

Influence of the floor systems on the sustainability of reinforced concrete structures

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Abstract

The presented paper analyzes the influence of the choice of floor systems on the sustainability of the whole structure. The paper deals with some of the most popular seismic-resistant structures for buildings – reinforced concrete ductile wall and frame systems. Finding the optimal solution that meets the architectural and structural requirements, while giving a minimal environmental footprint is a challenging task.

The aim of the paper is to make a comparison of different design solutions, based on their structural analysis, in order to demonstrate the influence of our engineering decisions on the environmental impact.

Keywords: reinforced concrete structures, floor systems, sustainability, environmental impact

1 Introduction

Nowadays, environmental protection and the respect of the nature have become an additional parameter that is taken into account in the creation of buildings and facilities. More and more participants in the construction of buildings start to integrate this idea in the earliest stages of their projects.

Sustainable construction results from the application of the principles of Sustainable Development to the global cycle of construction, from raw material acquisition, through planning, design, construction and operation, to final demolition and waste management [1].

The contemporary standards require better environmental performance of buildings, but at the same time they must meet architectural, structural and financial requirements. New methods and approaches to achieve this goal are

constantly involved in research and professional practice [2]. The principles of "sustainable design" are the following: environmental protection, economic growth and beneficial effects on society.

The integral design of the buildings consists in finding the optimal solution that meets the architectural and structural requirements. The technical properties of a building can have a strong impact on the sustainability quality. Giving a minimal environmental footprint is a challenging task.

With the 2030 Climate Target Plan, the European Commission proposes to raise the EU's ambition on reducing greenhouse gas emissions to at least 55% below 1990 levels by 2030. This is a substantial increase compared to the existing target upwards from the previous target of at least 40% [3]. The Commission's proposal to cut greenhouse gas emissions sets Europe on a responsible path to becoming climate neutral by 2050.