

S.S. STATE SERVICE FOR VERIFICATION AND EXPERT EXAMINATION OF DESIGNS AND CONSTRUCTIONS

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REPORT OF EXPERT EXAMINATION No. 9839-08-23/T

**of the 'UN House Moldova' building
with cadastral no. 0100520.040.01 and 0100520.040.02
on 131, 31 August 1989 str., Chisinau municipality**



Prepared based on the request of
UNDP Moldova

Technical experts in construction

V. Ivasenco (Cert.No.046)

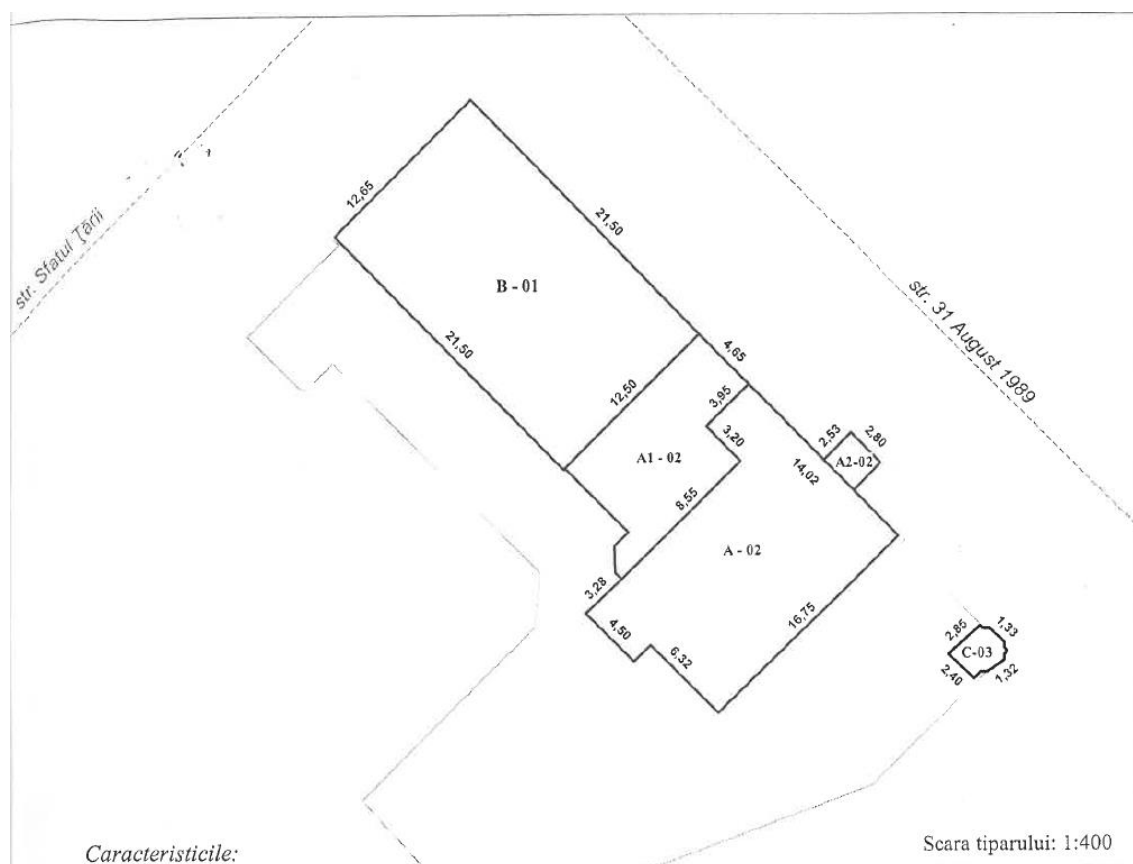
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Chisinau, 2023

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BUILDING SITE PLAN



1. GENERAL PRINCIPLES.

The undersigned technical experts in construction, Eng. Valentin Ivasenco (Certificate of Certification no. 046) and Eng. Nicolai Barcari (Certificate of Certification no. 094) examined the 'UN House Moldova' building with cadastral no. 0100520.040.01 and 0100520.040.02 on 131, 31 August 1989 str., Chisinau municipality, in order to assess the technical condition of the building and the level of its seismic protection.

The components of the 'UN House Moldova' building with cadastral no. 0100520.040.01 and 0100520.040.02 located on 131, 31 August 1989 str., Chisinau mun., in this Technical Expert Examination Report, are noted according to the Report of Cadastral Works of the Building dated 19.05.2022 and the Detailed Design for the unit with cadastral no. 01005200.040.02, developed by 'BINOM' T.A.M. (year 1996, ob.no.057-1) submitted by the beneficiary.

This Technical Expert Examination Report shall be examined together with the documentation listed above, submitted by the beneficiary.

1.1 Purpose of the technical expert examination.

The beneficiary of the expert examination intends to establish the degree of seismic vulnerability of the building as a whole and assess the possibility of its further operation according to its functional purpose.

