civil engineering degree in 1951 and PhD in 1973. He has worked at the "Politehnica" University and in various design institutes of Timisoara. His main research is in the field of the reinforced concrete space structures - foundation soil interaction.

Angelu Gadea, born in 1925, received his civil engineering degree in 1949. He has worked at the "Politehnica" University and in various design institutes of Timisoara. His main research fields are the geotechnical investigations and soil consolidations.

Summary

In the paper are classified the existing buildings of the town, from the point of view of vulnerability, in the case of a major future earthquake. Varied repair and rehabilitation methods are briefly described, applied especially to some historical or architectural monuments, according to actual antiseismic national codes, in correlation with the preoccupation for characteristic architectural conservation, new functional demands and investment funds. Finally, the authors propose some necessary measures, with a view to achieve a high technical and economical efficiency level of the antiseismic protection in Timisoara.

1. Introduction

Timisoara is situated in the Plain of Banat, well - known for a seismic medium activity (maximum 8 degree on the MM scale), with deepness focus of 4 to 10 km epicentral zones reduced as area. The soil stratification of alluvional nature contains, at the surface, the complex of difficult soils, made of heterogeneous fillings, silt ground and loose sands. Underground water rises just a reduced deep of 2 to 4m.

2. The vulnerability of existing buildings

The ensurance degree for a future major seismic action, of existing buildings in Timisoara, presents great differences due to both code requirements evolution, applied to these buildings construction and the official application of these codes and also due to the effects of " time factor" (chemical aggressivity, uneven foundation settlements, overloads from former earthquakes or functional modifications).

Therefore, the highest vulnerability it is noticed to old buildings, that have been built before the first world war, many of these buildings have a well - known architectural and historical value. Nor existing that epoch any codes in the field of antiseismic design, these constructions have no correct antiseismic conformation (structural system), nor strength capacity, or necessary ductility of the structural components, setting also some deficiencies concerning construction, completed

by the unfavourable effects of “time factor”. The absence of the antiseismic protection measures have unfavoured also the buildings constructed during the period between the two world wars. Since 1977, Timisoara, included officially into seismic zone of 7 degree intensity, has benefited from code requirements (P 100 - 78, P 100-81), and since 1992 its degree has been increased from 7 to 7.5, keeping with P 100-92 code.

3. Existing structures consolidation

The problem of antiseismic protection of existing buildings in Timisoara, although it has been revealed some 15 - 20 years before, has been seldom tackled (on the occasion of some functional transformations or elimination of some damages due to surrounding medium), because of the little funds. At present, the importance of this problem rises because of:

- the recent increase of the seismic intensity degree;
- the amplification of functional modifications (horizontal or vertical extensions) due to the constructional space crisis and proliferation of economic units, in the difficult conditions of transitional period of our country.

Among the old buildings, in the perimeter of United Square (realized between 1730 - 1750) included in the historical zone of town, submitted to some transformations and consolidations, one mentions especially: Constructim Residence, The Baroque Palace (The Art Museum today), Bankoop Residence.

Not having the necessary funds, it has been proposed, in some cases, the structural consolidation on steps: after foundation soil or foundation consolidation and of cracked structural elements ones, there is provided, in the next stages, the introduction of supplementary shear walls, columns, belts, tie - pieces, anchoring and increase of in plane rigidity of timber floors (through orthogonal disposal of metal beams) or the replacement of timber floors with reinforced concrete ones. In this way there were realized some consolidations at: The Huniade Castle (The Banat's Museum lately), The Building of Romanian Opera, The Church of the Piarist High - School, The Building of Romano - Catholics Bishopric.

Among the extension works that have been realized lately, there are mentioned especially: The Baby care Center Complex, The Orphan children Boarding School.

4. Conclusions

In order to realize the antiseismic protection, at a high level of technical and economical efficiency, of the existing buildings in Timisoara, the authors consider some necessary measures, starting with the determination of the ensurance degree for seismic actions of these buildings and ending with the performance of the consolidation works by specialized enterprises, able to assure the standard prescribed in the construction projects. The achievement of the above objectives needs the tight cooperation of all factors involved in this action (research, design, construction, local and central administration), the general level of antiseismic ensurance of existing buildings and the urgent application of these necessary measures being dependent of economical possibilities of investors, of entire society.