

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
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UDC 624.042

**PROJECT OF A 16-STOREY APARTMENT BUILDING IN UZHGOROD
WITH A STUDY OF ITS BEHAVIOR IN SEISMIC IMPACTS**

192 “Construction and Civil Engineering”

Abstract of a Master’s Thesis

Ternopil
2019

The thesis has been carried out at the Building Mechanics Department of Ternopil Ivan Puluj National Technical University, Ministry of Education and Science of Ukraine.

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Defense of a thesis will be held at the Meeting of the Examination Board №9 on February 26, 2019 at 15⁰⁰ in Ternopil Ivan Puluj National Technical University (46001, Ternopil, Ruska str. 46, building №2, room 35).

GENERAL CHARACTERISTIC OF THE THESIS

Actuality of the thesis. Seismic influences on buildings are very dangerous due to their unpredictable nature and high dynamic loadings that are applied in very short period. It is fundamental to detect the seismic response of the structure in high seismic zones to decrease the seismic harms.

The aim of the thesis: To improve the method of finite element simulation of seismic influence on multi-stored residential building.

Thesis tasks:

1. Analyze approaches to multi-stored building behavior evaluation in seismic impacts.
2. Apply finite element method to seismic calculation of designed sixteen-storey apartment building.

The object of the research: Sixteen-storey apartment building in Uzhgorod.

Novelty of the results: The method of finite element simulation of seismic influence has been further developed in application for multi-stored residential building.

The practical significance: Results could be used for evaluation of the displacements of multi-stored residential buildings in seismic impacts taking into account seismicity of the construction site.

Thesis approbation. The results have been reported at the VIII International scientific and technical conference of young researchers and students «Current issues in modern technologies», Ternopil, November 27-28, 2019.

The structure of the thesis. The thesis consists of explanatory notes and graphical presentation. The explanatory notes consists of introduction, 7 sections, conclusions, references. The thesis size: explanatory notes – 124 pages of the A4 format, graphical presentation – 10 sheets of the A1 format.

MAIN CONTENT OF THE THESIS

In introduction the importance of multi-stored building behavior evaluation in seismic impacts was established.

In the first section of the work analyzes the conditions of the construction area. The master plan and measures to landscaping were described. The architectural part of the project was developed, the basic decisions were substantiated by the corresponding calculations. For the designed sixteen-storey apartment building brick walls and combined prefabricated and monolithic ceilings has been chosen. Plans for the ground and typical floors and foundations were designed.

The second section is devoted to the detailed calculation of the individual structures used in the project – foundation, monolithic column and ceiling slab. Calculation and design was made using standard approaches described in building codes and methodical guidelines for designing taking into account the features of the designed building.

In the third section of the work a technological maps for the process of stairs and platforms installation and for the arrangement of flat roll roof were developed. The required materials and workforce were determined. The necessary construction equipment and machines were selected.

In the fourth section the object cost estimate was provided including total cost estimate and the list of the main constructive work types.

The fifth section is devoted to the problems of labour protection and safety regulations. It analyzes the main risk factors for construction works on designed building. Safety and fire safety measures at the construction site were proposed meeting the requirements of labor protection regulations

The sixth section deals with environmental protection and ecological development during the construction process.

The seventh section includes analysis of existing approaches to multi-stored building behavior evaluation in seismic impacts. Usage of finite element method was proposed for the further evaluation and corresponding simulation model was created. Deformations of designed sixteen-stored apartment building from vibration under normative seismic impact were determined using proposed model.

CONCLUSIONS

1. Existing approaches to multi-stored building behavior evaluation in seismic impacts were analyzed. Analytical and computational methods were compared. Finite element method of computer simulation was chosen for further usage.

2. The method of finite element simulation of seismic influence has been further developed in application for multi-stored residential building.

3. Proposed method was applied to designed sixteen-stored apartment building in Uzhgorod to determine its deformation under normative seismic impact.

LIST OF PAPERS PUBLISHED BY THE AUTHOR OF THESIS

1. Mbaya, K. Fire resistance assessment of steel truss [Text] / Morozov V., Mbaya K., Soroachak A. // VIII International scientific and technical conference of young researchers and students «Current issues in modern technologies» (Ternopil, November 27-28, 2019). – Vol. 1. – P. 121.

ANNOTATION

Mbaya Kazadi Christian. Project of a 16-storey apartment building in Uzhgorod with a study of its behavior in seismic impacts.

Master's thesis on the 192 "Construction and Civil Engineering" specialty. Ternopil Ivan Puluj national technical university, 2019.

Main architectural and constructive decisions for a project of sixteen-storey apartment building in Uzhgorod were proposed based on calculations according to relevant building codes of Ukraine. Main technological processes were developed including safety requirements.

Existing approaches to multi-stored building behavior evaluation in seismic impacts were analyzed. The method of finite element simulation of seismic influence has been further developed and corresponding simulation model was created. Deformations of designed sixteen-stored apartment building from vibration under normative seismic impact were determined using proposed model.

Keywords: Brick multi-stored building, seismic influence, finite element method, vibration.