ISSN : 2350-0743

www.ijramr.com

International Journal of Recent Advances in Multidisciplinary Research

Vol. 08, Issue 07, pp. 7006-7007, July, 2021

RESEARCH ARTICLE

ANALYSIS OF 5 FLOOR BRICK MASONRY BUILIDING, TYPE 77/5

* **Eng. Petraq Koka**

Lecturer at Europian University of Tirana/Albania

ARTICLE INFO

Article History:

Received 25th April, 2021
Received in revised form
14th May, 2021
Accepted 10th June, 2021
Published online 30th July, 2021

Keywords:

Open Chain Segmental Control, Closed Chain Segmental Control, Spinopelvic Angles, Asymptomatic Subjects.

ABSTRACT

Below we present the main results of the numerical analysis performed in ETABs, to assess the seismic response of an existing building, with brick masonry, type 77/5, which is part of many similar projects, built in the years 1975-1990, in Albania. While these 5-story buildings cover a significant percentage of residential buildings, the fundamental question is: "Are these buildings safe under seismic action, while so many families are accommodated on them? "This question stems from the following limitation: The 77/5 plan derives from regular forms, based on the recommendations of Eurocode 8.6 [4.2.3.2], p. 48. and KTP.N.2-89 (Technical Design Conditions), published by the Academy of Sciences. This study tends to answer this basic question.

INTRODUCTION

Masonry structures represent one of the oldest building concepts available. However, due to the substantial empirical knowledge, collected over several centuries of utilization a masonry as a structural material, the need for establishing a more modern basis, for the design of masonry structures, hasn't been appreciated in the same manner as for concrete structures. This study includes only the Linear analysis of the masonry building type 77/5, situated in Albania, with the help of finite element model (ETABs Program).

BRIEF DESCRIPTION of MATERIALS and the CONSTRUCTION

Masonry is a heterogeneous material, due to its composition of:

- Complete or perforated blocks.
- Beds of continuous mortar.
- Nodes (joints) interrupted, or continuous.

However, we can call it a homogeneous anisotropic material in terms of resistance and deformation.

Brick is characterized by an elastic behavior both in tensile and compressive. Based on the above materials, bricks and mortar, Table 1 gives: *Masonry resistance fk = 1.1 N / mm2*

Corresponding author:** ***Eng. Petraq Koka,
Lecturer at Europian University of Tirana/Albania

- The elasticity modulus E of masonry, for service conditions, in **EC6** is recommended **E = 1000 fk** N/mm2.

Loads:

The slab dead load is = 2 kN/m^2
Live load = 2 kN/m^2;
Additional dead load = 2 kN/m2
Bricks - clay material, Class = 7.5 N/mm2
Cement mortar - Class = 2.5 N/mm2

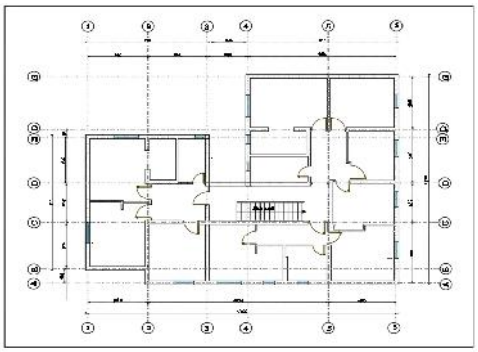

Fig. 1- Typical floor plan

Tab.1 f_k - Masonry compressive strength [5]

Nr	Brick class	Mortar class (N/mm2)						
	N/mm2	10	7.5	5.0	2.5	1.5	0.4	0.0
3	7.5	1.5	1.4	1.3	1.1	0.9	0.7	0.5

- The building ground and first floor walls are 38 cm thick.
- The second, up to the fourth floor walls, are 25 cm thick.
- On top of the masonry, of each floor, there are concrete girdle (38x15) and (25x15)cm, according to the wall thickness

The slabs are type Zoellner.