The technical expert examination includes the following tasks:

- examination of the general technical condition of the units with cadastral no. 0100520.040.01 and 0100520.040.02 located on 131, 31 August 1989 str., Chisinau mun., in terms of meeting the key requirements of 'resistance and stability' and 'safety in operation' provided for by the Law on quality in construction no. 721-XIII of 2 February 1996;
- assessment of the level of seismic protection and establishment of the degree of seismic vulnerability of the units with cadastral no. 0100520.040.01 and 0100520.040.02 located on 131, 31 August 1989 str., Chisinau mun.;
- determination of the degree of degradation of construction elements and items, affected by atmospheric and seismic actions, which affected the building during operation;
- identification of non-conformities in the structural elements of the building during operation;
- setting the intervention measures to be taken for the structural elements and systems of the units, if necessary;
- developing technical recommendations for elimination of detected non-conformities, if necessary;
- developing technical recommendations on strengthening of structural elements, if necessary.

- developing the Technical Expert Examination Report based on examination results.

To fulfil the tasks set by the beneficiary, the following was carried out:

- the technical condition of the 'UN House Moldova' building with cadastral no. 0100520.040.01 and 0100520.040.02 located on 131, 31 August 1989 str., Chisinau mun., was examined, with opening of some structural elements;
- the structural scheme and technical solutions of the existing construction were studied;
- the materials and items used to build the existing construction as well as their level of degradation were identified;
- the physical and mechanical characteristics of the structural foundation were studied based on the Geotechnical Report submitted by the beneficiary;
- samples were taken from the load-bearing elements of the building to assess the physical and mechanical characteristics used in construction of the units;
- the structural calculation developed by the company 'Buildup Serv' LLC was carried out and studied using the finite element method for static and dynamic actions of the units under examination, to assess the level of seismic protection, based on the results of laboratory tests, survey drawings and field study;
- this Technical Expert Examination Report was prepared.

The examination of the 'UN House Moldova' building with cadastral no. 0100520.040.01 and 0100520.040.02 located on 131, 31 August 1989 str., Chisinau mun., was carried out according to the key requirement 'A' - resistance and stability, 'B' - safety in operation, provided for by the Law no. 721-XIII of 2 February 1996 'On quality in construction'.

The technical experts fulfilled their assignment based on the Law no. 721-XIII of 2 February 1996 'On quality in construction', the Regulation on technical expert examination in construction approved by GD no. 936 of 16 August 2006 with amendments approved by GD no. 514 of 17 August 2009, no. 882 of 24 November 2011, no. 968 of 10.08.2016 and no. 1088 of 19.12.2017.

The examination of the 'UN House Moldova' building with cadastral no. 0100520.040.01 and cadastral no. 0100520.040.02 located on 131, 31 August 1989 str., Chisinau mun., was performed during September-October 2023.

The recommendations set out in this Expert Examination Report do not diminish the quality indicators set as per other key requirements.

This Report was prepared based on the following initial materials:

- the results of inspections with opening of some structural elements, and measurements carried out by the experts;
- study of the structural scheme of the construction, location, identification of items and materials used to construct the building, and verification of the works in

terms of their compliance with the normative requirements in the field of construction;

- Laboratory Test Report no. 763 of 04.10.2023 prepared by the RESEARCH AND LABORATORY TEST CENTRE of the Institute of Scientific Research in Construction 'INCERCOM' S.E.;

- Laboratory Test Report no. 763/1 of 10.10.2023 prepared by the RESEARCH AND LABORATORY TEST CENTRE of the Institute of Scientific Research in Construction 'INCERCOM' S.E.;

- Report on the development of the structural calculation of the 'UN House Moldova' building located on 131, 31 August 1989 str., Chisinau mun., developed by 'BUILDUP SERV' LLC in October 2023:

- normative documents in the field of construction in force in the Republic of Moldova:

1. Law on quality in construction no. 721-XIII of 2 February 1996;
2. Law on environmental protection no. 1515 of 16 June 1993;
3. Government Decision of the Republic of Moldova 'On the monitoring of performance of buildings during operation, interventions over time and post-use of constructions' no. 382 of 24 April 1997;
4. Normative document NCM F.03.02-2005 'Design of buildings with masonry walls';
5. Standard SNiP II-7-81* 'Construction in seismic areas';
6. Standard SNiP 2.01.07-85 'Loads and actions';
7. Normative document NCM E.03.02-2014 'Fire safety. Fire protection of buildings and installations';
8. Normative document NCM C.01.12-2018 'Public buildings and constructions';
9. Normative document NCM E 01.02-2019 – 'Regulation on establishing the importance category of constructions';
10. Normative document CP E.01.04:2019 'Actions in construction. Assessment of the level of seismic protection of existing constructions'
11. Normative document NCM E. 02.02-2016 – 'Reliability of structural elements and structural foundation. Basic principles';
12. Normative document CP E.01.04-2019 – 'Assessment of the level of seismic protection of existing constructions';
13. Normative document NCM A.09.03-2015 – 'Examination of load-bearing structural elements and structural foundation of buildings and edifices';
14. Normative document P130-88 – 'Methodological norms of the monitoring of performance of constructions, including their technical supervision'.

1.2 Study of the technical documentation, which was the basis for the construction, operation and modification of the building.

