SACO CONSTRUCT SRL

Bucharest, 10-22 Amzei Square Str., door B, district 1
Landline / Fax (+4) 021 313 53 33 Mobile (+4) 0744 655 627
E-mail office@sacoconstruct.ro, www.sacoconstruct.ro
CUI RO3790273
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TECHNICAL EXPERTISE REPORT
- strength structure -

- Bucharest, June 2020 -

CONTENTS

1. OBJECT OF THE TECHNICAL EXPERTISE

The object of the technical expertise report is the building located at 218 Calea Victoriei (Victory Avenue), District 1, Bucharest.

2. PURPOSE OF THE TECHNICAL EXPERTISE

The purposes of this technical expertise report are:
- assessment of the seismic performance of the current building;
- substantiation and proposing the intervention decision needed to reduce seismic risk, as well as to fix the other categories of damage.

3. BENEFICIARY OF THE TECHNICAL EXPERTISE

This technical expertise report is made for the „ELIE WIESEL" NATIONAL INSTITUTE FOR THE STUDY OF THE HOLOCAUST IN ROMANIA, based in Bucharest, 89 Dacia Boulevard, district 2, as beneficiary.

4. BASES OF THE TECHNICAL EXPERTISE

4.1 The legal basis for drawing up the technical expertise

This expertise is prepared based on the following legal provisions:

A. Law no. 10/1995 - Law on quality in constructions, with subsequent amendments and completions.
Art. 18 of this law stipulates that:

(2) Interventions to existing constructions refer to construction works, reconstruction, partial demolition, consolidation, repair, modernization, modification, extension, rehabilitation, thermal rehabilitation, increase of energy performance, renovation, major or complex renovation, as the case may be, change of destination, protection, restoration, conservation, total abolition. They shall be carried out on the basis of a technical expertise report drawn up by a certified technical expert and, where appropriate, on the basis of an energy audit drawn up by a certified building energy auditor, and shall include the design, work and acceptance of works requiring the issuance of building or demolition permit, as appropriate. Interventions to existing constructions must be recorded in the technical construction book.

B. Government Ordinance no. 20/1994 on measures to reduce the seismic risk of existing buildings, with subsequent amendments and completions.
Art. 2 of this ordinance stipulates that:
1. Building owners, natural or legal persons, and owners' associations, as well as legal persons who manage constructions, have the obligation to act for:

a) monitoring the behavior in operation of the buildings owned or managed by them;

b) the technical expertise, performed by technical experts certified for the fundamental requirement of mechanical strength and stability, of current buildings with insufficient levels of protection against seismic actions, degradation or damage due to seismic actions, in order to classify them in a seismic risk class and substantiate intervention measures. If, in the terms provided by this ordinance, the intervention measures based on the initial technical expertise report were not carried out or if the seismic Design Code / norm based on which the initial technical expertise report was performed and included the current building in a class of seismic risk is no longer applicable, at the request of the owners / association of owners, in order to update the intervention measures so as to reduce the seismic risk, there may be carried out a new technical expertise report for the current building, in accordance with the framework content provided in the seismic Design Code / norm in force at the date of the request, financed from local budgets. The technical expertise report is accepted by the owners / owners' association in order to continue, in accordance with the law, the intervention actions for reducing the seismic risk of the current building, after the prior approval of the National Commission for Seismic Engineering within the Ministry of Regional Development and Public Administration;

c) sending the conclusions of the technical expertise report and the classification of the construction in a seismic risk class to the competent local public administration authorities, as well as to the National Agency for Cadaster and Real Estate Advertising, within 30 days from the date of receipt of the technical expertise report so as to ensure, in accordance with the law, the proper monitoring of actions meant to reduce the seismic risk, respectively the registration of the seismic risk class in which the current building was included, in part I of the land register of the building;

d) approval of the intervention decision and continuation of the actions defined in par. (6), depending on the fundamental conclusions of the technical expertise report.

(2) For constructions of public interest and utility in the portfolio of public institutions, as defined in Law no. 500/2002 on public finances, as subsequently amended and supplemented, and in Law no. 273/2006 on local public finances, with subsequent amendments and completions, and which belong to the public / private property of the state / administrative-territorial units, or as the case may be, to the private property of these institutions, the heads of public institutions will act, with priority, for:

a) the identification of constructions owned or managed before the entry into force of the Anti-seismic design standard P100-78 and which are located in localities for which the peak value of land acceleration for earthquake design a (g), according to the zoning map of Romania of the Seismic Design Code P100-1, approved by law, is greater than or equal to 0.16 g;

b) the mandatory technical expertise report of the constructions provided at let. a);

c) notifying the local public authorities, as well as the county committees, respectively the Bucharest municipality, about emergency situations regarding the constructions identified according to let. a), which were technically expertized and classified in class I of seismic risk by a technical expertise report.

(3) The provisions of par. (2) shall be applied accordingly by the other owners or administrators of the constructions defined as being of public interest or utility, for the purposes of this ordinance.

(4) The owners and, as the case may be, the administrators of public venues with another destination, located on the ground floor and, as the case may be, in the basement and / or other levels of multi-storey residential buildings, with more than Gf + 3 floors, built before 1978, have the obligation to act proportionally, in solidarity with the homeowners and the homeowners' association, for the performance of the technical expertise report of the strength

structure of the entire construction, within 2 years from the date of receipt of the notification provided in art. 4 para. (9) lit. b).

(5) For the purposes of this Ordinance, the phrases below have the following meanings:

a) public venues other than residential – venues created for the purpose of carrying out activities involving crowds of people, such as: performance halls, exhibitions, reading rooms, venues for trade, tourist accommodation / catering and services, social and medical assistance, public administration and the like, regardless of whether these venues are the result of the initial design of the building or, as the case may be, of subsequent arrangements;

b) buildings of interest and public utility - current buildings, which include venues where activities are carried out in areas of general and / or communal and social public interest and which involve the presence of a temporary or permanent public in the total exposed area.

c) rooms with crowds of people - rooms in which at least 50 people can be found simultaneously, each of them having a floor area of less than 4 m^2;

d) crowded room - (a distinct category of room with crowds of people) – a room or group of rooms that communicate directly with each other through (protected or unprotected) openings, in which the surface area available for each person is less than 4 m^2 and in which at least 150 people can meet (performance halls, meeting rooms, exhibition halls, museums, clubs, cinemas, trade areas, casinos, discos, etc.). When located on the ground floor, rooms with more than 200 people are considered crowded.

(6) For technically expertized buildings and classified in class I seismic risk by a technical expertise report, regardless of the form of ownership, use, category and class of importance, building owners, natural or legal persons, owners' associations, legal persons who manage buildings, as well as the heads of public institutions and owners with any title, of buildings of interest and public utility, all these will proceed to fulfill the obligations incumbent on them according to the civil law and the requirements for quality in buildings, and will:

a) carry out the design of intervention works by authorized natural or legal persons and these projects will be checked by certified technical verifiers, within 2 years from the date of receipt of the notification of classification in class I of seismic risk, of the expertized building;

b) have the intervention works done by authorized legal entities who have certified technical executives, including the monitoring, check and the reception of the intervention works by authorized site managers, within 2 years from the date of completion of the consolidation project.

(6 ^ 1) The organization and development of permanent and / or temporary activities is forbidden in the venues provided in art. 2 para. (5) lit. a) and the like, which involve crowds of people, until the completion of the intervention works carried out in order to increase the level of safety against seismic actions for the current building, which was classified by a technical expertise report in class I of seismic risk.

...

(8) In order to warn the population in areas at risk of earthquakes, the owners and, where applicable, the administrators of public venues with another destination located on the ground floor and, as the case may be, in the basement and / or other floors of technically certified buildings belonging to class I of seismic risk, have the obligation to make and place notification panels near the entrances to the respective venues within 60 days from the date of receipt of the technical expertise report.

...

C. Romanian Government Ordinance no. 925/20 of November 1995 for the approval of the Regulation on the check and technical expertise reports of projects, technical expertise report of the works to be performed and of buildings, as well as the check of the quality of performed works, with subsequent amendments and completions.

Art. Article 9 of that regulation provides:

(1) The technical expertise report of projects, of the works and buildings, hereinafter referred to as technical expertise, is a complex activity that includes, as appropriate, tests, surveys, analyzes and assessments, all necessary to determine the technical condition of an existing or unfinished building, as well as the way in which the construction works were carried out or the way in which a project complies with the technical regulations, in order to ensure the applicable fundamental requirements provided by law.

(2) The technical expertise report can also be performed in the following situations:

a) interventions to current buildings;

b) in the case of disasters or accidents due to natural or man-made factors or technological activities, in order to assess the technical condition of damaged buildings;

c) at the request of the contracting authority or the beneficiary regarding the project (s) or the works and buildings to be made;

d) for the assessment of current buildings in terms of seismic actions and, where appropriate, in order to establish intervention measures;

e) in order to determine the technical quality of certain projects.

Article 10 of that regulation provides that:

The technical expertise report is performed by certified expert / experts, in accordance with the law, on fields / subdomains of constructions and specialties for installations related to buildings, corresponding to the fundamental requirements, at the request, as appropriate, of owners, administrators, investors, authorities with control powers, courts and / or other interested parties.

Art. Article 11 of that regulation provides that:

(1) In case of special events due to natural or anthropic factors, according to the provisions of art. 26 par. (5) of Law no. 10/1995, republished, with subsequent completions, at the request of the State Inspectorate for Buildings - ISC or, as the case may be, of its own control structures within the institutions with attributions in the field of defense, public order and national security, provided in art. 34 of Law no. 10/1995, republished, with subsequent completions, in order to assess the technical condition of damaged buildings, it is mandatory to have the participation of certified technical experts in the fields / subdomains of buildings and specialties for installations related to buildings, corresponding to damaged building / buildings, in order to establish conditions of use, the continuation of use or decommissioning.

(2) If the technical expert concludes that immediate action is justifiably necessary to prevent accidents with serious consequences - human casualties or property damage, he or she shall inform the owner / administrator of the building or the investor, as the case may be, in writing, and the latter has the obligation to implement them.

Article 12 of that regulation provides that:

(1) The technical expert performs the technical expertise report in accordance with the provisions of the technical regulations applicable at the date of its implementation.

The works requested by the beneficiary for the assessment of the seismic performance of the existing building must comply with these provisions.

4.2 Assumptions and limiting conditions

The technical expertise report is based on a series of assumptions and limiting conditions, presented below. The opinion of the technical expert is expressed in accordance with these assumptions and conditions, as well as with the other assessments in this report.

Assumptions

The expert considers that the assumptions made in applying the methods to verify the quality of the works were reasonable, in the light of the facts that are available at the date of drafting this report.

When drafting the work, all the factors that influence the quality of the performed works were taken into account, using only the available information, none of them being deliberately omitted. There may be other information that the expert was not aware of at the time of the report. To the best of the expert's knowledge, all the held information is correct.

The building was viewed and personally inspected by the expert.

The expert presented descriptive parts in the report, in order to provide a complete picture of the real technical condition.

The expert will not be held accountable for the existence of hidden defects regarding the building and / or environmental factors that could influence the technical or economic condition of the building and, therefore, he or she cannot give any guarantee in this respect.

The expert did not inspect those parts of the building that are covered or inaccessible.

The expert has obtained information and opinions that have been highlighted in this report, from sources that he or she considers credible and does not assume any responsibility for the data provided by the beneficiary of this report and by third parties.

The expert has no interest at present or in the future in terms of the beneficiary of this report or in terms of other persons covered by this report.

The expert assumes full responsibility for the views expressed in this report.

Limiting conditions

The possession of a copy of this report does not imply the right to publish it.

The expert, by the nature of his or her work, is not obliged to continue to provide advice or to testify in court regarding the subject matter of this report, unless such agreements have been concluded in advance.

This report or parts thereof shall not be published or publicized without the prior consent of the expert.

4.3 Date of inspection

The inspection was carried out on Tuesday, 05.05 (May).2020 and Thursday, 07.05 (May).2020.

No investigations were carried out into the possible contamination of neighboring buildings, land or sites and the hidden parts of the building were not inspected and examined.

4.4 Liability to third parties

This expertise report shall be confidential, intended only for the purpose specified and only for the use of the beneficiary referred to in Chapter 3 of this report. The expert does not accept any responsibility towards another person (if the report is transmitted to another person), either for the stated purpose or for another purpose, under any circumstances.

4.5 Technical regulations used in the preparation of the technical expertise

For the elaboration of the technical expertise, the following standards and norms in force were used, namely:

Eurocodes

1. Basics of design

- SR EN 1990: 2004 - Eurocode: Basics of structure design
- SR EN 1990: 2004 / A1: 2006 / AC: 2010 – Eurocode: Basics of structure design
- SR EN 1990: 2004 / NA: 2006 - Eurocode: Basics of structure design. National Addendum

2. Actions upon buildings

- SR EN 1991-1-1: 2004 - Eurocode 1: Actions upon structures. Part 1-1: General actions, specific weights, own weights, payloads for buildings
- SR EN 1991-1-1: 2004 / AC: 2009 - Eurocode 1: Actions upon structures. Part 1-1: General actions, specific weights, own weights, payloads for buildings - Amendment
- SR EN 1991-1-1: 2004 / NA: 2006 - Eurocode 1: Actions upon structures. Part 1-1: General actions. Specific weights, own weights, payloads for buildings. National Addendum
- SR EN 1991-1-3: 2005 - Eurocode 1: Actions upon structures. Part 1-3: General actions. Snow loads
- SR EN 1991-1-3: 2005 / AC: 2009 Eurocode 1: Actions upon structures. Part 1-3: General actions. Snow loads - Amendment
- SR EN 1991-1-3: 2005 / NA: 2006 - Eurocode 1: Actions upon structures. Part 1-3: General actions. Snow loads. National Addendum
- SR EN 1991-1-4: 2006 Eurocode 1: Actions upon structures. Part 1-4: General actions. Wind actions
- SR EN 1991-1-4: 2006 / A1: 2010 - Eurocode 1: Actions upon structures. Part 1-4: General actions. Wind actions - Amendment
- SR EN 1991-1-4: 2006 / AC: 2010 - Eurocode 1: Actions upon structures. Part 1-4: General actions. Wind actions - Amendment
- SR EN 1991-1-4: 2006 / NB: 2007 - Eurocode 1: Actions upon structures. Part 1-4: General actions - Wind actions. National Addendum

3. Concrete structures

- SR EN 1992-1-1: 2004 Eurocode 2: Design of concrete structures. Part 1-1: General rules and rules for buildings
- SR EN 1992-1-1: 2004 / AC: 2008 - Eurocode 2: Design of concrete structures. Part 1-1: General rules and rules for buildings - Amendment
- SR EN 1992-1-1: 2004 / NB: 2008 - Eurocode 2: Design of concrete structures. Part 1-1: General rules and rules for buildings. National Addendum