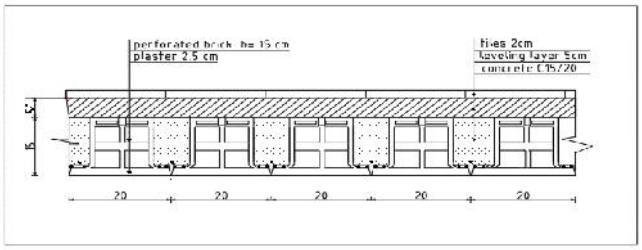

Fig. 3. Slab cross section

Fig.2. The cross section of the slabs

Seismic data: Based on EC recommendation [3], we chose the earthquake with magnitude MS > 5.5. So, we used spectrum type 1, the masonry ductility factor q = q0 kw ≥ 1.5, and 3% extinction [2]

- land type - category C
- acceleration ag - 0.25g

LINEAR ANALYSIS: Poor tensile strength of masonry requires a good knowledge of its characteristics and the correct use of linear elastic models, to predict the reaction and damage of a building. [5]. From this point of view, the use of a finite element model, for the study of the stressed state under the action of static loads and the modal behavior of the building, in the linear field, is of interest. The use of the ETABs program serves this intention. So, we will present below shortly the main results of this program

Displacement: (with gray lines - the deformed shape of the building is presented)

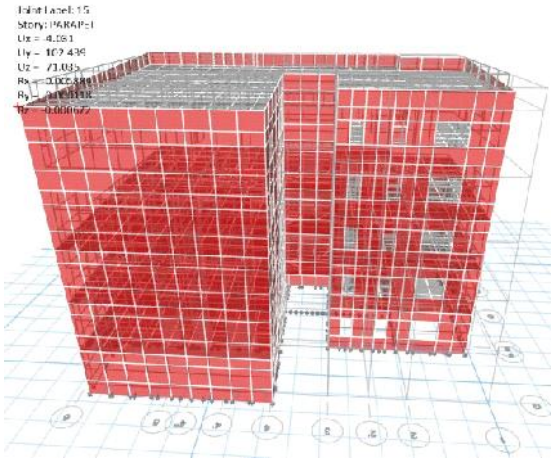

Fig. 3 - The displacements on the joint 15

Maximum displacement: **Uy = 10.81cm > 7.1 cm** for the combination:

ELY: D+0.3L+0.3EQLX+EQLY

Local controls on Axis 2-2:

The maximum value on this axis is the pressure S2-2, on Element W828, shown on the Fig. 4, with the value:

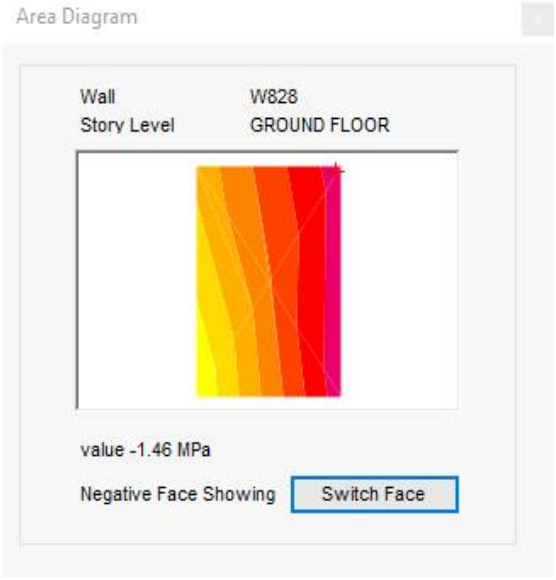

Fig. 6- Element W828, detached from axis 2-2

MPa= -1.46 MPa > [**- 1.1MPa**]

REFERENCES

1. Dr. Ing. Isai Clemente Structural Design Course, 2009/10, Lecturer at University of Trieste
2. Eurocode *EC6, EC8*
3. Magenes G., Kingsley G. R., Calvi G. M., 1995: "*Static Testing of a Full-Scale, two-story Masonry Building: Test Procedure and Measured Experimental, Response*". Università degli Studi di Pavia.
4. Calvi G. M., Kingsley G. R., Magenes G., 1996.: "*Testing of Masonry Structures, for Seismic Assessment*". Earthquake Spectra, Vol. 12, No. 1.
5. Alberto Antonelli[a], Michele Betti[a] , Maria Luisa Del Savio[b] ,Luciano Galano[a], Maurizio Orlando[a], 2010, " Methods for Seismic Analysis of Existing Masonry Buildings".
6. ETABS® Version 18.1.1, (2020), © Computers and Structures, Inc.
7. Furiozzi, B. C. Messina, L. Paolini, Handbook for the Calculation of Structural Elements, New Edition, 2007

****