1. The detailed design for the building with cadastral no. 01005200.040.02, developed by 'BINOM' T.A.M. (year 1996, ob.no.057-1) and duly verified;

2. TECHNICAL EXPERT EXAMINATION no. 2086 on the technical condition of the annex constructions to the building located on 131, 31 August str., of the United Nations in the Republic of Moldova and the possibility of operation, developed by the Republican Centre for Researches and Regulations in Construction 'CERCON', in 2003 by the certified technical experts Iu. Dobrovolischi and Iu. Sobetchi.
3. The detailed design on 'Reconstruction of the garage space for offices. UN House 131, 31 August 1989 str., Chisinau, RM. SECOND STAGE OF RECONSTRUCTION', developed by 'DOLMEN' LLC in 2006;
4. EXPERT EXAMINATION REPORT on the technical condition of the load-bearing structures, structural elements and the possibility of placing the electric generator with the construction of the emergency stairs at the 'UN House Building with limitation of height (Ground Floor + 3 Floors)', located on 131, 31 August 1989 str., Centre district, Chisinau municipality, Republic of Moldova, developed in 2014 by the certified technical expert Iu. Dohmila;
5. EXPERT EXAMINATION REPORT no. 7878-II-14/T on the technical condition of the structural elements of the conference hall of the UN building located on 131, 31 August 1989 str., Chisinau city, due to the appearance of cracks in the roof slab (of the annex of the building with cadastral number 01005200.040.02), developed in 2014 by the S.E. 'STATE SERVICE FOR VERIFICATION AND EXPERT EXAMINATION OF DESIGNS AND CONSTRUCTIONS' by the certified technical experts M. Potarca, M. Barbin-eagra and T.Axenti;
6. EXPERT EXAMINATION REPORT on the technical condition of the building of the UNDP headquarters in the Republic of Moldova located on 31 August 1989 str., Chisinau mun., in order to examine the possibility of building an elevator, developed by the technical expert Cucu Oleg at the enterprise 'UPCON' LLC in 2015;
7. Preliminary Design Sketch on 'Adjustment of the UN House building in Moldova to improve accessibility for people with disabilities by installing an elevator and adjusting the routes of movement for PLM (people with limited mobility) inside the building', developed by 'UPCON' LLC in 2015;
8. ENERGY AUDIT REPORT on the UN House building, located at the address: 131, 31 August 1989 str., Chisinau city, MD-2012, Republic of Moldova, developed by the Energy Auditor Retis Grigore, the Thermal Energy Auditor Pelivan Eugeniu and the Electrical Energy Auditor Codreanu Constanti in 2015;
9. EXPERT EXAMINATION REPORT on the technical condition of the load-bearing structures, the structural elements of the floor of the 1st floor, in office 223 and the possibility to increase the horizontal dimensions of two passage openings on the ground floor and the 1st floor, of the UNICEF Moldova headquarters, located on 131, 31 August str., Chisinau mun., Republic of Moldova, prepared in 2017 by the certified technical expert Iu. Dohmila;
10. EXPERT EXAMINATION REPORT on the technical condition of the UNDP headquarters building in the Republic of Moldova on 131, 31 August 1989 str.,

Chisinau mun., in order to examine the possibility of making a hole in the load-bearing wall, prepared by the technical expert Cucu Oleg within the enterprise 'IGC-Construct' LLC in 2017;

11. Detailed Design on 'Major repair with elements of partial re-systematization of the building of SE 'Directorate of Services for the Diplomatic Corps' (UN House in Moldova), located on 131, 31 August str., Chisinau mun.' (object no. 01A/2016) developed in 2017 by 'IGC-Construct' LLC;
12. Evaluation Report no. 1703 /39-36 C, object 'Heritage complex, UNDP headquarters in the Republic of Moldova (cadastral no. 0100520.040.01, 100520.040.02), developed in 2017 by 'ProEstim Imobil' LLC;

1.3 Determination of the importance category and location of the building.

The site is characterized by:

- Climatic conditions – III B.
- Outdoor air temperature – minus 16°C.
- Wind pressure – 0.5 kPa.
- Snow loads – 1.0 kPa.

According to NCM E.02.02-2016 'Reliability of structural elements and structural foundation. Basic principles', the importance class of the construction is – CC-2 (normal level). According to NCM E.01.02-2019 'Actions in construction. Regulation on establishing the importance categories of constructions', the importance category of the construction under examination is 'C' – (normal).

The building concerned is located in the Centre sector of Chisinau municipality, the historical area at the intersection of 31 August 1989 and Sfatul Tarii streets. The relief is characterized by a small slope in plane view towards 31 August 1989 street, with a slope of 2...4%.

According to the Geotechnical Report developed by 'GEOLUX PRIM' in 2015, geologist – Bet Nicolai, the geological section consists of:

- Technogenic soil with layer thickness $h=1.90\text{m}$;
- Clayey sand $h=3.30\text{m}$;
- Dusty sand.

The groundwater level was detected at a depth of 5.50m from the surface of the existing relief.

1.4. Seismic conditions of the site.

The seismic intensity, according to the 'Map of seismic zoning of the territory of the Republic of Moldova' is 7 (seven) according to the MSK-64 scale and taking into account the geological conditions of the rocks and the construction site (category III) the seismic degree of the site concerned should be accepted as being equal to 8 (eight) according to SNiP II-7-81 table 1.