4. Foundations

- SR EN 1997-1: 2004 - Eurocode 7: Geotechnical design. Part 1: General rules
- SR EN 1997-1: 2004 / AC: 2009 - Eurocode 7: Geotechnical design. Part 1: General rules - Amendment
- SR EN 1997-1: 2004 / NB: 2008 Eurocode 7: Geotechnical design. Part 1: General rules. National Addendum

5. Earthquake strength

- SR EN 1998-1: 2004 - Eurocode 8: Design of structures for earthquake strength. Part 1: General rules, seismic actions and rules for buildings
- SR EN 1998-1: 2004 / AC: 2010 - Eurocode 8: Design of structures for earthquake strength. Part 1: General rules, seismic actions and rules for buildings - Amendment
- SR EN 1998-1: 2004 / NA: 2008 - Eurocode 8: Design of structures for earthquake strength. Part 1: General rules, seismic actions and rules for buildings. National Addendum
- SR EN 1998-3: 2005 - Eurocode 8: Design of structures for earthquake strength. Part 3: Assessment and consolidation of buildings
- SR EN 1998-3: 2005 / AC: 2010 - Eurocode 8: Design of structures for earthquake strength. Part 3: Assessment and consolidation of buildings - Amendment
- SR EN 1998-3: 2005 / NA: 2010 - Eurocode 8: Design of structures for earthquake strength. Part 3: Assessment and consolidation of buildings

<u>Romanian standards</u>

1. Foundations

- STAS 6054/77 - Foundation land. Maximum depths of frost. Zoning of the territory of the Socialist Republic of Romania

<u>Norms:</u>

1. Basics of design

- CR 0 - 2012 - Design Code. Basics of designing structures in buildings

2. Actions upon buildings

- CR 1-1-3 - 2012 - Design Code. Assessment of the action of snow upon buildings
- CR 1-1-4 - 2012 - Design Code. Assessment of the wind action upon buildings

3. Concrete structures

- NE 012 / 1-2007 - Norm for the production of concrete and for works of concrete, reinforced concrete and pre-compressed concrete. Part 1: Concrete production
- NE 012 / 2-2010 - Norm for the production and for works of concrete, reinforced concrete and pre-compressed concrete. Part 2: Performance of concrete works
- CP 012 / 1-2007 - Code of practice for concrete production
- ST 009-2011 - Technical specification for steel products used as reinforcement: requirements and performance criteria

4. Foundations

- NP 112-2014 - Norm regarding the design of surface foundations

5. Earthquake strength

- P 100-1 / 2013 - Seismic Design Code - Part I: Design provisions for buildings
- P100-3 / 2019 - Seismic Design Code - Part III, Provisions for the seismic assessment of existing buildings

6. Quality check and the reception of building and installations works

- C 56-1985 - Norm for quality check and the reception of building works and related installations
- P 130-1999 - Norm regarding the behavior of buildings in time

<u>Laws:</u>

- Law no. 10 of January 18, 1995 - Law on quality in buildings, with subsequent amendments and completions
- Law no. 50 of July 29, 1991 on the authorization of the work of constructions and some measures for erecting buildings , with the subsequent modifications and completions;
- Order no. 839 of 12.10.2009 regarding the approval of the methodological norms for the implementation of Law no. 50/1991 regarding the authorization of building works
- Order no. 1867 of 16.07.2010 for the amendment and completion of the Methodological Norms for the implementation of Law no. 50/1991 regarding the authorization of building works
- Order no. 777 of May 26, 2003 for the approval of the technical regulations "Guide for the technical-professional attestation of the specialists who are active in buildings", with the subsequent modifications and completions
- Romanian Government Decision no. 925 of November 20, 1995 for the approval of the Regulation for check and technical expertise report of quality of projects, works to be performed and buildings, with subsequent amendments and completions
- Romanian Government Decision no. 766 of December 10, 1997 for the approval of some regulations regarding the quality in buildings, with the subsequent modifications and completions
- Decision no. 273 of June 14, 1994 - Regulation for the reception of building works and related installations, with subsequent amendments and completions
- Romanian Government Ordinance no. 20/1994 on securing the existing built portfolio

- Romanian Government Ordinance no. 67/28 August 1997 for the modification and completion of the Government Ordinance no. 20/1994 on securing the existing built portfolio (renamed Ordinance on measures to reduce the seismic risk of existing buildings)

4.6 Activities performed so as to draw up the technical expertise report

a) detailed visual inspection of the building and photographic survey;
b) reading documents related to the building, provided by the beneficiary;
c) building survey - the measurements were performed on the finished surface of the parts (the survey was made by the SACO CONSTRUCT SRL company in May 2020);
d) destructive and non-destructive testing of in-situ structural elements (made by the INSTAL TEST SRL company in May 2020)
e) the geotechnical study (made by the TERRA GAGE SRL company in May 2020)
f) structural calculation;
g) drafting the expertise report.

4.7 Data upon which the technical expertise report is based

The following documents were used to prepare the technical expertise:

1. The architectural survey, made by the SACO CONSTRUCT SRL company in May 2020.
2. Architectural memorandum, made by the SACO CONSTRUCT SRL company in May 2020.
3. The survey of the strength structure made by the SACO CONSTRUCT SRL company in May 2020.
4. Test reports on materials no. 888 of 25.05.2020 and no. 889 of 25.05.2020, made by the INSTAL TEST SRL company in May 2020.
5. Geotechnical study made by the TERRA GAGE SRL Company in May 2020.
6. Land book extracts for information, issued at requests no. 28437 and 28439 of 10.03.2020 by the Office of Cadaster and Real Estate Advertising of Bucharest.
7. Urbanism certificate no. 484 /1835344 of 28.04.2020, issued by the Bucharest City Hall.
8. The architectural project (written and drawn pieces), DALI phase, made by the CARPAŢI PROIECT SRL company in November 2012.
9. The project of the strength structure (written parts and drawn parts), DALI phase, made by the CARPAŢI PROIECT SRL company in November 2012.
10. Geotechnical study regarding the foundation conditions for the venue in 218 Calea Victoriei, District 1, made by the AGISFOR SRL company in April 2012.
11. Establishing the foundation conditions of the building in 218 Calea Victoriei, by uncovering the main types of existing foundations, in order to consolidate them. Documentation made by the AGISFOR company in December 2012.
12. The architectural project (written and drawn pieces), PT phase, made by the CARPAŢI PROIECT SRL company in December 2010.
13. The architectural project (written and drawn pieces), SF phase, made by the CARPAŢI PROIECT SRL company in December 2010.
14. The project of the strength structure (written and drawn parts), PT phase, made by the CARPAŢI PROIECT SRL company in December 2010.
15. The project of the strength structure (written and drawn parts), SF phase, made by the CARPAŢI PROIECT SRL company in December 2010.

16. The project of the strength structure (calculation notes), PAC phase, made by the CARPAŢI PROIECT SRL company in December 2005.

17. Technical expertise report on the consolidation of the old building (former IPCM), made by the CARPAŢI PROIECT SRL company in October 2005.

18. Technical expertise report on the consolidation of the new building (former IPCM), made by the CARPAŢI PROIECT SRL company in October 2005.

19. Geotechnical and geo-electric study referring to the “Consolidation of the AVAS building (former IPCM headquarters), 218 Calea Victoriei, District 1, made by the EXPERT-PROIECT GEO-HIDRO SRL company in November 2005.

20. Strength structure project (drawings), made by IPCM, in June 1984.

21. Information on the history of the site, the building works carried out, the physical condition, etc., provided by to the beneficiary.

These documents represent the theme data for the technical expertise, their correctness being the responsibility of the respective persons who issued the.

The subsequent modification of the theme data requires the revision and, if necessary, the corresponding modification of the conclusions and proposals in this report.

4.8 Non-publication clauses

The expertise report or any other reference thereto may not be published or included in a document intended for publicity without the prior written consent of the expert, specifying the form and context in which it is to appear.

Partial or full publication, as well as its use by persons other than those mentioned in chap. 3 of this technical expertise report entails the termination of the contractual obligations.

5. HISTORICAL DATA REGARDING THE BUILDING PERIOD AND THE LEVEL OF IMPLEMENTED DESIGN REGULATIONS

The building consists of two units: Unit A (the old building – the Banloc-Goodrich building) and Unit B (the new building).

Unit A was erected between 1943-1946 by the building company of the Dipl. Engineer "Emil Prager". The building was erected on the basis of technical knowledge and technological procedures specific to that era. It is also mentioned that the work was based on an architectural project (by Architect Octav Doicescu) and on a strength project (by Dipl Eng. Emil Prager). The construction system of the building is strictly "gravitational", without any seismic protection measures. The principles of anti-seismic design were not taken into account in the composition and compliance of the strength structure of the building.

The building has suffered degradation and damage during its existence, mainly caused by seismic actions.

In the period 1985-1986, the old building was consolidated up to the 6^{th} floor, following the project elaborated by Dipl. Eng. Alexandru Cişmigiu, based on the norms, standards and legislation in use at the time. In the composition and improvement of the strength structure, the principles of anti-seismic design established by Norm P100-81 were taken into account.

In the technical expertise report regarding the consolidation of the old building (former IPCM), drawn up by the CARPAŢI PROIECT SRL company in October 2005, the following were mentioned:

The old building was consolidated in 1984 and the works consisted of:

- Reinforcement on certain areas of the reinforced concrete frames on the two directions and the creation of new frames between certain pillars between which there were no connecting beams. Casings were made on 26 of the 55 pillars. The casings were made under the terrace, from a level of +21.95 m. in the lateral areas of 12 pillars, up to the level of +25.45 m. at 14 pillars.

- Reinforcement of the brickwork that had been previously damaged.

Unit B of the Building was erected between 1967 and 1968, based on norms, standards and legislation in effect on that date. In the composition and design of the strength structure the principles of anti-seismic design from the norm P13-63 were taken into account.

During its existence, the building (as a whole: units A and B) has undergone several repair and consolidation works (Unit A - 1985-1986 and, partially, Unit B - as mentioned above).

In the project made by the CARPAŢI PROIECT SRL company (December 2010 - PT phase) the following works were proposed (with small modifications when compared to the DALI phase of the project):

According to the conclusions stated in the Technical Expertise, for Unit A (main unit), due to the "age" of the building and the fact that it suffered the effects of significant earthquakes (1977, 1986, 1990) this unit does not comply with the requirements of strength and stability.

This unit was also consolidated in 1984, a consolidation that consisted of:

- strengthening reinforced concrete frames in certain areas and making new frames between certain pillars between which there were no connecting beams;

- casing 26 pillars out of the 55 existing ones;

- strengthening certain damaged masonry, inside.

Following the new expertise report, the degree of safety was determined on the two main directions, these being Rx = 0.28 and Ry = 0.54.

According to the rules in force, for an office building, the degree of safety must be at least 0.6 on the two main directions.

As a result of the above, it was proposed (see the conclusions of the expertise report) to increase the degree of safety by making rigid reinforced concrete pipes capable of ensuring the rigidity necessary to take over the forces induced by an earthquake.

These pipes have vertical continuity and are connected to the reinforced concrete "washer" at each level.

Unit "B" of the building, erected in the years 1960-1970, has the strength structure made of reinforced concrete (frames made of pillars and beams arranged in the two main directions).

The building does not present structural discontinuities, the dimensions of the parts being preserved, with small exceptions, from the ground floor to the top floor, and the parts do not present any aging sign, being in good condition.

The reinforcement of the parts does not correspond to current norms, especially in terms of ensuring sufficient ductility of the vertical and horizontal parts in potentially plastic areas, which could lead to brittle failures, which is quite normal, given the design philosophy specific to the 1960s., when the lateral seismic force was 0.05G compared to current norms, when the seismic force reaches 0.30G.

In order to increase the functional space, it was proposed to build a partial floor above the 5th floor. In order not to majorly influence the state of stress and stability of the current building, this level will have a light structure, made of metal frames that brace vertically and horizontally.

According to the conclusions of the expertise, the degree of safety of the building is 0.61 on the two main directions.

For its implementation the following works were proposed:

- Joint separation of unit "B" from unit "A" in the "g" axis;

- the introduction of reinforced concrete diaphragms along the entire height of the building in the "a", "g", "G" axes, in the transverse direction, respectively in axis VIII in a longitudinal direction;

- making a circulation node between the "g" and "a" axes by inserting a reinforced concrete staircase connected to the two diaphragms.

The project made by the CARPAŢI PROIECT SRL company (November 2012 – D.A.L.I. phase) proposed the following works:

Unit "A" of the Building

To increase the degree of safety, according to the expertise, by making rigid reinforced concrete tubes (marked as cores in the strength plans), able to ensure the strength and rigidity necessary to stand the forces induced by an earthquake and to insert two reinforced concrete slats in the D axis, for taking over the torsional effect induced by the shape of the building in the plan.

• Of these, the N1 and N6 cores are located at the two stairwells, the N5 and N2 cores will be the cages of the new elevators, and the N3 and N4 cores make the corners on the A-axis side. The slats N7 and N8 are positioned in the D axis, stuck into the inner face of the existing beams. Reinforcement with tubes and slats exist over the entire height of the current structure, depending on the height regime differentiated by areas.

• The conclusions and recommendations of the geotechnical study made by SC AGISFOR will be taken into account, which admits an increase of 30% in the calculation of pressure upon the field, due to the consolidation of the field, in time.

• The recommendations of the geotechnical study made by SC AGISFOR were brought to the attention of the technical expert, following that, after uncovering, the best technically and economically solution will be finalized, without requiring changes in the foundations of the exterior walls.

• Carrying out repair works, injections, local consolidations, etc.

• Building an external metal staircase (fire escape) that starts from the ground floor and leads to the attic.

• Replacing the wooden frame of the attic with a metal frame capable of taking on both gravitational and seismic loads.

Unit "B" of the Building

An increased the degree of seismic safety is achieved by:

• Joint separation of Unit B from Unit A, starting with the plate above the ground floor, by means of a new diaphragm, N9, that spreads upon the entire height of the structure.

• On the exterior walls (in axis 10 diaphragm N11 and adjacent to axis g - diaphragm N12) the intervention will be done upon the entire height of the structure.

• Restoration of the circulation node in axis 8'-10 / a-G.

• Making an N10 diaphragm in axis A, also casing the existing pillars.

Note that none of the projects elaborated in 2005, 2010 and 2012, mentioned above, reached the DE phase (except for the one in 2012, where some parts were detailed - the nuclei proposed for the consolidation of Unit A and the metallic structure of the 6th floor at Unit B) and no intervention work was carried out.

6. DESCRIPTION OF THE LOCATION

6.1 Legal status

The building that is the object of this technical expertise report, located in Bucharest, 218 Calea Victoriei, District 1, is owned by the Romanian State, with the right of administration ceded to the „ELIE WIESEL" NATIONAL INSTITUTE FOR THE STUDY OF THE HOLOCAUST IN ROMANIA, according to the extracts of the Land Book for information no. 28437 and 28439 of 10.03.2020 issued by the Office of Cadaster and Real Estate Advertising Bucharest.

On the left side of the building - as one looks at the building from Calea Victoriei (upon an area of ~ 1479 m² in the basement of the building, which represents ~ 14% of the developed area of the building, which has 10.397 m²) the basement is partly owned by CNTEE "TRANSELECTRICA" SA

The building is registered in the Land Book no. 209407 and is identified with cadastral number 209407-C1, according to the Land Book extract for information no. 28437 of 10.03.2020, issued by the Office of Cadaster and Real Estate Advertising of Bucharest.

The building is not on the list of historical monuments, as updated in 2015.

According to the Urbanism Certificate no. 484 /1835344 of 28.04.2020, issued by the Bucharest City Hall, the building is located in the protected area no. 16, a symbolic street of the city, Calea Victoriei, with a maximum degree of protection – architectural, urban, historical values and the natural environment is protected as a whole: the street network, built portfolio, as well as its character and urban value. Only interventions that preserve and enhance the current values are allowed.

6.2 Site topography

The construction which is the subject of this technical expertise report belongs to the building located in Bucharest, 218 Calea Victoriei, District 1. This construction is composed of land and several buildings, of which only units A and B are the object of the present technical expertise report.

It is mentioned that, in the inner courtyard, having an opening to the Puţul de Piatră street, over the basement floor, there are two buildings with height regime of Gf (A_c = 175 m^2) and Gf + F (A_c = 55 m^2), which are not the object this technical expertise report.

The land has an irregular shape and a double opening: towards Calea Victoriei, respectively towards the Puţul de Piatră Street. The surface of the land is 1950 m^2 as measured and 1947 m^2 in the documents (according to the land book extracts for information no. 28437 and 28439 of 10.03.2020, issued by the Office of Cadaster and Real Estate Advertising of Bucharest).

The terrain is flat, without uneven surfaces.

The property has the following vicinities:

- to the north, the construction at 220 Calea Victoriei, consisting of land and a building, with a blind wall towards the current building (Unit A) which is the subject of this technical expertise report;

- to the south, the construction at 216 Calea Victoriei, consisting of land and a building, with a blind wall towards the existing building (unit A and unit B) which is the subject of this technical expertise report;

- to the east, Puţul de Piatră street and private properties belonging to the buildings located on Puţul de Piatră Street, without a blind wall towards the current building which is the object of the present technical expertise report;

- to the west, Calea Victoriei.

The constructions with a blind wall towards the building at 218 Calea Victoriei, are separated by a gap from the building that is the object of the present technical expertise report.

6.3 Site features

The location is characterized by the following data:

Earthquake (under Design Code P 100-1 / 2013 and - Design Code P100-3 / 2019)

- terrain acceleration for design (for the horizontal component of terrain acceleration) - a_g = 0.30g = 2.95 ms^{-2}, for earthquakes with an average recurrence period IMR = 225 years - Bucharest, figure 3.1 and table A.1- Design Code P100-1 / 2013

- values of the control periods (corner) - TB = 0.32 s, Tc = 1.6 s, TD = 2.0 s - Bucharest, figure 3.2 and table A.1 - Design Code P100-1 / 2013

- the maximum dynamic amplification factor of the horizontal acceleration of the terrain by the structure, with the fraction from the critical shock absorption ξ = 0.05 - β_0 = 2.50 - Bucharest, figure 3.3 - Design Code P100-1 / 2013

- performance factor - q = 2.0 (a global performance factor was chosen):

  * Unit A: q = 2.0 (maximum value), building made of reinforced concrete frames, with several floors (Ug + Gf + 5F / W + GF + 8F + AT), with several openings, irregular in plane and vertically (we opted for a global performance factor of the structure) - table 5.1, Design Code P100-1 / 2013 and subchapter B.4.2.1, Design Code P100-3 / 2019;

  * Unit B: q = 2.5 (maximum value), building made of reinforced concrete frames, with several floors (Ug + Gf + 5F), with several openings, regular in plane and vertically - table 5.1, Design Code P100-1 / 2013 and subchapter B.4.2.1, Design Code P100-3 / 2019

- importance class and earthquake exposure - II, $\gamma_{I\ e}$ = 1,2, table 4.2 ("Buildings presenting a major danger to public safety in the event of collapse or serious damage, such as: (d) Multi-storey residential, office or commercial buildings with a capacity exceeding 300 persons in the total exposed area (f) Buildings belonging to the national cultural heritage, museums, etc. (k) Buildings with a total height above-ground of 28 to 45 m") - Design Code P100-1 / 2013

- the elastic response spectrum of absolute accelerations for the horizontal components of the on-site ground motion, $S_e(T)$ (în m/s^2), is defined as follows:

$$S_e(T) = a_g\ \beta(T)$$

where the value of a_g is given in m/s^2, and β (T) is the normalized elastic response spectrum of absolute accelerations:

$$0 \le T \le T_B \quad \beta(T) = 1 + \frac{(\beta_0 - 1)}{T_B} T = 1 + 4{,}69T$$

$$T_B \le T \le T_C \quad \beta(T) = \beta_0 = 2{,}5$$

$$T_C \le T \le T_D \quad \beta(T) = \beta_0 \frac{T_C}{T} = \frac{4{,}0}{T}$$

$$T_D < T \quad \beta(T) = \beta_0 \frac{T_C T_D}{T^2} = \frac{8{,}0}{T^2}$$

- the design spectrum for the horizontal components of the $S_d(T)$ ground motion (ordinate in m/s^2) is the inelastic response spectrum of the absolute accelerations, as defined by the equations:

* Unit A and B

$$0 \le T \le T_B \quad S_d(T) = a_g \left[1 + \frac{\left(\frac{\beta_0}{q} - 1\right)}{T_B} T \right] = 2{,}95(1 + 0{,}782T)$$

$$T_B \le T \le T_C \quad S_d(T) = a_g \frac{\beta(T)}{q} = a_g \frac{\beta_0}{q} = 3{,}68 \ \ge \ 0{,}2a_g = 0{,}59$$

$$T_C \le T \le T_D \quad S_d(T) = a_g \frac{\beta(T)}{q} = a_g \frac{\beta_0}{q} \frac{T_C}{T} = \frac{5{,}89}{T} \ \ge \ 0{,}2a_g = 0{,}59$$

$$T_D < T \quad S_d(T) = a_g \frac{\beta(T)}{q} = a_g \frac{\beta_0}{q} \frac{T_C T_D}{T^2} = \frac{11{,}78}{T^2} \ \ge \ 0{,}2a_g = 0{,}59$$

Snow (under Design Code CR 1-1-3-2012)

- the characteristic value of snow load on the ground: s_k = 2,0 kN/m^2 - Bucharest, figure 3.1 and table A.1
- the importance-exposure class for snow action: II γ_{is} = 1.10 - Table 4.1 ("Buildings presenting a major danger to public safety in the event of collapse or serious damage, such as: (d) Multi-storey residential, office or commercial buildings with a capacity exceeding 300 persons in the total exposed area (f) Buildings belonging to the national cultural heritage, museums, etc. (k) Buildings with a total above ground height of between 28 and 45 m")
- shape coefficient for snow load on the roof: μ_i = 0.8 - table 5.1 (0º < α <30º)
- exposure coefficient of the building site: Ce = 1.0 (normal exposure), table 4.2
- thermal coefficient: C_t = 1.0

Wind (under Design Code CR 1-1-4-2012)

- dynamic wind pressure reference value: q_b = 0,50 kN/m^2 - Bucharest, figure 2.1 and table A.1
- importance-exposure class for wind action: II,γ_{iw} = 1.15 - table 3.1 ("Buildings presenting a major danger to public safety in the event of collapse or serious damage, such as: (d) Multi-storey residential, office or commercial buildings with a capacity exceeding 300

persons in the total exposed area (f) Buildings belonging to the national cultural heritage, museums, etc. (k) Buildings with a total above ground height between 28 and 45 m")

- exposure factor at height z above the ground:

* Gf + 8F

c_e (z) = c_{pq} (z) c_r^2 (z) = 1.85 - for Z_{min} = 10 m <z = 36.10 m < Z_{max} = 200 m

* Gf + 5F

c_e (z) = c_{pq} (z) c_r^2 (z) = 1.54 - for Z_{min} = 10 m <z = 23.0 m < Z_{max} = 200 m

- aerodynamic pressure coefficient c_p = 0.8(zone D)

- aerodynamic suction coefficient c_p = 0.6 (zone E), c_p = 0.5 (zone E), c_p = 1.2(zone A), c_p = 0.8 (zone B) and c_p = 0.5 (zone C).

Foundation ground (according to the geotechnical study made by the TERRA GAGE SRL company in May 2020):

- land stratification (elevations relative to the basement floor):

± 0.00 m ÷ -0.20 m (-0.30 m)

- concrete slab;

-0.20 m (-0.30 m) ÷ -7.30 m (-7.50 m)

- layer of granular material consisting of sand and gravel sand, brown to gray, of average density (type I package);

-7.30 m (-7.50 m) ÷ -12.00 m

- layer of cohesive material made of brown clay, plastic to viscous consistency down to the base of the boreholes (type II package);

- hydrostatic level: groundwater was found at a depth of 3.30 m ÷ 3.60 m;
- frost depth: 0.80 m ÷ 0.90 m, according to STAS 6054/77;
- conventional base pressure: 400 kPa for type I package.

Foundation ground (according to the geotechnical study made by the AGISFOR SRL company in April 2012):

- land stratification (relative elevations to basement elevation):

± 0.00 m ÷ -1.90 m -layer of heterogeneous, dusty, gray filling with remnants of building materials;

-1.90 m ÷ -4.60 m - layer of dusty clays, brown, viscous and clayey, brown, thick sands (Bucharest Clays);

-4.60 m ÷ -11.00 m - layer of gravel sands, gravels, brown, dense sands (the so –called Colentina layers);

-11.00 m ÷ -15.60 m - layer of yellow-gray, green clays, with concretes and viscous calcareous areas (intermediate layers);

- hydrostatic level: groundwater was found at a depth of 6.20 m, being weakly carbonic in its aggressiveness on concrete and significantly corrosive to metals;
- frost depth: 0.80 m ÷ 0.90 m, according to STAS 6054/77;
- conventional basic pressure: 400 kPa, in the foundation layer represented by the layer of dense gravel sands.

The Foundation ground (according to the geotechnical and geo-electric study made by the EXPERT-PROIECT GEO-HIDRO SRL company in November 2005):

- land stratification (relative elevations to the land elevation):

± 0.00 m ÷ -3.60 m (-4.00 m)

- layer of filling made of rubble, with scrap building materials or sandy filling with fragments of bricks;

-3.60 m (-4.00 m) ÷ -11.10 m (-11.90 m)

- layer of fine - average sands with parts of small gravel and average-large sand, with a different gravel, this material being dense.;

-11.10 m (-11.90 m) ÷ -21.50 m (-32.00 m)

- layer of “intermediate clay"(fatty, plastic viscous clays, gray and yellow clays),with a plastic viscosity with levels of sand clays etc.);

- hydrostatic level: groundwater was found at a depth of 5.50 m; the groundwater level has variations from ± 1.00 - 1.5 m, depending on the rain regime;
- frost depth: 0.80 m ÷ 0.90 m, according to STAS 6054/77.

7. CLASSIFICATION OF THE BUILDING UNDER CLASSES AND CATEGORIES OF IMPORTANCE

In order to assess the human and economic consequences that may be caused by a major natural and / or anthropic hazard, as well as their role in post-hazard response activities of the company, the building is included in the importance-exposure class II - Buildings which presents a major danger to public safety in case of collapse or serious damage (according to "Design Code. Basics of building design", indicative CR 0 - 2012, Addendum A1).

In order to assess the level of seismic protection of the building, the building is included in the importance class II - *Buildings presenting a major danger to public safety in the event of a collapse or serious damage* (according to “Seismic Design Code - Part I - design provisions for buildings”, indicative P100-1 / 2013, table 4.2).

In order to evaluate the action of snow upon buildings, the building is included in the importance-exposure class II - Buildings that present a major danger to public safety in case of collapse or serious damage (according to "Design Code. Assessment of the action of snow upon buildings", indicative CR 1-1-3 - 2012, table 4.1).

In order to evaluate the wind action upon buildings, the building is included in the importance-exposure class II - Buildings that present a major danger to public safety in case of collapse or serious damage (according to "Design Code. Assessment of wind action upon buildings", indicative CR 1-1-4 - 2012, table 3.1).

In order to evaluate the designed lifespan of the building structure, the building is included in the structural class S4 - Structures for buildings and other current buildings, with a lifespan of 50÷100 years (according to "Design Code. Basics of building design", indicative CR 0 - 2012, table 2.1).

In order to differentiate the quality system in buildings, the building is included in the category of importance C - Buildings of regular importance (according to GD 766/1997, Addendum 3).

In order to evaluate the degree of exposure of the building to environmental conditions (according to the Norm for concrete production and for works of concrete, reinforced concrete and pre-compressed concrete. Part 1: Concrete production, indicative NE 012 / 1-2007 and Code of practice for concrete production, indicative CP 012 / 1-2007), the building is included in the following exposure classes: XC1 (superstructure - inside), XC4 (superstructure - outside) and XC2 (infrastructure).

The proposed intervention works do not change the classes and the category of importance of the building.

8. DESCRIPTION OF THE BULDING FROM THE FUNCTIONAL POINT OF VIEW, ITS ARCHITECTURE AND INSTALLATIONS

Unit A of the building was erected between 1943-1946 and was consolidated up to the 6th floor between 1985-1986. Unit B was erected in 1967-1968.

In plan, the building as a whole has an irregular shape, with maximum dimensions of 48.64 mx 50.09 m. The built surface of the building is 1311.16 m^2 (according to the land book extracts for information no. 28437 and 28439 of 10.03.2020, issued by the Office of Cadaster and Real Estate Advertising of Bucharest), and the developed surface is of 8918 m^2 (only the part of the building that is under the administration of the „ELIE WIESEL” NATIONAL INSTITUTE FOR THE STUDY OF THE HOLOCAUST IN ROMANIA) and of 10397 m^2 (the whole building - together with the Unit belonging to CTEE ”TRANSELECTRICA” SA). Unit A has a “U” shape, with maximum dimensions of 41.13 m x 33.58 m, a built area of 1028 m^2, and a developed area of approximately 6994 m^2 (only the part of the building that is under the administration of the „ELIE WIESEL” NATIONAL INSTITUTE FOR THE STUDY OF THE HOLOCAUST IN ROMANIA). Unit B has an irregular shape, with maximum dimensions of 24.18 m x 12.55 m, a built surface of 283 m^2 and a developed area of approximately 1924 m^2.