The design seismic intensity of the site concerned, according to the Map of seismic micro-zoning of the territory of Chisinau municipality, approved by the Deci-

sion of 29.12.2004 of the Institute of Geophysics and Geology of the Academy of Sciences of the Republic of Moldova is 8 (eight).

The existing unit with cadastral no. 0100520.040.01 was subjected to seismic actions caused by the earthquakes of: 04.03.1977; 30.08.1986 and 31.05.1990, with a magnitude of 6.4-7.7. During the operation of the building, no damage caused by the aforementioned earthquakes was recorded and highlighted.

2. Description of the constructions

2.1. Unit no. 1 with cadastral no. 01005200.040.01.

The building under examination was built according to an individual design, in the period 1950-1952, with a height limit type – S+P+E. The building has a regular shape in plane view with dimensions of – 12.65x21.50m. Floor height:

- basement – 2.60m;
- ground floor – 3.60m;
- first floor – 3.75m.

Building layout – load-bearing walls made of mixed masonry (thickness – 600mm), in the longitudinal direction there are 4 load-bearing walls, in the transverse direction there are 5 load-bearing walls, which are discontinuous in height – *see the cadastral plan attached to this Technical Expert Examination Report.*

The structural elements have the following composition:

- Foundations – raw stone masonry (M100 – according to laboratory tests) on lime and sand mortar (M4) – standard strength – 15kg/cm²;
- Floor above the basement – monolithic reinforced concrete slab with confining beams on the load-bearing walls and secondary beams;
- Floors between building levels and covering floors – wooden load-bearing beams with a circular section and filling of a mixture of slag and clay, plastered with lime and sand mortar on wooden battens, lined with a suspended ceiling.
- Walls – raw stone masonry on lime and sand mortar with a thickness of 500...600mm plastered on both sides with lime and sand mortar;
- Indoor stairs – monolithic reinforced concrete, faced with natural stone slabs;
- Partition walls – M100 brick masonry on lime and sand mortar and plasterboards on a frame of galvanized steel elements, executed during the operation of the building;
- Roof – truss-type roof with a load-bearing structure of wooden elements and a covering of corrugated metal sheets.

The interior and exterior joineries of the building under examination were largely replaced with double-glazed joineries.

2.2. Unit no. 2 with cadastral no. 01005200.040.02.

The building under examination was built according to an individual design (developed by 'BINOM' T.A.M., year 1996, ob.no.057-1), with a height limit type – P+2E+M. The building has an irregular 'L' shape in plane view. The dimensions of

the main part are - 17.80x10.40m, the dimensions of the secondary part (functional gallery - height limit - P+E) are - 3.50x7.10m. The height of the floors is as follows:

- ground floor – 3.50m;
- 1st and 2nd floor – 3.30m each;
- attic – variable.

Building layout – load-bearing frame of monolithic reinforced concrete elements (columns, beams in both directions) with load-bearing masonry of small limestone blocks (thickness – 390mm). Resistance to static and dynamic actions are ensured by rigid joints between vertical and horizontal elements (columns and beams), formation of the rigid disk at the level of the floors, spatial interaction of elements in the transverse and longitudinal directions.

The structural elements have the following composition:

- Foundations – monolithic reinforced concrete slab (B20) with a section of 400mm, with stiffening ribs oriented upwards;
- Columns – square elements of monolithic reinforced concrete (B15 – according to the detailed design, B7.5 of a tested element – according to the Laboratory Test Report), with a cross-section of 400x400mm.
- Beams – ‘L’-shaped elements – marginal ones, ‘T’-shaped elements – central ones, of monolithic reinforced concrete (B15).
- Floors – prefabricated hollow slabs of reinforced concrete type ‘TIK’ (series 1.141 B1,2), with monolithic reinforced concrete sectors;
- Walls – M35 limestone blocks on M50 cement and sand mortar, thickness – 390mm;
- Indoor stairs – prefabricated reinforced concrete elements;
- Outdoor stairs – load-bearing structure of metal profile elements;
- Partition walls – M100 brickwork on cement and sand mortar M35;
- Roof – truss-type roof with a load-bearing structure of wooden elements.

During the operation of the building, in 2015, vertical movement was ensured by means of the elevator. The resistance structure of the elevator shaft is made up of metal profiles on an isolated foundation of monolithic reinforced concrete slab. The elevator shaft structure is divided by a deformation-settlement joint along its entire height, with stability ensured by flexible joints from the main building.

2.3. Unit no. 2 (annex) with cadastral no. 01005200.040.02.

The building under examination was subsequently built according to an individual design with a height limit type – P (ground floor). The building has a regular shape in plane view with dimensions of – 6.0x6.10m. Ground floor height – 3.50m.

Building layout – a mixed-type load-bearing structure, consisting of load-bearing masonry of small limestone blocks (thickness – 390mm) in monolithic reinforced concrete frames.

The structural elements have the following composition:

- Foundations – continuous, made of monolithic reinforced concrete;
- Columns – square elements made of monolithic reinforced concrete with di-

mensions of 400x400mm.

- Beams – made of monolithic reinforced concrete in the transverse and longitudinal directions.
- Covering floor – monolithic reinforced concrete slab;
- Walls – M35 limestone blocks on M50 cement and sand mortar, thickness – 390mm;
- Roof – usable flat roof with bituminous membranes.