The height regime of the building is: basement (h = 3.80 m), ground floor (h = 4.50 m), floor 1 ÷ floor 7 (h = 3.50 m), floor 8 (h = 4.80 m) and attic (h_{free} = 1.75 m ÷ 3.60 m).

The building consists of a single section on the height of the basement and ground floor, and, starting with the 1st floor, it is divided into two units: Unit A and Unit B. The building as a whole is attached to the blind wall on the left side (as one regards the building from Calea Victoriei) of the construction belonging to the building from 220 Calea Victoriei. On the right side, it is attached to the constructions belonging to the building from 216 Calea Victoriei, being free in the remaining sides. The buildings are separated by gaps.

Functionally, the building is intended for office spaces. Currently, the building is not being used and is not maintained.

From an architectural point of view, the building is in an unsatisfactory technical condition. On the outside, on the facades, the plaster has cracks, fissures, dry stains from previous dampness and exfoliation. Inside, the unit also has cracks, fissures, dry stains from previous dampness and mold, as well as exfoliated and peeled plaster.

The building has water-sewerage installations, electrical lighting installations and sockets, heating installations and gas installations. No installation is connected to municipal networks.

9. DESCRIPTION OF THE BUILDING FROM THE STRUCTURAL POINT OF VIEW

Unit A was erected between 1943-1946 and was consolidated up to the 6th floor in 1985-1986. Unit B was erected in 1967-1968.

In plan, the building as a whole has an irregular shape, with maximum dimensions of 48.64 m x 50.09 m. Unit A has a “U” shape, with maximum dimensions of 43.61 m x 33.58 m, and Unit B has an irregular shape, with maximum dimensions of 24.18 m x 12.55 m.

The height regime of the building is Ug + Gf + 8F + At - unit A, partially, and Ug + Gf + 5F - unit A, partially, and unit B.

The building consists of a single section upon the height of the basement and ground floor, and, starting with the 1st floor, it is divided into two units: Unit A and Unit B. The building as a whole is attached to the blind wall on the left side (as one regards the building from Calea

Victoriei) to the construction belonging to the building at 220 Calea Victoriei. On the right side, it is attached to the constructions belonging to the building from 216 Calea Victoriei and is free on the remaining sides. The buildings are separated by gaps.

Foundations are made of reinforced concrete (according to geotechnical studies made by the TERRA GAGE SRL company in May 2020, and by the AGISFOR SRL company in April 2012 and in December 2012) and belong to the "insulated" type under the pillars and to the "continuous" type under the brick walls.

The continuous foundations have a width of ~ 1500 mm in Unit A and ~ 800 mm in Unit B. In Unit A, in axis 9, the width of the foundation is 2450 mm. The foundation elevation is -4.70 (from the elevation ± 0.00 of the ground floor), and -0.80 m respectively (from the upper elevation of the reinforced concrete slab of the basement), in the layer of granular material consisting of sand and gravel sand, brown to gray, of an average density (type I package), according to the Geotechnical Study made by the TERRA GAGE SRL company in May 2020, or in the layer of gravel sands, sand gravels, brown, in a dense state (the so-called Colentina layers), according to the geotechnical study made by the AGISFOR SRL company in April 2012 and in December 2012.

The insulated foundations have a square shape. The foundation level is -5.00 (from the level ± 0.00 of the ground floor), respectively -1.10 m (from the upper level of the reinforced concrete slab of the basement), in the layer of granular material consisting of sand and gravel sand, brown to gray, of average density (type I package), according to the Geotechnical Study made by the TERRA GAGE SRL company in May 2020, or in the layer of gravel sands, sand gravels, brown, in a dense state (the so-called Colentina layers) according to the geotechnical study made by the AGISFOR SRL company in April 2012 and in December 2012.

The basement is made of reinforced concrete frames and perimeter brick walls. The pillars have a rectangular, square and circular section, with various dimensions (according to the strength survey pl. R1 and R2). The floor is made of reinforced concrete and consists of main beams, secondary beams and slabs with a thickness between 100 mm ÷ 300 mm (dimensions according to the strength survey pl. R1 and R2). For the basement floor, a slab made of reinforced concrete, with a thickness of ~ 300 mm, was provided. No ballast was provided for under the concrete supporting plate.

The superstructure is made of reinforced concrete frames. The pillars have a rectangular, square and circular section, with various dimensions (according to the strength survey pl. R3 ÷ R11). The floors are made of reinforced concrete (with the exceptions mentioned below) and are made up of main beams, secondary beams and slabs (according to the strength survey pl. R3 ÷ R11). The 250 mm thick floors are mixed and made of reinforced concrete beams, ceramic blocks and, probably, an over-concreting whose thickness is not known (according to the strength survey pl. R3 ÷ R11).

The roof is both of the attic type (Unit A, partially - elevation +32.80 - concrete elevation), being made up of a wooden frame and sheet metal roofing, and of the circulating terrace type (Unit A, partially, and Unit B - elevation + 21.90 - concrete elevation), being made up of a reinforced concrete floor.

Compartments are made of brick masonry walls with a thickness of 560 mm, 420 mm and 280 mm (without plaster), wooden walls and metal walls (with windows).

Enclosures are made of brick masonry walls with a thickness of 560 mm, 420 mm and 280 mm (without plaster).

Vertical circulation is assured by two reinforced concrete stairs (Gf ÷ F5, B ÷ F5 and F5 ÷ M) and two elevators (Gf ÷ F5 and B ÷ F8) - unit A, as well as a reinforced concrete staircase (B ÷ F6) - unit B.

In 1985-1986, Unit A was consolidated between the basement and the 6th floor, by using reinforced concrete casings at a few columns and beams (according to the project of the strength structure, drawn up by the IPCM company in June 1984 and to the strength structure survey made by the SACO CONSTRUCT SRL company in May 2020). Also, from the on-site inspection and from the survey of the strength structure, drawn up by the SACO CONSTRUCT SRL company in May 2020, only the SJ12 pillar (Unit B) was reinforced by using a reinforced concrete casing, up to the middle of the 2nd floor.

The dimensions of the structural elements were established on the basis of the documentation provided to us and, in part, on the basis of direct measurements.

10. DESCRIPTION OF THE BUILDING STATE AT THE DATE OF ASSESSMENT

The building performed satisfactorily to the actions it was subjected to during its operation.

We did not notice:

a) changes in the position of construction objects in relation to their implantation environment, manifested:

- directly, by visible displacements (horizontal, vertical or inclinations);
- by visible side effects:

    * detachment of sidewalks, stairs and other annex parts, from the base or unit of the building, or the appearance of gaps, fissures, cracks or detached materials;

    * the appearance of cracks and fissures in the continuity areas of the parts of building or closing of gaps of different types between the parts of the building, building sections; progressive closing of the holes at ground level by submerging the building object;

b) changes in the shape of construction objects, manifested:

- directly, by visible vertical, horizontal deformations and rotations;
- by side effects, such as stiffening of doors or windows, distortion of the route of installation pipes, bending of bars or other constructive parts;

c) defects and degradations with implications on the functionality of construction objects:

- clogging of leaks (pipes, gutters, drains, sewers);
- opening of functional gaps, etc.;

d) defects and degradations in the strength structure with implications on the safety of construction objects:

- fissures and cracks;
- corrosion of metallic parts (with the exceptions presented below) and of the reinforcing at reinforced concrete parts;
- defects manifested by stains, cracks, exfoliations, erosions, etc;
- buckling of certain compressed components or the breaking of spread ones;
- decay or weakening of the wooden parts following a biological attack (with the exceptions presented below).

We noticed:

a) changes in the degree of protection and comfort offered by the building:

- in terms of sound, heating and water repellent insulation, manifested by local damage to the brick masonry walls and roof;

- aesthetically, manifested by wet surfaces, water infiltration, exfoliation, fissures and cracks in the protective layers (plaster walls and ceilings; partially collapsed false ceilings in the attic), changed color of surfaces (plaster of the walls and floors);

- the appearance of condensation, fungi and unpleasant molds;

b) defects and degradations in the strength structure with implications on the safety of construction objects:

- corrosion of metallic parts (metal beams on which the roof frame rests, partially);

- rotting or weakening of the wooden parts following a biological attack (partially on elements of the wooden roof frame) and the partially collapsed decking at the roof frame.

It is mentioned that the strength structure is visible to a very small extent.

There are deficiencies in the composition and design of the building. Over time, the building has suffered a series of degradations and damages, the causes and effects of which will be presented below.

There are major visible works of intervention upon the building (capital repairs and consolidations - in the period 1985-1986, the old building - Unit A - was consolidated up to the 6th floor). It is probable that, over time, other intervention works were carried out upon the building (current repairs, arrangements, etc).

<u>a) The effects of past seismic actions</u>

During its existence, the building has suffered the effects of several major earthquakes, the maximum intensities of which are given in the table below.

Table - Maximum intensities for major Vrancea epicenter earthquakes reported on site

Date (Dd-mm-yy)	Origin time GMT (HMS)	Epicenter coordinates		Depth h (Km)	magnitude	DH (km)	DE (km)	Io (MSK)	IA (MSK)
		Lat. N	Long. E						
04.03.1977	19:21:56	45.340	26.300	109	7.2	141	89	8.5	7.8
30.08.1986	21:28:37	45.530	26.470	133	7.0	174	113	8.0	7.3
30.05.1990	10:40:06	45.820	26,900	91	6.7	180	155	8.0	6.2
31.05.1990	0:17:48	45.830	26.890	79	7.0	174	155	7.0	4.9

Caption:
DH - hypocentral distance
DE - epicentral distance
I_0 - hypocentral intensity
I_A - intensity on site
h - depth of focus

No details are known about the building's behavior during these earthquakes.

In the technical expertise report regarding the consolidation of the old building (former IPCM), drawn up by the CARPAŢI PROIECT SRL company in October 2005, the following were mentioned:

7. Description of degradation and damage caused by earthquakes the building was subjected to

From the research we carried out, it was found that, following the earthquake of March 1977, damages occurred, consisting of the cracking of a few walls on both directions, as well as of the strength elements. Major repairs were carried out. No major cracks appeared during the 1986 and 1990 earthquakes. In this sense, it should be mentioned that, on the entire height of the buildings, the masonry was only partially dislocated at the last levels.

In chapter 5 of this technical expertise report, it was mentioned that, in the period 1985-1986, the old building was consolidated up to the 6th floor, the consolidation principles being briefly presented in the technical expertise report made by the CARPAŢI PROIECT SRL company in October 2005 (these being resumed in Chapter 5 of this technical expertise, as well). The works were based on the project of the strength structure drawn up by the IPCM company in June 1984.

In the technical expertise report regarding the consolidation of the new building (former IPCM), drawn up by the CARPAŢI PROIECT SRL company in October 2005, the following were mentioned:

7. Description of degradation and damage by earthquakes sustained by the building

Our research found that the March 1977 earthquake did not cause major damage. Minor repair works were carried out (a pillar and part of the masonry). No cracks appeared during the 1986 and 1990 earthquakes. In this sense, it should be mentioned that the masonry was not dislocated on the entire height of the buildings.

Following the investigations carried out upon the building, it was found that it displays degradation and damage (presented above). Some of these degradations and damages are visible. The complete identification of the state of degradation and damage can be done only after removing all the plasters.

<u>b) Other effects</u>

There are degradations of the building that have other causes than those produced by the seismic actions. These have been presented in detail above.

It is also mentioned that the building is not currently used and is not properly maintained.

<u>c) Physical and chemical degradation of the structure materials</u>

It is not known whether the materials of the strength structure display physical and chemical degradation (except for those mentioned above). The complete identification of the state of degradation can be made only after the removal of the plasters.

11. RESULTS OF VARIOUS INVESTIGATIONS FOR DETERMINING THE STRENGTH OF MATERIALS

The geotechnical study for the foundation land was made by the TERRA GAGE SRL company in May 2020. Its conclusions were presented at point 6.3 of this technical expertise report. Also at point 6.3 of this technical expertise, we presented the conclusions of the geotechnical study made by the AGISFOR SRL company in April 2012, as well as the conclusions of the geotechnical and geo-electric study issued by the EXPERT-PROIECT GEO-HIDRO SRL company in November 2005.

According to the Test Reports on materials no. 888 of 25.05.2020 and no. 889 of 25.05.2020, made by the INSTAL TEST SRL company, for the strength parts made of reinforced concrete (pillars, beams and slabs) the following materials were used:

- unit A
  * concrete class - C12 / 15 (pillars, beams and slabs on the ground floor and upper floors);
    - C16 / 20 (a pillar on the ground floor and a beam at the 1st floor);
    - C20 / 25 (two pillars on the ground floor);
  * steel class - S255 - OB37 (longitudinal and transversal reinforcements - clamps - in columns and beams, and horizontal reinforcements in plates);
    - S345, S355 - PC52 (longitudinal reinforcements in pillars and beams - parts reinforced by casing);
- Unit B
  * concrete class - C12 / 15 (pillars, beams and slabs on the ground floor and floors);
    - C20 / 25 (two pillars on the floors);
  * steel class - S255 - OB37 (longitudinal and transversal reinforcements - clamps - in pillars and beams, as well as horizontal reinforcements in plates).

These materials were commonly used during that period and were in accordance with the standards and regulations in force at the time of design and work. It is mentioned that these materials are currently used, as well, and comply with the standards and regulations in force.

In the technical expertise report regarding the consolidation of the old building (former IPCM), drawn up by the CARPAŢI PROIECT SRL company in October 2005, the following were mentioned:

9. Material quality investigations (method E_{2a})

For the old building, we have at our disposal the tests made in 1984 on the old structural elements, as well as the brand of concrete used in the consolidation.

For elements of the old (unconsolidated) building:

- concrete B90, B100, i.e. the equivalent of Bc 7.5;

- OB37 reinforcement.

For consolidated elements:

- B 300 concrete, i.e. the equivalent of Bc 25;

- PC52 reinforcement.

In the technical expertise report regarding the consolidation of the new building (former IPCM), drawn up by the CARPAŢI PROIECT SRL company in October 2005, the following were mentioned:

9. Material quality investigations (method E_{2a})

For elements of the new building:

- Concrete Bc 15;

- PC52 reinforcement.