The annex is divided along its entire height from unit no. 1 and unit no. 2 by a deformation-settlement joint.

3. Examination results

3.1. Results of qualitative assessment, researches and calculations.

Following the technical examination of the 'UN House Moldova' building with cadastral no. 0100520.040.01 and 0100520.040.02 located on 131, 31 August 1989 str., Chisinau mun., with opening of some structural elements, the analysis of the laboratory test results and structural calculations, the following was found out:

3.1.1. Unit no. 1 with cadastral no. 0100520.040.01:

The unit was built in the period 1950 - 1952 for administrative purposes. The overall composition and volumetric solutions, as well as construction works, were performed according to the architectural and constructive traditions followed at that time: massive masonry walls, reinforced concrete floor above the basement and wooden beams on the floors of the first floor. There are over 70 years since the building was constructed. It was reconstructed during its operation by means of several interventions in the load-bearing structure in order to modify the interior space arrangement.

Following the qualitative assessment and examinations, it was found out that the volumetric and overall composition solutions of the resistance structure of the building under examination do not comply with the mandatory provisions of the current normative documents NCM F.03.02-2005 'Design of buildings with masonry walls' and SNiP II.7-81* 'Construction in seismic areas', concerning the composition and location in seismic zones, with a design intensity of -8 points, of buildings depending on their category and class of importance.

The degree of resistance against seismic actions of structural elements and systems of buildings located in existing seismic zones, expressed by the allowable deformation factor of the resistance structure (K.1), according to tab.3; point 2, SNiP II-7-81*, shall meet the limit: [K=0.35].

The resistance structure of the existing building, assessed with a degree of resistance against seismic actions lower than acceptable according to the normative provisions, does not meet the admissible limits and will present a seismic risk in case of an eventual earthquake with a major magnitude (>7).

It is also mentioned that the volumetric solutions for establishing the shape in plane view and overall composition of the resistance structure of the building under examination meet the principles and methods followed in the construction of social and administrative buildings in the seismic zones of Moldova at that time (1840-1860).

The building concerned was constructed using easily acceptable and cheap traditional construction materials were used (processed raw stone, cut limestone, brick, wood, etc.).

For this reason, the seismic protection of the existing building is below the key requirements regulated mandatorily at present.

Also, the technical expert examination finds out that the resistance structure of the existing building sufficiently withstood the seismic stresses caused by the 'Vrancea' earthquakes with a magnitude of 6.4-7.7, which occurred during the long period of operation. This is due to the successful architectural and construction solutions of the composition in plane view and construction of the building, which are manifested by the following:

- a) the relatively small height of the building (<8m);
- b) the large thickness of the load-bearing walls and their strict location in plane view depending on the reduced opening of the wooden beams used in the floors;
- c) compliance with the principles and methods of construction of social and administrative buildings in seismic zones, widely followed at that time by architects and construction craftsmen;
- d) the good quality of all construction works upon construction;
- e) sufficient operation of the building throughout its entire period of existence.

There are no data available on the performance and interventions carried out in respect of the building with cadastral number 0100520.040.01 during the long period of operation, however, supporting documents with the interventions carried out during the period 1996-2023 were found – *described in point 1.2 of this Expert Examination Report*.

During the examination, the building spaces were used for administrative purposes and as auxiliary rooms.

The load-bearing structure of the building does not have critical deformations in the structural elements like uneven settlements, penetrating cracks, inadmissible deflections.

Non-conformities detected in accordance with the requirements of NCM F.03.02-2005 'Design of buildings with masonry walls':

Structural scheme:

- Tab.4, point 2 – at the estimated seismicity rate higher than or equal to 7, the structural scheme must be made with the structure in frames filled with masonry.

Foundations. Walls.

- Tab.2 – the material used (raw stone) in the construction of foundations al-

lows construction of buildings with a height limit up to one floor, with location of the area of seismic intensity of 8 (eight) – inadequacy of the material used.

- Point 5.2.3.1 – in buildings made of masonry and reinforced masonry, earthquake-resistant confining beams must be provided on all structural walls, at the level of all floors between floors and the roof floor;

That requirement is met in the building under examination only for the basement.

- Point 5.2.5.1 – in case of single-storey buildings with an estimated seismicity rate of 6...7 and a distance between walls of maximum 6 m, it is allowed to make wooden (roof) floors with metal or wooden beams, unless this is contrary to the fire safety requirements;

The building concerned has a height limit type S+P+E with floors between the ground, floor-first and floor-attic made of wooden elements, which cannot take over horizontal seismic loads, and therefore it does not meet the normative requirements in force.

- The distances between the gaps in the external walls do not meet the requirements of point 5.2.2.15, tab.13.

We also mention that the term of operation of some structural elements (floors made of wooden elements) is exceeded, is highly worn, and the structural scheme, materials used do not meet the current normative provisions in force, as compared to the design requirements at the construction stage (lack of normative basis during the 50s of the XXth century).

Following the laboratory tests of the masonry stone, it was found out that it has enough physical and mechanical properties to be used as a load-bearing material. We also note that the brand of mortar for connection of the masonry based on lime and sand has low resistance properties.

3.1.2. Unit no. 2 with cadastral no.0100520.040.02:

The unit was built in 1996 according to the design developed by 'BINOM' T.A.M., with a height limit type - P+2E+M and in terms of technical solutions of the resistance structure it meets the requirements of composition upon the design seismic intensity of 8.

The building concerned was designed as a rigid one with load-bearing walls made of limestone block masonry in monolithic reinforced concrete frames and monolithic reinforced concrete confining beams at the floor level, the foundation is a monolithic reinforced concrete slab.

The resistance structure of the building does not have critical deformations in the structural elements like uneven settlements, penetrating cracks, inadmissible bows, due to proper maintenance of the building and performance of current repair works in the required period.

As a result of the analysis of the structural scheme and laboratory tests of the concrete used for the selected column, the following was found out:

In accordance with 'SNiP II 7-81* - 'Construction in seismic areas. Design norms' point 1 - 'as a rule, adopt symmetrical structural schemes, even distribution of stiffness of structures and their masses, as well as loads on the floors - if constructions are located in seismic zones, it is usually recommended to adopt symmetrical structural schemes with even distribution of masses, stiffness and loads per floor. Following the structural calculation of the building, it was found out that dimensioning of the structural elements is compliant and does not require additional strengthening and can be operated according to the functional purpose.

In accordance with NCM F.03.02-2005 point 5.2.4.3, execution of columns of frames is allowed exclusively from monolithic concrete, having a minimum class of B15. The results of laboratory tests of the column in axis G-3, the 1st floor, proved that the concrete class was B7.50.

Following the inspection of the materials submitted by the beneficiary, including the structural calculation of the annex, it was determined that it complies with the requirements and technical regulations in force and does not require additional strengthening, as a result of which it can be operated according to its functional destination.

4. CONCLUSIONS AND RECOMMENDATIONS

Following the examination of the 'UN House Moldova' building with cadastral no. 0100520.040.01 and no. 0100520.040.02 located on 131, 31 August 1989 str., Chisinau mun., to assess the technical condition of the building and the level of its seismic protection, the expert examination reached the following conclusions:

1. The constructions under examination consist of three independent units, divided by a settlement-deformation joint, which were built in different periods of time. During their operation, they were subjected to modifications and interventions in terms of interior space arrangement, changing the functional purpose of some rooms.

2. Following the technical expert examination of the building with cadastral no. 0100520.040.02 located on 131, 31 August 1989 str., Chisinau mun. with the opening of some structural elements, the analysis of the results of laboratory tests and structural calculations, the following was found out:

- the resistance structure of the building does not have critical deformations in the structural elements in the form of uneven settlements, penetrating cracks, inadmissible bowing, due to proper maintenance of the building and performance of current repair works within the required period;
- the resistance and stability of the building concerned protect against seismic actions with an intensity of 8 (eight) and can be operated according to its functional purpose;
- following the inspection of the materials submitted by the beneficiary, including the structural calculation of the annex, it was found out that it complies with the requirements and technical regulations in force and does not require additional strengthening, as a result of which it can be operated according to its

functional purpose.

3. Following the technical expert examination of the building with cadastral number 0100520.040.01 located on 131, 31 August 1989 str., Chisinau mun., with opening of some structural elements, the analysis of the laboratory test results and structural calculations, the following was found out:

- Following the modelling of the resistance structure of the building under examination with the properties of the materials obtained after laboratory tests, it is proved that the design stresses in the wall masonry do not exceed the standard values. Due to the lack of a rigid disk at the level of the ground floor-floor, floor-attic and a wall sector on axis 2, displacements from the actions of the load combination at limit state II (including seismic ones) exceed the standard values (see Structural Calculation Report).
- The construction does not meet in full the key requirements A - resistance and stability, B - safety in operation, with respective resistance against seismic actions, and poses a certain risk of public danger. The seismic risk of the construction can be reduced only by increasing the resistance and stiffness of the structural system. To increase the resistance and stiffness of the existing structure as a whole (foundations, walls, floors, etc.), it may be proposed to change the existing structural system by adopting one of the strengthening options recommended in *point 4.2 of this Expert Examination Report*.
- To maintain the existing building in a safe and functional condition, as well as to improve performance of materials and superficial structural elements in the resistance structure, while increasing its seismic resistance, depending on its importance: ***the building concerned requires major repair with structural strengthening.***

4.1. Assessment of the seismic protection level.

The level of seismic protection was assessed in accordance with the normative requirements of CP E.01.04:2019 'Actions in constructions. Assessment of the level of seismic protection of existing constructions' with the aim of assessing the level of seismic protection depending on the importance class of the construction and the design seismic zone.

Basic data:

- Importance class – III;
- Importance category – C;
- Seismic zone of the site – 7 degrees;
- Design seismic intensity of the site – 8 degrees;
- Number of floors – buildings with height limit P...P+4E.
- Type and composition of the resistance structure:
 - constructions with structural masonry walls and light wooden floors;
 - constructions with a monolithic reinforced concrete frame with masonry infill and rigid monolithic concrete floors or prefabricated reinforced concrete pan-

els;

- Investigation method – MI1, inspection of the building;
- MI3 – simplified calculation method to assess resistance.