12. ESTABLISHING THE ASSESSMENT METHODOLOGY AND ITS CALCULATION METHODS

The establishment of the assessment methodology is made on the basis of the following criteria (according to “Seismic Design Code - Part III, Provisions for the seismic assessment of existing buildings ", indicative P100-3 / 2019):

1. Technical knowledge during the performance of the project and erection of the building

The building consists of two units: Unit A (old building) and Unit B (new building).

Unit A was erected between 1943-1946, by the building company of Dipl. Engineer "Emil Prager". The building was erected on the basis of technical knowledge and technological procedures specific to that era. It is also mentioned that the work was based on an architectural project (Architect Octav Doicescu) and a strength project (Dipl. Eng. Emil Prager). The construction system of the building is strictly "gravitational", without any seismic protection measures. The principles of anti-seismic design were not taken into account in the composition and compliance of the strength structure of the building.

In the period 1985-1986, the old building was consolidated up to the 6th floor, following the project elaborated by Dipl. Eng. Alexandru Cişmigiu, based on the norms, standards and legislation in force at that time. In the composition and compliance of the strength structure, the principles of anti-seismic design from the norm P100-81 were taken into account.

Unit B was erected between 1967 and 1968, based on the norms, standards and legislation in force at that time. In the composition and compliance of the strength structure, the principles of anti-seismic design from the norm P13-63 were taken into account.

2. Complexity of the building, especially from a structural point of view, defined by dimensions (openings, height), regularity, etc.

The structural system has been identified in its entirety. It is a structure made of reinforced concrete frames. The openings are moderate in the two orthogonal directions (3.00 m ÷ 6.57 m - Unit A and 2.18 m ÷ 7.76 m - Unit B, in the longitudinal direction; 2.45 m ÷ 5.86 m - Unit A and 1.48 m ÷ 7.00 m - Unit B, in the transversal direction). Level heights are also moderate (h = 3.50 m ÷ 4.50 m). The building and its strength structure are irregular both horizontally and vertically.

3. Data available for the assessment (level of knowledge)

The level of knowledge is limited - KL1:

- geometry - complete survey of the building and of the project of the strength structure (consolidation), drawn up by the IPCM company in June 1984;
- detailed composition - based on the simulated design in accordance with the practice at the time of erecting the building, based on a limited inspection in situ and on the design of the strength structure (consolidation), made by the IPCM company in June 1984;
- materials - values established on the basis of valid standards, on the basis of building practices during the erection, from limited field tests, from a limited field inspection and from the design of the strength structure (consolidation), made by the IPCM company in June 1984;
- calculation - MRS (modal calculation with response spectrum);
- confidence factors - 1.35.

4. Function, importance and value of the building

The function of the building is that of office space.

The importance class of the building is II.

5. Seismic hazard conditions on site, seismic acceleration values for design, a_g, local terrain conditions.

The acceleration of the terrain for design is a_g = 0.30g = 2.95 ms^{-2}, for earthquakes with the average recurrence interval IMR = 225 years (Bucharest - Design Code P100 / 1-2013).

The values of the control periods (corner) are: T_B = 0.32 s, T_c = 1.6 s, T_D = 2.0 s (Bucharest - Design Code P100 / 1-2013).

6. Type of structural system

The superstructure is made of reinforced concrete frames.

7. The basic requirements established for the building

The fundamental requirements used for the seismic assessment of the existing building are: *life safety requirement* (associated to the state of ultimate limit - SLU) and the *limit degradation requirement* (associated with the state of service limit - SLS), for the seismic action having IMR = 225 years.

8. Purpose of the technical expertise report

The purpose of this technical expertise report is:

- to assess the seismic performance of the current building;
- to substantiate and propose the intervention decision necessary to reduce seismic risk and to fix the other categories of damage.

The following mentions are made in the Design Code P 100-3 / 2019:

2.3 Assessment methodologies

(1) P100-3 sets out three methodologies for assessing buildings, which are different in terms of complexity, being defined by their conceptual basis, their level of refinement of calculation methods and the level of detail of checking operations:

(a) Level 1 methodology, of low complexity;

(b) Level 2 methodology, of average complexity;

(c) Level 3 methodology, of high complexity.

2.3.2. Level 2 methodology

(1) The level 2 assessment methodology can be applied to buildings with any type of structure, belonging to any class of importance-exposure to earthquakes.

...

(4) The level 2 methodology involves:

(a) the qualitative assessment of the building on the basis of the criteria of compliance, composition and detail of the buildings, and the level of degradation - the lists of conditions are provided in the addenda specific to the structures of different materials.

(b) quantitative assessment based on a linear static structural calculation and performance factors.

...

2.3.3. Level 3 methodology

(2) The level 3 methodology may not be applied to buildings where, following the collection of data for structural assessment, the level of knowledge is KL1, according to 4.3. The recommended level of knowledge for this methodology is KL3.

Based on the above criteria and observations, the methodology of level 2 (of average complexity) is chosen for quantitative assessment, by calculation, as well as for qualitative assessment.

The intervention works proposed by this expertise report do not change the importance classes and the importance category of the building.

13. SEISMIC ASSESSMENT OF THE CURRENT BUILDING

The following mentions are made in the Design Code P100-3 / 2019:

The seismic assessment of buildings consists of a set of operations based on which the susceptibility of seismic damage is established, in relation to the seismic hazard at the site, corresponding to the limit states for which the assessment is made and to the importance-exposure to earthquake class of the building.

and

The operations that make up the building assessment process can be grouped into two categories, which are:

(a) qualitative assessment;

(b) quantitative assessment, by calculation.

13.1 Qualitative assessment

The following mentions are made in the Design Code P100-3 / 2019:

Qualitative assessment refers to:

(a) the general compliance of the structure and detailing of the structural and non-structural elements;

(b) structural and non-structural degradation.

The components of the qualitative assessment regarding the *composition of the building* are the following:

a) Conditions regarding the overall composition
- a.1) Load path
- a.2) Redundancy
- a.3) Criteria for vertical regularity
- a.4) Criteria for regularity in the plan

b) Conditions regarding building interactions
- b.1) Distance from neighboring buildings
- B.2) Split levels
- b.3) Non-structural components

c) The diaphragm action of the floors

d) Conditions regarding the composition of the structural elements

e) Conditions regarding the infrastructure and the foundation land

In case of applying the level 2 methodology for reinforced concrete structures, the criteria for qualitative assessment are set out below.

The establishment of indicator R1 is made on the basis of the list of conditions set out in table B.2, from the Design Code P100-3 / 2019.

1. Conditions regarding the configuration of the structure

1.1 The structure has vertical continuity (vertical parts are continuous down to the foundations)

All reinforced concrete pillars have vertical continuity down to the foundation.

The criterion is **met**.

1.2 The structure is redundant

The composition of the strength structure (both the construction system and, partially, the materials used) ensures a relatively favorable structural mechanism for dissipating energy under high intensity seismic actions.

In the qualitative assessment one takes into account the fact that this checking could be done only partially - consolidated parts (one could not verify whether all connections are properly sized: anchorage lengths of the reinforcements, overlapping joint lengths of the reinforcements, strength of the nodes, etc.).

The criterion has a **moderate failure**.

1.3 The structure has similar features of strength and stiffness at all levels above the theoretical embedding height

The structure has weak levels in terms of lateral strength (Unit A has been strengthened up to the 6th floor and has two major withdrawals at this level).

The structure has flexible levels (Unit A has been consolidated up to the 6th floor and has two important withdrawals at this level).

The criterion has a **moderate failure**.

1.4 The structure has similar dimensions in plan at all levels above the theoretical embedding height

The structural system does not develop monotonously on the vertical:

- from the 1st floor, the two units (A and B) become independent;
- Unit A has two important withdrawals on the 6th floor;
- Unit B does not continue over the 5th floor.

The criterion has a **moderate failure**.

1.5 The building has a uniform vertical distribution of the masses at all levels above the theoretical embedding height (differences between level masses are less than 30%)

There are differences between the level masses higher than 30% - Unit A has two important withdrawals on the 6th floor.

The criterion has a **moderate failure**.

1.6 The structure is regular in plane, the overall torsional effects are moderate

In plane, the building and its strength structure have an unfavorable shape: it has major withdrawals, with an uneven distribution of volumes, masses and rigidities. These properties lead to the amplification of the unfavorable effects of general torsion under the seismic action.

The criterion has **a major failure**.

1.7 The structure has an adequate and compatible infrastructure with the foundation ground

The infrastructure is a relatively rigid and resistant whole, able to send to the ground both the vertical and horizontal forces in relatively good conditions - no degradations and damages to the infrastructure caused by earthquakes were highlighted because of past earthquakes, but there are no reinforced concrete walls in the basement, only brick masonry, arranged on the perimeter of the building and, to a small extent, inside it - only on the right wall of the building, as one looks at the building from Calea Victoriei.

The qualitative assessment shall take into account the fact that this verification could only be done partially.

The criterion has a **moderate failure**.

1.8 The quality of concrete and steel is consistent with the provisions of P 100-1

The quality of concrete and steel is only partially in compliance with the provisions of Design Code P 100-1 (concrete of a class at least C20 / 25 and profiled steel, except for closed clamps and clips, with specific elongations corresponding to the maximum stress of at least 7.5% - class C, in critical areas, respectively class B outside of the critical areas).

Unit A:	initial structure	- C8 / 10 concrete;
		- steel (for reinforcement) OB37;
	consolidated parts	- C20 / 25 concrete;
		- steel (for reinforcement) PC52.
Unit B:	initial structure	- C1 concrete 2/15;
		- steel (for reinforcement) PC52.

The qualitative assessment shall take into account the fact that this verification could only be done partially.

The criterion has a **moderate failure**.

1.9 Dimensions of structural elements and their reinforcement allows the development of a plasticization mechanism with an optimal capability of seismic energy dissipation

The qualitative assessment takes into account the fact that this checking could be done only partially – at the consolidated parts.

The criterion has a **moderate failure**.

Max points:	**45 pct.**
Total achieved score:	**24 pts.**

2. Conditions regarding the interactions of the structure

2.1 The distances between the assessed unit and the neighboring buildings are large enough to prevent the degradation of the buildings due to the uncontrolled interaction.

The building consists of a single section upon the height of the basement and ground floor, and, starting with the 1st floor, it is separated into two units: A and B. The building as a whole is attached to the blind wall both on the left side and on the right side (as regards the building in Calea Victoriei) and is free on the other sides. The buildings are separated by gaps.

The qualitative assessment takes into account the fact that this verification could only be done partially (the dimensions of the gaps could not be measured; no degradation of the building was highlighted as a result of a possible interaction).

The criterion has a **moderate failure**.

2.2 Intermediate floors (split levels) have their own side structure or are properly anchored to the main structure.

The building has no intermediate floors (split levels).

The criterion **is met**.

2.3 The interaction of non-structural walls with the structure is controlled, does not cause significant degradation to them or to adjacent structural elements and does not alter the nature of the response of the structure as a whole.

According to the technical expertise report regarding the consolidation of the old and of the new building (former IPCM), drawn up by the CARPAŢI PROIECT SRL company in October 2005, after the earthquake of March 1977 there were degradations of some brick masonry walls (mainly at Unit A), but, after the 1986 earthquake, degradations were minor.

The qualitative assessment shall take into account the fact that this verification could only be done partially.

The criterion has **a moderate failure**.

Max points:	**15 pts.**
Total achieved score:	**10 pts.**

3. Conditions regarding the composition of the structural elements

It is mentioned that the initial project of the strength structure is not available, but the project for the consolidation of Unit A, the previous technical expertise report and the non-destructive tests were performed in the field. The qualitative assessment at this point will be made in relation to the mentioned documents and to the Seismic Design Codes in force at the date of erection of the two units: P100-81 - consolidation of Unit A - and P13-63 - Unit B, as well as in relation to the concrete standards for reinforced concrete from the 1980s (STAS 10107 / 0-76) - consolidation of Unit A and, respectively, the 1960s - Unit B.

a) Structures of the reinforced concrete frame type

Unit A

3.1 The pillars have proportions of long parts (the ratio between the height of the cross section and the free height of the pillar is less than 0.3)

The ratio between the height of the section and the free height of the pillar is in the range of 0.07 ÷ 0.43.

The criterion has a **moderate failure**.

3.2 Normalized average axial stress in each pillar (calculated by using the strength to compression of the concrete, established according to 6.1 (11)), is less than 0.3

This criterion is partially met.

The criterion has a **moderate failure**.

3.3 Joints and anchorages of reinforcements comply with the conditions set out in P 100-1. According to the norm P100-81, at point 5.2.4 d), it was required that the joint length of the reinforcements in the pillars (PC52, concrete C16 / 20) be at least 40 diameters. According to the norm P100-81, at point 5.2.6, for buildings with a seismic protection degree ≥7 (this being the case of the building from the present technical expertise report), it was required that an increase of the clamps, at maximum 10 cm, be made “in the areas from the extremities of the pillars in lengths of Hs/8, but at least 60 cm”. According to the standards for reinforced concrete from the 1980s (STAS 10107 / 0-76), the joining length of the reinforcements from the pillars (PC52, concrete C20 / 25) was at least 45 diameters (for the case of joining at most 50% of the total area of longitudinal reinforcements). The joint length increases if the area of the joint reinforcement exceeds 50% of the total area of the joint reinforcements. The qualitative assessment takes into account the fact that this checking could be done only partially (only for the consolidated elements, but not for the elements of the initial structure).

According to the current design practice (also valid in the year of design of the building in question), the joints of the beam reinforcements are made outside of the critical areas. For openings ≤ 6.57 m (in the case of the analyzed building) the reinforcements arranged at the bottom are not to be joined, but anchored in the pillars. The reinforcements at the top are joined in the field, usually in the middle of the opening, and / or are anchored in pillars. The qualitative assessment takes into account the fact that this checking could be done only partially (only for the consolidated parts, not for the parts of the initial structure).

The reinforcement anchorages mentioned in Design Code P 100-1 are not there either at the pillars or at beams.

The criterion has **a major failure**.

3.4 Transversal reinforcements from pillars and beams comply with the position conditions provided for by P 100-1

In the case of pillars, according to the norm P100-81, at point 5.2.6, for buildings with a seismic protection degree ≥7 (as is the case of the building from the present technical expertise report), it was required that the increase of clamps be made at maximum 10 cm “in the areas from the extremities of the pillars, on lengths of Hs / 8, but at least at 60 cm”. According to the concrete standards of the 1980s (STAS 10107 / 0-76), the distance between the clamps was a maximum of 15 diameters, maximum the minimum section size, a maximum of 30 cm, with no distinction between critical and non-critical areas. The qualitative assessment takes into account the fact that this checking could be done only partially (only for the consolidated parts, not for the parts of the initial structure).