In accordance with point 12.5 – criteria of assessing seismic risk classes for the existing buildings, the following was found out:

- the building with cadastral number 0100520.040.01 can be referred to Class RII of seismic risk, constructions with reduced likelihood of collapse, but major structural degradation of which is expected under design seismic actions.

As regards the priority of intervention works (design and detailed design), according to the requirements of CP E.01.04:2019, point 13.4, tab.3, ensuring seismic resistance of the building following the calculations performed, it was found out that this is not enough, with a resistance against seismic actions of <60% and emergency category – U2. As a result, according to tab.4 of CP E.01.04:2019, the total duration of eliminating non-conformities is – 5 years.

- the buildings with cadastral number 0100520.040.02 (including the annex) can be referred to Class RIV of seismic risk – constructions to which the seismic response is similar to the response that corresponds to new constructions, designed and built according to normative documents in force.

4.2. Specific measures for reduction of the seismic risk of the built environment.

These measures refer to complex intervention works at the existing building with cadastral number 0100520.040.01 located on 131, 31 August 1989 str., Chisinau mun., the main purpose of which is constructive rehabilitation of the structural elements and systems, with an insufficient level of safety, which depending on the location conditions, architectural and constructive solutions in place, importance and destination, will be classified differently for each element of the building concerned.

Intervention works aimed at ensuring the structural seismic safety of the existing building, in principle, will include the following strengthening options:

Option I:

- a) strengthening the foundations by introducing reinforcement beams at the lower level of the existing foundations, in order to ensure the anchoring of the column reinforcement, resumption of horizontal loads during seismic actions (requirements of NCM F 03.02-2005, point 5.2.1.2);
- b) as for the basement, ground floor and first floor, to ensure seismic resistance, an internal monolithic frame system with a minimum section of 30x30cm shall be designed, provided that the column pitch does not exceed 7m. The vertical elements will create a spatial system with horizontal elements 30x40(h)cm, with creation of a monolithic reinforced concrete floor, at the level of the exist-

- ing floors, following the demolition of the existing wooden floors;
- c) the walls of the building shall be strengthened by sheathing after cleaning it of the plaster, cleaning the joints with low strength properties, lining the joints with cement and sand mortar, repairing the masonry sectors with poor strength, sheathing from the inside with Ø5 Bp-I p.100x100 mesh with sheathing thickness of 50-60 mm. It is recommended that the sheathing be performed by shotcrete method;
 - d) external waterproofing and thermal insulation of the basement walls, ensuring internal ventilation in accordance with the regulatory requirements in force shall be made.

Option II:

- a) introduction into the construction system of the transverse wall portion in axis 2, with load sharing joints, at the ground floor and first floor levels, with transmission of vertical loads to the existing wall at the basement level, in order to ensure spatial stiffness of the building as a whole;
- b) the walls of the building will be strengthened by sheathing after cleaning it of the plaster, cleaning the joints with low strength properties, lining the joints with cement and sand mortar, repairing the masonry sectors with poor strength, sheathing from the inside with Ø5 Bp-I p.100x100 mesh with a sheathing thickness of 50-60 mm. It is recommended that the sheathing be performed by the shotcrete method;
- c) dismantling the existing wooden floors, making a stepped recess in the existing walls with creation of a monolithic reinforced concrete floor, which would ensure connection of the structural elements as a whole, taking over of the horizontal (seismic) forces.

Once the strengthening options is chosen, it is recommended to reconstruct the roof by dismantling the existing wooden structural elements and covering, and build a new structure in accordance with the normative requirements in force.

The intervention measures aimed at making the building concerned (with cadastral number 0100520.040.01) safer may be possible subject to the following conditions:

- a) approval by the Central Specialized Body of the concept of reconstruction of the building, depending on the future purpose of the building;
- b) confirmation by the Urban Planning Certificate of the specific requirements regarding the development of design documentation;
- c) given the high degree of complexity of the intervention works regarding the constructive rehabilitation and major repair of the building concerned, as well as the type of property, they can be carried out only on the basis of the duly developed and verified design documentation.

The reconstruction solutions can be developed by well-determined stages, without affecting the resistance structure of the building as a whole.

The solutions selected and developed by the designer shall not decrease the resistance and stability of the resistance structure of the existing building, subject to construction interventions or failure to ensure the levels of key requirements provided for by Law no. 721-XIII of 02.02.1996 on quality in construction.

Upon the reconstruction of the building, the works shall be carried out in accordance with the Government Decision of the RM no. 382 of 24.04.1997 on the monitoring of performance of buildings during operation, interventions over time and post-use of constructions, as well as based on the construction works organization section.

Upon beginning of the reconstruction works, the internal quality control system of construction works will be established in accordance with Law no. 721-XIII of 02.02.1996 on quality in construction.