In the case of beams, in the norm P100-81, at point 5.3.5, for buildings with a seismic protection degree ≥7 (as is the case of the building in the present technical expertise), it was required that the increase of the clamps be made at maximum 20 cm in the areas in the vicinity of the supporting elements. The qualitative assessment takes into account the fact that this checking could be done only partially (only for the consolidated parts, not for the parts of the initial structure).

The criterion has a **moderate failure**.

3.5 The longitudinal reinforcement from pillars and beams meets the location conditions provided for in P 100-1

In the case of pillars, in normative P100-81, at point 5.2.4, paragraph c, it was specified that the distance between the bars must be ≤ 25 cm, and for buildings with a seismic protection degree ≥7 (as is the case of the building in this technical expertise), for monolithic pillars with a side length ≤ 35 cm, only two longitudinal bars could be used.

In the case of pillars, according to the standards for reinforced concrete from the 1980s (STAS 10107 / 0-76), the longitudinal reinforcements had to be arranged in pairs at the corners of the clamps. The qualitative assessment takes into account the fact that this checking could be done only partially (only for the consolidated parts, not for the parts of the initial structure).

In the norm P100-81 and in the standards for reinforced concrete from the 1980s (STAS 10107 / 0-76) no specification is made regarding the arrangement of at least two bars at the top of the beams, nor the arrangement of two bars at the top and at the bottom, with a diameter ≥ 14 mm. The qualitative assessment takes into account the fact that this checking could be done only partially (only for the consolidated parts, not for the parts of the initial structure).

The criterion has a **moderate failure**.

Max points:	**30 pts.**
Total achieved score:	**16 pts.**

4. Conditions regarding floors

4.1 The plate of the floors has a thickness of more than 100 mm and is made of monolithic reinforced concrete or of precast slabs with an overconcrete of minimum 80 mm in thickness.

The floors are made of reinforced concrete and consist of main (frame) beams, secondary beams and slabs with a thickness between 100 mm ÷ 300 mm. The 250 mm thick floors are mixed and made of reinforced concrete beams, ceramic blocks and probably an overconcrete of an unknown thickness.

The qualitative assessment shall take into account the fact that this verification could only be done partially.

The criterion has a **moderate failure**.

4.2 Reinforcement of belts etc. and reinforcements distributed in the plate meet the conditions provided for in P 100-1 and in the related technical regulations

The qualitative assessment shall take into account the fact that this verification could not be performed.

The criterion has a **moderate failure**.

4.3 By the mode of composition and reinforcement of the floors, seismic forces in the plane of the floor can be transmitted to the elements of the vertical structure (walls, frames)

The composition of the strength structure (both the construction system and the used materials) ensures the transmission of seismic forces to the elements of the vertical structure, respectively to the frames.

The qualitative assessment shall take into account the fact that this verification could only be done partially.

The criterion has a **moderate failure**.

4.4 Gaps in the floor are appropriately bounded

There are no gaps, except for those (small) installations, which reduce the rigidity and strength of the plates.

The qualitative assessment shall take into account the fact that this verification could only be done partially.

The criterion has a **moderate failure**.

4.5 In the case of ground floor halls with articulated beams, the floor composition allows to fulfill the role of a rigid horizontal diaphragm which is strong against actions in its plane.
The criterion **does not apply**.

Max points: **10 pts.**
Total achieved score: **5 pts.**

Unit B
3.1 The pillars have the proportions of long elements (the ratio between the height of the cross section and the free height of the pillar is less than 0.3)
The ratio between the height of the section and the free height of the pillar is in the range 0.13 ÷ 0.32.
The criterion has a **moderate failure**.
3.2 Normalized average axial stress in each pillar (calculated by using the strength to compression of the concrete, as established according to 6.1 (11), is less than 0.3.
This criterion is partially met.
The criterion has a **moderate failure**.
3.3 The joints and anchorages of reinforcements comply with the conditions set out in P 100-1.
In the case of pillars, according to norm P13-63, in point 5.4.1 it was required that an increase of the clamps be made at a maximum of 10 cm "on a length of at least 60 cm". The qualitative assessment shall take into account the fact that this verification could not be performed.
According to the current design practice (also valid in the year of design of the building in question), the joints of the beam reinforcements are made outside of the critical areas. For openings ≤7.76 m (as is the case of the analyzed building) the reinforcements arranged at the bottom are not to be joined, but are anchored in pillars. The joining of reinforcements at the top are made in the field, usually in the middle of the opening, and / or anchored in pillars. The qualitative assessment shall take into account the fact that this verification could not be performed.
The reinforcement anchorages as set out in Design Code P 100-1 were not noticed for either pillars or beams.
The criterion has a **major failure**.
3.4 The transversal reinforcement from pillars and beams complies with the location condition, as provided for in P 100-1.
In the case of pillars, according to normative P13-63, at point 5.4.1 it was required that an increase of the clamps be made at a maximum of 10 cm “on a length of at least 60 cm”. The qualitative assessment shall take into account the fact that this verification could not be performed.
In the case of beams, in the norm P13-63 no mention is made regarding the distance between the clamps in the plastic areas or outside them. The qualitative assessment shall take into account the fact that this verification could not be performed.
The criterion has a **moderate failure**.

3.5 The longitudinal reinforcement from pillars and beams meets the location condition, as provided for in P 100-1
In the case of pillars, in the norm in force at that time, P13-63, no mention is made regarding the position of the longitudinal reinforcement bars in relation to the clamps, or a minimum number of bars on their sides. The qualitative assessment shall take into account the

fact that this verification could not be performed.

In the norm P13-63 no mention is made regarding the arrangement of at least two bars at the top of the beams, or regarding the arrangement of two bars at the top, respectively at the bottom, with a diameter ≥ 14 mm. The qualitative assessment shall take into account the fact that this verification could not be performed.

The criterion has a **moderate failure**.

Max points:	**30 pts.**
Total achieved score:	**16 pts.**

4. Conditions regarding floors

4.1 The floor plate has a thickness greater than 100 mm and is made of monolithic reinforced concrete or of precast slabs with overconcrete of a minimal thickness of 80 mm.

The floors are made of reinforced concrete and include the main (frame) beams and plates with a thickness of 110 mm.

The criterion is **met**.

4.2 Reinforcements of belts and reinforcements distributed in the plate meet the conditions set out in P 100-1 and in the related technical regulations.

By taking into consideration the calculation and building provisions of the reinforced concrete standards of the 1960s, it results that the above requirement is met.

The qualitative assessment shall take into account the fact that this verification could not be performed.

The criterion has a **moderate failure**.

4.3 By the mode of composition and reinforcement of the floors, seismic forces in the plane of the floor can be transmitted to the elements of the vertical structure (walls, frames).

The composition of the strength structure (both the construction system and the used materials) ensures the transmission of seismic forces to the parts of the vertical structure, respectively to the frames.

The qualitative assessment shall take into account the fact that this verification could not be performed.

The criterion has a **moderate failure**.

4.4 Gaps in the floor are properly bounded

There are no gaps, except for those made for (small) installations, which reduce the rigidity and strength of the plates.

The qualitative assessment shall take into account the fact that this verification could not be performed.

The criterion has a **moderate failure**.

4.5 In the case of ground floor halls with articulated beams, the floor composition allows to fulfill the role of a rigid horizontal diaphragm, which is strong against actions in its plane.

The criterion **does not apply**.

Max points:	**10 pts.**
Total achieved score:	**7 pcs.**

Following the qualitative analysis, indicator R1 is established:

R1= 24 + 10 + 16+ 5 = 55 points - Unit A
R1= 24 + 10 + 16 + 7 = 57 points - Unit B

Depending on the scale and distribution of the level of damage throughout the building (due to the earthquake and / or other actions), the indicator R2 is established according to table B.3, Design Code P100-3 / 2019.

1. Degradation caused by the action of earthquakes

1.1 Inclined fissures in critical areas of the beams or pillars
No inclined fissures were found in the critical areas of the beams and pillars. According to the technical expertise report regarding the consolidation of the old and of the new building (former IPCM), made by the CARPAŢI PROIECT SRL company in October 2005, after the earthquake of March 1977 there were noticed damages to a few of the strength elements (mainly at Unit A), while during the 1986 earthquake the degradation was minor.
The qualitative assessment shall take into account the fact that this verification could only be done partially.
The criterion has a **moderate failure**.

1.2 Inclined fissures in walls
The criterion **does not apply**.

1.3 Regular fissures in the beams and pillars, with openings larger than 0.3 mm
No regular fissures were identified in the beams and pillars. According to the technical expertise report regarding the consolidation of the old and of the new building (former IPCM), made by the CARPAŢI PROIECT SRL company in October 2005, after the earthquake of March 1977, there were damages at some of the strength elements (mainly at Unit A), while, after the 1986 earthquake, the degradation was minor.
The qualitative assessment shall take into account the fact that this verification could only be done partially.
The criterion has a **moderate failure**.

1.4 Expulsion of the concrete coating in the critical areas of the structural elements
The expulsion of the concrete coating in the critical areas of the structural elements was not highlighted. According to the technical expertise report regarding the consolidation of the old and of the new building (former IPCM), made by the CARPAŢI PROIECT SRL company in October 2005, after the earthquake of March 1977 there were damages at some of the strength elements (mainly at Unit A), while, after the 1986 earthquake, the degradation was minor.
The qualitative assessment shall take into account the fact that this verification could only be done partially.
The criterion has a **moderate failure**.

1.5 Crushed concrete in critical areas of pillars, beams or wall made of concrete
No crushed concrete in critical areas of concrete pillars or beams was highlighted. According to the technical expertise report regarding the consolidation of the old and of the new building (former IPCM), made by the CARPAŢI PROIECT SRL company in October 2005, after

the earthquake of March 1977 there were damages at some of the strength elements (mainly at Unit A), while, after the 1986 earthquake, the degradation was minor.

The qualitative assessment shall take into account the fact that this verification could only be done partially.

The criterion has a **moderate failure**.

1.6 Buckling of longitudinal reinforcements

No buckling of longitudinal reinforcements was highlighted. According to the technical expertise report regarding the consolidation of the old and of the new building (former IPCM), made by the CARPAŢI PROIECT SRL company in October 2005, after the earthquake of March 1977 there were damages at some of the strength elements (mainly at Unit A), while, after the 1986 earthquake, the degradation was minor.

The qualitative assessment shall take into account the fact that this verification could only be done partially.

The criterion has a **moderate failure**.

1.7 Fissures that develop along the bars of reinforcement in the critical areas of the structural elements

No fissures that develop along reinforcing bars were highlighted in the critical areas of the structural elements. According to the technical expertise report regarding the consolidation of the old and of the new building (former IPCM), made by the CARPAŢI PROIECT SRL company in October 2005, after the earthquake of March 1977 there were damages at some of the strength elements (mainly at Unit A), while, after the 1986 earthquake, the degradation was minor.

The qualitative assessment shall take into account the fact that this verification could only be done partially.

The criterion has a **moderate failure**.

1.8 Fissures and deformations remaining in the critical areas (plastic areas) of the pillars, walls and beams

No remaining fissures and deformations in the critical areas (plastic areas) were highlighted at the pillars and beams. According to the technical expertise report regarding the consolidation of the old and of the new building (former IPCM), made by the CARPAŢI PROIECT SRL company in October 2005, after the earthquake of March 1977 there were damages at some of the strength elements (mainly at Unit A), while, after the 1986 earthquake, the degradation was minor.

The qualitative assessment shall take into account the fact that this verification could only be done partially.

The criterion has a **moderate failure**.

1.9 Longitudinal fissures in the structural elements which are subject to compression

No longitudinal fissures were highlighted in the structural elements that are subject to compression. According to the technical expertise report regarding the consolidation of the old and of the new building (former IPCM), made by the CARPAŢI PROIECT SRL company in October 2005, after the earthquake of March 1977 there were damages at some of the strength elements (mainly at Unit A), while, after the 1986 earthquake, the degradation was minor.

The qualitative assessment shall take into account the fact that this verification could only be done partially.

The criterion has a **moderate failure**.

1.10 Inclined or regular fissures in critical areas of the structural elements

No inclined or regular fissures were highlighted in the critical areas of the structural elements. According to the technical expertise report regarding the consolidation of the old and of the new building (former IPCM), made by the CARPAŢI PROIECT SRL company in October 2005, after the earthquake of March 1977 there were damages at some of the strength elements (mainly at Unit A), while, after the 1986 earthquake, the degradation was minor.

The qualitative assessment shall take into account the fact that this verification could only be done partially.

The criterion has a **moderate failure**.

1.11 Remaining shifts of structural elements

No remaining shifts were highlighted in the structural elements.

The qualitative assessment shall take into account the fact that this verification could only be done partially.

The criterion has a **moderate failure**.

1.12 Deviations from the verticality of the structure as a whole

No deviations from the verticality of the structure as a whole were highlighted.

The qualitative assessment shall take into account the fact that this verification could only be done partially.

The criterion has a **moderate failure**.

1.13 Local degradation caused by the interaction with neighboring buildings

No local degradations caused by the interaction with neighboring buildings were highlighted.

The qualitative assessment shall take into account the fact that this verification could only be done partially.

The criterion has a **moderate failure**.

1.14 Severe degradation of nonstructural components that interact with the structure (fissures, cracks, excessive deformations)

No severe degradation of nonstructural components that interact with the structure (fissures, cracks, excessive deformations was highlighted. According to the technical expertise report regarding the consolidation of the old and of the new building (former IPCM), drawn up by the CARPAŢI PROIECT SRL company in October 2005, after the earthquake of March 1977 there were degradations of some brick masonry walls (mainly at Unit A), and, after the 1986 earthquake, the degradations were minor.

The qualitative assessment shall take into account the fact that this verification could only be done partially.

The criterion has a **moderate failure**.

1.15 Fissures in floors caused by stresses that act in their plan

No fissures caused by stresses that act in their plan were highlighted in the floors. According to the technical expertise report regarding the consolidation of the old and of the new building (former IPCM), made by the CARPAŢI PROIECT SRL company in October 2005, after the earthquake of March 1977 there were damages at some of the strength elements (mainly at Unit A), while, after the 1986 earthquake, the degradation was minor.

The qualitative assessment shall take into account the fact that this verification could only be done partially.

The criterion has a **moderate failure**.

1.16 Degradations of foundations or of the foundation ground

No degradations of foundations or of the foundation ground were highlighted. According to the technical expertise report regarding the consolidation of the old and of the new building (former IPCM), made by the CARPAŢI PROIECT SRL company in October 2005, after the earthquake of March 1977 there were damages at some of the strength elements (mainly at Unit A), while, after the 1986 earthquake, the degradation was minor.

The qualitative assessment shall take into account the fact that this verification could only be done partially.

The criterion has a **moderate failure**.

Max points: **50 pct.**
Total achieved score: **30 pts.**

2. Degradation caused by vertical loads, other than seismic loads, in structural or unstructured parts

No degradations produced by vertical loads, other than seismic ones, in structural or nonstructural elements were highlighted. According to the technical expertise report regarding the consolidation of the old and of the new building (former IPCM), made by the CARPAŢI PROIECT SRL company in October 2005, after the earthquake of March 1977 there were damages at some of the strength elements (mainly at Unit A), while, after the 1986 earthquake, the degradation was minor.

The qualitative assessment shall take into account the fact that this verification could only be done partially.

The criterion has a **moderate failure**.

Max points: **15 pts.**
Total achieved score: **12 pts.**

3. Degradation caused by loading with deformations (settlement of supporting elements, shrinkage, temperature action, slow flow of concrete).

No degradation caused by loading with deformations (settlement of supporting elements, shrinkage, temperature action, slow flow of concrete) was highlighted.

The qualitative assessment shall take into account the fact that this verification could only be done partially.

The criterion has a **moderate failure**.

Max points: **8 pcs.**
Total achieved score: **7 pcs.**

4. Degradation caused by a faulty work (segregated concrete, incorrect work gaps, etc.)

No degradation caused by a faulty work (segregated concrete, incorrect work gaps, etc.) was highlighted.

The qualitative assessment shall take into account the fact that this verification could only be done partially.

The criterion has a **moderate failure**.

Max points: **10 pts.**
Total achieved score: **7 pcs.**

5. Degradation caused by environmental factors (freeze-thaw, chemical or biological corrosive agents, etc.) on concrete or steel reinforcements

No degradation caused by environmental factors (freeze-thaw, chemical or biological corrosive agents, etc.) on the concrete or steel reinforcements was highlighted.

The qualitative assessment shall take into account the fact that this verification could only be done partially.

The criterion has a **moderate failure**.

Max points: **10 pts.**
Total achieved score: **8 pcs.**

6. Degradation caused by users (anthropic factors)

No degradation caused by users (anthropic factors) was highlighted.

The qualitative assessment shall take into account the fact that this verification could only be done partially.

The criterion has a **moderate failure**.

Max points: **7 pcs.**
Total achieved score: **6 pts.**

Following the qualitative analysis, the following indicator R_2 is established:

$\mathbf{R_2}$ = 30 + 12 + 7 + 7 + 8 + 6 = **70 pts**.

13.2 Assessment by calculation

Assessment by calculation is a quantitative procedure that verifies whether current buildings, degraded or not, meet the requirements of the limit states considered in the relevant seismic design actions: the safety requirement of life (SLU - ultimate limit states) and the requirement to limit degradation (SLS - service limit states).

The detailed assessment by calculation (for the level 2 methodology) is done upon an elastic linear calculation model, analyzed with the modal calculation method with response spectra (MRS).

In the static and dynamic calculation of the structure as well as in the verification of the parts, the standards and norms in force were complied with (according to subchapter 4.5 of the present technical expertise report).

Under Design Code P100-1 / 2013, articles 4.4.3.2 and 4.4.3.3, the structure is irregular in plane and vertically.

A spatial calculation model and the modal calculation method with response spectrum for the seismic action were selected.

The strength structure was summarized as a spatial system consisting of bar or “frame” finite parts and surface finite parts (plates or "shell"). The vertical parts (pillars) were embedded at the base (at the level of the foundations). The floors were not considered to be rigid washers. The gravitational loads were evenly distributed on the plates and along the beams, and the design spectrum defined by the Design Code P100-1 / 2013 was used for the seismic action. A static and dynamic analysis was performed, in the elastic field, with the ETABS 2018 Nonlinear Version 18.1.1 software.

The following results were obtained:
- vibration modes;
- nodal shifts;
- stresses.

The analyzes we made led to the following conclusions:

a) The vibration periods of the construction are:

Vibration mode / Calculation assumptions	Vibration period (s)	
	1	2
1	1.253	1.752
2	1.168	1.629
3	1.08	1.506
4	0.929	1.31
5	0.918	1.297
6	0.797	1.125
7	0.645	0.908
8	0.608	0.855
9	0.55	0.776
10	0.355	0.497
11	0.346	0.485
12	0.329	0.459

Calculation assumptions:
1. Stiffness at bending EI
2. Stiffness at bending 0.5EI

b) The total mass and weight are:

$A_{tot} = 9922{,}0 \text{ m}^2$

$M_{tot} = 16306{,}0 \ \frac{\text{kN}}{\text{m} \cdot \text{s}^{-2}}$

$G_{tot} = 159958 \text{ kN } (\sim 16{,}2 \text{ kN/m}^2)$

c) The basic cutting force (for a system with a single degree of dynamic freedom), as well as the components on the directions x and y (for a system with several degrees of dynamic freedom - the real system) are:

1. Stiffness at bending EI

$$S = cG_{tot} = 1{,}2x0{,}30x2{,}50x\frac{1}{2{,}0}x159958 = 0{,}45x159958 = 71982 \text{ kN}$$

$S_x = 49657 \text{ kN} \ \ (69{,}0\%)$

$S_y = 47017 \text{ kN} \ \ (65{,}4)$

2. Stiffness at bending 0.5EI

$$S = cG_{tot} = 1{,}2x0{,}30x2{,}50x\frac{1}{2{,}0}x159958 = 0{,}45x159958 = 71982\text{ kN}$$

$$S_x = 47784\text{ kN (66,4\%)}$$

$$S_y = 42184\text{ kN (58,6)}$$

It is specified that the “X” direction is that direction which is parallel to Calea Victoriei, while the “Y” direction is that direction which is perpendicular to Calea Victoriei.

d) Lateral displacements

In the SLS group (service limit states) the relative level displacements are higher than the admissible ones (5 ‰) in both directions: “X” (parallel to Calea Victoriei) and in the “Y” direction (perpendicular to Calea Victoriei).

In the SLU group (ultimate limit states) the relative level displacements are higher than the admissible ones (2.5%), in both directions: “X” (parallel to Calea Victoriei), respectively “Y” (perpendicular to Calea Victoriei).

We mention that the brick masonry filling panels were not taken into account in the calculation model. Given these conditions, the relative level displacements are much larger than the admissible ones (both for SLS - service limit states and for SLU - ultimate limit states). In reality, the reinforced concrete frames worked together with the brick masonry filling panels, so that the seismic energy was dissipated to a large extent by these brick masonry panels. This is also confirmed by the behavior of the building in the 1977 earthquake when, although the building suffered significant degradation and damage, there was no partial or total collapse. It should be emphasized that, at present, the "natural" strength reserves of the masonry have been significantly diminished by the cumulative effects of past seismic stresses and that the co-operation between reinforced concrete frames and brick masonry filling panels can no longer be taken into consideration.

e) The global strength output of the building in the two directions is (expressed in percentages):

$R_{3,x}$ = 45 ÷ 55;

$R_{3,y}$ = 45 ÷ 55.

It is specified that the “X” direction is parallel to Calea Victoriei, while the “Y” direction is that direction which is perpendicular to Calea Victoriei.

The global determination of the R_3 indicator was made according to the values of this indicator, calculated for each part of the strength structure. This global indicator is not an arithmetic mean, but an assessment that takes into account the values of the R_{3i} indicator, calculated for each part (including the position of the section in the part), the position of the part in the structure, and the possibility of partial or total collapse of the structure.

It is mentioned that the initial project of the strength structure is not available, but we do have the project for the consolidation of Unit A, the previous technical expertise report and the non-destructive tests that were performed in the field. Under these conditions, we proposed reinforcements that correspond to:

- the standards and norms in force at the date of design;
- design practices from that period;

- the real conditions in the field (respectively the technical condition of the strength structure after a period of operation time - approximately 70 years (Unit A), and 50 years (Unit B), respectively.

Moreover, there are differences between the seismic norms in force at the time of drawing up this expertise and those in force at the date of erection of the building in question (Unit A and Unit B). These differences are found both in terms of calculation (seismic zoning, design spectra, intensity of seismic forces, calculation methods, sizing stresses, etc.), and in terms of constructive composition (minimum and maximum percentages of reinforcement, number and minimum diameters of the bars, joining and anchoring lengths, quality of materials, detailed reinforcement solutions, etc).

A relatively small performance factor (q = 2.0) was chosen to evaluate the seismic forces, which implies a less ductile performance of the structural elements. This choice was based on three considerations:

- the lack of seismic norms in force at the date of design of Unit A;
- differences between the seismic norms in force at the moment of drawing up this expertise and those in force at the date of design of the building in question (Unit A - consolidation project, Unit B - work project);
- partial knowledge of the quality of the materials (concrete and reinforcements);
- partial knowledge of the constructive details (anchoring and joining lengths of the longitudinal reinforcements, the thickening areas of the clamps, etc.).

Given these conditions, it is emphasized that the quantitative analyzes (by calculation) have an approximate character, of assessment and not of exact calculation.

As far as the combinations of loads that do not contain the seismic action (fundamental grouping - SLUa 1 and SLUa 2) and for the two combinations of loads that do contain the seismic action (seismic grouping - SLUc - x and SLUc - y), the strength checks are partially fulfilled, depending on the type of element and its position in the structure. The strength checks of the elements, expressed as a percentage of their capability, vary as follows:

- R3, S, MN <35 - pillars stressed by bending with axial force - 15 ÷ 20% of the number of pillars;
- R3, S, MN = 36 ÷ 100 - pillars stressed by bending with axial force - 65 ÷ 75% of the number of pillars;
- R3, S, MN> 100 - pillars stressed by bending with axial force - the remaining pillars;
- R3, S, Q <35 - pillars stressed by cutting force - 10 ÷ 15% of the number pillars;
- R3, S, Q = 36 ÷ 100 - pillars stressed by cutting force - 60 ÷ 70% of the number pillars;
- R3, S, Q> 100 - pillars stressed by cutting force - the remaining poles.
- R3, GR, M <35 - beams stressed by bending - moments in supporting elements - 10 ÷ 15% of the number of beams;
- R3, GR, M = 36 ÷ 100 - beams stressed by bending - moments in supporting elements - 60 ÷ 75% of the number of beams;
- R3, GR, M> 100 - beams stressed by bending - moments in supporting elements - the remaining beams;
- R3, GR, M <35 - beams stressed by bending - moments in the field - 5 ÷ 10% from the number of beams;
- R3, GR, M = 36 ÷ 100 - beams stressed by bending - moments in the field - 65 ÷ 75% of the number of beams;

- R3, GR, M> 100 - beams stressed by bending - moments in the field - the remaining beams;
- R3, GR, Q <35 - beams stressed by cutting force - 10 ÷ 15% of the number beams;
- R3, GR, Q = 36 ÷ 100 - beams stressed by cutting force - 70 ÷ 80% of the number beams;
- R3, GR, Q> 100 - beams stressed by cutting force - the remaining beams.

At Unit A, for the pillars and for the beams, there were two plates (one at the ground floor and one at the 1st floor) in which the longitudinal and transversal reinforcements were specified, but without details of their shape, positioning, anchoring and joining lengths. The consolidation project was also available for Unit A. Unit B did not have any project that specified the reinforcements.

14. CONCLUSIONS REGARDING THE SEISMIC RISK OF THE BUILDING

After the qualitative analysis and by calculation, the following conclusions can be formulated regarding the seismic risk of the building that is the object of the present technical expertise:

1. For the value of the indicator R1 = 55 (Unit A) and R1 = 57 (Unit B), the building, as a whole, is included in the seismic risk class R_sII (according to art. 8.1.1. (3) of the Design Code P100-3 / 2019).

For the value of the indicator R_2 = 70 (Unit A and Unit B), the building, as a whole, is included in the seismic risk class R_sIII (according to art. 8.1.2. (3) of the Design Code P100-3 / 2019).

For the value of the indicator $R_{3,x}$ = 45 ÷ 55 and R $R_{3,y}$ = 45 ÷ 55 (Unit A and Unit B), the building, as a whole, is included in the seismic risk class R_sII (according to art. 8.1.3. (5) from the Design Code P100-3 / 2019, table 8.3).

The building, as a whole (Unit A and Unit B), is included in the seismic risk class R_sII.

This classification is also justified by the following arguments:

a) the overall composition and the constructive solutions correspond to a small extent to the current knowledge and norms of seismic protection;

b) mixed floors (consisting of reinforced concrete beams, ceramic blocks and, probably, an overconcrete whose thickness is not known) have an insignificant rigidity in their plan and do not ensure a good concurrence between the reinforced concrete frames;

c) the values of the relative level displacements;

d) the values of indicators R_1, R_2 and R_3;

e) the overall analysis of the real situation;

f) the mentions presented in chapter 13, points d) and e), of this technical expertise report.

In the Design Code P100-3 / 2019, at art. 3.2. (1) (b), the seismic risk class R_sII is defined as follows: the class "that buildings susceptible of major damage due to their design, in case of earthquake, belong to, corresponding to the Ultimate Limit State, which endanger the safety of users, but in which the total or partial collapse is unlikely".

2. The reduction of the seismic risk of the building can be done only by measures to increase the strength capability and rigidity of the structural system, respectively by changing the structural system of reinforced concrete frames into a dual system with predominant reinforced concrete walls. The proposed measures are described in Chapter 15 of this technical expertise.

15. DESCRIPTION OF THE PROPOSED INTERVENTION WORKS

The intervention works proposed in the following paragraphs constitute a unitary whole, which aims to reduce the seismic risk, to ensure the regular operation, as well as the sustainability of the building.

15.1 Intervention works in order to reduce the seismic risk

According to Design Code P100-3 / 2019, intervention works are required to reduce the seismic risk of the building that is the subject of this technical expertise.

The following consolidation works are proposed:

1. In order to increase the strength and rigidity of the existing structure, the structural system will be changed from reinforced concrete frames into a dual system with predominant reinforced concrete walls (minimum concrete C30 / 37 and steel S500 - Bst 500S). Consolidation works are carried out by:

- having, in the perimeter of the building (Unit A and Unit B), reinforced concrete walls inside the building;
- having casings of reinforced concrete pillars and beams (only where applicable);
- enlarging the gap between the two units (A and B) to the dimensions provided in the Design Code P 100 / 1-2013.

2. The reinforced concrete walls (minimum concrete C30 / 37 and steel S500 - Bst 500S) will have a minimum thickness of 350 mm and will be arranged on the perimeter of the building, inside it. It is recommended that, depending on the consolidation solution adopted and the requirements of the beneficiary, rigid reinforcements (S355 steel) be provided in the reinforced concrete walls. The new structure will be anchored to the original one with the help of sheets, rods, anchors, etc. Also, for a better concurrence between the initial structure and the reinforced concrete wall (possibly also with rigid reinforcements - BAR), empty spaces will be provided in the exterior walls of brick masonry (filled with concrete). The current empty spaces must be kept and the geometry of the façade will be complied with.

In the basement, in the cases where the reinforced concrete walls (possibly with rigid reinforcement - BAR) of the reinforcement affect the circulation in the garage, a consolidation solution with eccentrically braced metal frames will be adopted.

3. In order to increase the load-bearing capability in case of eccentric compression of the existing pillars, casings of reinforced concrete will be used (minimum concrete C30 / 37 and steel S500 - Bst 500S), but only where necessary. No work will be done on the already consolidated pillars. The concrete casing will be made, as a rule, on the four sides of the pillars and will have a thickness of 100 mm ÷ 150 mm. These works consist of:

a) preliminary operations:

- the concrete is broken to reveal the longitudinal reinforcements at the corners;
- removal of degraded concrete areas with a splint or chisel and hammer;
- the operation of removing the degraded concrete will be done carefully, so as not to affect the neighboring areas;
- the concrete is hit over the entire surface to be encased;
- the hit concrete surface is cleaned with a wire brush and a pressurized water jet;

- the degree of deterioration of the existing concrete is evaluated;
- all fissures, cracks and other existing damage in the concrete are repaired;
- the fixing solutions will be established for each case;

b) actual consolidation:

- the longitudinal reinforcement connectors will be welded at the corners of the pillars;
- the longitudinal and transversal reinforcements will be mounted;
- the concrete will be encased and poured;
- before pouring, the existing concrete surface will be excessively wetted and wilted, according to the principle “the concrete should be wet on the inside and wilted on the outside”.

As an alternative to reinforcing by using reinforced concrete, sheet metal and / or steel profiles S355 can be used. This process can be used on pillars with high loads and where it is necessary (for architectural or for other reasons) to preserve the existing geometry and dimensions (especially in the garage).

4. In order to increase the load-bearing capability of existing beams, casing works with reinforced concrete (minimum concrete C30 / 37 and steel S500 - Bst 500S) will be performed, but only where necessary. The casing will be made on three sides of the beams and will have a thickness of 120 mm ÷ 150 mm. The casing works shall comply with the rules set out in point 3 above, except for those that refer to connectors.

As an alternative to reinforcement by casing with reinforced concrete, S355 sheet metal and / or profile casings can be used. This process can be used in the case of beams with large openings (≥ 6.00 m), with high loads and where it is necessary (for architectural or other reasons) to preserve the existing geometry and dimensions.

5. In order to improve the spatial concurrence of the vertical reinforced concrete parts, the following is recommended:

- to perform an over-concreting at all floors, especially over mixed ones (consisting of reinforced concrete beams, ceramic blocks and, probably, an over-concreting), with a thickness of at least 50 mm (minimum concrete C30 / 37); the reinforcement of the concrete in the overconcreting will be done with a minimum mesh Ø12 / 150 S500 (Bst 500S). The reinforcing in the overconcreting will be anchored in the concrete of the new reinforced concrete walls and in the pillar casing, as well as in the area of the interior walls made of brick masonry with a minimum thickness of 280 mm, by using a newly created belt in the wall, having the dimensions of the cross section of 100 mm x 200 mm. For a better concurrence with the brick masonry walls having a minimum thickness of 280 mm, gaps in the walls at a maximum interval of 1000 mm will be provided along the support lines; the dimensions of the vertical gaps will be 200 mm x 200 mm and will penetrate to a depth of 150 mm ÷ 200 mm into the walls.

The over-concreting of the floors will be performed as follows:

a) preliminary operations:

- the floor will be uncapped over the entire surface;
- the concrete is hit upon the entire surface of the floor;
- the hit concrete surface will be cleaned with a wire brush and a pressurized water jet;
- the degree of deterioration of the existing floor will be evaluated;
- all existing fissures, cracks and other damages in the concrete will be repaired;
- fixing solutions will be established for each case;

b) the actual consolidation:

- the connectors will be mounted in the existing plate;
- the reinforcements will be installed;
- the concrete will be poured;
- before pouring, the existing concrete surface will be excessively wet and wilted, upon the principle “the concrete should be moist inside and wilted at exterior".

In order not to increase the vertical loads upon the floor, the concrete from the overconcreting will be processed at the end (plastered), so as to ensure the support layer for finishing (no slab will be poured).

6. In order to fix the visible reinforcements of the reinforced concrete elements, the following works will be performed:

a) The condition of the reinforcement is checked, by visual observation and measurement, as the case may be, regarding:

(i) cleanliness: the surface of the reinforcement must not be covered with materials that prevent adhesion (soil, greasy substances, etc.);

(ii) the state of corrosion, for which the following conditions apply:

- the current condition is accepted in cases where the reinforcement has:
  * non-stick surface rust (reddish-brown), which is easy to clean by wiping;
  * adherent surface rust (reddish-brown or black), with a matte, rough appearance, which does not come off by hitting;
- one will measure the depth of areas with localized corrosion (points, stains) or with rust in layers that come off by hitting, after cleaning the rust, after which:
  * if the section reduction is smaller than that corresponding to the negative permissible limit deviations for the diameter of the reinforcement, the existing condition can be accepted, but with the approval of the designer;
  * if the section reduction is larger, the reinforcement will be partially replaced.

The assessment of the condition of the reinforcement in cases where it shows localized or layered corrosion, by measuring the reduction of the section, must be carried out in the areas where the corrosion is visibly advanced, in at least three sections of each reinforcement bar.

b) The cut vertical reinforcements will be partially replaced (on the affected area). The replacement will be made with reinforcements of the same diameter. The addition of new and existing reinforcements will be done by manual electric arc welding by overlapping, with welding seams on both sides (thickness of the welding seam: $a_s = 0.34Ø$ and length of the welding seam $L_s = 5d + 20$ mm, where Ø is the diameter of the bar);

7. In order to fix the reinforced concrete elements of the existing structure, the following works will be performed:

Fixing surface defects (DS) and those in the reinforcement covering layer (DSA) will be done by using cement-based mixtures and is to be performed at ambient temperatures of at least 10^0C. Proceed as follows:

a) The preparatory works consist of the following operations:

- detaching the concrete by hitting it with a hammer and brushing the defective area with a wire brush, so as to reach the "healthy" concrete and to obtain a rough surface;
- the operation described in the previous point is done with special care, so as not to produce strong shocks in the element and not to damage the neighboring elements;
- the existing rust on the reinforcements is cleaned by using a wire brush and one checks if there are situations in which the rust penetrated the mass of the material (the fixing solutions will be established for each case);

- the area is cleaned with an air jet;

- before applying the mortar, one will moisten the concrete; it will be let to dry on the surface and absorb water according to the rule "the concrete must be saturated, but the surface must be wilted".

b) The composition of the mortar for fixing (in units of volume) is the following:

- cement 1 part;
- sand 2 parts;
- water in the amount necessary to obtain a consistency that allows the applied mortar to maintain its position.

In the composition of the mortar, one can add max. 0.2 parts of polyvinyl acetate.

c) The preparation of the mortar will be done as follows:

- mix the amounts of sand and cement;
- water is added gradually;
- continue to mix until a mixture with a uniform appearance and consistency, necessary for spreading, is obtained.

If the addition of polyvinyl acetate is used, it will be diluted by 50% with water beforehand, after which the amounts of sand and cement will be introduced. Continue mixing as mentioned above, filling with water to reach the required consistency.

d) The spreading will be done as follows: the mortar is applied in layers of max. 15 mm thickness by trowel throwing and pressing.

Special repair mortars can be used. The technical specifications of the manufacturer must be observed during preparation and installation. The mortars to be used must ensure at least the strength of the concrete in the repaired parts (concrete class C8 / 10 - at least C12 / 15 is recommended).

8. The wooden frame of the attic will be partially repaired / replaced (softwood, quality class I and usage class 1).

9. Depending on the requirements and needs of the beneficiary, for the modification of the space according to the new destination of the building (new compartments) the interior walls of brick masonry can be partially or totally demolished, but only with the written approval of the expert.

15.2 Intervention works at the infrastructure

Under Design Code P100-3 / 2019, intervention works at the infrastructure are necessary at the building that is the subject of this technical expertise report.

In order to ensure a better transmission of the vertical and horizontal actions from the superstructure to the foundation land, consolidation works are required at the level of the foundations. The proposed measures also fix any current infrastructure damage.

1. It is mandatory to strengthen the foundations in the area of the new reinforced concrete walls and in the area of the pillars to be strengthened. Consolidation will be achieved by casing the foundations with reinforced concrete (minimum concrete C30 / 37 and minimum reinforcement S500 - Bst 500S), respectively by widening the existing bottom layers. The width of the casings will be of at least 500 mm. The link between the casings and the existing foundations will be made by means of connectors (minimum 2Ø20 / 200 S500 - Bst 500S), inserted into holes drilled in the existing foundation (after inserting the connectors, the holes will be injected with adhesive mortars).

No consolidation work is necessary for the other foundations. These can be decided upon only after the finalization of the consolidation solution and only if, following the performed checks, it results that interventions are necessary.

2. It is recommended to link the insulated foundations by reinforced concrete beams (minimum concrete C30 / 37 and minimum reinforcement S500 - Bst 500S) and / or to perform the complete restoration of the concrete supporting plate of the basement floor. The new supporting plate will be made of reinforced concrete (minimum concrete C30 / 37 and minimum reinforcement S500 - Bst 500S), with a minimum thickness of 300 mm. It will be connected to the existing elements (foundations, pillars and walls) by chemical anchors. A polyethylene foil, a layer of heating insulation (extruded polystyrene is recommended) and a layer of ballast, with a minimum thickness of 200 mm, will be provided under the supporting plate of the floor.

3. In order to remove moisture from the basement, it is recommended that the following measures be made:

a) To do the waterproofing on the inside of the exterior walls. It is recommended to use concrete waterproofing materials and brick masonry, by crystallization. Materials applied to the surface of the parts make waterproof and deeply protect both the concrete and the brick masonry.

b) On the outside, all fissures and cracks in the base will be repaired. There will be poured a watertight sidewalk all around the building (where applicable), at least 1.0 m wide, insulated with elastic mastic at the contact area with the building, so as to make sure the direction of water is towards the outside of the building.

c) As much as possible, natural ventilation of the basement will be ensured. Where this is not possible, mechanical ventilation installations will be provided.

d) The system of gutters and downspouts will be fixed (where applicable).

15.3 Intervention works for making architectural changes

In the brick masonry walls where empty spaces will be made, only local constructive measures are required: local reinforced concrete frames or, as the case may be, reinforced concrete lintels. The holes will be performed in strands, manually or by milling, in order to avoid spreading shocks to the existing structure. Before starting the breaking works, the masonry will be strengthened over the newly created gap by inserting two metal profiles, on either side of the wall, joined by rods, threaded at both ends, which pierce the wall.

At the brick masonry walls where the empty spaces of doors or windows will be covered, the filling masonry will be interwoven with the existing ones. The same provision is valid in the case of the new brick masonry walls to be made.

It is recommended that the existing brick masonry walls be completely uncovered and plastered, so as to repair fissures, cracks or other defects in the masonry (as indicated in subchapter 15.1 of this technical expertise).

The new plasterboard walls will be made according to the manufacturer's technology.

At the roof, repair / partial replacement works of the wooden frame will be performed and a new sheet metal roof will be installed.

16. CONCLUSIONS

Drafting the expertise report for this building was a complex activity due to its constructive composition which does not meet the criteria imposed by current standards for buildings in seismic areas, as well as due to calculation difficulties referring to the manner of establishing the dynamic spatial model of structure and the real knowledge of mechanical strength features of materials.

The building as a whole (Unit A and Unit B) is included in the seismic risk class RsII.

The decrease of the seismic risk in the case of this building can be done only by measures taken to increase the strength capability and rigidity of the structural system, respectively by changing the structural system, made of reinforced concrete frames, into a dual structure with predominant walls. The proposed measures are described in Chapter 15 of this technical expertise report.

In order to consolidate the building, intervention works of an ordinary level of complexity are required. The works recommended by this expertise report will be extended and completed in the work project phase or during the works proper, only with the written approval of the expert.

In order to carry out the proposed intervention / consolidation works, it is recommended to adopt the following measures:

1. The intervention / consolidation works at the strength structure will be carried out on the basis of a work project that takes into account the measures provided for in the expertise report. It will be finalized, in the areas that display degradations or structural modifications, depending on the findings during the work proper.

The design of the intervention / consolidation project will be done only after the finalization of the architectural and installation projects.

2. The work project will be signed by an expert and will be verified by a project checking specialist, certified according to the law, for the essential requirement A (mechanical strength and stability), in fields A1: "Civil, industrial, agro-zootechnical, energy performance in buildings, telecommunications, mining, urban and communal assets with the structure made of concrete, reinforced concrete, masonry, wood "and A2:" Civil, industrial, agro-zootechnical, energy performance buildings, telecommunications, mining, urban and communal assets with a strength structure made of metal, wood".

3. The performance of intervention / consolidation works must be entrusted only to a building company that can prove it has experience in this type of works and the project will be carried out under the supervision of a technical expert in charge of the work, certified according to the law, for civil buildings.

4. The construction entrepreneur will examine the intervention / consolidation project and will communicate their observations to the beneficiary and to the designer no longer than 15 days from the receipt of the project. During the work, the manufacturer will request the approval of the designer for any change required by the newly found situations.

5. The technology for the performance of the intervention / consolidation works will be established by the construction entrepreneur on the basis of the "Tender Book" drawn up by the designer of the intervention works, and will be endorsed (by signature) by the latter. Also, the work technology for the entire building, as adopted by the construction entrepreneur, must not cause vibrations, shocks, etc. likely to put stress on the structure of this building, as well as on nearby buildings, beyond the limits established by the technical norms in force.

6. For the works proper, the quality of safety and control system will be applied in accordance with the legal provisions, its components being those established for buildings belonging to category C of importance.

7. Throughout the development of the structural works, the beneficiary will ensure the supervision of the works by employing a certified site manager, according to the legal provisions in force.

The adoption, during the work proper phase, of solutions that do not comply with the conclusions and recommendations of the present expertise report and of the work project approved by the expert, does not entail the accountability of the expert.

The proposed interventions / consolidation works, both by their design and by the proposed work solutions, **do not affect the strength, rigidity and stability of the existing unit, belonging to the building located in Bucharest, 218 Calea Victoriei, District 1, or of any of the neighboring units, belonging to the buildings located in Bucharest, at 216 and 220 Calea Victoriei, District 1**.

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Written by
Dipl. Eng. Maria Ruxandra Andriţoiu

Dr. Eng. Tudor Andriţoiu
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