Schedules:

- Photos of the technical condition of the building on 10 sheets;
- Extracts from the cadastral file with layouts of the existing building on 13 sheets;
- Extracts from the Geotechnical Report on 9 sheets;

Technical experts in construction:

Eng. V. Ivasenco (cert. no.046)

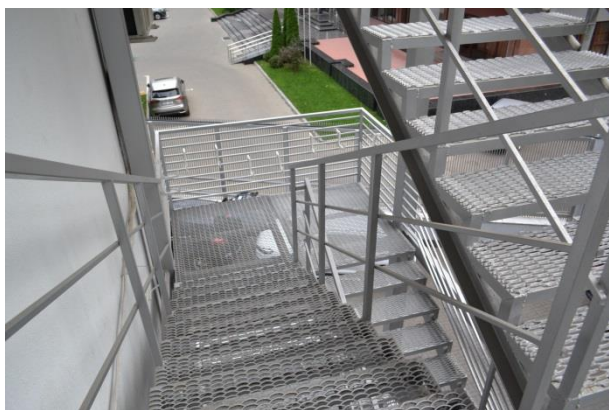
Eng. N. Barcari (cert. no.094)

Anexe:

Fotofixări privind starea tehnică a clădirii existente:

Starea tehnică a fațadelor și teritoriului aferent clădirii:

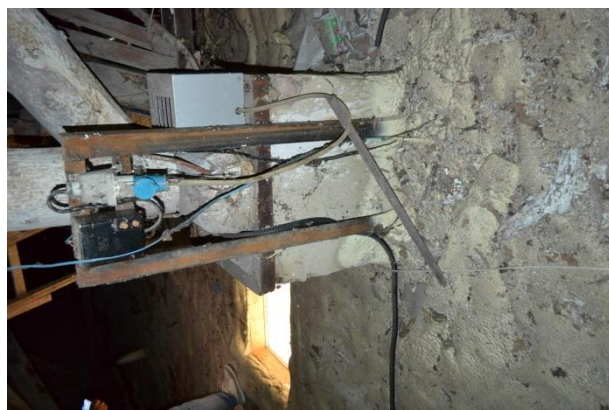






Starea tehnică a acoperișului și planșeului de pod:



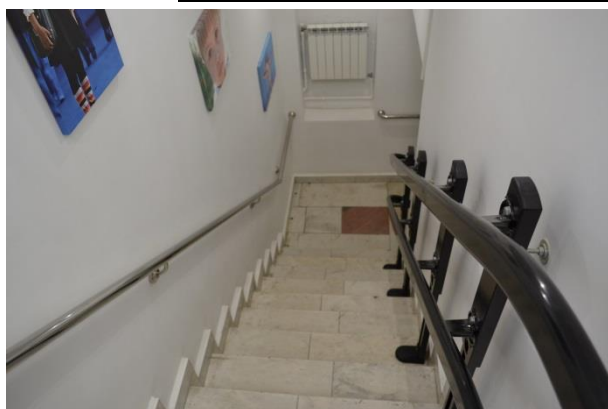


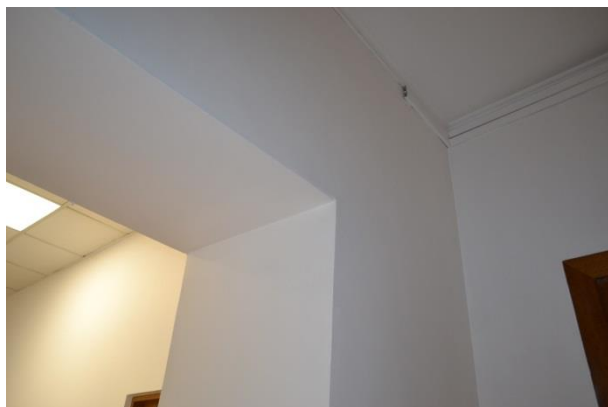
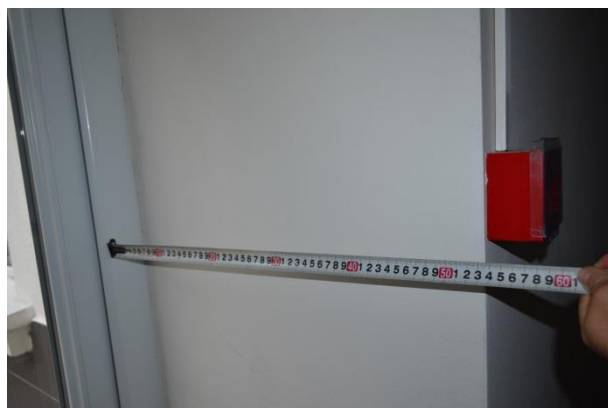
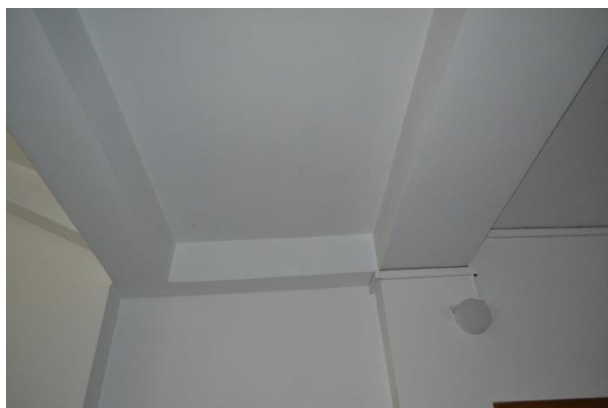






Starea tehnică a elementelor structurale și pereților interiori:





Starea tehnică a elementelor structurale ale subsolului:

